No

End Use Energy Consumption Data Base: Transportation Sector

February 1980

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Prepared for:

U.S. Department of Energy

Energy Information Administration

Assistant Administrator for Program Development

Under Contract No. W-7405-eng-26

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February 1980

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PREFACE

The project described in this report forms the Transportation Sector of the End Use Energy Consumption Data Base of the Office of the Consumption Data System, organized under the Assistant Administrator for Program Development, Energy Information Administration.

Work documented here was performed by Oak Ridge National Laboratory (ORNL) under contract to the Department of Energy. Within the sponsoring office, the project was completed under the general supervision of Kenneth A. Vagts with data base management assistance from Michael J. Maloney. Overall direction was provided by Leigh Carleton, the technical project officer.

The work performed by Oak Ridge National Laboratory was a collaborative effort of several persons, most of whom during this period were members of the ORNL Data Management and Analysis Group, headed by Andrew S. Loeb1.

John Hooker devised the estimation method for the pipeline mode and, with the assistance of Ben Elliot and David T. Johnson, wrote computer programs implementing it and the estimation methods for the highway modes and military fuel use. He wrote computer programs for aggregating estimates and generating tables and data tapes. He also wrote the report and prepared the other materials submitted to the Department of Energy.

Axel Rose with the assistance of Ken Reed devised the estimation methods and carried out the necessary calculations for the rail and marine modes. Mr. Rose developed the estimation methods for the air mode and assisted Sam Holmes in their implementation.

David Greene was responsible for devising the methods of estimating energy use in all of the highway modes: auto, bus, truck and motorcycle. He wishes to acknowledge Gwen Walton's contribution of the intercity and commuter auto estimation methods, as well as the assistance of Gretchen Kulp and Jennifer Hill.

The authors wish to acknowledge the technical services of Betsy Horwedel and Mary L. Johnson and the secretarial services of Carolyn P. Boggess and Stephanie B. Davison.

The retrieval system used in the course of this project was written by Niket Patwardhan and Danny Johnson, under the direction of Derrell Foster at Vanderbilt University.

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CHAPTER 1. INTRODUCTION

(This report documents the transportation fuel and energy use estimates developed at Oak Ridge National Laboratory (ORNL) for the End Use Energy Consumption Data Base.) This data base contains estimates of energy use in the United States broken down into many categories within all sectors of the economy: agriculture, mining, construction, manufacturing, commerce, the household, electric utilities, and of course, transportation.) The transportation data ORNL has provided generally cover each of the ten years 1967-1976 (occasionally 1977 and 1978), with omissions in some modes. The estimates are broken down by mode of transport, by fuel, by region and State, by the sector of the economy providing the transportation and by the use to which it is put, and in the case of automobile and bus travel by the income of the traveler. The mode, fuel, sector and use categories themselves subsume one, two, or three levels of subcategories, resulting in a very detailed categorization of energy use. The aim has been to furnish the Energy Department with the definitive accounting of transportation energy use in the United States.

The report contains both methods and results. There are a few dozen tables displaying a fraction of the data that have been submitted to the Energy Department on computer tapes. There are also detailed and precise descriptions of the methods by which the data were generated. Besides these, there are an explanation of the scheme of categories, a description of tape formats and retrieval programs, and miscellaneous essays, some of technical and some of general interest. Section 1.1 offers advice as to how to use the report.

In total, the materials that comprise ORNL's contribution to the End Use Energy Consumption Data Base are the following. The section of this report dealing with each is mentioned.

- + this report (Section 1.1)
- + two computer tapes, containing the same consumption estimates but recorded in different formats (Chapter 8)
- + a computer tape containing all input data sets, other than survey tapes, used in generating the energy estimates, as well as, the programs described here. (9 track, 1600 bpi, IBM standard label tape - Fortran programs, dataset name:ENDUSE.TRNSPORT.ORNL.FORTTRAN.FEB80. and dataset name:ENDUSE.TRNSPORT.ORNL.INPUT.FEB80).
- + a computer tape containing the Fortran retrieval program described below. (9 track, 1600 bpi, IBM standard label tape, - dataset name:ENDUSE.TRNSPORT.ORNL.RETRIEVE.FEB80)
- + a series of Fortran routines used to compute and record the estimates (the methods implemented by these routines are described in Chapter 5)

- + a FORTRAN retrieval program, DBRS, used for on-line retrieval of the consumption data at ORNL (Chap. 7), and a separately bound guide to its use
- + a FORTRAN program, KEYSUM, used to compute all possible aggregate data, given any combination of aggregate and disaggregate data as input (Method 900 in Chap. 5; Chap. 6)
- + numerous smaller FORTRAN programs used to generate tables, prepare data for tables, produce documented listings of input data, etc.

1.1 How to Use this Report

This report is intended for use by persons having any of several purposes in mind. Below, advice for using the report is addressed separately to each type of reader. The previous section, however, should be read first.

For those consulting the tables of energy and fuel consumption:

- + Chapter 4 contains the tables.
- + The introduction of Chap. 4 contains some important caveats.
- + Chapter 5 explains how the numbers in these tables were arrived at. The method number at the bottom of each table refers to a corresponding method description in Chap. 5.
- + The introduction to Chap. 5 explains the method numbering scheme and offers tips on how to read the method descriptions.
- + The data quality numbers at the bottom of each table are defined in Sec. 2.2.
- + The categories by which energy use is classified are defined in Chap. 3. They are summarized in a chart in Sec. 3.10.

For those who wish to retrieve data, or have data retrieved, from the data tapes:

- + The introduction to Chap. 2 lists the sorts of data recorded on the tapes. Only a portion of the data on these tapes is displayed in the tables in Chap. 4.

- + Section 3.10 explains generally how the data are retrieved and provides a chart of the categories used to classify energy use. Consultation of this chart is necessary for intelligent retrieval of the data.
- + Chapter 3 as a whole defines the categories that appear on the chart. The introduction of the chapter should be read first.
- + Section 7.1 provides simple instructions for how to use DBRS, a retrieval program developed for the purpose of retrieving these energy use data.

For those who wish to install retrieval capability on a local computer:

- + Chapter 8 details the tape formats.
- + Section 7.2 provides instructions for installing DBRS.
- + Chapter 3 explains the scheme by which the data are classified.

For those who have a general interest in the estimation and analysis of energy use data:

- + Section 1.2 analyses the concept of end use energy consumption.
- + Section 1.3 distinguishes transportation energy use from the use of energy for other purposes.
- + Section 2.1 introduces the reader to the British Thermal Unit.
- + Section 2.2 discusses at length the problem of assessing the accuracy of an energy use estimate.

For those who have a professional interest in how the estimates were generated:

- + Chapter 5 presents the estimation methods in explicit detail, cites the sources, and discusses problems that arise in estimation.
- + Section 2.2 discusses at length the problem of assessing the accuracy of an energy use estimate.

For those who have a technical interest in the recording and aggregation of data:

- + Section 3.9 introduces some of the problems encountered in the aggregation of the data whose generation is documented in Chap. 5.
- + Sections 6.1 and 6.2 discuss, in a technical idiom, the problem of generating aggregate data and the algorithm used to do so.
- + Section 6.3 discusses the techniques used to flag missing data in order to prevent the generation of incomplete aggregations.

Lists of references occur at the end of each chapter containing references, with the exception that each Method Description in Chap. 5 has its own list of references.

1.2 What Is End Use Energy Consumption?

An energy end use is a use of energy that is not used again. That is, it is a use of energy that is not merely passed along, perhaps in another form, to another user. Accordingly the end use energy consumption of an operation is the net amount of energy it consumes. For instance, suppose a coal-fired power plant consumes 30 billion Btu each day in the form of coal energy in order to generate 10 billion Btu in the form of electrical energy. The difference, 20 billion Btu, represents the plant's end use energy consumption. On the other hand, the end use consumption of an electric razor is simply all the energy that reaches it through the cord, since the razor obviously delivers no energy for use elsewhere.

The End Use Energy Consumption Data Base, as the name says, accounts for end uses of energy. Consequently when coal or oil is burned to generate electricity, most (usually about two-thirds) of the energy released is dissipated as waste heat and is charged against the power plant. The remaining third of the energy is converted to electricity. A small fraction of this electricity never reaches the consumer, but is lost in transmission. This loss might reasonably be classified as consumption by the transportation sector, but in the End Use Data Base it is not. The rest of the electricity is charged against the consumers to whom it is transmitted.

All this means that while, say, a diesel locomotive's consumption is taken to be the full energy content of the oil it burns, an electric locomotive's measured consumption is the energy content of only about a third of the oil or coal burned to supply the electricity. This discrepancy must be kept in mind when the energy use of electrical devices is compared with that of other devices. (A locomotive's consumption of hydroelectricity, on the other hand, does not incur an overhead at the power plant, since the Data Base assigns hydroelectric plants a net consumption of zero.)

Although this is not the place to discourse at length on the concept of energy consumption, a notion as misleading as this one warrants some brief remarks. It is misleading because consumers of energy do not, in a literal sense, consume energy. They do not use it up, as one uses up a tank of gasoline. The reason, of course, is that outside of nuclear reactions, energy is neither created or destroyed, but only transformed. Indeed, consumers of nuclear-generated electricity are responsible for increasing the energy in the world, since nuclear fission converts a small amount of matter into energy.

It is better to say that to consume energy is to decrease the usefulness or availability of energy. Energy need not occur in a useful form, after all. Useless energy occurs as an undifferentiated pool of heat. The air that fills an empty supertanker, for instance, contains heat that, if it could somehow be used to fuel an auto, would take one from New York to Los Angeles and back. But energy in this state is useless.

Useful or available energy occurs in several forms. An obvious form is mechanical energy, such as that had by flowing water. There are various kinds of potential energy, such as that gained by water as it is pumped to the top of Raccoon Mountain in Tennessee in order to be chuted through turbines during periods of peak demand for electricity. Potential energy is also stored in the bonds of hydrocarbon molecules, such as those of gasoline or coal. And, even though heat is not useful per se, temperature differences make the heat available for use, as does the temperature difference between hot underground rocks and the chilly interior of a house to be heated geothermally.

One "consumes" energy when he allows a reservoir of useful energy to degrade into one that is less useful. When one heats his house geothermally, or harnesses the temperature gradient of the ocean, he narrows a temperature gap and hence reduces the utility of the heat reservoir he is tapping. One who grinds corn with water power transforms the useful mechanical energy of falling water to less useful heat in the millstone and the grist. Heat is always less useful than its equivalent in mechanical or potential energy because energy converted to heat can never be fully recovered as mechanical energy; the laws of thermodynamics dictate how much is theoretically recoverable. Most consumers of potential or mechanical energy not only reduce it to heat, of course, but then allow the heat to dissipate, thus reducing the utility of the energy to nought. So it is in the case of the auto, which not only converts gasoline energy to heat but allows the heat to escape and dissipate through the radiator and exhaust pipe. Even the 10 or 20% of the gasoline energy that is delivered to the drive wheels is quickly dissipated, as friction and air drag heat up the tires, brake drums and car body.

One subtlety in the notion of energy consumption is that, contrary to what was said above, it is in certain circumstances possible to consume energy that is not made less available as it is consumed. For instance, the potential energy an auto gains by driving to the top of a mountain is

energy that is still available, and that will in fact be used when the car rolls back downhill. Yet since fuel was burned to supply this energy, and since the energy will sooner or later be dissipated by friction and its availability destroyed, we speak of the energy as consumed on the way up. An exception to this principle occurs when the energy whose dissipation is delayed is used again during its dissipation. When water makes its return trip down Raccoon Mountain, for example, the potential energy converted to electricity should not be counted as consumed by the Raccoon Mountain operation, since that energy is to be consumed elsewhere. It is on the same principle that the electrical energy produced by a power plant should not be counted against the plant's consumption. Rather, only that portion of the energy which is not delivered for consumption elsewhere is counted. In other words, only the end use energy consumption is counted. The notion of end use energy consumption, then, is simply the proper way to conceive of energy consumption in general.

An interesting consequence of the foregoing line of thought is that the energy consumed in the production and use of hydroelectricity should not be equated with that consumed in the production and use of the same amount of coal or oil-generated electricity, even if this is a common practice. Rather, the energy required to produce hydroelectricity is the energy lost by the water as it passes through the reservoir and through or over the dam. This is only reasonable, since a leaky dam should be regarded as consuming more of nature's energy (per kilowatt produced) than a tight dam with efficient turbines.

The End Use Data Base, due to its emphasis on end uses, does not follow the practice of equating the energy cost of hydroelectricity with that of coal-generated electricity. It would be ludicrous, after all, to report that a hydroelectric dam consumes twice as much energy as it delivers to the electric grid. The Data Base policy, as noted earlier, is to put the dam's net consumption at zero. This practice is entirely reasonable in view of the facts that: (a) no one knows just how much water power is consumed by hydroelectric plants; and (b) if it were known, the figure would probably be only 20 or 30% above the energy content of the electricity generated, as compared to a 200% overhead in the case of fossil-fuel plants.

The reader may have noticed an affinity between energy consumption, as conceived here, and the physicist's concept of entropy. The connection is indeed close, but far from straightforward. A more rigorous discussion of this matter and a defense of the analysis suggested above is presented in Ref. 1, which is a spinoff of work on the transportation sector of the End Use Data Base.

1.3 What Is Transportation Energy?

There are a number of reasonable ways to distinguish energy used for transportation from energy used for other purposes, and they issue in consumption estimates of substantially different sizes. The transportation data in the End Use Energy Consumption Data Base adhere as consistently as possible to the following definition:

Transportation energy (i.e., energy used for the purpose of transportation) is considered to be the energy content of the fuel burned by transportation engines. (Electricity is counted as a fuel.) A transportation engine is an engine that has some part in achieving and controlling the motion of the objects transported.

The reader should be alerted that within particular categories of transportation energy use, this definition must be refined and occasionally modified in order to make the resulting consumption figures useful or estimable. The precise definition used for any category is presented at the beginning of the method description(s) for that category.

Still, it is possible to say generally how the definition applies to the various modes. To begin with, the energy content of oil, gasoline or natural gas is the heating value of the fuel — that is, the energy equivalent of the heat released upon its combustion. The energy content of electricity is equated with the kilowatt-hours delivered. The energy used by autos, trucks, aircraft, watercraft and nonelectric locomotives* is considered to be the energy content of the fuel pumped into their fuel tanks. Electric locomotives are charged with the kilowatt-hours they receive from the catenary or third rail. The pipeline fuel counted is that which powers the transmission and storage pumps. In all cases, the reader is admonished to consult the method description for definitions and any other important details before he begins drawing inferences from any number he finds in the data base.

The implications of the above definition, as well as the reasons for its choice and its precise meaning, can be better understood if some alternative definitions, each having its own merit, are examined. The definitions to follow begin with the narrowest and become successively broader.

*The traction of a "diesel-electric" locomotive is provided by electric motors, but the motors use electricity generated by diesel engines on board the locomotive; consequently the locomotive's energy use is taken to be the energy content of the diesel oil it burns.

1. Transportation energy can most strictly be defined as the mechanical work actually done by the transportation engine(s) to achieve and control motion, such as the work done by the drive wheels and steering mechanism of an auto. The idea here is that the rest of the energy involved is either wasted as heat or used for some such purpose as running an air conditioner, and so it does not end up actually being used to transport things. It was noted earlier, for instance, that only 10 to 20% of the energy used by an auto (depending on the speed) is delivered to the drive wheels (Ref. 2, pp. 4-5). Recall that a transportation engine is an engine that has some part in achieving and controlling motion; the driver of an auto, no less than the engine under the hood, would be one. It is necessary to consider the energy used to control motion, since otherwise a helicopter, say, would be regarded as using no transportation energy at all while hovering. True, the application of brakes also results in work which controls motion, but the energy brakes consume is presumably not counted because brakes are not transportation engines, and in general, transportation engines should not be identified in such a way as to count some energy as consumed twice by the same vehicle, as would be the case with braking energy.

This definition, far stricter than the one adopted for the End Use Data Base, is perhaps of little practical value and certainly makes estimation on a national scale difficult or impossible. But it lays a conceptual foundation for more useful definitions, such as the one to follow.

2. Transportation energy can be more usefully defined as the energy content of that portion of the fuel used by the transportation engine(s) to do the work described in definition 1, such as that portion of an auto's gasoline burned to drive the drive train, valve mechanism, oil and water pumps, power steering, alternator (in part), and so on. The fuel cost of an air conditioner, lights, radio or other accessories would be excluded. Many of these accessories use negligible energy; but an air conditioner typically increases a car's fuel use some 13% (Ref. 2, pp. 4-7). The caloric content of that portion of the driver's diet that allows him to steer the car should theoretically be counted, but it is, perhaps regrettably, far too slight to be significant in relation to the gasoline energy that is consumed.

This definition has the virtue of focusing on fuel consumption, which is our principal worry anyway. It differs from the End Use Data Base definition only in that it overlooks that portion of a vehicle's fuel consumption that powers accessories. Comparison of transport energy consumption reckoned in these two ways can give us an idea of what potential savings a reduction of accessories could effect. But a good many accessories are indispensable, and their energy consumption is difficult to estimate. Perhaps the best course is to compute transportation energy according to the slightly broader End Use Data Base definition and then to consider the energy advantages of removing particular accessories. In any case, the narrower definition is out of the question

for the data base, since the data base taxonomy provides no category for this accessory energy use other than the transportation category.

3. Transportation energy can be still more broadly defined as operational energy, which is that covered by the data base definition, plus the indirect energy consumption of transportation — that is, the energy consumed in order to build and maintain the vehicles, plus that consumed in order to build, maintain and operate supporting facilities. In the case of the auto this would include the energy used to build and maintain autos and auto plants, highways, bridges, etc., amortized in a reasonable way over their lifetimes. By one estimate, the operational energy consumed by all transportation in 1977 was 20 quadrillion Btu's, whereas the addition of indirect energy consumption raises this figure to 28.4 quadrillion Btu's, a jump of 42% (Ref. 3).

This definition is an excellent one for questions of long-range policy, since indirect energy costs are substantial. For instance, if one is interested in the energy advantages of a commuter rail system, he must consider that a good deal of energy is required to build the system — a quantity that, when properly amortized, is of the same order of magnitude as the operational energy (Ref. 4). Also when one is counting up the energy savings of small cars, he must consider the fact that small cars have shorter lifetimes than big cars (Ref. 5), so that the energy used to make more small cars may partially offset their operational energy advantage. A grave difficulty, however, is that estimates of transportation energy in this sense are as yet of limited reliability. Furthermore, even if one knew accurately the average indirect energy costs of, say, a commuter rail system, his knowledge is likely to be of little value in estimating the energy cost of a particular system in a particular city, which could differ enormously from the average. As for the End Use Data Base, it cannot provide estimates of transportation energy use in this sense because the indirect energy costs are accounted for elsewhere as consumption in the industrial and construction sectors.

4. Finally, the foregoing definitions are in a way unfair to the highway modes, since the installation of rail and air routes entails an additional expenditure of energy in the cars, taxis and buses that must shuttle people to the airport or rail depot. Transportation energy, then, might be yet more broadly defined as the energy described in definition 3 plus the energy consumed (in any of these senses) by any other transportation mode necessary to make the mode in question usable.

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CHAPTER 2. TYPES OF DATA PROVIDED

All of the fuel and energy consumption estimates documented in this report, as well as all possible aggregations of them, are recorded on two computer tapes (Chap. 8). A portion of these data appear in a set of tables in Chap. 4 of this report. The two computer tapes contain the same data classified in the same way; only the formats differ.

Each of the many thousand fuel and energy use estimates provided represents consumption within a particular category of transportation energy use. For each of these categories the computer tapes contain:

- + a figure showing the quantity of fuel used, in appropriate units (Sec. 2.1 explains the units used)
- + a figure showing the energy content of this quantity of fuel, expressed in billions of Btu (Sec. 2.1 explains what a Btu is and how fuel quantities are converted to energy quantities)
- + a series of codes identifying the category in which the consumption figure falls (Chap. 3 describes how energy use figures are classified and Chap. 8 sets out the codes representing the categories)
- + a 3-digit number identifying the method, described in this report, by which the figure was calculated (the method descriptions appear in Chap. 5, and the introduction to that chapter explains how the method numbering works)
- + a single digit indicating roughly the reliability of the estimate (Sec. 2.2 discusses the problem of grading the reliability of an estimate and explains the data quality codes used)
- + codes indicating the units in which the energy consumption (always in billions of Btu) and fuel consumption are expressed (see Sec. 2.1)

Chapter 8 lays out the format of the two tapes in detail.

Each energy use estimate is recorded with its own uniquely identifying category codes in order to ease its retrieval. These data can be retrieved "on-line," at a computer terminal by plying an interactive computer program written for the purpose. ORNL uses retrieval program, DBRS, to retrieve

the transportation data, and it is described in Chap. 7 of this report. DBRS was written as part of ORNL's End Use Data Base project and is available to those who wish to install it on a local computer.

2.1 Fuel and Energy Consumption

Fuel consumption is reported in the following units:

all liquid fuels (including: motor gasoline, aviation gasoline, jet fuel, diesel oil, LPG)	thousands of barrels (1 barrel = 42 gallons)
electricity	millions of kilowatt-hours
natural gas	millions of cubic feet

Each fuel consumption figure is accompanied by a figure showing the energy content of that amount of fuel, expressed in billions of British thermal units (Btu). Except in the case of electricity, the energy content is computed simply by multiplying the fuel quantity by the heating value of a single unit of that fuel. Since the heating value of a quantity of fuel is the amount of energy released on its combustion, these energy figures by no stretch represent the amount of energy that is actually put to use. They represent the amount of heat that is released when the fuel is burned, much of which is wasted (see Sec. 1.3). As for electricity, its energy content is of course identical to its quantity expressed in kilowatt-hours, but for comparison the kilowatt-hours are converted to Btu.

It should be understood that the heating value of petroleum fuels can vary a few percent from the average, depending on the type of crude oil from which they are derived and the process by which it is refined. Perhaps most variable, however, is the heating value of natural gas, which depends on how "wet" the gas is: that is, on the fraction of propane, butane, etc., mixed in with the predominant methane. For this reason the state-by-state breakdown of natural gas consumption by gas pipelines is multiplied by the average heating values of gas delivered in the respective states, a quantity that is fortunately kept track of by gas companies for contractual purposes. In the case of the remaining fuels, however, regional variations are not known, and there is no reason to believe they are significant. Consequently the following average values are consistently used:

Motor gasoline	125,000 Btu/gal
aviation gasoline	124,000 Btu/gal

diesel oil	138,700 Btu/gal
residual oil	149,700 Btu/gal
propane (liquefied)	85,300 Btu/gal
butane (liquefied)	93,400 Btu/gal
jet fuel, commercial	135,000 Btu/gal
kerosine-type	
jet fuel, JP-5	135,000 Btu/gal
(kerosene type)	
jet fuel, JP-4	130,000 Btu/gal
(naphtha type)	

One kilowatt-hour is equivalent to 3412.1416 Btu.

Unfortunately most people do not have a working familiarity with the British thermal unit, which is the amount of energy that, when converted to heat, will raise the temperature of a pound of water one degree Fahrenheit. The following comparisons may help convey the relative size of a Btu:

- one Btu is equivalent to 778 foot-pounds, 1.41 horsepower-seconds, 0.293 watt-hours, and 1055 joules
- a 100 watt bulb burns about 341 Btu each hour
- a one-horsepower motor provides about 2544 Btu of mechanical energy each hour
- a typical daily diet providing 2000 calories provides about 8000 Btu
- an average auto travelling at 55 mph uses about 8000 Btu per mile
- a gallon of fuel oil provides the household furnace about 150,000 Btu
- a monthly electric bill of \$75, which typically buys about 1500 kilowatt-hours of electricity, buys about five million Btu
- a ton of coal, when burned, supplies about 25 million Btu
- a 100 megawatt power plant produces, at full capacity, about 340 million Btu an hour
- the same power plant produces about 3 trillion Btu a year
- the USA consumed about 70 quadrillion Btu (70 quads) in 1974

The End Use Energy Consumption Data Base reports energy in billions of Btu, as noted earlier. One thousand billion Btu, i.e., one trillion Btu, is the energy content of about:

one billion cubic feet of natural gas
200,000 barrels of gasoline
300 million kilowatt-hours of electricity
40,000 tons of coal

2.2 Data Quality Numbers

All fuel and energy use estimates documented in this report have been assigned a data quality code that is meant to convey roughly the reliability of the estimates. The codes are:

- 1 - probably less than 10% error (in either direction)
- 2 - probably less than 25% error
- 3 - probably less than 50% error
- 4 - reliability unknown

These codes are recorded on the computer tapes containing the estimates and are indicated at the bottom of the tables in Chap. 4 of this report. They are also summarized at the end of each of the method descriptions in Chap. 5. Aggregate data (i.e., data that are got merely by summing figures whose generation is described herein) are assigned computed quality numbers based on the quality of the addends. The formula used for this computation is given and derived in Method 900 of Chap. 5.

The word "probably" in the quality code definitions above is meant to suggest that these data quality codes indicate crude confidence intervals in the statistician's sense. The quality code 1, for instance, indicates that one can be 80 or 90% confident (not 100% confident) that the true value lies within $\pm 10\%$ of the estimate. The level of confidence is as high as 80 or 90% only because the data quality numbers were chosen rather conservatively, with care not to overestimate the quality of an estimate.

The reader who is distressed by the fact that most of the estimates have a quality number other than 1 should keep several things in mind.

- (a) It is very difficult to obtain accurate estimates of energy consumption. In this report, the inherent unreliability of such estimates is honestly acknowledged.
- (b) A large percentage error in one of the more highly disaggregated estimates represents a relatively small absolute error, and it is these estimates that generally are rated lowest in quality.

- (c) For many purposes it is useful even to have an estimate that is accurate to within a factor of 5 or 10. It would be useful to know, for instance, whether recreational boats and motorcycles, say, consume 10%, 1%, or 0.1% of our gasoline. The estimates provided here are of course more accurate than this.
- (d) The errors are generally more systematic than random. This means that one can compare consumption figures from one year to another, or from one subcategory to another within a given mode, with considerably greater confidence than he can estimate the absolute value of a given consumption figure. The data quality numbers of course reflect the accuracy of estimates as absolute values.
- (e) The estimates provided herein are almost entirely derived from data that had already been collected by government, trade associations, survey firms, etc. An improvement in the quality of the data would require that more primary data be gathered directly from the users of energy. The imposition of more data-gathering not only is a nuisance to those who are asked to comply, but a single data-gathering instrument can easily cost many millions of dollars to administer.

The remainder of this section deals with problems that arise in the determination and definition of data quality numbers.

It was found impossible to assign confidence intervals to estimates in any systematic or defensible way. There are too many variables, many of them doubtless unknown, that affect the accuracy of an estimate. The assignments made represent judgment and guesswork on the part of the persons preparing the estimates. These are intended only to put the user on guard when there are reasons to suspect a number's reliability. The user, if uneasy about the quality number assigned an estimate, should read the description of how the estimate was derived and make up his own mind as to its reliability.

Two specific remarks should be made about the choice of data quality numbers. One is that figures obtained from primary sources, such as figures routinely reported to the government or to trade associations, are given the benefit of the doubt. They are presumed to be probably accurate to within $\pm 10\%$ unless there is some specific reason to doubt their verisimilitude. Secondly, when a large number of estimates, calculated by the same method, are assigned a single quality number, this is not meant to imply that every one of the estimates is believed to be probably within the stated interval. It implies that the great majority of them are so regarded, but that here and there an estimate, especially one of the smaller numbers, may well be likely to show greater error.

No less troublesome than the choice and defense of a confidence interval is the matter of understanding just what it means to say that an estimate is "probably" within $\pm x\%$ of the true value. Furthermore,

the fourth data quality number ("reliability unknown") is puzzling. If a data quality number indicates the interval within which one can place the true value with confidence, why not simply replace the "reliability unknown" description with an interval so wide that one can be sure that the true value lies within it? That is, what is the difference between "reliability unknown" and a sufficiently wide confidence interval?

Such questions are puzzling in part because the notion of probability can be understood in two entirely different ways that are often confused. Their confusion is in fact evident in nearly every application of probabilistic notions, and the concept of a data quality rating cannot be clarified until the confusion is dispelled. In one sense when one says that an event is "probable" or "improbable," he says something about the physical process responsible for it. To say that heads and tails are equally probable when a coin is tossed is to say something about the symmetry of a coin and of physical forces affecting it. One who believes that heads and tails are equally probable should also expect them to occur with more or less equal frequency when a coin is tossed repeatedly (but more on this later). This type of probability might be called "objective" probability. In another sense, to say an event is "probable" or "improbable" is to say something about how sure one is that it will happen, or about the strength of his reasons for believing it will happen. In this sense probability is really not probability at all and perhaps should not be called such; it is rather a judgment about the state of one's mind or one's evidence. It might be called "doxastic" probability if it reflects the strength of one's belief, or "epistemic" probability if it reflects the strength of his evidence. A meteorologist who says that there is a 90% probability of rain tomorrow, for instance, may mean it epistemically: he may mean that he has good reason to believe it will rain. On the other hand, he may have in mind an objective probability; perhaps the coming cold front dumps rain on 90% of the area it passes over, so that there is presumably a 90% (objective) probability that a given reader of the weather forecast will be in one of the wet areas. This latter judgment need not (although it usually does) imply that the weatherman has good reason to believe it will rain on a given reader, since he may have little or no evidence to back up his assignment of probability!

It is clear that if a data quality number were to indicate the interval within which it is epistemically or doxastically probable the true value lies, it would indeed be odd to recognize a "reliability unknown" assignment of confidence. Although it is possible that one be unaware of the strength of one's evidence or belief, it generally is not difficult to become aware of it. There would be no good reason, then, for indicating that one does not know what his degree of certainty is by assigning the quality number 4 to an estimate.

The data quality numbers, however, do not indicate degrees of certainty, except in an indirect sense to be explained shortly. They

indicate intervals within which the true values probably, in an objective sense, lie. Yet even once this is made clear, the notion of a confidence interval is not a straightforward one. Statisticians hasten to concede that to say that an interval extending 25% on either side of a given estimate is a 90% confidence interval is not to say that there is a 90% chance the true value lies within that particular range of numbers. Rather, it is to say that if many estimates were made, about 90% of them would lie within 25% of the true value. This obviously implies that it makes sense to speak of a probability distribution of estimates.

The notion of a probability distribution of estimates was conceived in a mathematical context in which an estimate is based directly on a random sampling from a fixed population. But these ideas often become problematic when one attempts to apply them to a real-world estimation. For one thing, it is difficult in principle to tell whether a sampling procedure is random, due to the fact that our only clean definitions of randomness merely state the mathematical properties of random variables. It is usually question-begging to judge a sampling procedure to be random on the grounds the resulting estimates exhibit these properties, since careful examination usually reveals that it is as unclear whether these properties obtain as it is whether the sampling is random. But more pertinent here is the fact that even if the idea of randomness were clarified, it is difficult to conceive of energy consumption estimates as statistically distributed in some way, because it is difficult to conceive of them as based on sampled observations. One might be inclined to characterize the difficulty by saying it is impossible in principle to learn the shape of such a distribution. For, one could attempt to learn its shape only by taking a random sample of estimates, and different estimates of the same quantity would necessarily, it seems, be made under conditions too different to allow the estimates to be regarded as samplings from a single distribution. But it is not from this that the obscurity of the idea of a probability distribution of estimates actually stems. Upon close analysis objective probability appears to be best conceived not as definitionally connected with the observed frequency of occurrence in experiment in the first place. Rather, it should be seen as an idea that must be made an integral part of the physical theory describing the phenomenon in question. The connection between probability and frequency of occurrence is apparently only epistemic. That is, when an event described as improbable by a physical theory is observed to happen over and over again it becomes irrational to continue to believe the theory. The frequency of occurrence provides a test of the warrantability of belief of a probability claim and of a theory from which it is derived, but it does not enter into the definition of the probability claim. (It still may be correct to define an objectively probable event as one that would happen frequently in experiment, but only with the understanding that the subjunctive "would" can be ultimately analyzed only as a statement about the physical theory governing the event's occurrence, and not as a statement about the frequency with which the event will actually occur.)

The natural question at this point is: how does one define objective probability in terms of a physical theory? It is precisely because this question is difficult to answer in general that the idea of objective probability is problematic. Since objective probability receives its meaning from its role in a physical theory, its precise sense varies from one application to another. Often probabilities derive from a stipulation that certain events are equiprobable due to a symmetry or isomorphism they and their causes have. The number of raindrops that will land in any one of a row of identical buckets, for example, may be said to have a Poisson probability distribution because, at any instant, all of the buckets have equal probability of being hit next, and because a Poisson distribution is the mathematical result of this equiprobability. In this case the assignment of a certain probability to that event consisting of the collection of, say, 3584 drops in a given bucket might ultimately be understood as a statement about the lack of relevant differences in the situation of the buckets. But each such application of probability has its own peculiarities, and any satisfactory understanding of objective probability requires examination of particular applications. (Perhaps most bizarre is the application of probability to quantum mechanics, wherein it receives no definition at all; it is a primitive notion in whose terms the rest of the theory is expressed.)

The lesson to be learned here is that if talk about the probability of arriving at this estimate rather than that one is to make sense, it must be understood in reference to the natural laws governing the process by which the estimates come about. Since this process involves judgment and ratiocination on the part of data analysts, we are generally ignorant of these laws, and all the more ignorant of what interpretation probability statements might receive. This fact alone would doom any attempt to arrive systematically at defensible confidence intervals.

It need not doom attempts to guess at confidence intervals, however. Objective probability, though it in the end receives its meaning in the context of particular physical theories, has vague but recognizable general features that tend to recur from one context to the next. (Otherwise, no one would know how to apply probability to a new theoretical context.) Consequently if one has some familiarity with an imperfectly understood phenomenon, such as the production of an accurate estimate, he may be able to anticipate roughly what its probability of occurrence would turn out to be if the meaning of probability in that context were made clear. He might do this through a combination of looking at the frequency of similar phenomena and of considering the factors that seem to bear on its occurrence. In the area of data estimation, one might recall the accuracy of past estimates that were later compared with better data and consider such conditioning factors as possible deliberate bias in the primary data, ways that underreporting might occur, assumptions in the estimation method that would tend to under- or overestimate some quantity, and so on. Yet it all must be judgmental because there can be no cogent and specific defense of a probability statement whose meaning is still unclear.

This, then, is the nature of the confidence intervals assigned in this report to energy use estimates. A $\pm 10\%$ confidence interval (data quality 1), for instance, represents someone's guess that the natural laws governing the process issuing in the estimate make it probable, in a sense that can be made clear only once these laws are understood, that the estimate is within 10% of truth. Note that, on this analysis, it makes perfectly good sense to distinguish a "reliability unknown" judgment from the assignment of a sufficiently wide confidence interval. "Reliability unknown" means that the analyst is prepared to make no objective probability judgments whatever, presumably because he knows too little about the process that led to the estimate in question. A wide confidence interval, on the other hand, implies a judgment that the (objective) probability that the estimate will lie close to the true value is low.

An illustration may help. Suppose one estimates energy use by tossing an odd-shaped die he is not allowed to examine first. (Be assured that the authors of this report have not used such a method.) Suppose further that he knows that a right answer is possible: that at least one side of the die bears the true value. He is of course unable to estimate the objective probability that his estimate is right to within a stated tolerance. It could be as high as one (if all sides bore the correct answer) or as low as, say, 0.001 (if only one in a thousand sides bore the correct answer). Consequently he will designate his estimate as "reliability unknown." The epistemic probability he is right is of course quite low, and it would be low even if the objective probability were one, since he has no idea of what is on the faces of the die. On the other hand, suppose he is allowed to examine the die before tossing. Then since he knows that at least one side bears the correct answer, he can easily assign a confidence interval to his estimate. If it happens that the objective probability that he is close to the right answer is low, then the epistemic probability that he is close is again low. But this time he would judge it to be low on the basis of his knowledge of the objective probability, rather than on his ignorance of it, as in the first case. This, at least in theory, is the difference between "reliability unknown" and a wide confidence interval.

In a complete accounting of data quality one could provide a data quality number for his data quality number, a third quality number for the second, and so on through an infinite regress. These second-order data quality judgments might reflect epistemic, doxastic or objective probability. But for present purposes the objective probability that a given data quality number is correct is regarded as inestimable. Furthermore, the epistemic and doxastic probability it is correct is assumed to be at least as high as the objective probability the energy use estimate itself is correct (or within the stated tolerance). That is, if an estimate is assigned data quality 3, then the analyst may have had little confidence in this assignment. But if an estimate is assigned a 1, then it can be assumed that the analyst had good reason to believe

the assignment is correct and consequently that the estimate itself is a good approximation. (If the analyst had been very unsure of the quality judgment, then he would have been equally unsure of the estimate, even though he assigned it a quality of 1.) This is why it was remarked earlier that a data quality number, even though it reflects objective probability, indicates indirectly the epistemic or doxastic probability that an estimate is close to the true value.

CHAPTER 3. THE CLASSIFICATION OF ENERGY USE

Aside from making everything conveniently available in one place, probably the main contribution of the End Use Data Base is that it breaks energy use down into categories more finely than is ordinarily done. Consequently the invention of a logical and well-defined taxonomy of energy use is crucial to the success of the data base. In this section the transportation categories used in this report are set out and explained. For the user's convenience they are also summarized in a category chart appearing in Sec. 3.10. The categories and intersections of categories for which estimates are actually provided are summarized in Table 2.1 of Chap. 4.

The taxonomy breaks energy use down in nine major ways:

1. by year — the year in which the energy was used
2. by mode — the mode of transport that used the energy
3. by sector — the sector of the economy in which the vehicles using the energy were operated
4. by range — whether the energy was used for local or intercity transport
5. by fuel — the form in which the energy was consumed
6. by use — the particular use to which the energy was put in transporting people or things
7. by carrier — whether the vehicle using the energy was a common carrier or not.
8. by region and state — the region or state in which the energy was used
9. by income — the income class into which the travelers (if any) transported by the energy fall

Several of these categories, especially those in the breakdowns by mode and use, are further subdivided, as depicted by the chart in Sec. 3.10. This same chart governs the classification of fuel use as well as energy use.

The power of a taxonomy with multiple breakdowns lies in the possibility of allowing categories to intersect. A certain quantity of expended energy, for instance, might be classified as falling simultaneously under the auto category, the Kentucky category and the 1972 category. This would of course be the energy used by cars in Kentucky in 1972. Or there is the energy used by intercity diesel-powered dump

trucks operated in Ohio in 1976, which lies in an intersection of five categories. Although the possibilities are practically limitless (they number in the hundreds of millions), figures can be provided for no more than a few hundred thousand intersections of categories. As it happens the two quantities just mentioned are available, but in general one should check the breakdown charts at the beginning of each method description to learn for which categories data are provided (see the introduction to Chap. 5).

It may be helpful to conceive the data as scattered through a large array of many dimensions. For the sake of illustration suppose the data are classified only by three modes (highway, rail and air), two uses (passenger and freight) and three fuels (gasoline, diesel, jet fuel). Then these data can be conceived as arranged in the cells of the $3 \times 2 \times 3$ box pictured in Fig. 1. Each datum (each cell in the box) lies in the intersection of three categories, and there are $3 \cdot 2 \cdot 3 = 18$ such intersections. In addition the data can be aggregated in numerous ways. They can be summed over one breakdown: the energy used by highway passenger vehicles, which represents a sum of that used by gasoline-burning and that by diesel-burning vehicles, is a sum over the fuel breakdown. Or they can be summed over two breakdowns, as is the total energy used by all passenger vehicles (all modes and all fuels). It turns out that when all aggregate data are taken into account, the number of data increases from 18 to $4 \cdot 3 \cdot 4 = 48$ (see Sec. 6.1 for the theory behind this).

The point is that the entire End Use Data Base can be conceived as such an array, except that each cell in the array lies in the intersection of many categories rather than only three. Granted, such a multi-dimensional array is impossible to visualize, but it is yet a helpful device when conceived in analogy with a three-dimensional array like the one just described. In particular, aggregate data can be computed by summing over cells in a similar way, except that now there are many possible types of aggregations — sums over five breakdowns, over 10, and more. The energy used by gasoline-burning California autos in 1976 represents a sum over all breakdowns but these four, and the total transportation energy used nationwide in 1974 is a sum over all breakdowns but one.

The following nine sections elaborate on each of the nine major breakdowns. They are intended to convey the motivation behind the taxonomy and a feeling for how to use it as well as the particulars of its definition. Afterwards there is a brief discussion of the kinds of aggregate data that are included in the data base.

FIG. 1 IF THERE ARE THREE BREAKDOWNS, THE DATA
FORM A 3 - DIMENSIONAL ARRAY, PERHAPS :

HERE THERE ARE 18 CELLS, WITH 30 POSSIBLE
MARGINAL SUMS (AGGREGATIONS).

3.1 The Breakdown by Year

The development of the transportation portion of the End Use Data Base was undertaken with the understanding that data would be provided for the calendar years 1967, 71, 74, 75 and 76 whenever possible. In fact every effort was made to supply data for the intervening years as well, and occasionally 1977 and 1978 data are provided. But there are gaps in many categories; see the individual method descriptions for details. No seasonal breakdowns were attempted.

3.2 The Breakdown by Mode of Transport

The different modes of transport are conceived solely as different types of transportation hardware. Whereas transit rail cars and transit buses are counted as separate modes, transit buses and intercity Greyhound buses are counted as the same mode, since the hardware is practically the same. Likewise taxis and private autos represent the same mode. The taxonomy distinguishes transit buses from Greyhound buses by way of the range breakdown: one is local and the other intercity. It distinguishes taxis from private autos by way of the carrier breakdown: one is a common carrier and the other is not.

The major modal divisions are based on the surface (if any) on which the transportation hardware operates — air, rail, highway, marine and pipeline. The air mode is broken down into wide-body and narrow-body craft and by the engine configuration. The rail mode is divided into heavy rail, which denotes trains pulled by locomotives (overland and subway), and light rail, which denotes rail coaches individually equipped with engines, such as rail trolley cars. The highway mode, which devours the bulk of the energy, splits into autos, buses, trucks and motorcycles. It is convenient to regard school buses as representing a different mode than other buses. All highway vehicles except buses, trucks and motorcycles are classified as automobiles. This includes jeeps, station wagons, hearses, and motor homes. The marine mode is divided among commercial and recreational craft. In theory commercial (or recreational) craft are not identical with craft used for commercial (or recreational) purposes, since the former refers to the type of boat and the latter to the use to which the boat is put, but for practical purposes the two breakdowns coincide. Finally, pipelines are classified as liquids or gas pipelines, since the equipment differs substantially between the two cases. The distinction between crude oil, oil product, coal slurry and water pipelines is made in the breakdown by use. Further definition of the mode categories, when necessary, is provided in the individual method descriptions.

3.3 The Breakdown by Sector

A breakdown by sector of the economy is unexpectedly effective at permitting categories within the other breakdowns to fall neatly into place. This household/commercial/government breakdown also corresponds to the three major avenues by which public policy can influence transportation. The sector under which a given quantity of transportation energy is classified is conceived as the sector of the economy served by the vehicles using the energy. Vehicles in the household sector are taken to be private vehicles, in the sense of vehicles that are not owned by or under the economic control of a business or government. Data constraints, however, have required that all autos other than taxis and cars in fleets of four or more be counted as household autos. Some of the auto fuel consumption attributed to the household section, then, is likely to be consumption by autos owned or controlled by businesses. As for trucks, all trucks whose owners indicated their trucks were used primarily for personal transportation have been counted as trucks in the household sector. Since a few of the trucks so described are rather large, it is possible that a few of the trucks classified as household are owned or controlled by businesses. Boats put into the household sector are recreational boats.

It is important to distinguish the sector of the economy to which a vehicle belongs from the use to which it is put. Both the energy used by autos in the business sector and the energy used by autos for business purposes can be estimated, but they are classified differently. The former is found under the commercial category of the sector breakdown, and the latter is found under the personal transport subcategory of the use breakdown. The energy used to transport a vacationer in a bus is classified as consumption in the commercial sector, since the bus is operated by a commercial enterprise, even though its use classification is that of personal transport.

By way of summary, the household/commercial breakdown of passenger vehicles is as follows:

<u>household sector</u>	<u>commercial sector</u>
autos (i.e., all nongovernment highway vehicles besides buses, trucks, cycles) other than taxis and other than cars in fleets of four or more	taxis
trucks and vans used primarily for personal transportation	other autos in fleets of four or more
recreational boats	buses (except government and school buses)
private aircraft (the data,	commercial aircraft (the data, however, do not permit identification of commercial air fuel use other than that of certificated, supplemental

however, do not permit a
separation of private
aircraft from the rest of
general aviation)
motorcycles

and foreign-flag air carriers)
rail cars and trains
pipelines

As for government vehicles, they are generally those owned or operated by some government. All school buses are considered to be part of the government sector, since no data are available on fuel use by buses operated exclusively by private schools. A public transit bus or rail system is counted as part of the commercial sector regardless of its degree of public support or ownership. Transport systems in government receivership, such as Amtrak, or those getting government subsidies are placed in the commercial sector, on the theory that public outlays in these cases are instances of largesse calculated to ransom a commercial enterprise rather than expenditures of the controlling entity.

Each of the three sections is given two subcategories in the End Use Data Base taxonomy: civilian and military. This is done, despite the fact the household and commercial sectors have no military subcategory, in order to facilitate the computation of aggregate data. The difficulty is that the civilian branch of the government sector is much more highly disaggregated than the military branch, so that data for all the government sector cannot be as highly disaggregated as the civilian data. If the highly disaggregated household and commercial sector data are specifically indicated in the data base as civilian data, then cross-sectional sums with the highly disaggregate civilian military data, yielding totals for all civilian transport, are possible. Otherwise most of these summations are missed, because only the totals for all the government sector could then serve as addends.

3.4 The Breakdown by Use

The use categories represent the purposes for which transportation energy is expended. The major division is into passenger and nonpassenger uses, and these are subdivided, subdivided again, and in one instance subdivided still again. Three caveats are in order with respect to this breakdown. One is that energy consumed in driving, say, autos for "personal" uses is not the same as energy consumed in driving personal (i.e., household) autos; this point is covered in Sec. 3.3. A second is that the distinction between freight and services, the major subdivisions of the nonpassenger category, is ill defined. A utility truck or meals-on-wheels van, for instance, seems to fall into either category. In practice, all nonpassenger transport is presumed to be freight transport except that fraction of truck transport that is identified by the Truck Inventory and Use Survey as providing "services" (see Method 330).

A third caveat is more serious. When bus or aircraft fuel use is broken down by trip purpose, the matter is complicated by the fact that a bus or plane carries passengers traveling for different purposes. A bus or plane's energy use has, with reluctance, been allotted to each trip purpose in proportion to the number of people aboard that are traveling for that purpose. This is extremely misleading because the user of these consumption figures is likely to infer that if, say, vacationers riding the bus were to stay home instead, total bus fuel use would decrease by the amount that had been allotted to the vacationers. This is of course a mistake because it is easily possible that as many buses would run as before, or nearly as many, and because the subtracted passenger weight reduces the bus's fuel use only slightly. Also there is the fact that the cargo carried in the bottom of a bus or in the belly of a passenger plane gets, in this allocation, an energy-free ride. For these reasons bus and plane breakdowns by use should be interpreted with caution. This particular method of allocation was chosen only because it is relatively simple and because no other method seems preferable from either a practical or a theoretical point of view.

3.5 The Breakdown by Range

When possible, transportation energy is broken down into that used for local transport and that used for intercity transport. A third range category, "regional" travel, is useful for the air and rail modes, and estimates for "foreign" travel are available for the air mode.

No air travel is classified as local. Travel over airlines other than the major carriers, over supplemental (i.e., chartered) carriers, and over all carriers other than common carriers is classified as regional travel. Domestic travel over the major U.S. carriers (United, Delta, etc.) is called intercity, and all flights leaving the U.S. for foreign countries are considered to provide foreign transport.

Rail transport on subways and local elevated lines is classified as local. Travel over commuter lines, such as the Long Island Railroad, as well as that portion of travel over intercity lines (e.g., Amtrak) that is identifiable as commutation, is classified as regional travel. The rest is intercity.

In the auto and bus modes, intercity travel encompasses trips to a destination at least 100 miles away, a definition imposed by the National Travel Survey. All other auto and bus travel is local. Intercity truck travel is that designated "short-haul" or "long-haul" by the Truck Inventory and Use Survey, and it includes the travel of all trucks whose trips are primarily "over the road." Trucking that is "mostly in the local area (in or around the city and suburbs, or within a short distance

of the farm, factory, mine, or place vehicle is stationed)" is counted local. As for the marine mode, all recreational boating is classified as local, and all commercial shipping as intercity. An unknown fraction of the fuel used for intercity shipping is fuel burned on trips to foreign countries. Finally, all pipelining is considered to be intercity.

3.6 The Breakdown by Carrier

This breakdown allows the identification of energy used by common carriers. As remarked earlier it distinguishes energy used by taxis from that used by autos, otherwise undistinguished (except by the numbers of the methods used to calculate them). In similar fashion it distinguishes energy used by corporate aircraft from that used by commercial airlines, and it distinguishes energy used by company-owned tractor-trailer rigs from that used by operator-owned tractors. In neither of the last two cases, however, did the data permit a breakdown by carrier.

3.7 The Breakdown by Region and State

The breakdown by state and Census region would seem to be straightforward, but sometimes it is not. For most purposes the amount of fuel consumed in New York is best conceived as the amount of fuel burned within its borders, even if in many cases this must be interpreted as the amount of fuel sold within its borders. But it would make little sense to allot the energy used during a transcontinental flight to the states flown over, presumably in proportion to the amount of fuel burned while over each state, even if this were possible. Instead, the energy used by aircraft during a given leg of its flight (i.e., between one takeoff and the next landing) has been allotted wholly to the state from which the plane took off. A similar convention has been adopted for marine transport. The reader is referred to the individual method descriptions for explicit information on how energy use was broken down by region and state within each mode of transport.

3.8 The Breakdown by Income

The National Travel Survey permitted a breakdown of intercity auto and intercity bus energy use by the income class of the traveller. The

income categories, however, change enormously from one year to another. For this reason no single range of categories has been set up, and the user must consult Methods 315 and 324 for category definitions. There are statistical techniques that allow one to fit the data into a single income breakdown, but since they require several assumptions about income distributions, it was thought best to provide the original categories and let the user perform whatever transformations he wishes.

3.9 Aggregate Data

Great care has been taken to provide, on the data tape containing the consumption estimates documented herein, all aggregate data that can be computed from the other data. (See the introduction to Chap. 3 for a definition of aggregate data, and Sec. 6.1 for a technical description of how they are computed.) The tapes, then, contain not only the data that would result from doing all the computations described in this report, but in addition all the totals that can be computed by summing these data over one or more breakdowns. Certain types of aggregate data, however, are never to be found on the tapes, usually because some of the addends that would be summed to complete these totals were unknown. It may be helpful to list these types of missing aggregate data. They do not include all the aggregations that are missing, but all those enumerated below are missing.

1. No sum covering more than one year is provided, since there seems to be no point in providing it. For instance, the total gasoline use in 1967 is provided, but the total over the 1967-76 period is not.
2. No sum is broken down by income category, since different modes use different income breakdowns (see Sec. 3.8). The only data so broken down are those whose generation is documented in Methods 315 and 324. For instance, the 1967 auto fuel use by people in income category 1 is provided, but the 1967 fuel use over all modes by people in income category 1 is not provided.
3. It turns out that no sum representing all modes, or even all highway modes, is broken down other than by YEAR, SECTOR, FUEL and USE. In other words, a sum classified under some category besides these four will also be classified by MODE, and by MODEL as well if it represents one of the highway modes. This is the case because no data more finely broken down are consistently available across all the modes or across all the highway modes. Perhaps some examples will make this clear.
 - a. The diesel fuel consumption of common-carrier buses in 1976 is provided, but the diesel fuel consumption of all common carriers

in 1976 is not provided. This last figure is not supplied because it is broken down by CARRIER and does not specify a particular mode.

- b. The gasoline used for transporting persons by all modes is provided, but the gasoline used for transporting persons for business purposes is not provided (because this sum would be broken down by USE1 but not by mode).
- c. The gasoline used for transporting persons over the highway for business is not provided, because this sum would be broken down by USE1 and does not specify a particular highway mode.

All other aggregate data not found in the tape are those that could not be computed due to missing data.

The foregoing remarks are intended to give the user prior notice that certain types of aggregations are never to be found. The best and often the easiest way to tell whether a given aggregation is provided, however, is simply to try to retrieve it from the data tape and see whether it is there.

3.10 Retrieval of Data by Category

This section explains how in principle fuel and energy use estimates can be retrieved from the data tapes containing them. It also provides a chart of categories that can serve as a guide to retrieval. This chart should also be useful to those who merely wish to consult tables in this report.

This section does not instruct one in how to operate any particular retrieval system or program. Most such systems are in principle very similar, however, and the remarks to follow should apply to them. Chapter 7 discusses DBRS and Sec. 7.1 tells how to use DBRS, a program developed expressly for the retrieval of the data documented in this report.

As remarked in Chap. 1, the data tapes consist of many thousands of records, each of which contains the following data:

- a fuel use estimate, with a code showing the units in which it is expressed
- a corresponding energy use estimate, with a code showing the units in which it is expressed (always billions of Btu)

a data quality number

a method number

a series of codes indicating the category to which
the estimates on this record correspond

Chapter 8 explains that there is a choice of two tapes, an "EIA tape" and an "ORNL tape," which contain exactly the same data. They differ in format, however, in that the EIA tape puts several fuel and energy use estimates on each record, covering several years, whereas the ORNL tape devotes a separate record to each year within each category. The EIA tape also uses different codes for the categories, and the repercussions of this difference for retrieval will be discussed shortly. The details of format can be found in Chap. 8.

Each datum on a record can be referred to as an "attribute" of that record. The attributes of records in the End Use Data Base are the data items listed above. The series of category codes, listed last, is actually a series of 18 attributes, corresponding to 18 breakdowns by which the data are classified. (Only 17 are indicated on the EIA tape, omitting the YEAR breakdown, since all years are represented on a single record.) The value of one of these attributes indicates the category in the corresponding breakdown under which the estimates on that record fall. For instance, if the estimates on a particular record are for rail energy in 1976, then the YEAR attribute on that record will have the value 76, and the MODE attribute will be a code that stands for RAIL. If these estimates do not happen to correspond to any particular USE, but represent a sum over all uses, then the USE attribute will be a code that stands for a total over that breakdown (viz., a zero). The combination of values had by all 18 category attributes serves uniquely to identify the data on that record.

Generally a retrieval program operates by allowing the user to specify a desired value for some or all of the attributes. The program then retrieves all the records whose attributes have the specified values and permits the user to examine any part of these records he wishes. It is important to realize that if only a few attribute values are specified, the number of records retrieved may be very large. One who specifies only that the year is 76, for instance, may find himself retrieving 50,000 records. If one wants, however, to retrieve only the total energy use in 1976, he has two options. One is to specify the value ALL for the other breakdowns, indicating that the total over all those other breakdowns is desired. The other is to use a retrieval system so designed that when an attribute's value is not specified, it is assumed to be ALL. (The retrieval system DBRS makes no such assumption.) In the meantime, one should bear in mind that a given specification of categories may retrieve nothing at all. Only a fraction of the possible combinations of attribute values appear on the tape. Most of these in fact make no sense, as is the case with the energy use of pipelines for passenger transport.

Although data are generally retrieved by category, they can be accessed by specifying or limiting the values of other attributes. One might, for instance, specify the method to be Method 102 and the quality number to be 1, in order to retrieve all estimates generated by Method 102 having the data quality 1.

The chart that appears with this section presents the entire scheme by which transport energy use is classified. Recommended abbreviations for each breakdown name and each category name are typed in capital letters. Users of DBRS should refer to breakdowns and categories with these abbreviations, and it is suggested that any other retrieval system be set up to recognize the same abbreviations.

Note that categories in some breakdowns are subcategories of categories in other breakdowns. For instance, some of the MODE categories subsume MODEL categories, some of which subsume MODE2 categories, some of which in turn subsume MODE3 categories. Other hierarchies of breakdowns are USE-USE1-USE2-USE3, SECTOR-CIVMIL and FUEL-FUEL1. ("USE1," then, is not a category in the USE breakdown, but is an entirely distinct breakdown, whose categories are subsumed by categories in the USE breakdown.)

The difference of coding between the EIA and ORNL tapes, mentioned earlier, require that these hierarchies be treated somewhat differently. Users of the EIA tape should proceed as follows. When one wishes to specify the value of any but the highest attribute in a hierarchy, such as MODE2, he assigns that value not to MODE2 but to the highest attribute, MODE. One interested in light trucks, for instance, would specify that the MODE is LIGHT. It is not necessary to say that the MODE is TRUCK and HIGHWAY as well, since these are implied by saying that the MODE is LIGHT; HIGHWAY and TRUCK are the only categories that subsume LIGHT. The aircraft engine-type categories under MODE2, however, are subsumed by both the WIDE and NARROW categories under MODEL. For this reason, users of the EIA tape interested in 4-engine wide-body jet aircraft should specify some value that indicates both WIDE and 4-JET for the MODE attribute. To retrieve the figure for all wide-body jets, he need only specify MODE = WIDE. No figure for all 4-engine jets (both wide- and narrow-body) is recorded, since the body categories subsume the engine categories. The truck body types under MODE3 are similarly subsumed by multiple categories (the four weight classes) under MODE2.

The EIA tape also has its own way of delivering aggregate data classified within a hierarchy of categories. If one specifies that the USE is PERSONAL (a value of USE1), he does not get all records on which USE1 has the value PERSONAL. He gets only records on which USE1 is PERSONAL and on which all breakdowns lower in the hierarchy (USE2, USE3) have the value ALL. In other words, he gets only records showing a total over all PERSONAL uses. This holds even if the retrieval program is not designed to assume that all unmentioned attributes are to have the value ALL.

Users of the ORNL tape must view hierarchies differently. The values of MODEL, USE1, etc., are assigned directly to MODEL, USE1, etc., rather than to the subsuming breakdown (MODE, USE, etc.). It is still true, however, that implied subsuming categories need not be specified; once one says that MODE2 is LIGHT, he need not say that MODEL is TRUCK and MODE is HIGHWAY. Specifications of aircraft engine type of truck body type must again be accompanied by a specification of the immediately subsuming category (if one wants to specify the immediately subsuming category). Yet whereas the EIA tape requires that one who wants a figure for 4-engine jets specify a value of MODE that implies a body type as well, the ORNL tape requires that he say separately that MODE2 = 4-JET and MODEL = WIDE. The ORNL tape has the advantage, however, that a figure for a particular engine type, such as 4-JET, representing a total over both body types (WIDE and NARROW), can be obtained by specifying MODE2 = 4-JET and MODEL = ALL. Such a sum over subsuming categories, where a subsumed category is specified, cannot be obtained from the EIA tape.

Aggregate data within hierarchies are also retrieved differently from the ORNL tape. Whereas the EIA tape delivers only a total over all personal uses when one specifies USE = PERSONAL, specification of USE1 = PERSONAL fetches from the ORNL tape all records on which USE1 has the value PERSONAL. This includes records on which USE2 is COMMUTE, OUTDOOR, etc. (This of course does not hold if the retrieval program assigns all unmentioned attributes the value ALL.)

A final difference in the two tapes has to do with the specification of a desired year. Users of the ORNL tape who want fuel or energy use data for 1976 will retrieve FUELUSE or ENERGY while assigning YEAR the value 76. But since the EIA tape places all the years on one record, its users should retrieve, say, FUEL76 and ENERGY76 without attempting to specify the value of the YEAR attribute (which does not occur on the EIA tape). Data quality numbers for the different years are similarly retrieved by asking for QUAL67, QUAL68, etc.

RETRIEVABLE DATA

In addition to a category within each of the 18 breakdowns listed in the next chart, the following data occur on each record of the data tapes and can be retrieved.

Recommended abbreviations of the data names are typed in capital letters.

See Sec. 3.10 for instructions in using this table.

FUELUSE, or fuel consumption (use FUEL67, FUEL68, ..., FUEL77 for retrieval from the EIA tape)

FUNIT, or the units in which the fuel use estimate is expressed

ENERGY, or energy consumption (use ENERGY67, ENERGY68, ..., ENERGY77 for retrieval from the EIA tape)

EUNIT, or the units in which the energy use estimate is expressed
(always billions of Btu)

QUALITY of the data, as explained in Sec. 2.2 (use QUAL67, ..., QUAL77 for retrieval from the EIA tape)

METHOD, which is the number of the method used to derive the estimates, as explained in the introduction to Chap. 5.

The reader is reminded that only the first two or so of the recorded digits are significant. The rest are recorded only for the purpose of computing sums over breakdowns without accumulating roundoff error.

CHART OF CATEGORIES

Recommended abbreviations of breakdown and category names are typed in capital letters.

An arrangement like this	A.....B	indicates that B and C are
	C	subcategories of A but not
	D	of D

An arrangement like this	A.....B	indicates that B and C are
	D	subcategories of A and
	C	subcategories of D as well

See Sec. 3.10 for instructions in using this chart.

MODE categories.

<u>MODE</u>	<u>MODE1</u>	<u>MODE2</u>	<u>MODE3</u>
AIR.....	NARROW-body.....	2-JET (2-engine jet plane)	
	WIDE-body	3-JET	
		4-JET	
		PROP (propeller-driven plane)	
		OTHER-AIR	
RAIL.....	LIGHTRAIL		
	HEAVY		
HIGHWAY.....	AUTO		
	BUS.....	SCHOOL	
		OTHER	
	MOTORCYCLE		
	TRUCK.....	LIGHT.....	PICKUP, panel,
		(under 10,000 lb	multi-stop or
		gross weight)	walk-in
		MEDIUM	PLATFORM truck
		(10,000-20,000 lb)	CATTLE rack
		LIGHT-HEAVY	INSULATED,
		(20,000-26,000 lb)	nonrefrigerated
		HEAVY-HEAVY	van
		(over 26,000 lb)	REFRIGERATED van
			FURNITURE van
			OPEN-TOP van
			VAN (enclosed) of
			other types
			BEVERAGE truck
			UTILITY truck
			GARBAGE truck
			WINCH or crane
			WRECKER
			POLE or logging
			truck
			AUTO transport
			truck
			DUMP truck
			LIQTANK, tank
			truck for
			liquids
			DRYTANK truck
			CONCRETE mixer
			truck
			OTHER truck
MARINE.....	COMMERCIAL craft		
	RECREATIONAL		
PIPELINE.....	GAS		
	LIQUIDS		

SECTOR categories.

SECTOR

CIVMIL

HOUSEHOLD.....CIVILIAN

COMMERCIAL MILITARY

GOVERNMENT

RANGE categories.

LOCAL

REGIONAL (for AIR mode only)

INTERCITY

FOREIGN (for AIR mode only)

CARRIER categories.

COMMON carrier

PRIVATE carrier (i.e., other than a common carrier)

USE categories.

USE

USE1

USE2

USE3

PASSENGER.....BUSINESS

PERSONAL.....COMMUTING (auto and motorcycle only)

FAMILY business (bus and motorcycle only)

EDUCATIONAL (bus and motorcycle only)

OUTDOOR recreation.....PLEASURE riding
(motorcycle only) RACING and

competition

OFF-ROAD riding

OTHER

VISIT friends or relatives (auto only)

VACATION travel and sightseeing (bus,
auto, motorcycle)

ENTERTAINMENT (auto only)

OTHER-PERSONAL

NONPASSENGER....SERVICES

FREIGHT.....AGRICULTURE

CONSTRUCTION

MANUFACTURING

TRADE (wholesale and retail)

UTILITIES

FOR-HIRE

FORESTRY and lumber

MINING

OTHER

GAS (natural gas) pipeline

CRUDE oil pipeline

PRODUCTS (oil products) pipeline

WATER pipeline

SLURRY pipeline

FUEL categoriesFUELFUEL1

GASOLINE (motor gasoline)
AV-GAS (aviation gasoline)
JET-FUEL.....NAPHTHA-type fuel
KEROSINE-type fuel
DISTILLATE oil, including diesel oil
RESIDUAL oil
NAT-GAS (natural gas)
ELECTRICITY

REGION and STATE categories.REGIONSTATE

NE (Northeast).....	CT	NH
	ME	RI
	MA	VT
MA (Mid-Atlantic).....	NJ	PA
	NY	
SA (South Atlantic).....	DE	NC
	DC	SC
	FL	VA
	GA	WV
	MD	
ENC (East North Central).....	IL	OH
	IN	WI
	MI	
EGC (East South Central).....	AL	MS
	KY	TN
WNC (West North Central).....	IO	NE
	KS	ND
	MN	SD
	MO	
WSC (West South Central).....	AR	OK
	LA	TX
MTN (Mountain).....	AZ	NV
	CO	NM
	ID	UT
	MT	WY
PAC (Pacific).....	AL	OR
	CA	WA
	HA	

CERTIFICATE categories (used for the air mode only).

YES (i.e., travel over certificated air carriers)
NO (i.e., all other air travel)
(see Method 100 for an explanation)

CHAPTER 4. TABLES OF TRANSPORT ENERGY CONSUMPTION

This chapter consists of tables of transport energy use estimates. They contain only a fraction of the estimates made by the methods described in Chap. 5. The rest of the estimates, generally those more finely broken down, must be got from computer tapes (see Chap. 8).

The reader is cautioned that only the first two digits or so in an estimate are significant. The others are retained only because they are necessary to reduce accumulated round-off error in totals and to serve as a precise record of the figures generated by the methods of Chap. 5.

Note that the scaling of the figures in the summary tables (Tables 1.1 and 1.2) differs from that of the figures in the remaining tables by a factor of 1000.

CHAPTER 5. METHODS OF ESTIMATION

The pages to follow contain documentation of the methods by which the energy consumption of the several modes of transport is estimated. The documentation is divided into eleven self-contained essays, corresponding to the air, rail, auto, bus, truck, motorcycle, marine and two pipeline modes, and to military fuel use and aggregations. Every estimate provided in this report or on the data tape is explicitly documented in this way.

The method descriptions are referenced in this report and on the data tape by three-digit numbers. A method number divisible by 10 is understood to refer to one of the eleven self-contained descriptions, as follows:

- 100 - air
- 200 - rail
- 310 - auto
- 320 - bus
- 330 - truck
- 340 - motorcycle
- 400 - marine
- 510 - gas pipeline
- 520 - liquids pipeline
- 600 - military fuel use
- 900 - aggregations

Other method numbers refer to headings within a particular method description. For instance, Method 310 is the complete auto description, while Method 312 is the portion of that description dealing with taxicabs. The distinction is important because whereas Method 310 is self-contained, Method 312 should not be read in isolation from the rest of Method 310. Aggregate data on the data tape are footnoted Method 900, which is a description of how the aggregate data are generated. (Here, an "aggregate" datum is one whose estimation is not explicitly documented but can be obtained by summing documented estimates over one or more breakdowns; see Sec. 3.9.) Method 600 has been set aside for military fuel use because the military's use of fuel can be broken down by mode only in a very limited fashion.

The method descriptions follow generally the same format. Each component of a description is outlined below, along with some pointers as to how to interpret it.

- I. The categories used. The list of categories, which heads every method description, is designed to permit the reader to infer precisely which data are generated by the method that follows. A simple hypothetical example should clarify how the inference can be made:

categories used:

<u>year</u>	1975-76 (1975-77 for transit nationwide; 1976 only for transit by region & state)
<u>mode</u>	highway....bus....school other
<u>sector</u>	commercial (i.e., intercity and transit) government....civilian (i.e., school and Federal)
<u>range</u>	intercity local (i.e., transit, school and Federal)
<u>region and state</u>	(no breakdown for intercity)

Note that this breakdown is a simplification of the one actually used for buses, Method 320. Let us simplify matters further by supposing that there are only two states, Connecticut (CT) and Massachusetts (MA), both of which lie in the Northeast Census region (NE).

The convention for reading this sort of schematic is that all possible intersections of the categories mentioned, and no others, are provided consumption estimates, except where omissions and additions are explicitly noted. That is, for any choice of categories from those listed, taking one from each breakdown listed, the energy use that falls in all these categories simultaneously is estimated, except where otherwise noted. For instance, the consumption in 1975 by school buses in the civilian government sector operating locally in Connecticut is estimated. When annotations specifically exclude a certain intersection of categories, then the intersection of these same categories except for the ones excluded is yet provided an estimate. For example, the 1975 energy consumption by Connecticut's transit buses (i.e., its local buses in the commercial sector) is not estimated, because transit energy use is not broken down by state for the year 1975. Yet the 1975 nationwide transit consumption (omitting the breakdown by state) is estimated. A complete list of the category intersections for which data would be provided, in this illustration, follows.

<u>Year</u>	<u>Mode*</u>	<u>Sector</u>	<u>Range</u>	<u>Region</u>	<u>State</u>
75	school	government...civilian	local	NE	CT
75	school	government...civilian	local	NE	MA
75	other	commercial	intercity	all	all
75	other	commercial	local	all	all
75	other	government...civilian	local	NE	CT
75	other	government...civilian	local	NE	MA
76	school	government...civilian	local	NE	CT
76	school	government...civilian	local	NE	MA
76	other	commercial	intercity	all	all
76	other	commercial	local	NE	CT
76	other	commercial	local	NE	MA
76	other	government...civilian	local	NE	CT
76	other	government...civilian	local	NE	MA
77	other	commercial	local	all	all

*The categories "school" and "other" both fall under the category highway....bus.

Note that some of the annotations, those beginning "i.e., ...," provide additional information as to what sorts of buses fall into a category. Sometimes such notes reveal when a category does not cover all the energy it should; the civilian government category, for example, includes only the energy used by Federal buses in the illustration above, whereas it would ordinarily include state and local government energy. All such irregularities are noted either in the list of categories or immediately following, in the second component of the method description.

In addition to the data categorized in the list above, all possible aggregations of these data would be provided. For example, transit bus consumption nationwide, total commercial bus consumption, and consumption by all buses would appear. Missing data rule out some totals, however. There would be no figure for the total bus consumption in Connecticut in 1975 because the transit and intercity bus portions of this total are missing.

A more schematic but serviceable accounting of the categories provided appears as Table 2.1 in Chap. 4.

- II. Important notes. This portion of the write-up consists of a few sentences warning the user of irregularities in the data or of other caveats that should get prominent billing. These notes are sufficiently important that a user who did not read them could misinterpret the data seriously.

- III. Instructions for estimating energy use, normally under several headings. The pattern is to follow a general discussion with formulas that provide explicit instructions for calculating the estimates. Each symbol in the formulas is defined, and when the value of a symbol must be retrieved from a data file, the number of the file containing that value is mentioned.
- IV. Data quality numbers. The data quality numbers are detailed here (see Sec. 2.2 for an explanation of what these are).
- V. Input data files. All the input data files cited in the symbol definitions are thoroughly documented in this section. The references from which the data were extracted are cited by number. Documented printouts of any of these files, as well as card decks containing them, are available upon request; they should be requested by the file name (e.g., BUSES.320) given at the beginning of each file description.
- VI. References. Each method description has its own reference list.

Method 100

AIR

Categories used:

<u>year</u>	1972-77 (1974-77 for U.S. supplemental air carriers, 1973-77 for foreign-flag carriers)
<u>mode</u>	air.....wide-body.....2-engine jet plane narrow-body 3-engine jet plane 4-engine jet plane other (including turbo-prop) propeller-driven plane (excluding turbo-prop) (no breakdown for foreign flights from individual states, except for U.S. certificated carriers; no breakdown for aircraft other than U.S. certificated carriers)
<u>sector</u>	commercial (i.e., all common carriers; no breakdown for aircraft other than common carriers)
<u>range</u>	regional (i.e., all flights of aircraft other than common carriers, and all flights of airlines other than the major ones and of supplemental carriers) intercity (i.e., flights of major U.S. and of foreign-flag airlines) foreign (i.e., flights departing the U.S. for other countries)
<u>fuel</u>	aviation gasoline jet fuel.....kerosene type residual oil (i.e., lubricating oil for certificated carriers)
<u>use</u>	passenger (i.e., all passenger aircraft, including those that carry belly freight) nonpassenger.....freight (i.e., all freight aircraft) (breakdown for U.S. certificated carriers only)
<u>carrier</u>	common (i.e., all commercial airlines; air taxis and commuter aircraft excluded) private (i.e., all general aviation, plus air taxis and commuter aircraft)
<u>certificate</u>	certificated U.S. air carriers everything else (see below for an explanation of this breakdown)

region and state (no breakdown for U.S. supplemental air carriers or for jet fuel use by general aviation)

N.B. Estimates of jet fuel use by common carriers providing service to other countries (except for certificated carriers), when broken down by state, omit all fuel used by noncertificated domestic (i.e., supplemental) carriers. Estimates not so broken down omit nothing.

Energy use reported for aircraft other than common carriers includes that used by commuter aircraft and by air taxis, since their consumption could not be separated (see Method 104).

The fuel or energy use attributed to a state is that used by aircraft in flights that depart from that state. Energy use attributed to foreign flights is that of planes leaving the U.S. for foreign countries.

Estimates of certificated carrier jet fuel use in some states exceed the recorded total use of jet fuel in those states. This is because the latter figure represents sales, which need not occur in the states where the fuel is actually burned (as determined in the way just described). This is discussed further in Method 104.

Estimates of fuel used for air freight includes consumption by freight aircraft only. Freight in the bellies of passenger aircraft is accorded an energy-free ride. See Method 101 for treatment of mixed passenger-freight aircraft (i.e., craft having a vertical partition separating passengers and freight).

The computation of energy use by certificated carriers required a series of data sets, each the result of calculations on the last, beginning with the Civil Aeronautics Board tapes and ending with the air section of the End Use Data Base tapes described in Chap. 8. The "Input Data Files" section documents only the penultimate data sets, those from which the data for the tapes were derived directly. Because of its complexity, complete documentation of the intermediate data sets has been submitted in a separate packet and is available on request. And as always, the computer programs that made the calculations have been turned over to the Energy Department and are available. Meanwhile, the method by which the final figures were arrived at is completely documented here.

The energy consumption of an aircraft is defined to be the energy content of the fuel burned to power its engines.

The air mode presents a peculiar problem to one who would estimate energy use, in that the operations of one group of aircraft, the certificated air carriers, are monitored in detail by the Civil Aeronautics Board, whereas little can be inferred about the energy use of the rest. This contrast is slightly exasperating because the division between certificated and other aircraft corresponds to no division that can be

consistently delineated within the nine major end use breakdowns (mode, year, sector, range, fuel, carrier, use, income, state). So, to avoid wasting the wealth of data from the certificated carriers, an extra breakdown has been created expressly to solve this problem: the "certificate" breakdown, which classifies transportation energy as that used by certificated air carriers or as that used by anything else. Aircraft energy estimates that fall into the certificated category tend to be accurate and highly disaggregated, whereas the remaining estimates do not.

Once energy use by certificated carriers is estimated, energy use by supplemental carriers, foreign-flag carriers and general aviation can be estimated separately for each. Supplemental air carriers normally provide charter service, usually for civilian organizations but often for the military. All supplemental carrier energy use is classified in the commercial sector, however, since the chartered planes are under the economic control of the business sector. In fact, no military aircraft energy can be estimated (see Method 600). Foreign-flag carriers are carriers registered in other countries and that connect U.S. airports with cities abroad. General aviation is everything not mentioned so far, including private aircraft and corporate planes. Although the category is distinguished by classifying these aircraft as other than common carriers, they unavoidably include commuter aircraft and air taxis as well. Unfortunately it is impossible to distinguish those general aviation craft belonging to the commercial sector from those belonging to the household sector.

The breakdowns provided for each of the four classes of aircraft are as follows.

- (a) Certificated carriers — U.S. certificated commercial common-carrier fuel use, broken down by year (1972-77), type of aircraft (e.g., 3-engine jet), type of fuel (aviation gasoline/jet fuel), range (foreign/intercity/regional), use (passenger/freight), and state.
- (b) Supplemental carriers — U.S. noncertificated commercial common-carrier jet fuel use, broken down by range (foreign/regional). (Fuel use classified as foreign includes the national totals for foreign-flag air carriers.) There is no breakdown by state.
- (c) Foreign-flag carriers — Foreign noncertificated (i.e., by the U.S.) commercial common carrier jet fuel use for flights departing from the U.S., broken down by year (1970-77) and state. There is no breakdown by type of aircraft or use.
- (d) General aviation — U.S. noncertificated aircraft fuel use, classified as other than common carrier and as providing "regional" service, broken down by year (1970-77) and state, except that jet fuel is not broken down by state. There is no breakdown by type of aircraft.

A discussion of the somewhat awkward range breakdown can be found in Sec. 3.5. The energy use within the above four classes is estimated respectively in Methods 101-104.

Part of the jet fuel used by noncertificated common carriers providing service to other countries is included among the supplemental carrier estimates, and the rest is included among the foreign-flag carrier estimates. Method 105 explains how these are added together to arrive at the correct total.

101. Certificated air carrier fuel use, 1970-77, by fuel by range by use by aircraft type by state

The detailed accounting of certificated air travel provided on computer tapes by the Civil Aeronautics Board enables fairly accurate estimates of energy use, even when broken down rather finely by state, range and type of aircraft. Schedule T3 (Ref. 1) catalogs the number of all scheduled and nonscheduled departures by carrier (e.g., United), aircraft make and model (e.g., Boeing 707), cabin configuration (passenger, cargo, mixed), airport and quarter. The total tons of cargo loaded and the number of passengers embarking and disembarking before departure are recorded along with the number of departures. Schedule T2 (Ref. 2) provides, among many other data, the fuel and oil use nationwide for each certificated air carrier. Practically the only estimation necessary is that of fuel use by state, and this is done with considerable accuracy below.

These data permit a breakdown of energy use by year (1970-77), type of aircraft (e.g., three-engine jet), type of fuel, range, use (passenger/freight), and state. The type of fuel is easily inferred from the type of aircraft: propeller engines (except for turboprop engines) burn aviation gasoline, and the remaining engines in commercial use burn the kerosene type of jet fuel. The range categories used are intercity, regional and foreign. The large airlines connecting major cities (United, PanAm, etc.) are classified as making intercity and possibly foreign flights; Schedule T3 permits the distinction of flights to foreign countries from domestic flights. The smaller airlines connecting large cities with lesser cities are classified as making regional flights. The fuel used by passenger aircraft is charged wholly against consumption for passenger transport; the energy cost of the luggage and cargo in the belly of the plane is regarded as part of the cost of transporting people. Cargo aircraft fuel use is counted as consumption for freight transport. About 2 or 3% of certificated aircraft fuel is used by mixed passenger-cargo planes, which are popular in Alaska. The fuel use of these is allotted to passenger and cargo consumption in proportion to the weight of the passengers and the cargo aboard the plane.

Estimation begins with a determination of some highly disaggregated energy intensities. The extra fuel required to carry each extra ton of payload a mile has been estimated in Ref. 3 for each aircraft type. The fuel required to carry an empty plane a mile is calculated from this figure and the fuel required to carry the loaded planes:

$$EI_{fcrmnq}^{\text{empty}} = \frac{F_{fcrmnq} - TM_{fcrmnq} EI_{ft(m)}^{\text{tons}}}{VMT_{fcrmnq}} \quad (1)$$

where

$EI_{fcrmnq}^{\text{empty}}$ = average gallons per mile of fuel f required by carrier c to fly an empty plane of make and model m and cabin configuration n over a range r during quarter q

F_{fcrmnq} = total fuel of type f used by planes of make and model m and cabin configuration n , belonging to carrier c and flying over range r during quarter q (Ref. 2)

TM_{fcrmnq} = total ton-miles of passengers and cargo carried by planes using fuel f , of make and model m and cabin configuration n , belonging to carrier c and flying over range r during quarter q (Ref. 2)

$EI_{fa(m)}^{\text{tons}}$ = average extra gallons of fuel f per mile required to carry an extra ton of cargo a mile in a plane of type $a(m)$, where $a(m)$ is the type of aircraft a plane of make and mode m is (Ref. 3)

VMT_{fcrmnq} = total plane-miles flown by planes burning fuel f , of make and model m and cabin configuration n , belonging to carrier c and flying over range r during quarter q (Ref. 1)

This calculation of energy intensities permits the fuel use by each carrier to be broken down into that used by scheduled revenue flights, nonscheduled revenue flights and nonrevenue flights. And this breakdown by type of service will later permit a more accurate allocation of fuel use to the states. So, we have:

$$F_{fcrmnq}^{s,r} = EI_{fcrmnq}^{\text{empty}} VMT_{fcrmnq}^{s,r} + EI_{ft(m)}^{\text{tons}} TM_{fcrmnq}^{s,r} \quad (2)$$

$$F_{fcrmnq}^{ns,r} = EI_{fcrmnq}^{\text{empty}} VMT_{fcrmnq}^{ns,r} + EI_{ft(m)}^{\text{tons}} TM_{fcrmnq}^{ns,r} \quad (3)$$

$$F_{fcrmnq}^{nr} = EI_{fcrmnq}^{empty} VMT_{fcrmnq}^{nr} \quad (4)$$

$$O_{fcrmnq}^{s,r} = (F_{fcrmnq}^{s,r} / F_{fcrmnq}^r) O_{fcrmnq} \quad (5)$$

$$O_{fcrmnq}^{ns,r} = (F_{fcrmnq}^{ns,r} / F_{fcrmnq}^r) O_{fcrmnq} \quad (6)$$

$$O_{fcrmnq}^{nr} = (F_{fcrmnq}^{nr} / F_{fcrmnq}^r) O_{fcrmnq} \quad (7)$$

where

O_{fcrmnq} = total lubricating oil used by planes of make and model m and cabin configuration n, belonging to carrier c and flying over range r during quarter q (Ref. 2)

$F^{s,r}, VMT^{s,r}, TM^{s,r}, O^{s,r}$ = fuel, plane-miles, ton-miles and oil pertaining to scheduled revenue flights (Refs. 1 & 2)

$F^{ns,r}, VMT^{ns,r}, TM^{ns,r}, O^{ns,r}$ = fuel, plane-miles, ton-miles and oil pertaining to nonscheduled revenue flights (Refs. 1 & 2)

$F^{nr}, VMT^{nr}, TM^{nr}, O^{nr}$ = fuel, plane-miles, ton-miles and oil pertaining to nonrevenue flights (Refs. 1 & 2)

Since the number of nonrevenue departures is not available, there is no breakdown of nonrevenue service into that which is scheduled and that which is unscheduled. The breakdown is assumed to show the same fractions as the parallel breakdown of fuel use for revenue service:

$$F_{fcrmnq}^{s,nr} = (F_{fcrmnq}^{s,r} / F_{fcrmnq}^r) F_{fcrmnq}^{nr} \quad (8)$$

$$F_{fcrmnq}^{ns,nr} = (F_{fcrmnq}^{ns,r} / F_{fcrmnq}^r) F_{fcrmnq}^{nr} \quad (9)$$

where

$F^{s,nr}$ = fuel use for scheduled nonrevenue flights

$F^{ns,nr}$ = fuel use for unscheduled nonrevenue flights

$F_{fcrmnq}^r = F_{fcrmnq}^{s,r} + F_{fcrmnq}^{ns,r}$

Now we can add to get the fuel use for all scheduled and all unscheduled flights:

$$F_{fcrmnq}^s = F_{fcrmnq}^{s,r} + F_{fcrmnq}^{s,nr} \quad (10)$$

$$F_{fcrmnq}^{ns} = F_{fcrmnq}^{ns,r} + F_{fcrmnq}^{ns,nr} \quad (11)$$

The lubricating oil use for all scheduled and all unscheduled flights,

$$O_{fcrmnq}^s, O_{fcrmnq}^{ns} \quad (12)$$

is derived from formulas (5), (6) and (7) in exactly the same way that scheduled and unscheduled fuel use is derived above from formulas (2), (3) and (4).

Each carrier's fuel and oil use can now be allotted to the states in proportion to the number of scheduled and unscheduled departures in each state. The breakdown by fuel, range, aircraft make and model, and quarter is maintained.

$$F_{fcrmnscq} = \frac{D_{fcrmnscq}^s}{D_{fcrmnscq}^s} F_{fcrmnq}^s + \frac{D_{fcrmnscq}^{ns}}{D_{fcrmnscq}^{ns}} F_{fcrmnq}^{ns} \quad (13)$$

$$O_{fcrmnscq} = \frac{D_{fcrmnscq}^s}{D_{fcrmnscq}^s} O_{fcrmnq}^s + \frac{D_{fcrmnscq}^{ns}}{D_{fcrmnscq}^{ns}} O_{fcrmnq}^{ns} \quad (14)$$

where

$F_{fcrmnscq}$ = fuel of type f used by planes of make and model m and cabin configuration n, belonging to carrier c, departing from state s and flying over range r during quarter q

F_{fcrmnq}^s = fuel used for scheduled flights, from (10)

F_{fcrmnq}^{ns} = fuel used for unscheduled flights, from (11)

$O_{fcrmnq}^s, O_{fcrmnq}^{ns}$ = oil used for scheduled and unscheduled flights, from (12)

$D_{fcrmnscq}$ = number of departures from points in state s of planes burning fuel f, of make and model m and cabin configuration n, belonging to carrier c and flying over range r during quarter q (Ref. 1)

D^S = number of scheduled departures (Ref. 1)

D^{ns} = number of unscheduled departures (Ref. 1)

All that remains is properly to aggregate the figures calculated according to (13) and (14). Passenger and freight energy use are treated separately.

$$F_{frast}^P = \sum_c \sum_{m \in a} \sum_{q \in t} \left(F_{fcrmsq}^P + \frac{TM_{fcrmq}^P}{TM_{fcrmq}} \cdot F_{fcrmsq}^m \right)$$

$$F_{frast}^f = \sum_c \sum_{m \in a} \sum_{q \in t} \left(F_{fcrmsq}^f + \frac{TM_{fcrmq}^f}{TM_{fcrmq}} \cdot F_{fcrmsq}^m \right)$$

$$O_{frast}^P = \sum_c \sum_{m \in a} \sum_{q \in t} \left(O_{fcrmsq}^P + \frac{TM_{fcrmq}^P}{TM_{fcrmq}} \cdot F_{fcrmsq}^m \right)$$

$$O_{frast}^f = \sum_c \sum_{m \in a} \sum_{q \in t} \left(O_{fcrmsq}^f + \frac{TM_{fcrmq}^f}{TM_{fcrmq}} \cdot F_{fcrmsq}^m \right)$$

where

F_{frast}^P = fuel of type f used for passenger transport in certificated aircraft of type a flying from state s over range r during year t

F_{frast}^f = fuel of type f used for freight transport in certificated aircraft of type a flying from state s over range r during year t

O_{frast}^P = lubricating oil used for passenger transport in certificated aircraft of type a flying from state s over range r during year t

O_{frast}^f = lubricating oil used for freight transport in certificated aircraft of type a flying from state s over range r during year t

$m \in a$ indicates that all aircraft makes and models that are of type a are to be included in the sum

$q \in t$ indicates that all four quarters in year t are to be included in the sum

- F_{fcrmsq}^p = fuel of type f used by passenger aircraft of make and model m, belonging to carrier c and flying from state s over range r during quarter q, from formula (13)
- F_{fcrmsq}^f = fuel of type f used by cargo aircraft of make and model m, belonging to carrier c and flying from state s over range r during quarter q, from formula (13)
- F_{fcrmsq}^m = fuel of type f used by mixed passenger/cargo aircraft of make and model m, belonging to carrier c and flying from state s over range r during quarter q, from formula (13)
- O_{fcrmsq}^p , O_{fcrmsq}^f , and O_{fcrmsq}^m defined similarly and taken from formula (14)
- TM_{fcrmq}^p = ton-miles of passengers flown by mixed passenger/cargo aircraft of make and model m, belonging to carrier c and flying over range r during quarter q (Ref. 1)
- TM_{fcrmq}^f = ton-miles of cargo flown by mixed passenger/cargo aircraft of make and model m, belonging to carrier c and flying over range r during year t (Ref. 1)

Note: The Civil Aeronautics Board tape for Schedule T-2 (Ref. 2) was not available for the last quarter of 1977. Consequently fuel use in this quarter was calculated by computing the average fuel use per departure, in each category, during the first three quarters, and multiplying the result by the number of departures in each category during the fourth quarter of 1977.

102. U.S. supplemental air carrier jet fuel use, by range, 1974-77

The amount of fuel (nearly all jet fuel) consumed by supplemental air carriers is directly available from the Civil Aeronautics Board Form 41, Schedule P-12(A) (Ref. 6). No data prior to 1974 exist, and no breakdown by state is possible. These national totals were derived from Ref. 6 first by estimating the fuel used in domestic and international operations and then by discounting half the international fuel (since fuel purchased in foreign countries is not included in this data base). The domestic and international breakdown was got by allotting fuel use to each in the same ratio as the number of aircraft hours flown in 1976 in domestic and international supplemental air carrier service, obtained from the Transportation Systems Center (Ref. 7).

In summary,

$$F_{rt} = \begin{cases} \frac{H_r}{H} F_t & \text{if } r \neq \text{regional (i.e., domestic)} \\ \frac{H_r}{H} (\frac{1}{2} F_t) & \text{if } r = \text{international} \end{cases}$$

where μ

F_{rt} = jet fuel used by U.S. supplemental air carriers operating over range r in year t , where r is regional (i.e., domestic) or international (recorded in File 7)

H_r = aircraft hours flown over range r by U.S. supplemental air carriers in 1976 (Ref. 7)

H = total aircraft hours flown by U.S. supplemental air carriers in 1976 (Ref. 7)

F_t = reported jet fuel used by U.S. supplemental air carriers in year t (Ref. 6)

Only the domestic fuel use so calculated is recorded on the data tapes. The international fuel use is saved for combination with the foreign-flag air carrier fuel use (national totals only) in Method 105.

103. Foreign flag air carrier jet fuel use, 1973-77, by state

The only available data concerning foreign-flag air carrier activity from the U.S. are the number of aircraft departures by airport, which were provided by the Transportation Systems Center (Ref. 7). The fuel used by foreign planes leaving a given airport must be estimated by supposing the average flight uses the same amount of fuel as the average international flight of a U.S. plane providing similar service. For example, to calculate the foreign-flag fuel use at Kennedy airport the average fuel used by a U.S. plane providing service to Europe would be used. This average is calculated by dividing the fuel used by U.S. carriers providing such service by the number of such flights, information available from Refs. 1 and 2.

In summary,

$$F_{st} = \sum_{p \in s} D_{pt}^{\text{for.}} \frac{F_{(p)t}^{\text{u.s.}}}{D_{(p)t}^{\text{u.s.}}}$$

where

F_{st} = amount of jet fuel used by foreign-flag carriers leaving airports in state s during year t (recorded in File 8),

$p \in s$ indicates that airports p in state s are included in the sum

$D_{pt}^{\text{for.}}$ = number of departures of foreign-flag aircraft from airport p during year t (Ref. 7)

$D_{(p)t}^{\text{u.s.}}$ = number of departures during year t of U.S. aircraft providing international service similar to that provided by foreign-flag aircraft leaving airport p during year t (Ref. 1)

$F_{(p)t}^{\text{u.s.}}$ = jet fuel used during year t by U.S. aircraft providing international service similar to that provided by foreign-flag aircraft leaving airport p during year t (Ref. 2)

Although these state estimates are classified simply as fuel consumption by noncertificated carriers for international service, they exclude fuel used by U.S. supplemental carriers for foreign service (as explained earlier and in Method 105). The national totals, however, are combined (in Method 105) with the national fuel use totals for international service provided by U.S. supplemental carriers (calculated in Method 102).

104. General aviation use of aviation gasoline, 1974-77, by fuel by state

Because few reliable data are available concerning general aviation fuel use, these values must be calculated as a residual. The aviation gasoline used in each state by certificated, supplemental and foreign-flag carriers is subtracted from the total aviation gasoline sold in that state (Ref. 4). Since the supplemental fuel (Method 102) is not broken down by state, it is allotted to the states in the same proportion as certificated air carrier fuel, for the purposes of this calculation. The formula is,

$$F_{st} = T_{st} - C_{st} - I_{st} - \frac{C_{st}}{C_t} S_t$$

where

F_{st} = aviation gasoline used by general aviation in state s during year t

T_{st} = total fuel of type f used for aviation in state s during year t (File 10)

C_{st} = fuel of type f used by certificated air carriers in state s during year t (from Method 101)

I_{st} = fuel of type f used by foreign-flag carriers serving state s during year t (from Method 103)

C_t = fuel of type f used by certificated air carriers nationwide during year t (from Method 101)

S_t = fuel of type f used nationwide by supplemental air carriers during year t (from Method 102)

Unfortunately, no breakdown by aircraft type is possible.

The state-by-state estimation of jet fuel use by general aviation is impossible due to a basic incommensurability of data sources. Air carriers use the bulk of jet fuel sold in the U.S., and Method 101 divides this use among the states in a way based on the fuel consumed in flight legs originating in each state. The fuel burned in a leg starting in Kentucky, however, may have been sold in New York. Consequently the jet fuel used by certificated carriers in some states exceeds the total jet fuel sales in those states. This is particularly true of those states that do not contain major air terminals, terminals where refueling is more often done. If general aviation jet fuel use is estimated as a residual in these states, a negative number results (as can be seen in File 10). This problem does not arise in the estimation of aviation gasoline use by general aviation because air carriers consume relatively little aviation gasoline and because the distances between refuelings of aviation gasoline are shorter. Also, general aviation jet fuel use is yet estimable on a national level:

$$F_t = T_t - C_t - I_t - S_t$$

where

F_t = general aviation jet fuel use nationwide in year t

T_t = total jet fuel use nationwide in year t

For comparison, total sales of aviation gasoline and jet fuels, by state, are recorded in the data base; these are also recorded in File 10.

105. Aggregations

Most of the energy use categories not already explicitly provided estimates in Methods 101-104 can be computed simply by summing these estimates over appropriate breakdown(s). For instance, the jet fuel used by common carriers providing domestic passenger service in 1977 is the sum of that used in all states by certificated carriers in this category (Method 101) and in all states by supplemental carriers in this category (Method 102). Certain estimates involving foreign service, however, cannot be computed by summing over breakdowns. These are the estimates of jet fuel used by noncertificated air carriers providing service to other countries. The difficulty is that part of this jet fuel is counted among the estimates of U.S. supplemental carrier fuel use (Method 102), and the rest among the estimates of foreign-flag carrier fuel use (Method 103). Consequently estimates in this category are documented here, Method 105, and they are derived from estimates described in Methods 102 and 103 in the following way:

$$F_t = F_t^{\text{suppl.}} + \sum_s F_{st}^{\text{for.}}$$

where

F_t = jet fuel used by noncertificated common carriers providing service to other countries (passenger and freight) in year t

$F_t^{\text{suppl.}}$ = jet fuel used by supplemental common carriers of type a providing service of type u (passenger/freight) to other countries in year t (from Method 102)

$F_{st}^{\text{for.}}$ = jet fuel used by foreign-flag common carriers providing service from state s to other countries in year t (from Method 103)

Note that only within the foreign-flag carrier class is the fuel use of noncertificated common carriers providing service to other countries broken down by state. Consequently estimates of jet fuel use by common carriers providing service to other countries (except for certificated carriers), when broken down by state, omit all fuel used by supplemental carriers.

Input Data Files

File 1. U.S. certificated air carrier fuel use, by fuel by range by use by aircraft type by state, 1972. File name = AIR72.100

Format: col.
2-6 carrier code (interpretation of the codes not available at the time of writing)
7-8 year
11-13 state or nation code (only the state codes are relevant here; they are the same as the census codes used in the End Use Data Base, as described in Sec. 8.2, except that the last 5 codes are different*), right-justified integer
16-17 aircraft type code** (right-justified integer)
18-32 fuel used for scheduled flights, in gallons (decimal point in col. 30)
33-47 fuel used for nonscheduled flights (decimal point in col. 45)
48-62 scheduled + nonscheduled fuel use (decimal point in col. 60)
63-77 lubricating oil used for scheduled flights (decimal point in col. 75)
78-92 lubricating oil used for nonschedule flights (decimal point in col. 90)
93-107 scheduled + nonscheduled lubricating oil (decimal point in col. 105)

*state codes that differ are:

California	91
Oregon	92
Washington	93
Alaska	01
Hawaii	02

**the aircraft type codes are:

1	- propeller (excluding turbo-prop)
2	- miscellaneous turbine
3	- 2-engine narrow body
4	- 3-engine narrow body
5	- 3-engine wide-body
6	- 4-engine narrow body
7	- 4-engine wide body

Source: Method 101

Files 2-6. Same content as File 1, except for years 1973-77 respectively.
File names = AIR73.100, AIR74.100, ..., AIR77.100

Format: Same as File 1.

Source: Same as File 1.

File 7. U.S. supplemental air carrier jet fuel use, by range, 1974-78.
File name = SUPPLE.100

Format: col.
1-2 year
3-12 supplemental air carrier fuel use for domestic service
(right-justified integer), gallons
13-22 supplemental air carrier fuel use for international
service, departures from the U.S. only (right-justified
integer), gallons

Source: Method 102

File 8. Foreign-flag air carrier jet fuel use, by state, 1973-77. File
name = FORGN.100

Format: col.
1-2 year
4-5 state FIPS code (see Sec. 8.2)
6-20 jet fuel use in gallons (decimal point in col. 20)

Source: Method 103

File 9. General aviation fuel use, by fuel by state, 1974-77. File
name = GENRL.100

Format: col.
1-2 state FIPS code (see Sec. 8.2)
4-5 year
11-20 aviation gasoline use in thousands of gallons (right-
justified integer)
21-30 jet fuel use in thousands of gallons, calculated as a
residual (right-justified integer)

Source: Method 104

File 10. Total sales of jet fuel and aviation gasoline, by fuel by state,
1974-77. File name = FUEL.100

Format: col.
1-2 state FIPS code (see Sec. 8.2)
4-5 year
11-20 sales of aviation gasoline, in thousands of gallons
(right-justified integer)
21-30 sales of jet fuel, in thousands of gallons (right-
justified integer)

Source: Ref. 4

Data Quality Numbers

Method 101.	All fuel and energy estimates for certificated carriers, however broken down	-- 1
Method 102.	total fuel and energy use estimates for supplemental air carriers providing	
	domestic service	-- 1
	international service	-- 2
Method 103.	All fuel and energy estimates for foreign-flag air carriers providing service to other countries from the U.S., broken down by year by state	-- 2
Method 104.	All estimates of the use of aviation gasoline and of energy in that form by aircraft other than common carriers, however broken down	-- 3
Method 105.	All fuel and energy estimates for noncertificated common carriers providing service to other countries, broken down by year only	-- 2

The data quality numbers for all aggregations of these estimates are computed as described in Method 900.

References

1. National Archives and Records Service, Machine-Readable Archives Division, *CAB Form 41, Schedule T-3*, Washington, D.C., 1970-77.
2. National Archives and Records Service, Machine-Readable Archives Division, *CAB Form 41, Schedule T-2*, Washington, D.C., 1970-77.
3. A. B. Rose, *The Energy Intensity and Related Parameters of Selected Transportation Modes: Freight Movements*, ORNL-5554, Oak Ridge, TN, 1979.
4. Unpublished data obtained from the Federal Aviation Administration.
5. Civil Aeronautics Board, *Handbook of Airline Statistics: Supplement*.
6. Civil Aeronautics Board Form 41 Schedule P-12(A), Washington, D.C., 1974-77.
7. Personal communications from D. Schieder, Transportation System Center, U.S. Dept. of Transportation, Cambridge, MA.

Method 200

RAIL

Categories used:

<u>year</u>	1967-78 (1968-77 for rail transit and freight rail)
<u>mode</u>	rail.....light (no national breakdown; breakdown heavy is available within certain states)
<u>sector</u>	commercial
<u>range</u>	local regional (i.e., commuter rail) intercity
<u>fuel</u>	distillate (diesel) oil residual oil electricity
<u>use</u>	passenger nonpassenger....freight
<u>carrier</u>	common
<u>region and state</u>	

The energy consumption of a railroad is the energy content of the oil it burns plus the Btu equivalent of the electricity it takes from the catenary or third rail. An exception is local rail transit (e.g., subways), whose energy consumption is taken to be the energy consumed both for traction and for operating the facilities generally. No account is taken of the energy wasted in the generation and transmission of electricity (see Sec. 1.2). Diesel-electric locomotives are viewed as consuming the energy content of the fuel they burn, even though their traction engines are actually powered by electricity generated by diesel engines on board the locomotive.

"Heavy rail" refers to trains pulled by a locomotive, such as intercity freight and passenger trains and subway trains. "Light rail" refers to rail cars individually equipped with engines, such as rail trolley cars. All light rail systems are transit systems.

Rail energy use is best estimated by determining passenger rail energy use first, and then treating the far larger freight rail energy use as a residual. Local, commuter and intercity passenger rail are treated separately. The local rail operations are the transit systems, usually subterranean or elevated. Commuter rail service, here classified under the "regional" category of the range breakdown, is service between

major cities and outlying towns and suburbs. Intercity rail service includes only the rail lines that connect major cities with each other or with smaller cities beyond ordinary commuting distance.

201. Rail transit electricity use, by weight (light/heavy) by state, 1968-77

Rail transit operations are classified in the End Use Data Base as local common-carriers in the commercial sector, even if most are supported in part by public funds. Energy use figures are obtained from the individual systems in the following way:

1. The systems operating in a given year are obtained from The American Public Transit Association's *Transit Fact Book* (Ref. 1).
2. The energy use of those reporting to the American Public Transit Association is obtained from Ref. 2.
3. The energy use of the remaining systems is gotten by contacting the operators directly.

All rail transit systems run their trains with electricity.

Although, in general, this procedure yields excellent results, the user should be aware of several caveats. Principally, the data problems center around the fact that several transit systems do not maintain fully accurate records of their energy use while others report only traction energy use. (Refer to the above discussion of the definition of rail energy use.) These data problems have necessitated the following approximations:

1. New York City Transit Authority (i.e., the New York subway system). The system reported only traction energy use for all years except 1975. In order to yield estimates to total energy use the nontraction energy use of 369.5 million kilowatt-hours for 1975 (Ref. 3) was assumed to remain constant over time and was added to the traction energy use for the other years to yield estimates of total energy use.
2. Southeastern Pennsylvania Transportation Authority (SEPTA), Philadelphia, Pennsylvania. Actual energy use values for 1970 and 1971 were not available. Included in the totals are SEPTA estimates for those years.
3. Greater Cleveland Regional Transit Authority (RTA), Cleveland, Ohio. Actual values for 1967-69 were not available. Included in the totals are RTA estimates for those years.

4. Municipality of Metropolitan Seattle (i.e., the Seattle monorail), Seattle, Washington. Only traction energy use values were available and were permitted to serve as estimates of total energy use.
5. Dillard's Department Store Tandy Line, Forth Worth, Texas. No exact time-series data are available. Since operations remained relatively constant, and the entire system consists of about one mile of line, the monthly energy use of roughly 55,000 kilowatt-hours was assumed to remain constant over time.
6. Port Authority Trans-Hudson Corporation (PATH), New York, NY. The total energy use values are known, but since the system operates in both New York and New Jersey the energy use by state had to be estimated by allocating equal amounts to each state.
7. Washington Metropolitan Area Transit Authority (Metro), Washington, D.C. No values were available for 1976 and 1977, so that the national totals consistently omit the energy used by this system.

In spite of these approximations, the state-level reported data should deviate less than 10% (except in Washington state) from the true value, for the years for which data are provided.

Breakdown into light and heavy rail is difficult, since several systems operate both types of rail and often cannot reliably separate the two with respect to energy use. The inability of the large Boston system alone (i.e., Massachusetts Bay Transportation Authority) to make the separation makes a national breakdown by light and heavy impossible. State level breakdowns by light/heavy, however, are provided for those states containing systems which operate only one type of rail. The light vs. heavy rail estimates that were available from some of the dual systems were judged not to be reliable enough to report. The situation is summed up below:

State	Light/heavy breakdown?	State	Light/heavy breakdown?
California	yes	New Jersey	yes
Illinois	yes	New York	yes
Louisiana	yes	Ohio	no
Michigan	yes	Texas	yes
Massachusetts	no	Washington	no

The states not listed are those that contain no rail transit lines.

If one wishes a formulaic rendering of the above method, he might use the one below:

$$F_{st} = \sum_{r \in s} F_{rst}$$

where

F_{st} = electricity used by rail transit in state s during year t

F_{rst} = electricity used by system r in state s during year t (File 1)

$r \in s$ indicates that rail system r is in state s

$$F_{wst} = \sum_{\substack{r \in s \\ w(r)=w}} F_{rst}$$

where

F_{wst} = electricity used by rail transit classified as weight w (light or heavy) in state s during year t , where state s contains systems each of which operates one weight class only

$w(r)$ = the weight class(es) operated by transit system r

$w(r)=w$ indicates that system r is to be included in the sum only if it operates weight class w only

202. Commuter rail fuel use, by fuel by state, 1967-78

Commuter rail traffic is distinguished both from local rail transit and from regular intercity service by placing it in the "regional" category of the range breakdown. The railroads providing commuter service are heavy rail operations in the commercial sector. Their energy use is not classified as commuting energy use because it is unknown how many of their passengers make short business trips or go into the city for shopping or entertainment. Rather, there is no use breakdown at all, except to classify all the energy as used for passenger transport. It should also be noted that although the eastern seaboard's passenger lines (Washington, D.C., to Boston) are heavily patronized by commuters, these trains have been classified as providing intercity transport and are accounted for in Method 203.

During the years 1972-78 commuter service was provided by lines devoted exclusively to commuter service, with the exception of a small Amtrak commuter line in Detroit. This is because Amtrak had assumed responsibility for all intercity passenger service. (The Southern Railroad's passenger lines are here considered part of the Amtrak system.) The commuting fuel use in these years, then, is simply the total fuel use for passenger service of railroads other than Amtrak, plus the fuel consumption of Amtrak's line (obtained directly from the company). These

fuel use figures appear sometimes in the ICC annual reports (Ref. 5), and otherwise were obtained directly from the railroads.

Breakdown by state was obtained by attributing a commuter railroad's fuel use to the state in which it is located. Commuter railroads serving two or more metropolitan areas in different states were contacted to learn how much fuel is used in each metropolitan area. If a metropolitan served by a commuter railroad lies in more than one state, the fuel use was allocated to the states in proportion to the fraction of route-miles in each state.

Prior to 1972 the fuel consumption of these railroads for passenger service, except for such purely commuter lines as the Long Island Railroad, included fuel used for both commuter and regular intercity service. In most cases the railroads kept no distinguishing records, so that for each year 1967-71 their commuter fuel was crudely estimated to be the average annual fuel consumption after 1971. (Although Amtrak was operating in 1971, the year was one of transition and the data are often incomplete.)

In some cases a railroad's commuter fuel use in a given state even in years after 1971 could not be learned, often because the railroad serves several states and could not provide a breakdown. For these years, the railroad's fuel use was estimated to be the average annual consumption during years for which data are available. In other cases a commuter-intercity breakdown was available from a railroad for years earlier than 1972. The data quality numbers reflect these complexities as follows. Whenever a state's fuel use in year t is different than its fuel use in year $t - 1$ ($t > 1967$), the recorded data quality is 1; otherwise it is 2. This ensures that estimates that are mere averages are given the lower quality number. When all the years 1967-78 show the same fuel consumption, however, each is given a data quality of 1, since these are cases in which the railroads concerned have assurances that their fuel consumption changes little from one year to the next.

In summary, the calculation of commuter rail fuel consumption is:

$$F_{fst} = \begin{cases} \sum_{c \in s} \sum_{r \in c} \sum_{t' \leq t_r} \frac{R_{rcs}}{R_{rc}} F_{frct} & \text{when } t > t_r \\ \sum_{r \in s} F_{frst} & \text{when } t \leq t_r \end{cases}$$

where

F_{fst} = fuel of type f used by commuter railroad service in state s in year t (recorded in File 2)

t_r = usually 1971; it depends on the data available from railroad r

- ces indicates that metropolitan areas c that lie mainly in state s are included in the sum
- rec indicates that rail systems r serving metropolitan area c are included in the sum
- s'erc indicates that state s' reached by the lines serving metropolitan area c and operated by system r are included in the sum
- R_{rcs} = number of route-miles in state s serving metropolitan area c and belonging to system r (Ref. 4)
- R_{rc} = total number of route-miles serving metropolitan area c and belonging to system r (Ref. 4)
- F_{frc} = fuel of type f used by commuter rail system r for passenger service in metropolitan area c (Ref. 5, or learned by direct contact with railroad)
- $$F_{\text{first}} = \sum_{t=t_r+1}^{1978} F_{rst} / (1978 - t_r)$$

203. Intercity passenger rail fuel use, by fuel by state, 1967-78

The basic sources for estimating energy use in intercity passenger service are again the Official Guide of the Railways (Ref. 4), which lists the railroads providing passenger service before the advent of Amtrak, their route structure and their frequency of service by route, and the ICC annual report (Ref. 5), which provides total train-miles, fuel use by railroad, gross ton-miles and other operating data for passenger service for each railroad. Since some of the railroads provide commuter service as well, the fuel used for commuter service by each railroad (as determined in Method 202) must be subtracted from each railroad's total passenger fuel use.

Energy use by state, before Amtrak, is estimated differently than more recent fuel use. For the years 1967-71 each railroad's energy use for passenger service must be allocated to the states in which that railroad operates in proportion to the number of train-miles traveled in each state. A railroad's train-miles in a given state was calculated by hand after consulting Ref. 4 for the frequency of each run in that state and the number of miles covered in that state by each run. The breakdown by fuel was obtained by assuming that all trains using tracks with a catenary (electric wires) overhead run on electricity and that all other trains burn diesel fuel.

State-by-state fuel use by Amtrak (1972-78) can be estimated with somewhat greater accuracy by allocating Amtrak's fuel use to the states in proportion to the number of ton-miles (rather than train-miles) of movement in each state. Ton-miles were calculated by hand, based on the frequency and length of each run in each state and on the weight of each train. The Amtrak Annual (Ref. 8) provides not only the Amtrak schedules but the type of engine and types of cars in the consist of each scheduled train, so that the train's weight could be readily calculated.

In formulas, the calculations are:

$$F_{fst} = \begin{cases} \sum_{r \in s} \sum_{u \in frs} \frac{L_{us} N_u}{VMT_{fr}} (F_{frt} - C_{frt}) & \text{for } t \leq 1971 \\ \sum_{u \in fs} \frac{W_u L_{us} N_u}{TM_f} (F_{ft} - C_{ft}) & \text{for } t > 1971 \end{cases}$$

where

F_{fst} = consumption of fuel f by intercity rail passenger service in state s during year t (recorded in File 3)

$r \in s$ indicates that all railroads r providing intercity passenger service in state s are included in the sum

$u \in frs$ indicates that all trains u run by railroad r on tracks designed for trains using fuel f in state s are included in the sum

L_{us} = length of the route covered by train u in state s (Ref. 4)

N_u = number of runs of train u annually (Ref. 4)

F_{frt} = fuel of type f consumed by railroad r for passenger service in year t (Ref. 5)

C_{frt} = fuel of type f consumed by railroad r for commuter services in year t (Method 202)

$VMT_{fr} = \sum_r \sum_{u \in fr} L_u N_u$ = total train-miles traveled by railroad r over tracks designed for locomotives using fuel f

L_u = total length of the route covered by train u (Ref. 4)

$u \in fr$ indicates that all trains u run by railroad r over tracks designed for locomotives

$u \in fs$ indicates that all Amtrak trains u running over tracks designed for locomotives using fuel f in state s are included in the sum

W_u = weight of train u (calculated from Ref. 8)

$TM_f = \sum_{uef} L_u W_u N_u$ = total ton-miles of Amtrak passenger train movements over tracks designed for locomotives using fuel f

uef indicates that all trains running on track designed for locomotives using fuel f are included in the sum

F_{ft} = fuel of type f consumed by Amtrak in year t

C_{ft} = fuel of type f consumed by Amtrak for commuter service in year t

204. Freight rail fuel use, by fuel by state, 1968-77

The energy used in freight operations accounts for the vast majority of all rail energy use. Consequently it is possible to calculate freight energy use as a residual, since even large errors in the estimation of the rest of rail energy use would have a very small relative effect on the freight consumption. *Energy Data Reports* (Ref. 6) provides the total railroad distillate (diesel) and residual oil use by state for the years 1967-78, and The Edison Electric Institute (Ref. 7) provides the railroad electricity use by state. Fuel use by transit, commuter and intercity passenger rail is subtracted from these values:

$$F_{fst} = R_{fst} - T_{fst} - C_{fst} - I_{fst}$$

where

F_{fst} = freight rail consumption of fuel f in state s during year t (recorded in Files 5, 6)

R_{fst} = total rail consumption of fuel f in state s during year t (Ref. 6, 7)

T_{fst} = rail transit consumption of fuel f in state s during year t (from Method 201)

C_{fst} = commuter rail consumption of fuel f in state s during year t (from Method 202)

I_{fst} = intercity passenger rail consumption of fuel f in state s during year t (from Method 203)

Input Data Files

File 1. Rail transit energy use, by system, 1967-78. File name = TRNSIT.200

Format: col.

Card 1: 1-5 system abbreviation
7-8 state abbreviation
10-11 state FIPS code (see Sec. 8.2), right-justified integer
13 the letter A
14 H for heavy rail system, L for light rail, blank for dual system
15-74 6 fields of 10 columns each, containing kilowatt-hours of electricity used, in thousands (decimal point in col. 9 of field). A blank field indicates data were not available; 0.0 indicates zero consumption. The fields correspond respectively to 1967-72.
Card 2: 1-14 same as Card 1, except that the letter B appears in col. 13
15-74 same 6 fields as in Card 1, corresponding respectively to 1973-78

Source: Ref. 2 and direct contacts with rail transit systems.

File 2. Commuter rail fuel use, by fuel by state, 1967-78. File name = COMMUT.200

Format: col.

1-2 state abbreviation
3-4 state FIPS code (see Sec. 8.2)
6 the number 3
7 1 for diesel fuel, 2 for electricity
9-80 12 fields of 6 columns each, corresponding to the years 1967-78, showing fuel use in thousands of bbl or millions of kwh (right-justified integers)

Source: Method 202

File 3. Intercity passenger rail diesel fuel use, by state, 1967-78. File name = PASSD.200

Format: col.

4-5 state FIPS code (see Sec. 8.2), right-justified
7-126 12 fields of 10 columns each, corresponding respectively to 1967-78, showing diesel fuel use in thousands of bbl (right-justified integer)

Source: Method 203

File 4. Intercity passenger rail electricity use, by state, 1967-78.
File name = PASSE.200

Format: Same as File 3; electricity use expressed in millions of kwh.

Source: Method 203

File 5. Freight rail diesel fuel use, by state, 1967-78.

Format: col.

1-2 state FIPS code (see Sec. 8.2), right-justified
3-122 12 fields of 10 cols. each, corresponding to diesel
fuel use in thousands of barrels (right-justified
integer) respectively in 1967, ..., 1978.

Source: Ref. 6

Note: When punched on cards, the last 42 cols. of each
record are punched in cols. 1-42 of a continuation
card immediately following the initial card.

File 6. Freight rail residual oil use, by state, 1967-78.

Format: col.

1-2 state FIPS code (see Sec. 8.2), right-justified
6 the number 2
7-80 12 fields of 6 cols. each, corresponding to residual
oil use in thousands of barrels (right-justified integer)
respectively in 1967, ..., 78

Source: Ref. 6

Data Quality Numbers

All estimates except those for commuter rail and local transit -- 2

Estimates for commuter rail (see Method 202) -- 1 or 2

Estimates for local transit -- 1

References

1. American Public Transit Association, *Transit Fact Book*, 1967-79 editions, Washington, D.C.
2. American Public Transit Association, *Transit Operating Report*, 1967-77 editions, Washington, D.C.
3. Stanford Research Institute, *Energy Study of Rail Passenger Transportation*, Vol. 2, Menlo Park, Cal., 1977.
4. National Railway Publication Company, *The Official Guide of the Railways*, New York, July editions 1967-78.
5. National Railway Publication Company, *Annual Report to the Interstate Commerce Commission for the Year Ended December 31, 19--*, 1967-78 editions, Washington, D.C.
6. Energy Information Administration, Table 10 in "Fuel Oil Sales Annual," *Energy Data Reports*, Washington, D.C., 1967-78.
7. Edison Electric Institute, *Statistical Yearbook of the Electric Utility Industry*, 1967-78 editions, Washington, D.C.
8. National Railroad Passenger Corporation (Amtrak), *1978-79 Annual*, Rail Transportation Archives, San Francisco.

Method 310

AUTO

Categories used:

<u>year</u>	1967-76
<u>mode</u>	highway.....auto
<u>sector</u>	household (includes state and local government autos) commercial (i.e., fleeted autos and taxis) government...civilian (i.e., Federal autos)
<u>fuel</u>	gasoline
<u>use</u>	passenger.....business personal.....visit friends or relatives outdoor recreation sightseeing entertainment other (the above breakdown for 1972 & 76 household intercity travel only; figures include light trucks) commuting to work
<u>income</u>	see Method 315 (breakdown for intercity travel only and for years 1972 and 1976 only; figures include travel in light trucks)
<u>carrier</u>	common (i.e., taxis) private (everything but taxis)
<u>range</u>	intercity (i.e., trips over 100 miles) local (breakdown for household autos only)
<u>region</u>	(no breakdown for estimates broken down by use by income)
<u>state</u>	(no breakdown for estimates broken down by income class)

N.B.: When auto fuel use is broken down by trip purpose it includes the fuel used by both autos and light trucks, since the available survey data do not distinguish the two. The recorded total over all purposes for intercity travel likewise includes trucks. All other auto figures recorded encompass autos only.

It should also be noted that auto fuel use in the household sector includes that used by state and local government vehicles, since it was impossible to separate the two.

The energy consumption of an auto is taken to be the energy content of the fuel it burns.

In view of the predominance of the automobile among highway vehicles, surprisingly little is known about its fuel use. The reason for this is simply that primary data on fuel sales to automobiles are not collected.

closest one can come is the household expenditure data available in the 1973-74 Consumer Expenditures Survey (Ref. 12), and even this includes purchases for household trucks and off-highway uses and excludes much gasoline use in automobiles outside the household sector. Because of this, fuel use by the most prevalent vehicle type must be determined largely as a residual from other uses.

311. Commercial sector gasoline use (excluding taxicabs) 1967-76, by state

While the household sector is certainly the largest owner and user of automobiles, commercial use is undoubtedly a large component of total use. Although not all commercial automobiles are in fleets, it is probable that the vast majority of them are. Automobiles operated in fleets of four or more comprise about 10% of cars on the road. Perhaps two-thirds of all fleet vehicles (in fleets of 10 or more) are used by businesses, with the remainder divided between governments, utilities, police and taxis, in order of importance (Ref. 1, pp. 15-16). Fleet vehicle use by households is apparently confined to small shares of the daily rental and leasing fleets or unofficial use of business fleet vehicles. (The National Association of Fleet Administrators guesses that this is about 15% of fleet vehicle use.) Thus it would appear to be reasonable to approximate commercial gasoline use by automobiles as that used by fleeted automobiles. Unfortunately it is not that straightforward. There is no universally accepted definition of what constitutes a fleet. Statistics are reported for fleets of 10 or more or 4 or more cars operated jointly. The distinction is important for two reasons: (1) almost as many cars are operated in fleets of 4-9 in size as in fleets of 10 or more, and (2) it would seem reasonable to expect cars in large fleets to be operated differently and have different usage rates than cars in smaller fleets. Unfortunately, the data necessary to make these distinctions are not available. As a result, estimates of fleet and, therefore, commercial auto gasoline use must be crude and very uncertain.

All automobile fuel use is assumed to be gasoline. A sector breakdown of this use will be made using cars in fleets of 4 or more minus state and local government and police cars to represent commercial

gasoline use and treating household use as what is left after truck, truck, motorcycle and commercial and government auto gasoline use have been subtracted from total highway gasoline use.

The procedure for computing estimates of fleet auto use (excluding taxis) is uncomplicated. Taxicab energy use will be estimated separately in the next section. Shonka (Ref. 1) surveyed all existing sources of data on fleet operations in the U.S., and most of the data required for this estimation can be found in her study. The number of vehicles in fleets of 10 or more by state in which the fleet operator is located can be obtained from a 1975 survey performed by *Commercial Car Journal* (Ref. 19). This distribution is used to share the estimated auto fleet population nationwide in fleets of 4 or more for each year. These national data are available from *Automotive Fleet* magazine (Ref. 2). They are first adjusted to remove government vehicles and taxis from the national total, again using data from Ref. 1 (p. 16). Fuel use by state is then obtained by multiplying the number of fleet vehicles by a constant 20,000 miles per year and dividing the total miles by an estimated 13.5 miles per gallon. The former number is a conservative estimate of average annual vehicle-miles for fleet autos in the U.S., as the figures below indicate.

Estimates of fleet automobile use

Annual VMT	Year	Source
22,244	1972	Automotive Fleet Magazine (Ref. 2)
24,322	1972	American Automotive Leasing Association (Ref. 14)
21,563	1976	National Association of Fleet Administrators (Ref. 9)
24,000	1978	Brookhaven National Laboratory (survey) (Ref. 13)

A series of annual data from a single source, such as the American Automotive Leasing Association, is not used because one source will show average miles per car rising while another shows it falling in the same period of time (Ref. 1, p. 24). The miles per gallon figure (13.5) is almost exactly the national average for automobiles estimated by the Federal Highway Administration for the period 1967-76 (Ref. 10). It compares with a National Association of Fleet Administrators estimate of 13.4 for 1976 (Ref. 9). It seems more than likely that these efficiencies have varied across states and over time. Therefore, the accuracy of the resulting estimates is unknown.

The estimation of commercial fleet gasoline use can be formulated as shown below.

$$F_{st} = \frac{vmt}{MPG} \left(1 - \frac{M10_t}{N10} \right) \frac{N4_{s,1975}}{N4_{1975}} N4_t$$

where

F_{st} = gasoline used by commercial fleeted autos (in fleets of 4 or more) in state s during year t

vmt = average annual miles driven per fleeted auto, set at 20,000 miles

MPG = average efficiency of a fleeted auto, set at 13.5 miles per gallon

$N4_{ot}$ = number of autos in fleets of 10 or more in state s in year t (File 2)

$N10_t$ = number of autos nationwide in fleets of 10 or more in year t (File 1)

$N4_t$ = number of autos nationwide in fleets of 4 or more in year t (File 1)

$M10_t$ = number of autos nationwide in government, utilities, taxi and police fleets of 10 or more in year t (File 1)

312. Taxicab gasoline use, 1967-76, by state

Taxicabs are treated separately. They represent the commercial sector vehicles that can be classified as common carriers. National estimates of numbers of taxis in use and annual vehicle-miles are available for 1970, 1973 and 1975 in *Taxicab Operating Characteristics* (Ref. 4). Estimates are made for the intervening years using the relative magnitudes of the taxi fleet estimates reported by *Automotive Fleet* magazine for 1966-76 (Ref. 2). Specifically, both the number of taxis operating and the average vehicle-miles per taxi (in an intervening year) are estimated by taking a weighted average of these quantities in 1970 and 1973 (or 1973 and 1975), where the weights are based on the *Automotive Fleet* figures for the intervening year in question. This allows trends in the vehicle-miles per taxi, as well as the number of taxis, to be taken into account. Details of the calculation are made clear in the formula below. Applying a national average miles-per-gallon figure of 11.45 results in a nation estimate of taxi gasoline use. The national total is shared to states based on the number of persons reporting taxi as their means of journeying to work in the 1970 Census of Population (Ref. 11). These data were judged to be most indicative of taxicab use. However, the accuracy of the approach is unknown. The formula is:

$$F_{st} = \begin{cases} \frac{VMT_t}{mpg} \frac{P_s}{P} & \text{when } t = 1970, 73, 75 \\ \frac{1}{mpg} (N_{73}w_1 + N_{75}w_2) \left(\frac{VMT_{73}}{N_{73}} w_1 + \frac{VMT_{75}}{N_{75}} w_2 \right) \frac{P_s}{P} & \text{when } t = 1974, 76 \\ \frac{1}{mpg} (N_{70}w_3 + N_{73}w_4) \left(\frac{VMT_{70}}{N_{70}} w_3 + \frac{VMT_{73}}{N_{73}} w_4 \right) \frac{P_s}{P} & \text{when } t = 1967, 68, 69, 71, 72 \end{cases}$$

where

F_{st} = gasoline consumption by taxicabs in state s during year t

VMT_t = vehicle-miles traveled by taxis nationwide in year t ,
 $t = 1970, 73, 75$ (File 3)

mpg = national average taxi efficiency, set at 11.45 miles per gallon

P_s = number of persons taking the taxi to work in state s in 1970 (File 4)

P = total number of persons taking taxi to work in 1970 (File 4)

N_t = number of taxis in operation in year t , $t = 1970, 73, 75$ (File 3)

$$w_1 = \frac{M_{75} - M_t}{M_{75} - M_{73}}$$

$$w_2 = \frac{M_t - M_{73}}{M_{75} - M_{73}}$$

$$w_3 = \frac{M_{73} - M_t}{M_{73} - M_{70}}$$

$$w_4 = \frac{M_t - M_{70}}{M_{73} - M_{70}}$$

M_t = number of taxis in fleets of 10 or more in year t (File 1)

313. Federal government civilian gasoline use, by state, 1967-76

Data on Federal government/civilian gasoline use is readily available in the "Federal Motor Vehicle Fleet Reports" of the General Services Administration for 1967-76 (Ref. 6). The reports contain the number, vehicle-miles traveled, and fuel consumed by government-owned sedans, station wagons and ambulances. Total Federal civilian auto gasoline use is shared to the states based on their percentage share of Federal automobiles. The latter data are reported annually by the Federal Highway Administration (Ref. 10, Table MV-7). In short,

$$F_{st} = F_t \frac{N_{st}}{N_t}$$

where

F_{st} = gasoline used by Federal civilian autos in state s during year t

F_t = reported national Federal civilian gasoline consumption by autos in year t (File 5)

N_{st} = number of Federal civilian autos in state s in year t (File 6)

N_t = total number of Federal civilian autos in year t (File 6)

Very little is known about state and local government fuel use, as pointed out elsewhere in the discussion of truck fuel use estimation methods. Here, again, this fuel use is included with the household sector due to a general lack of data. Another reason for not attempting to estimate these data is the fact that fragmentary data provided to ORNL by several states indicates widely varying annual consumption rates.

314. Household and state and local government gasoline use, 1967-76, by state

After all the above estimates plus estimated gasoline use by other vehicles have been subtracted from the highway gasoline use control total, the remainder constitutes an estimate of household and state and local government gasoline use by state. That is,

$$F_{st} = H_{st} - C_{st} - G_{st} - TX_{st} - B_{st} - T_{st} - M_{st} \quad (1)$$

where

F_{st} = total household and state and local government auto gasoline use in state s during year t

H_{st} = total gasoline sold for highway use in state s during year t (File 7)

C_{st} = total commercial gasoline use, except taxis, in state s during year t (Method 311)

G_{st} = total Federal government auto gasoline use in state s during year t (Method 313)

TX_{st} = total taxicab gasoline use in state s during year t (Method 312)

B_{st} = total bus gasoline use in state s during year t (see below)
File 22

T_{st} = total truck gasoline use in state s during year t (Method 330) File 23

M_{st} = total motorcycle gasoline use in state s during year t
(Method 340) File 24

Since transit bus gasoline use, as estimated by Method 323, is not broken down by state, it must be approximated by allotting to each state a fraction of the national consumption based on its share of the transit bus gasoline use reported to the American Public Transit Association. That is,

$$B_{st} = BS_{st} + BF_{st} + BT_t \frac{APTA_{st}}{APTA_t}$$

where

BS_{st} = school bus gasoline use in state s during year t (Method 321)

BF_{st} = Federal bus gasoline use in state s during year t (Method 322)

BT_t = national transit bus gasoline use during year t (Method 323)

$APTA_{st}$ = transit bus gasoline use reported to the American Public Transit Association (APTA) by state s in year t (File 5, Method 320)

$APTA_t$ = total transit bus gasoline use reported to APTA in year t (File 5, Method 320)

The estimate of intercity household gasoline use to be provided by Method 315 allows a breakdown by range of travel. As Method 315 explains, intercity travel must here be defined as trips of at least 100 miles. So, we have

$$F_{rst} = \begin{cases} I_{st} & \text{when } r = \text{intercity} \\ F_{st} - I_{st} & \text{when } r = \text{local} \end{cases}$$

where

I_{st} = auto and light truck household gasoline use for intercity travel in state s during year t (from Method 315)

F_{st} = total household and state and local government auto gasoline use in state s during year t , from formula (1) above

An obvious difficulty here is that F_{st} includes state and local government auto gasoline use as well as household use, and I_{st} includes intercity light truck gasoline use as well as auto use. In the computation of local auto gasoline use these two distortions will to some extent cancel each other, but how much they will do so is impossible to know.

Another difficulty is that F_{st} includes the fuel used by state and local government trucks (see Method 336) and that used by buses that are not common carriers, other than school and Federal buses (see Method 325). The resulting overage is likely to be insignificant, however, in relation to the voracious consumption of gasoline by household autos.

Finally, although household autos are in any state the vehicle-sector combination burning more gasoline than any other, they still consume only about half of all highway gasoline. Thus errors in the estimation of other fuel uses can compound to cause considerable errors in these household and local government estimates. The uncertainty of these convoluted estimation methods serves to point up the desperate need for basic reliable data on the uses of highway gasoline.

315. Intercity household gasoline use, by use by income (1972 & 76), by income by region (1972 & 76), and by use by state (1972-76).

There are relatively few data available on household automobile gasoline use by purpose and income. The primary data sources used to obtain this information are the National Travel Surveys for 1972 and 1977 (Ref. 5) and the Journey to Work Survey for 1975 (Ref. 1). In each of these sources, the data are given by mode of travel with automobiles and light trucks combined as one category.

In the estimation to follow intercity auto travel has been broken down into that for business purposes and that for personal use. Personal travel has been further divided into that for visiting friends and relatives, recreation, sightseeing, entertainment, and other purposes. In addition Method 316 estimates the gasoline use for commuting to work, which is classified as local travel. These estimates are made by computing the vehicle-miles traveled in each category and dividing by an appropriate fuel efficiency number (miles per gallon).

An intercity trip is defined by the National Travel Survey as one in which the traveler goes to a place at least 100 miles from home and returns. Intercity trips exclude (a) travel as a part of an operating crew on a train, plane, bus, truck or ship, and (b) commuting to a place of work, as well as (c) students' trips to school or trips of those taking students to school.

The breakdown of intercity auto and light truck travel by income class is limited to two years, 1972 and 1976. Because of the sample size of the National Travel Survey and the large number of income categories used for each year, there are no estimates by income class by state. Rather, there are estimates (for 1972 and 1976 only) by income class by region and by income class by use. There is also a third set of estimates broken down by use by state. (The estimates of gasoline use by commuters is broken down by state and is provided for 1975 only.)

The distribution of VMT (vehicle-miles traveled) for household intercity travel is available only from the 1963, 67, 72 and 77 National Travel Surveys. Furthermore, the definition of a trip was changed from "travel to a place at least 100 miles away from home in one day or travel out of town one or more nights" for the 1963 and 1967 surveys to a definition of "travel to a place at least 100 miles away from home and return" for the 1972 and 1977 surveys. Therefore the 1963 and 67 survey results are not comparable with the results of the 1972 and 77 surveys. For this reason only the data from the 1972 and 77 surveys are used to estimate vehicle-miles traveled for intercity travel.

The trip purpose categories for both 1972 and 1977 are the same. Therefore if one assumes a constant rate of change in VMT by purpose and state between 1972 and 1977 he can estimate the intervening years. However, the income data available from the two surveys are given in the following categories:

<u>Income class</u>	<u>1972 NTS</u>	<u>1977 NTS</u>
1	under \$1000	under \$2000
2	1000-1999	2000-2999
3	2000-2999	3000-3999
4	3000-3999	5000-5999
5	4000-4999	6000-7499
6	5000-5999	7500-9999
7	6000-7499	10,000-11,999
8	7500-9999	12,000-14,999
9	10,000-14,999	15,000-19,999
10	15,000-24,999	20,000-24,999
11	over 25,000	25,000-34,999
12	unclassified	35,000-49,999
13		over 50,000

Because the income data for each year are given in current dollars, rather than constant dollars, the data are not readily comparable. For this reason and because there is no justification for assuming a linear relationship between household income and year, it is not possible to use these data to estimate VMT by income class for intervening years. Therefore the income breakdown is provided for two years only: 1972 (from 1972 NTS income and VMT data), and 1976 (from 1977 NTS income and VMT data).

The match between the End Use Data Base use categories and those of the NTS are as follows:

End Use Category (USE1...USE2)	1972 NTS Category	1977 NTS Category
business	business & conventions	business conventions
personal...outdoor recreation	outdoor recreation	recreation
...visit friends or relatives	visit friends or relatives	visit friends or relatives
...vacation & sightseeing	sightseeing	sightseeing
...entertainment	entertainment	entertainment
...other	personal & family affairs	other
	other	

Formulas for estimating household intercity gasoline use are as follows:

$$F_{ust} = VMT_{us,1972} r_{us}^{t-1972} / MPG_{st} \quad (1)$$

where

$$r_{us} = (VMT_{us,1977} / VMT_{us,1972})^{1/4}$$

F_{ust} = household intercity gasoline use for use u in state s during year t

VMT_{ust} = household intercity vehicle-miles traveled for use u in state s during year t, t = 1972 or 1977 (Files 12, 13)

MPG_{st} = average intercity miles per gallon for household autos and light trucks in state s during year t, estimated by ORNL. Data will be based on EPA miles per gallon, adjusted by state and year to take account of state fleet mix and trip length

For the years 1972 and 1976,

$$F_{irt} = \begin{cases} VMT_{ir,1972}/MPG_{r,1972} & \text{for } t = 1972 \\ VMT_{ir,1977}/MPG_{r,1977} & \text{for } t = 1976 \end{cases} \quad (2)$$

$$F_{uit} = \begin{cases} VMT_{ui,1972}/MPG_{1972} & \text{for } t = 1972 \\ VMT_{ui,1977}/MPG_{1977} & \text{for } t = 1976 \end{cases} \quad (3)$$

where

F_{irt} = household intercity gasoline use by families in income class i in region r during year t

F_{uit} = household intercity gasoline use for use u by families in income class i during year t

VMT_{irt} = household intercity vehicle-miles traveled by families in income class i in region r during year t, t = 1972, 1977 (Files 8, 9; but see note below)

VMT_{uit} = household intercity vehicle-miles traveled for use u by families in income class i during year t, t = 1972, 1977 (Files 10, 11)

MPG_{rt} = estimated miles per gallon for intercity household auto and light truck travel, based on EPA estimates and fleet mix in region r in year t (File 18)

MPG_t = estimated miles per gallon for intercity household auto and light truck travel, based on EPA and national fleet mix in year t (File 18)

Note that the foregoing method is based on two assumptions:

- (a) The annual rate of change in VMT for intercity trips is constant between 1972 and 1977 for each state s and each use u.
- (b) VMT for intercity trips by income class in 1976 is the same as that for 1977.

Note: The 1977 National Travel Survey occasionally combines states in order to protect the anonymity of respondents. New Hampshire and Vermont are combined, as are Montana, North Dakota, South Dakota and Wyoming, as are Alaska, Idaho and Washington. In order to secure a complete breakdown by state, the car-miles reported for these combinations has been attributed to the individual states in the same proportions they exhibited in 1972. That is,

$$VMT_{us,1976} = \frac{VMT_{us,1972}}{VMT_{uc,1972}} VMT_{uc,1976}$$

where

VMT_{ust} = car-miles traveled for use u in state s during year t , as used in formula (1) above

VMT_{uct} = car-miles traveled for use u in combination of states c during year t

This same merger of state data causes difficulties for the 1976 breakdown by region by income and for that by region by use, since the last two combinations mentioned above lie astride regional boundaries. The second combination was placed wholly in region 8, the third wholly in region 9, and corrections were made as follows:

$$VMT_{ir,76} = \frac{VMT'_{ir,76}}{VMT'_{r,76}} \sum_{ser} VMT_{s,76}$$

where

VMT_{irt} = car-miles traveled by persons in income class i in region r during year t , as used in formula (2) above

VMT'_{irr} = car-miles traveled by persons in income class i in region r during year t , as taken from File 9, which uses the grouping mentioned above

VMT'_{rt} = VMT'_{irt} summed over all income classes i

VMT_{st} = VMT_{ust} summed over all uses u

ser indicates that state s is in region r

316. Gasoline used for commuting to work, 1975, by state

For each SMSA (standard metropolitan statistical area), the 1975 Journey to Work Survey provides estimates of the number of trips of persons living in the central city within that SMSA, of persons living in the SMSA but outside the central city, and of persons living outside the SMSA (Table 1, Ref. 1). The vehicle-miles traveled nationwide by persons living in each of these three types of areas is computed from the person-miles traveled in one-way trips to work of those traveling

alone and of those traveling in a carpool. The latter figure is divided by the average number of travelers per carpool in each individual state, an average that varies from state to state. Consequently the resulting VMT estimate is indexed by state. This computation is carried out for 1975 only.

$$VMT_{a(s)} = 2 \left(PMT_a^{alone} + \frac{PMT_a^{pool}}{L_{as}} \right) (250 \text{ days/yr}) \quad (1)$$

where

$VMT_{a(s)}$ = vehicle-miles traveled nationwide by commuters driving to work from type of area a (see above for explanation), using the average number of riders per carpool that applies in state s

PMT_a^{alone} = person-miles traveled nationwide by commuters driving to work alone from type of area a (File 16)

PMT_a^{pool} = person-miles traveled nationwide by commuters driving to work in carpools or vanpools from type of area a (File 16)

L_{as} = average number of persons per carpool driving to work from type of area a in state s (File 19)

The vehicle-miles traveled by commuters in a particular state can now be estimated by taking a weighted average of the vehicle-miles traveled by residents of the three types of areas, and apportioning the result among the states according to the number of nonfarm employees in each state. The weights used are the estimated percentages of the population surrounding a given central city that occupy the three types of areas. It is assumed that these percentages are the same for the population surrounding a given city as they are for the state as a whole. For instance, it is assumed that the percentage of population commuting to Philadelphia that lives, say, in Philadelphia proper is the same as the percentage of Pennsylvania's commuting population that lives in central cities. Once the commuting VMT is computed for each state, it can be divided by an estimated miles per gallon to determine the gasoline use in that state. In order to reflect the fact that longer-distance driving gets better gas mileage, the miles per gallon figure used is made to depend on the type of area from which the commuter is traveling. The mileage figure used for commuters who live within the SMSA in which they work is an adjusted EPA city mpg estimate for autos or trucks, and the figure used for commuters living outside the SMSA is an adjusted EPA highway mpg estimate. The adjustments are based on a regression of actual on EPA fuel economies developed by McNutt et al. (Ref. 20). The mpg figures used in each state reflect the fleet mix of autos and light trucks in that state. The formulas are,

$$F_s = \frac{E_s}{E} \sum_a \left(VMT_{a(s)} \frac{P_{as}}{P_a} / MPG_{as} \right) \quad (2)$$

where

F_s = gasoline used in state s in 1975 by commuters to work;
includes both autos and light trucks

E_s = number of employees in nonagricultural establishments in
state s in 1975, from Table 675, Ref. 2 (File 14)

E = total number of employees in nonagricultural establishments
in the U.S. in 1975, from Table 675, Ref. 2 (File 14)

$VMT_{a(s)}$ is given by formula (1) above

P_{as} = percentage of the population of state s that lives in type
of area a in 1975 (i.e., in a central city, in an SMSA but
outside the contained central city, or in no SMSA), given
by formula (3) below

MPG_{as} = estimated miles per gallon for type of area a and state s
in 1975 (File 18)

$$P_{as} = \begin{cases} C_s (POP_s - POP_s^{out}) / POP_s & a = \text{inside central city} \\ (1 - C_s) (POP_s - POP_s^{out}) / POP_s & a = \text{inside SMSA} \\ & \text{but outside} \\ & \text{central city} \\ POP_s^{out} / POP_s & a = \text{outside central city} \end{cases} \quad (3)$$

where

C_s = percent of 1970 population residing in an SMSA in state s
that live in a central city, from Table 41, Ref. 3 (File 15)

POP_s = 1975 population of state s , from Table 19, Ref. 2 (File 17)

POP_s^{out} = 1975 population of state s living outside any SMSA, from
Table 19, Ref. 2 (File 17)

Input Data Files

File 1. U.S. cars in fleets of 10 or more, by type of fleet, 1967-76.
File name = FLEE10.310

Format: col.
1-2 year
4-6 company-owned cars in business fleets of 25 or more
8-11 leased cars in business fleets of 25 or more
13-15 company-owned cars in business fleets of 10-24
17-19 leased cars in business fleets of 10-24
21-23 cars in government fleets of 10 or more
25-27 cars in utilities fleets of 10 or more
29-31 cars in police fleets of 10 or more
33-35 cars in taxi fleets of 10 or more
37-39 cars in daily rental fleets of 10 or more
41-42 cars in driver school fleets of 10 or more
44-48 cars in all fleets of 4 or more
all numbers are in thousands and are right-justified integers

Source: Ref. 2, p. 22; Ref. 1, p. 16

File 2. U.S. cars in fleets of 4 or more, by state, 1975. File
name = FLEET4.310

Format: col.
1-2 FIPS state code (see Sec. 8.2), right-justified integer
4-9 number of cars in fleets of 4 or more (right-justified integer)

Source: Ref. 3, p. 43

File 3. Taxicabs in use and taxi-miles, taxicab industry estimates,
1970, 73, 75. File name = TAXI.310

Format: col.
1-2 year
10-15 number of taxicabs in use (right-justified integer)
21-27 annual vehicle-miles in thousands (right-justified integer)

Source: Ref. 4

File 4. Percent taking taxi to work, number of workers, by state, 1970.
File name = WORCAB.310

Format: col.
1-2 FIPS state code (see Sec. 8.2), right-justified integer
5-7 percent of state's workers who take the taxi to work
(decimal point in col. 6)
10-16 number of workers in state (right-justified integer)

Source: Ref. 5, Table 152

File 5. Fuel consumed by Federal government autos, 1967-76. File
name = FEDGAS.310

Format: col.
1-2 year
4-11 fuel consumed by sedans, gallons (right-justified
integer)
13-20 fuel consumed by station wagons, gallons (right-
justified)
22-28 fuel consumed by ambulances, gallons (right-justified)

Source: Ref. 6

File 6. Number of Federal civilian vehicles, by type, 1967-76. File
name = FEDCAR.310

Format: col.
1-2 year
4-5 FIPS state code (see Sec. 8.2), right-justified
7-10 number of automobiles (right-justified integer)
12-14 number of buses (right-justified)
16-20 number of trucks and tractor-trucks (right-justified)
22-24 number of motorcycles (right-justified)

Source: Ref. 7, Table MV-7

File 7. Gasoline sold for highway use, by state, 1967-76. File
name = GAS.310

Format: col.
Card 1: 1-2 state FIPS code (see Sec. 8.2), right justified
4-5 year
6-13 gallons (in thousands) of highway gasoline
15-16 year
18-24 gallons
26-27 year
29-35 gallons
37-38 year
40-46 gallons
48-49 year
50-57 gallons

Card 2: 1-2 state FIPS code
 4-5 year
 7-13 gallons
 15-16 year
 18-25 gallons (note irregularity of column spacing)
 27-28 year
 30-36 gallons
 38-39 year
 41-47 gallons
 49-50 year
 52-59 gallons

Source: Ref. 7, Tables MF-23 and MF-25

File 8. Car-miles by income by region, 1972, from National Travel Survey. File name = INRG72.310

Format: col.
 1-15 car-miles (left-justified integer), followed by a blank, followed by income class code*, followed by a blank, followed by region code**

*Income class codes:

1 - less than \$100
 2 - \$1000-1999
 3 - \$2000-2999
 4 - \$3000-3999
 5 - \$4000-4999
 6 - \$5000-5999
 7 - \$6000-7499
 8 - \$7500-9999
 9 - \$10,000-14,999
 10 - \$15,000-24,999
 11 - over \$25,000
 99 - no answer
 • - all incomes

**Region codes

1 - New England
 2 - Mid-Atlantic
 3 - South Atlantic
 4 - East North Central
 5 - East South Central
 6 - West North Central
 7 - West South Central
 8 - Mountain
 9 - Pacific
 • - all regions

Source: Ref. 18

File 9. Car-miles by income by region, 1977, from National Travel Survey. File name = INRG77.310

Format: col.
 1-26 region code* (1 or 2 digits, left-justified), followed by a blank, followed by income class code**, followed by a blank, followed by number of cars (integer), followed by a blank, followed by number of car-miles (integer)

**The income class codes are:

1 - less than \$2000
 2 - \$2000-2999

*Region codes

1 - New England
 2 - Mid-Atlantic

3 - \$3000-3999
 4 - \$4000-4999
 5 - \$5000-5999
 6 - \$6000-7999
 7 - \$8000-9999
 8 - \$10,000-11,999
 9 - \$12,000-14,999
 10 - \$15,000-19,999
 11 - \$20,000-24,999
 12 - \$25,000-34,999
 13 - \$35,000-49,999
 14 - \$50,000 or over
 • all incomes

3 - South Atlantic
 4 - East North Central
 5 - East South Central
 6 - West North Central,
 minus ND & SD
 7 - West South Central
 8 - Mountain, plus
 ND & SD, minus ID
 9 - Pacific, plus ID
 • all regions

Source: Ref. 18

File 10. Car-miles by income by purpose, 1972, from NTS. File
name = INPR72.310

Format: col.
1-15 car-miles (left-justified integer), followed by a
blank, followed by purpose code*, followed by a blank,
followed by income class code

*The purpose codes are:

- 1 - visit friends or relatives
- 2 - business and conventions
- 3 - outdoor recreation
- 4 - entertainment
- 5 - sightseeing
- 6 - personal & family affairs, other

Income class codes are those for File 8.

Source: Ref. 18

File 11. Car-miles by income by purpose, 1977, from NTS. File
name = INPR77.310

Format: col.
1-26 purpose code*, followed by a blank, followed by income
class code, followed by a blank, followed by number of
cars, followed by a blank, followed by number of
car-miles (all integers)

*The purpose codes are:

- 11 - visit friends or relatives
- 12 - business
- 13 - conventions
- 14 - recreation
- 15 - entertainment
- 16 - sightseeing
- 20 - other

The income class codes are those for File 9.

Source: Ref. 18

File 12. Car-miles by state by purpose, 1972, from NTS. File
name = STPR72.310

Format: col.
1-16 number of car-miles, followed by a blank, followed by
purpose code, followed by a blank, followed by FIPS
state code (all integers)

The purpose codes are those for File 10.

Source: Ref. 18

File 13. Car-miles by state by purpose, 1977, from NTS. File
name = STPR77.310

Format: col.
1-26 special state code*, followed by a blank, followed by
purpose code, followed by a blank, followed by number
of cars, followed by a blank, followed by number of
car miles (all integers)

The purpose codes are those for File 11.

*The state codes are:

01 - AL	28 - MS
04 - AZ	29 - MO
05 - AR	31 - NE
06 - CA	32 - NV
08 - CO	34 - NJ
09 - CT	35 - NM
10 - DE	36 - NY
11 - DC	37 - NC
12 - FL	39 - OH
13 - GA	40 - OK
15 - HA	41 - OR
17 - IL	42 - PA
18 - IN	44 - RI
19 - IO	45 - SC
20 - KS	47 - TN
21 - KY	48 - TX
22 - LA	49 - UT
23 - ME	50 - NH & UT
24 - MD	51 - VA
25 - MA	53 - AK, ID & WA
26 - MI	54 - WV
27 - MN	55 - WI
	56 - MT, ND, SD & WY

Source: Ref. 18

File 14. Nonagricultural employees by state, 1975. File name = EMP75.310

Format: col.
1-2 state FIPS code, right-justified
4-8 number of employees, thousands (right-justified integer)

Source: Ref. 15

File 15. Population in SMSA's, in central cities, and outside SMSA's, by state, 1970 Census. File name = POP70.310

Format: col.
1-2 state FIPS code (right-justified)
4-11 population inside SMSA's (right-justified integer)
13-19 population inside central cities (right-justified integer)
21-27 population outside SMSA's (right-justified integer)

Source: Ref. 16

File 16. Commuter person-miles by area of residence, 1975. File name = TOWORK.310

Format: col.
1 1 = driving alone, 2 = carpooling
3-6 miles driven twice a day to or from work in 1975; represents the median value of a range (decimal point in col. 5)
7-16 number of persons driving this distance twice a day who live in the central city (thousands, decimal point in col. 14)
17-26 number of persons driving this distance twice a day who live in an SMSA but not in the central city (thousands, decimal point in col. 24)
27-36 number of persons driving this distance twice a day who live outside any SMSA (thousands, decimal point in col. 34)

Source: Ref. 14

File 17. Population inside and outside metropolitan areas, by state, 1975. File name = POP75.310

Format: col.
1-2 state FIPS code (see Sec. 8.2), right-justified
4-9 population of metropolitan areas (SMSA's), right-justified integer
11-15 population living outside metropolitan areas, right-justified integer
all population figures in thousands

Source: Ref. 15

File 18. Estimated average miles per gallon for autos, by state, 1967-77.
File name = MPG.310

Format: col.
1-2 state alphabetic code (see Sec. 8.2), right-justified integer
4-69 11 fields of 6 columns each, corresponding respectively to average MPG in 1967, ..., 1977. A decimal point occupies the fourth position in each field.

Source: Axel Rose, ORNL

File 19. Commuter auto load factors, by region by type of area of residence, 1975. File name = LOAD.310

Format: col.
1 region code (see Sec. 8.2)
3-7 average number of persons per car in carpools whose participants live within central cities
9-13 persons per car, for persons who live in SMSA's but outside central cities
15-19 persons per car, for persons who live outside any SMSA (Standard Metropolitan Statistical Area)
A decimal point occurs in the second position of each of the last three fields.

Source: Ref. 14

File 21. Estimated average urban and rural miles per gallon for autos, by state, 1975. File name = MPG2.310 (File 20 is an output file)

Format: col.
1-2 state alphabetic code (see Sec. 8.2), right-justified
5-9 urban MPG (decimal point in col. 7)
11-15 rural MPG (decimal point in col. 13)

Source: Axel Rose, ORNL

Data Quality Numbers

Method 311. Commercial autos

all estimates

-- 3

Method 312. Taxicabs

national estimates	-- 2
state estimates	-- 3

Method 313. Federal autos

national estimates	-- 1
state estimates	-- 2

Method 314. Household autos

national estimates	-- 2
state estimates	-- 3

Method 315. Intercity travel

all estimates	-- 2
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Method 316. Commuting

all estimates	-- 3
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Method 320

BUS

Categories used: year 1967-76 (1967-77 for transit nationwide;
1976 only for transit by state
1967, 72, 76 only for intercity by
purpose)

mode highway.....bus.....school
other

sector commercial (i.e., intercity and transit)
government...civilian (i.e., school and Federal)

range intercity
local (i.e., transit, school and Federal)

fuel gasoline (except for transit by state)
distillate (diesel) oil
electricity (national figures only)

use passenger....business
personal..family business
social and recreational
civic, educational,
religious
other
(no breakdown into business,
personal, etc., for transit buses)

income sec Sec. 324 (for intercity buses only)

carrier common (i.e., transit and intercity)
private (i.e., school and Federal)

region and state (no breakdown for intercity)

The energy consumption of a bus is the energy content of the fuel the bus burns. Bus energy use is broken down into four modal subcategories, each of which uses one fuel type for the overwhelming majority of its operations and is either exclusively local or exclusively intercity in its range of operation. These are: (1) intercity common carriers, (2) local transit buses, (3) school buses, and (4) government buses (Federal civilian only). Data are available from the American Public Transit Association (APTA, Ref. 1) for both gasoline and diesel fuel use for many transit systems. The General Services Administration (GSA) reports that all Federally-owned buses use gasoline (Ref. 2), and it is assumed for these estimates that all school buses use gasoline while all

intercity buses use diesel oil. Breakdowns by bus size and weight are generally unavailable. Transit buses are presumed to be local in their range of operation as are Federal and school buses, while intercity buses are clearly just that.

The reader is warned that division of energy use by purpose or income group is problematic. Buses are multipassenger vehicles by definition and there is no obviously correct way to attribute responsibility for the fuel use to different passengers. What has been done here is to attribute fuel use according to passenger-miles of travel. (These passenger-mile data are available for intercity bus travel only.) It is particularly important to understand that if a certain group of people are attributed x% of the fuel use in this way, one cannot infer that total bus fuel use would be reduced by x% if these people were to quit riding the bus. The obvious reason is that all or most of the same buses might yet run with reduced loads and so consume nearly as much fuel as before.

321. School bus gasoline use, by state, 1967-76

All school buses are regarded as private (i.e., not common) carriers providing local transportation. The available data (Files 1, 2 and 3) cover school buses operated at public expense and consequently are likely to reflect a very few buses carrying private school children. Nonetheless all these buses are classified as part of the government sector, since government pays for them. There is no reasonable way to estimate the fuel use of buses funded privately, except to say it is a very small portion of school bus fuel use. The government sector estimate of school bus fuel use in fact serves, in the data base, as an estimate of fuel use in both the private and government sectors. School bus consumption in the commercial sector is taken, by definitional fiat, to be zero.

Total annual school bus miles traveled is available for almost all states for the years 1967-76 from the National Safety Council (Ref. 3, File 1) which also reports the number of school buses by state (Ref. 3, File 1). To obtain an estimate of school bus gasoline consumption this annual mileage is divided by an estimate of national average school bus miles per gallon obtained from Table VM-1 published by the Federal Highway Administration (Ref. 5, File 2):

$$F_{st} = \frac{VMT_{st}}{MPG_t}, \quad (1)$$

where

F_{st} = gallons of fuel consumed in state s during year t

VM_{st} = school bus miles traveled in state s during year t (File 1)

MPG_t = average national school bus miles per gallon in year t
(File 2)

For states where total school bus miles are missing for certain years, gasoline use is estimated based on the number of school buses registered (NSC statistics, File 1, where available, otherwise FHWA, Ref. 5, File 3) and on the state average miles per school bus for other years where data are available for that state. More precisely,

$$F_{st} = N_{st} vmt_s / MPG_t \quad (2)$$

where

N_{st} = number of school buses registered in state s in year t
(File 1 or 2)

vmt_s = the average of VM_{st} / N_{st} over the years t' for which VM_{st} and N_{st} are known.

N_{st} is taken directly from File 1 if it occurs there. Otherwise, the number of registered school buses reported in File 3 is adjusted to reflect the fact that registration statistics evidently provide incomplete coverage. The adjustment factor is the average ratio of the total number of school buses (as reported to the National Safety Council, File 1) to the number of registered buses, over the years in which both figures are available. That is, when N_{st} is not available in File 1,

$$N_{st} = R_{st} \frac{1}{n} \sum_{t'} (N_{st} / R_{st})$$

where

R_{st} = number of registered school buses in state s in year t (File 3)

n = number of years, 1967-76, in which N_{st} is reported to the National Safety Council

t' ranges over the years in which N_{st} is reported to the National Safety Council

If VM_{st} is not known for any year t' , the national average miles per school bus replaces the state average vmt_s . That is,

$$F_{st} = N_{st} \text{vmt}_t / \text{MPG}_t \quad (3)$$

where

vmt_t = average miles per school bus nationwide in year t (computed from File 1)

For years in which neither VMT_{st} nor number of buses is in the NSC data, the state is given the same share of total national school buses as it had in the most recent year for which data are available. That is,

$$F_{st} = \frac{N_{st}}{N_{t'}} N_{t'} \text{vmt}_t / \text{MPG}_t \quad (4)$$

where

$N_{t'}$ = number of school buses registered in the U.S. in year t' (File 1 or 3)

t' = latest year prior to year t for which N_{st} is known

322. Federal civilian bus gasoline use, by state, 1967-76

All Federal buses are presumed to transport passengers locally and their use is classified as use for business purposes. They are not classified as common carriers.

The General Services Administration (Ref. 2) reports annual gallons of gasoline consumed and average miles per gallon of Federally-owned buses for each year (File 4). These data are available at only the national level. The Federal Highway Administration, however, reports the number of federally-owned buses in each state for each year (File 3). These data may be used to obtain order of magnitude estimates of Federal bus gasoline use by state, by simply sharing the total national use among the states according to their percentage share of Federal bus registrations. That is,

$$F_{st} = \frac{N_{st}}{N_t} F_t$$

where

F_{st} = fuel consumed by Federal buses in state s during year t

N_{st} = number of Federal buses registered in state s in year t
(File 3)

N_t = total number of Federal buses registered nationwide (File 3)

F_t = total fuel consumed nationwide by Federal buses (File 4)

These buses are all civilian buses.

323. Transit bus fuel use, nationally 1967-76, diesel fuel use by state for 1976

While many transit bus systems are publicly owned and typically subsidized by public funds, their fuel use is classified here in the commercial sector. Transit buses are also classified as common carriers. The basic source of statistics on transit bus fuel use is the *Transit Operating Reports* published by APTA (Ref. 1, File 5). This annual document covers all but a few of the major public transit systems in the U.S. and the majority of transit bus operations. Operating statistics such as numbers of buses, bus and passenger-miles, and fuel use by type are reported for APTA member systems. There are unfortunately a few major and many minor systems which do not report (e.g., Seattle) and several systems (e.g., Boston) which report only combined fuel use data for all transit operations, including rail. As a result, the APTA data may cover only about two-thirds of transit bus fuel use, with a bias toward omission of the smaller systems.

Fortunately, data on the number of peak period buses for all 899 local transit operations in the U.S. are available from the U.S. Department of Transportation for 1977-78 (Ref. 6, 7, 8; File 6). The data are reported by state and urbanized area. It was decided to use these data to estimate fuel use in transit systems that do not report to APTA, simply by multiplying the number of buses in these systems by the average fuel usage per bus. The average usage per bus was estimated from the APTA data in the following way. The systems reporting to APTA were divided into five groups by population of urbanized area: (1) less than 10,000, (2) 100,000-250,000, (3) 250,000-500,000, (4) 500,000-1 million, and (5) over 1 million. Systems operating more than 500 buses were excluded from this grouping because virtually all of the systems missing from the APTA reports are small ones, and because systems with more than 500 buses exhibited widely differing levels of fuel use per peak period bus. The average fuel use per bus was calculated for each group, and these averages

were employed as estimates of fuel usage per bus in the systems not reporting to APTA.

Recall, however, that the Department of Transportation data on the number of buses operating is available only for 1977-78. The latest APTA data are for 1976. To make matters worse, the number of buses in operation varies considerably over the years. Consequently the method described above was used to estimate only 1976 transit fuel consumption. To attempt earlier years would be to risk considerable error in supposing that the number of buses operating in these years is similar to the number operating in 1977.

There appears to be no reliable way to estimate the state-by-state fuel consumption in years preceding 1976. As mentioned earlier, the APTA data compass only a fraction of the transit systems in operation. In 1976, for instance, the total diesel fuel consumption reported to APTA was 258.6 million gallons, which is only 66% of the actual consumption of 383.3 million gallons, as estimated in the way described above. In addition, prior to 1972 or so the consumption of gasoline becomes a significant fraction (10% or more) of fuel consumption, whereas in 1976 it accounts for only 1.3% of fuel consumption (Ref. 9, Table 17). In order to permit diesel consumption estimates in these earlier years, attempts were made to regress a system's diesel consumption on its number of buses, on the number of customers it serves, on both of these, and on the urbanized area population, in each case without success. Similar failure beset attempts to run regressions of a system's diesel use on its number of buses within individual regions, and a regression of a region's total diesel use on its total number of buses.

To sum up, a state's transit consumption of diesel fuel is computed:

$$F_{st} = \sum_{b \in s} F_{bt}$$

where

F_{bt} = diesel fuel used by transit buses in state s during year t

$F_{bt} = \begin{cases} \text{the fuel consumed by bus system } b, \text{ if it is reported to APTA} \\ \text{(File 5)} \\ N_{bt} \cdot f_{p_b t}, \text{ if } F_{bt} \text{ is not reported to APTA} \end{cases}$

N_{bt} = number of peak period buses operating in bus system b in year t (File 6, except where data are available from File 7)

$b \in s$ indicates that bus system b is in state s

$f_{p_b t}$ = average gallons consumed per bus during year t in cities in population group p_b , excluding cities that operate more than 500 buses (calculated from File 5)

p_b = the population group to which the city served by bus system b belongs

$t = 1976, \quad t' = 1977$

In the meantime, APTA provides estimates of national transit diesel and gasoline use for all the years 1967-77 (Ref. 9, Table 17), and these figures (File 8) are included in the data base (except for the 1976 diesel figure, which is estimated as above). The APTA estimates that in 1976, 389.2 million gallons of diesel oil and 5.2 million gallons of gasoline were burned by transit buses, showing close agreement with the 383.3 million gallons of diesel oil estimated using the method described above. The APTA also provides estimates (File 8) of transit electricity consumption nationwide for 1967-77, and these appear in the data base. Estimates of 1976 total transit energy use by state is based solely on the diesel consumption by state.

324. Intercity common carriers fuel use, 1967-76, by trip purpose by income class, 1967, 72, 76

For intercity commercial buses national fuel use estimates are available for 1972-77 from the American Bus Association (ABA) (Ref. 13, File 9). These estimates include Interstate Commerce Commission (ICC) regulated Class I, II, III companies and carriers in interstate service. They are based on fuel use data reported by the companies to the ICC. Total annual vehicle-miles traveled (VMT) for the same buses are also available in ABA publications covering 1967-76 (Ref. 10, File 9). ABA statistics indicate that intercity bus miles per gallon varied only from 6.06 to 6.22 over the period 1972-77. Thus fuel use for years prior to 1972 can reasonably be estimated from annual VMT and the 1972 figure of 6.07. Regional or state breakdowns are not available, and since the nature of these bus operations is intercity it would not be appropriate to estimate fuel use on the basis of state commercial bus registration data. All intercity common carriers are presumed to burn diesel fuel.

The National Travel Surveys (Ref. 4) for 1967, 72 and 77 can be used to obtain a division of passenger-miles of travel on intercity buses (viz., those making trips longer than 200 miles) by trip purpose or by income of traveler (File 10). The percentage of passenger-miles by purpose are used to share energy use among passengers by giving each passenger-mile an equal share of energy use. The mapping from the National Travel Survey trip purposes to the End Use data base categories is as follows.

End Use Data Base	1967 NTS	1972 NTS	1977 NTS
business	business and conventions	business conventions	business conventions
personal	personal and family affairs	personal and family affairs	personal or family affairs
...visits to friends and relatives		visit friends and relatives	
...outdoor recreation	outdoor recreation	outdoor recreation	outdoor recreation
...entertainment	entertainment	entertainment	entertainment
...vacation and sightseeing	sightseeing other pleasure	sightseeing	sightseeing
...family business	(none)	(none)	shopping
...other	no answer	other no answer	medical other

Income category breakdowns are similarly based on passenger-miles and utilize current dollars. The family income categories are:

Income group	Dollar range		1977
	1967	1972	
1	0-3999	0-4999	0-1999
2	4000-5999	5000-7499	2000-2999
3	6000-7499	7500-9999	3000-3999
4	7500-9999	10,000-14,999	4000-4999
5	10,000-14,999	15,000-up	5000-5999
6	15,000-up		6000-7499
7			7500-9999
8			10,000-11,999
9			12,000-14,999
10			15,000-19,999
11			20,000-24,999
12			25,000-34,999
13			35,000-49,999
14			50,000-up

Due to the incommensurability of the income categories, no income breakdown is provided for years other than 1967, 72 and 76. The 1977 NTS is used for the 1976 breakdown, without correction for inflation. Since the subcategories of the personal use category are likewise incomparable, only the business/personal USE2 breakdown is provided (and the USE3 breakdown is not provided) for years other than 1967, 72 and 76. Again, the 1977 survey is used for the 1976 estimates. The business/personal breakdown for the intervening years is estimated by interpolating linearly the breakdown in 1967, 72 and 77.

In fine, intercity bus fuel use is calculated according to the following formulas. When $t = 1967, \dots, 76$ and p is the personal or business category,

$$F_t = \begin{cases} F_t \text{ (as reported)} & \text{when } t \geq 1972 \\ VMT_t \cdot MPG_t & \text{when } t < 1972 \end{cases}$$

$$F_{pt} = \begin{cases} \frac{1}{5} F [pm_{p,1972}(1977 - t) + pm_{p,1977}(t - 1972)] & \text{when } t \geq 1972 \\ \frac{1}{5} VMT_t \cdot MPG_t [pm_{p,1967}(1972 - t) + pm_{p,1972}(t - 1967)] & \text{when } t < 1972 \end{cases}$$

When $t = 1967, 72$ or 76 and p is unrestricted,

$$F_{pt} = \begin{cases} F_t \cdot pm_{p,1977} & \text{when } t = 1976 \\ F_t \cdot pm_{pt} & \text{when } t = 1972 \\ VMT_t \cdot MPG_t \cdot pm_{pt} & \text{when } t = 1967 \end{cases}$$

$$F_{it} = \begin{cases} F_t \cdot pm_{i,1977} & \text{when } t = 1976 \\ F_t \cdot pm_{it} & \text{when } t = 1972 \\ VMT_t \cdot MPG_t \cdot pm_{it} & \text{when } t = 1967 \end{cases}$$

where

F_t = intercity common carrier fuel use during year t (File 9 for $t \geq 72$)

F_{pt} = intercity common carrier fuel use for purpose p during year t

F_{it} = intercity common carrier fuel use by persons in income class i during year t

VMT_t = total intercity bus-miles traveled nationwide in year t (File 9)

MPG_t = estimated miles per gallon for intercity buses during the years prior to 1972, set at 6.07 miles per gallon, the observed efficiency for 1972

pm_{pt} = fraction of passenger-miles traveled for purpose p in year t (from File 10)

pm_{it} = fraction of passenger-miles traveled by persons in income class i during year t (from File 11)

325. Private carrier fuel use

It is not known how much fuel is consumed by buses not operated as common carriers, with the exception of the school buses and Federal buses already canvassed. This gap in the data deprives us of consumption estimates for church buses and buses operated by institutions other than schools and the civilian branches of the Federal government.

Input Data Files

File 1. Number of buses and total bus mileage, by state 1967-76 (National Safety Council Survey), File name = SCHOOL.320

Format: cols.
1-2 year
4-5 state FIPS code (see Sec. 8.2), right-justified integer
7-15 number of school buses registered (right-justified integer); a period in col. 15 indicates missing data
17-25 school bus-miles traveled (right-justified integer); a period in col. 25 indicates missing data

Source: Ref. 3

File 2. Average miles per gallon for school buses, 1967-76. File name = SCHMPG.320

Format: cols.
1-70 10 fields of 7 columns each, each corresponding to a year in the period 1967-76, in chronological order. Each number contains a decimal point in the second column of the field. The file contains only one card.

Source: Ref. 5, Table VM-1

File 3. Number of buses by state in five classification, 1967-76. File name = BUSES.320

Format: cols.
1-2 state FIPS code (see Sec. 8.2), left-justified integer
10-11 year
20-29 number of commercial gasoline buses (left-justified integer)
30-39 number of commercial diesel buses (left-justified integer)
40-49 number of school buses (left-justified integer)
50-59 number of Federal buses (left-justified integer)
60-69 number of public school buses (left-justified integer)

Source: Ref. 5, Table

File 4. Federal bus fuel consumed and miles per gallon, 1967-76. File name = FED.320

Format: cols.
1-2 year
3-11 gallons of fuel consumed (right-justified integer)
12-15 miles per gallon (decimal point in col. 14)

Source: Ref. 2

File 5. American Public Transit Association data for transit buses, 1967, 71, 74, 75, 76. File name = APTA.320

Format: cols.
Card 1: 1-2 state FIPS code (see Sec. 8.2), right-justified integer
3-10 abbreviated name of transit system (characters)
12-15 month and year (month right-justified in 12-13)
17-19 system code number (right-justified integer), which has no special meaning
21-30 diesel fuel consumed by revenue equipment, line 15A* (dollars)
31-40 gasoline consumed by revenue equipment, line 16A* (dollars)
41-50 lubricating oil consumed by revenue equipment, line 17A* (dollars)
51-60 line service bus hours, line 7B*
61-70 special (charter) bus hours, line 8B*
71-80 nonrevenue bus-hours, line 9B*
Card 2: 1-10 line service bus-miles, line 3B*
11-20 charter bus-miles, line 4B*
21-30 nonrevenue bus-miles, line 5B*
31-40 gallons of diesel fuel consumed, line 12B*
41-50 diesel bus-miles, line 13B*
51-60 diesel bus-hours, line 14B*
61-70 gallons of gasoline consumed, line 15B*
76-77 year
78-80 system code number
Card 3: 1-10 gasoline bus-miles, line 16B*
11-20 gasoline bus-hours, line 17B*
21-30 gallons lube-oil, line 18B*
31-40 total revenue passengers, line 27B*
41-50 special (charter) passengers, line 28B*
51-60 total passengers carried, line 35B*
61-65 transit buses owned and leased, line 40B*
66-70 other buses owned and leased, line 41B*
71-75 intercity buses owned and leased, line 42B*

*denotes line numbers in Ref. 1, 1975. A indicates financial data, B indicates operating data. Numbers are sometimes left-justified, followed by a decimal point if there is room,

and other times right-justified without decimal point. A period somewhere in the field indicates a missing datum.

Source: Ref. 1

File 6. Number of buses in operation at peak hours (UMTA data), 1967, 71, 74, 75, 76. File name = UMTA.320

Format: cols.
1-2 FIPS state code (see Sec. 8.2), right-justified integer
3-10 abbreviated transit system name (characters)
11-35 five fields of 5 columns each, containing peak buses in operation respectively in 1967, 71, 74, 75 and 76 (right-justified integers); a period in the fifth column of a field indicates that the missing number is available in File 7
42-49 urban area population (right-justified integer)

Source: Ref. 6, 7, 8

File 7. Number of buses in operation at peak hours (APTA data), 1967, 71, 74, 75, 76. File name = APTA2.320

Format: cols.
1-2 state FIPS code (see Sec. 8.2), right-justified
3-10 abbreviated transit system name (characters)*
20-23 number of peak buses (right-justified integer); period in col. 23 indicates a missing datum
30-31 year
42-49 population of urban area (right-justified integer)
*the system abbreviations are standard codes that can be matched with the abbreviations in File 6.

Source: Ref. 1

File 8. Transit bus fuel consumption (APTA estimates), 1945-77. File name = APTA3.320

Format: col.
1-2 year
3-10 electric power consumed, millions of kwh (right-justified integer)
11-20 gasoline consumed, thousands of gallons (right-justified integer)
21-30 diesel fuel consumed, thousands of gallons (right-justified integer)
31-40 propane consumed, thousands of gallons (right-justified integer)

Source: Ref. 9, Table 17

File 9. Intercity bus passenger-miles, bus-miles and fuel use, 1967-76.
File name = NTRCTY.320

Format: col.

Card 1: 1-60 10 fields of 6 columns each, containing revenue passenger-miles in regular intercity service, respectively in 1967-76, Class I only (left-justified integers); figures in millions

Card 2: 1-60 10 fields of 6 columns each, containing vehicle-miles for 1967-76 respectively, Class I only (decimal point in fourth column of field); in millions

Card 3: 1-70 10 fields of 7 columns each, containing fuel consumption for 1967-76 respectively, Class I only (decimal point in fifth column of field); figures in millions of gallons

Card 4: 1-70 10 fields of 7 columns each, containing fuel consumption for 1967-76 respectively, Classes I, II and III (decimal point in fifth column of field); figures in millions of gallons (original data for 1972-76 only)

Card 5: 1-60 10 fields of 6 columns each, containing bus-miles in millions for 1967-76 respectively, Classes I, II and III (decimal point in sixth column of field)

The file contains only five cards.

Source: Ref. 10 (Cards 1-3), Ref. 14 (Cards 4-5)

File 10. Passenger-miles by trip purpose (National Travel Survey), 1967, 72, 77. File name = PURPOS.320

Format: col.

1-2 purpose code*, right-justified

4-5 year

7-18 passenger-miles (round-trip passenger-miles for 1977), right-justified integer

*the codes are as follows:

1977 codes: 1 - business 6 - outdoor recreation
2 - convention 7 - personal or family affairs
3 - entertainment 8 - shopping
4 - medical 9 - sightseeing
5 - other 10 - visit relatives or friends

1972 codes: 1 - visit friends or relatives
2 - business and conventions
3 - outdoor recreation
4 - sightseeing and entertainment
5 - other

1967 codes: 1 - business and convention
2 - visits to friends and relatives
3 - outdoor recreation
4 - entertainment and sightseeing
5 - other pleasure

6 - personal and family affairs
7 - no answer

Source: Ref. 11 (1967 and 72) and 12 (1977)

File 11. Passenger-miles by income class (National Travel Survey), 1967,
72, 77. File name = INCOME.320

Format: col.
1-19 income class code (1 or 2 digits)*, followed by a blank,
followed immediately by an integer showing the number
of passenger-miles traveled on intercity buses by
persons whose family is in that income class
20 year
*the income class codes are indicated in Sec. 324.

Source: Ref. 11 (1967 and 72) and 12 (1977)

Data Quality Numbers

Method 321. School buses	-- 2
Method 322. Federal buses	-- 1
Method 323. Transit buses	-- 3
Method 324. Intercity buses	-- 1

References

1. American Public Transit Association, *Transit Operating Report*, annually.
2. General Services Administration, *Federal Motor Vehicle Fleet Report*, annually.
3. National Safety Council, *Accident Facts*, 1973, p. 93.
4. National Travel Survey.
5. Federal Highways Administration, *Highway Statistics*, U.S. Department of Transportation, annually.
6. U.S. Department of Transportation, *Directory of Regularly Scheduled, Fixed-Route, Local Public Transportation Service in U.S. Urbanized Areas over 200,000 Population*, December 1978.
7. Urban Mass Transit Administration, "Transit Data for 173 Urbanized Areas between 50,000 and 200,000 Population," Technical Notice #6-77, released August 11, 1977.
8. UMTA, "Non-Urbanized Areas of Less than 50,000 Population with Fixed-Route, Local Bus Service Scheduled Every Weekday, Available to the General Public," Technical Notice #9-78, released May 3, 1978.
9. American Public Transit Association, *Transit Fact Book*, 1977-78 edition.
10. American Bus Association, *America's No. 1 Passenger Transportation Service*, 1976, Table 1, p. 26.
11. Bureau of the Census, *1972 Census of Transportation*, Vol. 1: National Travel Survey, 1967 (Table 12) and 1972 (Table 4).
12. Bureau of the Census, National Travel Survey 1977 data tape, available from Customer Services Branch, Data User Services Division, Bureau of the Census, Washington, D.C. 20233.
13. American Bus Association, letter of Frederick H. Mueller to Axel Rose, Aug. 14, 1978.

Method 330

TRUCK

Categories used (see next page for breakdowns available):

<u>year</u>	1967-76		
		(weight class)	(body type)
<u>mode</u>	highway...truck....	light (under 10,000 lb..... gross vehicle weight)	pickup, panel, multi-stop, walk-in
		medium (10,000-20,000 lb)	platform
		light-heavy (20,000- 26,000 lb)	carrie rack
		heavy-heavy (over 26,000 lb)	insulated, nonrefrigerated van
		(for Federal trucks only:)	insulated,
		light (under 12,500 lb)	refrigerated
		medium (12,500-17,000 lb)	van
		light-heavy (over 17,000 lb)	furniture van, open top van other enclosed van
			beverage truck
			utility truck
			garbage truck
			winch or crane
			wrecker
			pole or logging truck
			auto transport truck
			dump truck
			tank truck (liquids)
			tank truck (dry bulk)
			concrete mixer
			other
<u>sector</u>	commercial		
	government (Federal government civilian only)		
<u>range</u>	intercity		
	local		
<u>fuel</u>	gasoline		
	diesel oil		
	other (i.e., LPG)		

<u>use</u>	passenger	
	nonpassenger...freight.....	agriculture
		construction
		manufacturing
		wholesale and retail trade
		utilities
		for hire
		forestry and lumber
		mining
		other
	services	

region and state

Breakdowns available, 1967-76:

Household and commercial fuel use,
 by sector by fuel by range by weight class by body type (Method 331)
 by sector by fuel by range by state (Methods 332, 333, 334)

Household and commercial intercity fuel use,
 by sector by fuel by weight class by use (Method 335)

Household and commercial intercity gasoline use,
 by sector by weight class by state (Method 334)

Federal government civilian fuel use,
 by weight class by state (Method 336)

All commercial fuel use is classified under the nonpassenger use category.

N.B. Beware. All household and commercial truck fuel use estimates are based on comprehensive surveys for the years 1967 and 1972 only. Estimates for the intervening years 1968-71 are derived by allotting to each category of fuel consumption an interpolated fraction of reported highway fuel used in those years. Estimates for 1973-76 are similarly based on extrapolation of these fractions. Consequently the 1967 and 1972 estimates alone represent genuine data, and the rest should be interpreted with extreme caution. They are provided for the convenience of those who may find such interpolations useful. (Extrapolation to 1976 was necessary because the 1977 Truck Inventory and Use Survey tape had not been received by the completion of this project. The incorporation of the 1977 data would improve the 1973-76 estimates considerably.)

N.B. The fuel use reported for each USE and RANGE category is the total fuel use of trucks whose operation falls primarily into that category. Local fuel use, for instance, represents the total fuel used by trucks that usually operate locally.

N.B. Household truck fuel use is defined here as the total fuel consumption of trucks described in the Truck Inventory and Use Survey as used primarily for personal transportation — i.e., of trucks "used in place of an automobile to go from home to work; for outdoor recreation; camping; fishing; etc." The dramatic rise in intercity truck fuel use in the household sector between 1967 and 1972 should be interpreted with this in mind.

More complete information is available for trucks and truck use than for any other highway vehicle type. The 1967 and 1972 Truck Inventory and Use Surveys (TIUS, Ref. 1), conducted by the Bureau of the Census as part of the Census of Transportation, contains information on annual miles traveled and number of trucks by state, range of operation, major use category, size, fuel type and other characteristics. The sample contains over 100,000 trucks, enabling fairly detailed breakdowns even at the state level. Government trucks, however, are not included in the survey. The TIUS, together with Federal government fleet statistics (Ref. 2) and Federal Highway Administration statistics on numbers of publicly owned vehicles (Ref. 3) comprise the basic data sources for estimating truck fuel use.

1. Household and commercial sectors, Methods 331-35

From the TIUS, numbers of trucks and annual vehicle-miles of travel are obtained for 11 use categories, 3 fuel types, 4 weight categories, and 3 ranges of operation (see above). These data are currently available for 1967 and 1972. (At the time this study was completed, the 1977 survey tape had still not been received.) Intervening years are estimated by linear interpolation of shares of highway fuel use by fuel type between survey years. The years 1973-76 are similarly estimated by extrapolation. That is,

$$F_{fct} = \frac{1}{5} \left[(1972 - t) \frac{F_{fc,1967}}{F_{f,1967}} + (t - 1967) \frac{F_{fc,1972}}{F_{f,1972}} \right] \cdot F_{ft} \quad (1)$$

where

F_{fct} = consumption of fuel f in category c during year t; c can be any category or intersection of categories for which fuel use might be estimated (except state and year categories), such as light trucks or intercity diesel-burning heavy-heavy trucks

F_{ft} = total consumption of fuel f in year t (Files 8, 11)

For data broken down by state, a more accurate interpolation can be had by using the total fuel consumption figures in each state:

$$F_{fcst} = \frac{1}{5} \left[(1972 - t) \frac{F_{fcs,1967}}{F_{fs,1967}} + (t - 1967) \frac{F_{fcs,1972}}{F_{fs,1972}} \right] \cdot F_{fst} \quad (2)$$

where

F_{fcst} = consumption of fuel f in category c in state s during year t

F_{fst} = consumption of fuel f in year t

However, if this is done the total fuel use, summed over a breakdown by state, would not equal other summations that ought to yield the same total. That is, we would have

$$\sum_c \sum_s F_{fcst} \neq \sum_c F_{fct}$$

For this reason formula (2) is not used, and formula (1) serves as the interpolation formula for all categories.

The use of formula (1) to extrapolate beyond 1972 yields negative estimates in certain categories of fuel use, namely those in which the consumption level dropped drastically between 1967 and 1972. Most of the negative numbers occur in rather disaggregate categories of LPG use. The tables and data tapes record a zero in place of every negative number, since it may be assumed that a quantity that had been shrinking so rapidly prior to 1972 would remain close to zero after 1972. Aggregate data, however, are computed by summing the original negative numbers rather than zeros. This means, for instance, that the recorded LPG use for individual truck body types in 1976 may sum to a figure larger than that recorded for all body types, since some of the extrapolated estimates for individual body types may have been negative. This method of summation is followed so that formula (1) will remain valid for all categories c, aggregate or disaggregate. In the meantime, it is to be admitted that extrapolation is not a happy way to estimate fuel use, even if it is only extrapolation of relative rather than absolute amounts. The incorporation of 1977 data into the computations would enormously upgrade the estimates for 1973-76.

The TIUS includes both commercial and household truck use. It is assumed that the use of trucks in the household sector is equivalent to the TIUS major use category "personal transportation." It is not clear from the TIUS survey instrument whether this question may have been interpreted by some firms to mean the transportation of persons rather than transportation in personal trucks. It is likely, however, that any such definitional problem is of minor consequence. The remainder of the

TIUS major use categories are considered to represent use of trucks in the commercial sector.

General Method

Since the TIUS data provide vehicle-miles of travel by state, use, fuel, weight and range of operation, fuel consumption in these categories can (generally speaking) be estimated by dividing the vehicle-miles of travel in a certain category by the fuel efficiency of trucks in that category. That is,

$$F_{sct} = \frac{VMT_{sct}}{MPG_c} \quad (3)$$

where

F_{sct} = fuel consumption in state s in category (or intersection of categories) c during year t

VMT_{sct} = truck-miles of travel in state s in category c during year t

MPG_c = miles per gallon in category c

Estimates of miles per gallon for each weight class for gasoline and diesel powered trucks by range of operation were obtained (Ref. 4). LPG-powered truck miles per gallon estimates were calculated by assuming that diesel and LPG vehicles achieved the same miles per Btu. Thus diesel miles per gallon were multiplied by the ratio of LPG to diesel Btu content per gallon. That is,

$$MPG_{rw,LPG} = \frac{H_{LPG}}{H_{diesel}} MPG_{rw,diesel} \quad (4)$$

where

MPG_{rwf} = average miles per gallon achieved by trucks in weight class w operating over range r and burning fuel f (File 7)

H_f = heat content of fuel f, in Btu/gal (see Sec. 2.1)

331. Household and commercial truck fuel use nationwide, by sector by fuel by weight by body type by range of operation, 1967-76

It is possible at the national level to estimate energy use for 21 body type categories by fuel type, weight and range of operation.

$$F_{fwbrht} = \frac{VMT_{fwbrht}}{MPG_{fwr}}, t = 1967, 72 \quad (5)$$

where

F_{fwbrht} = consumption (nationwide) of fuel f by trucks in weight class w, having body type b, operating over range r, and in sector h in year t

VMT_{fwbrht} = vehicle-miles traveled by trucks using fuel f, in weight class w, having body type b, operating over range r, and in sector h in year t (Files 5, 6)

MPG_{fwr} = average miles per gallon achieved by trucks using fuel f, in weight class w and operating over range r (File 7)

Truck diesel and LPG fuel use together with bus diesel fuel use must add up to total highway diesel fuel and special fuel (LPG) use at the national level. To provide for this, intercity truck diesel fuel use is normalized by multiplying it by the ratio of (a) actual highway diesel and special fuel use minus local truck diesel and LPG use minus bus diesel use to (b) the estimated total intercity truck diesel fuel use. The formula (5), then, must be amended for the calculation of intercity diesel fuel use:

$$F'_{wbht} = F_{diesel,wb,intercity,ht} \frac{H_t - L_t - B_t - IL_t}{D_t}, t = 1967-76 \quad (6)$$

where

F'_{wbht} = adjusted national consumption of diesel fuel by intercity trucks in weight class w, having body type b and in sector h during year t

VMT_{wbht} = truck-miles of travel by intercity trucks using diesel fuel and in weight class w, having body type b and in sector h during year t

MPG_w = average miles per gallon of intercity diesel trucks in weight class w

H_t = total sales of diesel and special fuel for highway use during year t (File 8)

L_t = total local truck consumption of diesel fuel and LPG during year t [from formula (5) above]

B_t = total bus consumption of diesel fuel in year t

D_t = total diesel fuel used by intercity trucks in year t, as calculated by formula (5) above

t = total LPG used by intercity trucks in year t, as calculated by (5)

Note that this adjustment is made in the interpolated and extrapolated estimates as well as in the 1967 and 72 estimates.

It is interesting to compare the intercity diesel truck fuel use before and after adjustment. The results are as follows.

Thousands of barrels of diesel fuel		
	1967	1972
Total reported highway diesel fuel use (FHWA)	120,232	202,843
Less estimated bus diesel fuel and LPG use (Method 320)	12,436	11,244
Less estimated total local truck diesel fuel and LPG use, using formula (5) above	16,779	34,412
Less estimated intercity truck LPG use, from formula (5)	<u>905</u>	<u>1,070</u>
Yields approximate intercity truck diesel fuel use	90,112	156,117
Less intercity truck diesel fuel use estimated by formula (5)	<u>97,003</u>	<u>142,665</u>
Yields adjustment necessary	-6,891	+13,452
...as % of highway diesel use	-5.7%	+6.6%
...as % of estimated intercity truck diesel fuel use	-7.1%	+9.4%

The adjusted intercity truck diesel fuel use, then, is got by decreasing the formula (5) estimate by 7.1% for 1967 and increasing it by 9.4% for 1972. These results suggest that, even before the adjustment in formula (6) is made, the ORNL estimates both of total highway diesel use and of intercity truck diesel use are accurate to within $\pm 10\%$. One can be fairly confident, then, that the adjusted figures are similarly accurate, at least for the survey years 1967 and 1972. The highly disaggregated estimates, however, are another matter entirely, and the data quality numbers reflect this.

332. Local household and commercial truck fuel use, by sector by fuel by state, 1967-72

Energy use estimates at the state level for local trucks can be made and broken down by sector (household or commercial) by fuel type. First, miles per gallon estimates by sector by fuel type at the national level were developed by taking the weighted harmonic mean fuel efficiency across weight classes for each sector. For each sector the fractions of truck-miles by weight class were used as weighting factors. Given these miles per gallon estimates by sector, fuel consumption was simply derived by dividing sector truck-miles by miles per gallon for each fuel type. In notation,

$$F_{sfht} = \frac{VMT_{sfht}}{MPG_{fht}} \quad (7)$$

where

F_{sfht} = consumption of fuel f by local trucks in state s and sector h during year t

VMT_{sfht} = vehicle-miles traveled by trucks burning fuel f in state s and sector h during year t (Files 3, 4)

$$MPG_{fht} = VMT_{fht} \left[\sum_w VMT_{fwht} (MPG_{fw})^{-1} \right]^{-1}$$

VMT_{fwht} = total vehicle-miles traveled by trucks in weight class w burning fuel f in sector h during year t (Files 5, 6)

VMT_{fht} = total vehicle-miles traveled by trucks burning fuel f in sector h during year t (Files 5, 6)

MPG_{fw} = average miles per gallon of trucks burning fuel f and in weight class w (File 7)

333. Intercity household and commercial truck diesel fuel use, by state, 1967-76

The TIUS data are reported by state of registration. While it is certainly reasonable to attribute fuel use by local trucks and perhaps even short haul trucks to their state of registration, this method is clearly inappropriate for trucks in long-haul operations. Such trucks traverse state boundaries as a rule, so that the location of their fuel purchases is unknown. (Experimentation with attributing long-haul fuel use to state of registration confirmed this judgment. Trucks registered

in Delaware in 1975, for example, were estimated to have consumed approximately four times as much diesel fuel as was actually sold in the state.) For this reason, the TIUS data are not directly used to determine state fuel sales for intercity trucking. Instead local truck diesel use, and bus diesel fuel and LPG use are subtracted from total state diesel and LPG fuel sales for highway use. The remainder represents sales of diesel fuel and LPG to intercity (i.e., short- and long-haul) trucking in the state. Sales of diesel fuel alone is got by adjusting this remainder to account for the national proportion of intercity truck diesel and LPG use represented by consumption of diesel fuel alone. More succinctly,

$$F_{st} = (H_{st} - L_{st} - B_{st}) \frac{I_t - IL_t}{I_t}, t = 1967-76 \quad (8)$$

where

F_{st} = consumption of diesel fuel by intercity trucks in state s during year t

H_{st} = sales of diesel and special fuel for highway use in state s during year t (File 8)

B_{st} = consumption of diesel fuel and LPG by buses in state s during year t [see formula (9) below]

L_{st} = consumption of diesel fuel and LPG by local trucks in state s during year t (as estimated in Method 332 above)

I_t = estimated national consumption of diesel fuel and LPG by intercity trucks in year t (Method 331)

IL_t = estimated national consumption of LPG by intercity trucks in year t (Method 331)

Since Method 320 estimates bus diesel fuel and LPG use on a national level only, it is necessary somehow to obtain a state-by-state breakdown. For present purposes it suffices simply to allot bus diesel fuel and LPG use to the states in proportion to the number of commercial diesel fuel buses registered in each state:

$$B_{st} = (T_t + I_t) (N_{st} / N_t) \quad (9)$$

where

T_t = national transit bus diesel fuel and LPG use in year t (Method 323)

I_t = national intercity bus diesel fuel use in year t (Method 324)

N_{st} = number of commercial diesel buses in state s in year t
(File 3, Method 320)

N_t = number of commercial diesel buses nationally in year t
(File 3, Method 320)

The resulting numbers are obviously too crude to serve as state estimates of bus diesel fuel use. But since buses consume less than a fifth as much diesel fuel as intercity trucks, these estimates are accurate enough to calculate the residual that is taken here to be intercity truck diesel fuel consumption.

334. Intercity household and commercial truck gasoline use, by state by sector by weight class, 1967-76

Diesel fuel is by far the predominant fuel used in long-haul trucking. According to the 1972 TIUS, diesel trucks account for over 80% of long-haul truck-miles although they comprise only about half of all trucks reporting that range of operation. Their share of long-range fuel use will be even greater, though, since 95% of the heaviest weight class trucks in long-range use are diesels. Gasoline powered trucks in long-haul use tend to be less than 20,000 lb gross vehicle weight, the majority being light trucks and thus using less fuel per vehicle-mile. There is no obvious way to allocate their fuel use to states. It is assumed here that their fuel purchase patterns will follow those of diesel long-haul trucks. The total national fuel use by these vehicles is first computed by dividing total vehicle-miles by estimated miles per gallon for each weight class, and these totals are then allotted to each state in proportion to long-haul diesel fuel use. Or,

$$F_{swht} = \frac{D_{st}}{D_t} \cdot \frac{VMT_{wht}}{MPG_w}, \quad t = 1967, 72 \quad (10)$$

where

F_{swht} = consumption of gasoline by intercity trucks of weight class w in sector h in state s during year t

D_{st} = consumption of diesel fuel by long-haul trucks in state s during year t (Method 333)

D_t = national consumption of diesel fuel by long-haul trucks during year t (Method 333)

$VM_{wh,t}$ = vehicle-miles traveled nationwide by gasoline-burning intercity trucks of weight class w in sector h during year t (Files 5, 6)

MPG_w = average miles per gallon of gasoline-burning intercity trucks of weight class w (File 7)

There is no way to assess the accuracy of this allocation of fuel use, due to lack of data.

335. Intercity household and commercial truck fuel use nationwide, by sector by use by fuel by weight class, 1967-76

At the national level the TIUS data can be used straightforwardly to estimate intercity truck fuel consumption by sector, use, fuel type and weight class:

$$f_{hfwut} = \frac{VM_{hfwut}}{MPG_{fw}}, \quad t = 1967, 72 \quad (11)$$

where

F_{hfwut} = consumption of fuel f by intercity trucks of weight class w for use u in sector h during year t

VM_{hfwut} = vehicle-miles traveled for use u by intercity trucks of weight class w burning fuel f in sector h during year t (Files 1, 2)

MPG_{fw} = average miles per gallon of intercity trucks of weight class w burning fuel f (File 7)

Again, trucks designated as short-haul or long-haul in TIUS are considered to be intercity trucks. As in Method 331, intercity diesel fuel use is adjusted so as to sum to the difference between highway diesel and special fuel use and the combined diesel fuel and LPG use of local trucks and of buses. That is,

$$F'_{hfwut} = F_{h,diesel,wut} \cdot \frac{H_t - L_t - B_t - IL_t}{D_t} \quad (12)$$

where

H_t = total sales of diesel and special fuel for highway use in year t (File 8)

L_t = total local truck consumption of diesel fuel and LPG during year t (Method 332)

B_t = bus diesel fuel consumption in year t (Method 320, File 12)

IL_t = estimated intercity truck LPG use in year t [from formula (11)]

336. Federal government civilian truck fuel use, by state, 1967-76

Data on truck use in the government sector are sparse. For the Federal government, national total fuel consumption and average miles per gallon by truck weight classes (less than 12,500 lbs, 12,500-17,000 lb, more than 17,000 lb) are available (Ref. 2), but only total numbers of Federal trucks are available by state. Thus it is possible to report this fuel use by weight class at the national level, but only use by all trucks can be estimated at the state level. State level estimates are generated by assuming that VMT and miles per gallon do not vary across states, so that fuel use is proportional to the number of trucks. An estimate of only order of magnitude accuracy results.

$$F_{swt} = \frac{N_{st}}{N_t} F_{wt} \quad (13)$$

where

F_{swt} = consumption by Federal government trucks of weight class w in state s during year t

N_{st} = number of Federal government trucks in state s during year t (File 9)

N_t = number of Federal government trucks nationwide in year t (File 9)

$F_{wt} = VMT_{wt} / MPG_w$

VMT_{wt} = vehicle-miles traveled by Federal government trucks of weight class w during year t (File 10)

MPG_w = miles per gallon of Federal government trucks of weight class w (File 10)

For purposes of converting fuel consumption to energy consumption, it is assumed that all trucks less than 12,500 burn gasoline, half between 12,500 and 17,000 lb burn gasoline and half diesel fuel, and all trucks over 17,000 lb burn diesel fuel. The resulting errors are smaller than the errors in the estimation of fuel use.

At the state government and local government level the situation is even worse. Data on VMT and fuel use by vehicle type are generally unavailable and, of course, there are no average national figures. Only numbers of trucks and tractor-trucks registered to state, county and municipal governments combined are available. In an effort to obtain some usable data, letters were sent to all state energy offices requesting any information available on fuel use by government vehicles in the state. Of the 51 letters mailed, 19 responses were received, the majority indicating that they hadn't the vaguest notion of what state, let alone local, government vehicle fuel usage was. Those which were able to supply statistics varied widely both in the level of detail of the data and the quantity of fuel use per vehicle which they implied. The North Carolina Department of Commerce, for example, estimated gasoline and diesel fuel use by state government vehicles at 40 million gallons for 1978. Ohio, a larger state, is believed by its energy office to use 17 million gallons. New York reported 160 million gallons for gasoline use by state and municipal vehicles, comprising 2.1% of total gasoline sales in the state. It appears that state and local government use is substantially greater than Federal government use. Unfortunately, the inconsistent figures for fuel use by vehicle of a given type makes it impossible to estimate state level breakdowns of state and local government energy use by trucks.

Input Data Files

File 1. Truck-miles traveled, by weight class by range by fuel by use, 1967. File name = USE67.330

Format: 4 groups of 9 records, corresponding respectively to light, medium, light-heavy and heavy-heavy trucks (see categories at beginning of Method 330 for definition of weight classes), each group containing 3 groups of 3 records, corresponding respectively to gasoline, diesel fuel and LPG, each group containing 3 records, corresponding to local, short-haul and long-haul travel, each record having the format:

col.
1-132 12 fields of 11 columns each, showing thousands of truck-miles, corresponding respectively to the following uses: personal, agriculture, forestry, mining, construction, manufacturing, wholesale/retail, utilities, services, for-hire, other, short-term lease (right-justified, decimal point in last column of field)

Source: Ref. 1

File 2. Truck-miles traveled, by weight class by range by fuel by use, 1972. File name = USE72.330

Format: same arrangement as File 1, except that each record has the format:

col.

1-132 11 fields of 12 columns each, showing tens of truck-miles, corresponding respectively to the following uses: agriculture, forestry, mining, construction, manufacturing, wholesale and retail trade, for-hire, personal, utilities, services, other

Source: Ref. 1

File 3. Truck-miles traveled locally, by state by fuel by sector by body type, 1967. File name = STAT67.330

Format: 5 groups of 6 record pairs, corresponding respectively to the 5 each group containing 3 groups of 2 record pairs, corresponding respectively to gasoline, diesel fuel and LPG, each group containing 2 record pairs, corresponding respectively to household and commercial, each record pair having the format:

col.

Record 1 1-121 11 fields of 11 columns each, showing thousands of truck-miles, corresponding respectively to the following 11 body types: multistop, platform, cattle rack, insulated nonrefrigerated, insulated refrigerated, furniture, open top, all other vans, beverage, garbage, winch (right-justified, decimal point in last column of field)

Record 2 1-109 one field of 10 columns followed by 9 fields of 11 columns each, showing truck-miles, corresponding respectively to the following 10 body types: wrecker, pole, auto, utility, pickup/panel, dump, tank (liq), tank (dry), concrete, other (right-justified, decimal point in last column of field)

Each of the 5 groups of 6 record pairs is preceded by an additional record showing the FIPS state code, right-justified, in col. 1-2.

Source: Ref. 1

File 4. Truck-miles traveled locally, by state by fuel by sector by body type, 1972. File name = STAT72.330

Format: same as File 3, except that the figures represent tens of truck-miles and the body types are:

Record 1 pickup or multistop or panel, platform with added device, other platform, cattle rack, insulated nonrefrigerated, insulated refrigerated, furniture, open top, other vans, beverage, utility

Record 2 garbage or refuse, winch, wrecker, pole, auto, dump, tank (liq), tank (dry), concrete, other

Source: Ref. 1

File 5. Truck-miles traveled, by weight class by range by fuel by sector by body type. File name = BODY67.330

Format: 4 groups of 18 record pairs, corresponding respectively to light, medium, light-heavy and heavy-heavy, each group containing 3 groups of 6 record pairs, corresponding respectively to gasoline, diesel fuel, LPG, each group containing 3 groups of 2 record pairs, corresponding respectively to local, short-haul, long-haul, each group containing 2 record pairs, corresponding to the household and commercial sectors, each pair of records having the same format as pairs in File 3

Source: Ref. 1

File 6. Truck-miles traveled, by weight class by range by fuel by sector by body type. File name = BODY72.330

Format: 4 groups of 18 record pairs, corresponding respectively to light, medium, light-heavy and heavy heavy, each group containing 3 groups of 6 record pairs, corresponding respectively to local, short-haul, long-haul, each group containing 3 groups of 2 record pairs, corresponding respectively to gasoline, diesel fuel, LPG, each group containing 2 record pairs, corresponding to the household and commercial sectors, each pair of records having the same format as pairs in File 4

Source: Ref. 1

File 7. Truck-miles per gallon estimates, by weight class by range by fuel. File name = MPG.330

Format: col.

Card 1 1-23 MPG estimates for local gasoline-burning trucks, respectively for light, medium, light-heavy and heavy-heavy trucks

Card 2 1-24 MPG estimates for intercity gas-burning trucks, one estimate for each weight class

Card 3 1-23 MPG estimates for local diesel-burning trucks, one estimate for each weight class

Card 4 1-23 MPG estimates for intercity diesel-burning trucks, each weight class

Card 5 1-23 MPG estimates for local LPG-burning trucks, each weight class

Card 6 1-23 MPG estimates for intercity LPG-burning trucks, each weight class

All figures are separated by at least one blank and have a decimal point followed by two digits.

Source: Ref. 4

File 8. Diesel and special fuel consumption for highway use, by state, 1967-76. File name = DIESEL.330

Format: col.
 1-2 state alphabetic code (see Sec. 8.2)
 3-72 10 fields of 7 columns each, corresponding respectively to 1967, 68, ..., 76 (right-justified integers); fuel use in thousands of gallons

Source: 1967-74: Ref. 3, Table MF-225; 1975: Ref. 5, Table MF-25; 1976: Ref. 5, Table MF-1

File 9. Number of Federal government vehicles, by vehicle type by state, 1967-76. File name = FED.330

Format: col.
 1-2 year
 4-5 state FIPS code, right-justified (see Sec. 8.2)
 7-10 number of autos (right-justified integer)
 12-14 number of buses (right-justified integer)
 16-20 number of trucks (right-justified integer)
 22-24 number of motorcycles (right-justified integer)

Source: Ref. 2

File 10. Average miles per gallon and gallons of fuel consumed by Federal trucks nationwide, by weight class, 1967-76. File name = FEDGAL.330

Format: col.
 1-2 year
 4-44 six numbers, each two separated by one blank, corresponding to:
 MPG for trucks under 12,500 lb (one digit after decimal point)
 MPG for trucks between 12,500 and 17,000 lb (ditto)
 MPG for trucks over 17,000 lb (ditto)
 gallons used by trucks under 12,500 lb (integer)

gallons used by trucks between 12,500 and 17,000 lb
(integer)
gallons used by trucks over 17,000 lb (integer)

Source: Ref. 2

File 11. Total highway consumption of gasoline, by state, 1967-76.
File name = GAS.330

Format: see File , Method 310.

File 12. Bus diesel fuel and LPG consumption, 1967-76. File
name = BUS.330

Format: col.

1-4 intercity bus diesel fuel consumption, in thousands
 of bbl
6-9 transit bus diesel fuel consumption, in thousands
 of bbl
11-13 transit bus LPG consumption, in thousands of bbl (all
 numbers are left-justified integers)

There are 10 cards, corresponding respectively to the years
1967-76.

Source: Method 320

Data Quality Numbers

Household and commercial trucks:

Disaggregate data:

1967, 1972 estimates	-- 2
other years (interpolated & extrapolated estimates)	-- 3
extrapolated estimates raised from negative to zero	-- 4

Aggregate data:

computed as described in Method 900

Federal trucks:

National level	-- 1
State level	-- 3

References

1. Bureau of the Census, Census of Transportation, *Truck Inventory and Use Survey*, 1967 and 1972 data tapes, Washington, D.C.
2. General Services Administration, *Federal Motor Vehicle Fleet Report*, annual, U.S. Government Printing Office, 1967-76.
3. Federal Highway Administration, U.S. Dept. of Transportation, *Highway Statistics; Summary to 1975*, U.S. Government Printing Office, Washington, D.C., 1977.
4. Jack Faucett Associates, *Trucking Activity and Fuel Consumption*, 1973, 1980, 1985, and 1990, Washington, D.C., 1976.
5. Federal Highway Administration, U.S. Dept. of Transportation, *Highway Statistics, Section 1: Vehicles, Drivers and Fuels*, U.S. Government Printing Office, Washington, D.C., 1975, 76.

Method 340

MOTORCYCLE

Categories used:

<u>year</u>	1967-76 (1974-76 includes off-road and breakdown by state and by use; 1967-73 includes on-road only and no breakdown by state or by use)
<u>mode</u>	highway.....motorcycle
<u>sector</u>	household
<u>fuel</u>	gasoline
<u>use</u>	passenger...personal...commuting family business social & recreational....racing & competition pleasure riding or cruising off-road cycling vacation travel other
<u>carrier</u>	private
<u>state and region</u>	(for 1974-76 only)

N.B.: Energy and fuel use estimates for years prior to 1974 exclude unregistered motorcycles and are therefore incomparable with 1974-76 figures, which do not exclude them. See below.

Motorcycle energy use is the energy content of the fuel the motorcycle burns. The energy supplied by the rider of a moped is not counted.

While there are relatively few data on motorcycle usage and fuel consumption, it is clear that motorcycle energy use is insignificant in comparison to that of automobiles and trucks. The Motorcycle Industry Council estimated that there were 8.4 million motorcycles in use in the U.S. in 1976 (including mopeds, which have been variously estimated to number between 400,000 and 700,000). If one assumes that each one used the somewhat high figure of 100 gallons of gasoline per year, total annual

fuel use would amount to less than one percent of highway gasoline use. Motorcycle fuel use is minor, and even substantial errors in its estimation will have little effect on the gross pattern of highway energy use.

341. Household motorcycle fuel use, 1967-76, by state, and by use, 1974-76

There are two major sources of statistics on the motorcycle population, vehicle-miles traveled and fuel use in the household sector: the Federal Highway Administration (FHWA) and the Motorcycle Industry Council (MIC). FHWA reports annual motorcycle registrations by state (Ref. 6, Table MV-1). However, a substantial number of motorcycles are apparently off-road, unregistered vehicles. The MIC estimates that off-road cycles are more than a third of the total cycle population (3.0 out of 7.9 million in 1977). They have produced estimates, based on sales and scrappage, of the number of off-road, on-road and dual-purpose vehicles by state for 1976 (Ref. 3, p. 6). These state estimates are used in conjunction with FHWA registrations data for 1974 and 1975 to estimate total motorcycle populations by state for these two years. It is assumed that the ratio of vehicles in each of the three categories to FHWA registrations remains constant for 1974-76. That is,

$$N_{cst} = \frac{M_{cs,76}}{M_{s,76}} N_{st} \quad (1)$$

where

N_{cst} = number of motorcycles in category c (on-road, off-road or dual-purpose) in state s in year t, t = 1974-76

N_{st} = number of cycles in state s in year t as reported by FHWA (File 1)

M_{cst} = number of cycles in category c in state s in year t, as reported by MIC (File 2)

M_{st} = total number of cycles in state s in year t, as reported by MIC (File 2)

For years prior to 1974 off-road vehicles are neglected, and FHWA data alone are used for state. Thus, estimates for 1967-73 are not consistent with those for subsequent years.

Data on bike-miles traveled are difficult to come by. At the national level FHWA and the MIC have estimated 4500 and 3176 miles per

cycle, respectively, for 1977. During the spring and summer of 1977, National Family Opinion, Inc., conducted a survey of motorcycle involvement in the U.S. (Ref. 5). The 3163 household survey recorded an estimate of approximate annual mileage and vehicle engine size for each household by state of residence. Additional information included in what months the vehicle was regularly ridden and the average monthly mileage for various purposes during this riding season as well as whether the vehicle was predominately on- or off-road. From this survey tape were extracted (with considerable labor) the average miles per bike, for on-road, off-road and dual-purpose bike, in each state in 1977 (Ref. 5). These figures were taken to be tolerably accurate for estimating fuel use in the years 1974-76. For prior years a weighted average of the 1977 miles per bike, over the three categories was used as a crude estimate of the average miles per bike nationwide. The weighting factors are the number of bikes in each category; formula (2) below makes the calculation explicit. No breakdown by state was attempted for years prior to 1974.

The remaining information necessary for computing motorcycle gasoline consumption is miles per gallon by engine size. Unfortunately such information is scarce. *Cycle*, a monthly motorcycle enthusiast magazine has published 65 road test fuel economies for street bikes from 1975 through 1979 (Ref. 1). These data were statistically analyzed in order to determine a relation between engine size and fuel economy. Only one bike in the sample was below 300 cc in size, the largest being over 1200 cc. Regression analysis revealed that a statistically significant but trivially small relationship between displacement and fuel economy was present in the data. Systematic variation about the mean of 42 mpg was slight. The results were unsatisfactory. While it is obvious that some relationship between engine size and fuel consumption exists (mopeds, for example, are claimed to achieve between 125 and 150 mpg), in attempting to quantify this relationship one is on very shaky ground. In the belief that some correction for engine size is better than none the following approach is used: The MIC estimates of fuel consumption and bike-miles traveled in 1977 lead to an overall mpg estimate of 48. If 42 mpg is assumed for bikes over 350 cc (of which there were approximately 3.3 million in 1977) then under the assumption of equal miles traveled for all engine sizes and solving the formula for the harmonic mean gives an estimate of approximately 53 mpg for bikes under 350 cc. That is, if we set

$$\text{mpg} = N \left(\frac{N_1}{\text{mpg}_1} + \frac{N_2}{\text{mpg}_2} \right)^{-1}$$

where

mpg = gas mileage for all motorcycles, set at 48 mpg

mpg₁ = gas mileage for cycles under 350 cc, unknown

mpg₂ = gas mileage for cycles at least 350 cc, set at 42 mpg

N = number of motorcycles in 1977, set at 7.9 million

N₁ = number of cycles under 350 cc in 1977, set at 4.6 million

N₂ = number of cycles of at least 350 cc in 1977, set at 3.3 million

then solution for mpg₁ yields mpg₁ = about 53. Rounding to the nearest 5 mpg to eliminate pretense of accuracy gives 40 mpg and 55 mpg for the two size classes.

Now the gas mileage by state can be computed as follows. For the years 1974-76, a weighted harmonic mean mpg is calculated for each bike category (on-road, off-road and dual-purpose) and for each state, based on the 1977 distribution of engine sizes above and below 350 cc in each state. Since it is unreasonable to extend the 1977 survey results to earlier years, prior to 1974 cycles are presumed to average 48 mpg in all states. Consequently the 1974-76 figures are considerably better than the others, not only because of inaccuracy in the earlier mileage figures but because, as mentioned earlier, the earlier bike population figures do not include unregistered bikes.

Breakdown by trip purpose for 1974-76 is reasonably based on the 1977 survey results. The survey categories are matched with the End Use Data Base categories as follows:

End Use categories

Motorcycle survey categories

under passenger....personal:

commuting

transportation to and from
work/school

family business

other business purposes

outdoor recreation....pleasure riding
or cruising

recreation/fun riding

racing & competition

organized competition &
practice

off-road riding

trail/off-road riding

vacation & sightseeing

touring/vacation travel

other personal

general transportation
other types of riding

The calculations are more precisely summed up in the following formulas. For the years 1967-73,

$$F_t = N_t \frac{vmt}{mpg} \quad (2)$$

where

F_t = total motorcycle gasoline used nationwide in year t

N_t = number of registered cycles nationwide in year t (File 1)

mpg = national average miles per gallon for cycles, set at 48

$$vmt = \frac{1}{M} \sum_{c=1}^3 M_c vmt_c$$

M_c = number of cycles in category c in 1976 (File 2)

M = total number of cycles in the U.S. in 1976 (File 2)

vmt_c = average miles per bike in category c in 1977 (File 3)

For the years 1974-76,

$$F_{st} = \sum_{c=1}^3 N_{cst} \frac{vmt_{cc}}{mpg_{cs}} \quad (3)$$

where

F_{st} = motorcycle gasoline used in state s in year t

N_{cst} = number of cycles in category c in state s in year t [from formula (1)]

vmt_{cs} = average miles per bike in category c in state s (File 4)

$$mpg_{cs} = (n_{1cs}/mpg_1 + n_{2cs}/mpg_2)^{-1}$$

n_{1cs} = fraction of cycles in class c and state s that have engine displacements under 350 cc (File 4)

n_{2cs} = fraction of cycles in class c and state s that have engine displacement of at least 350 cc (File 4)

mpg₁ = gas mileage of cycles of less than 350 cc, set at 55 mpg

mpg₂ = gas mileage of cycles of at least 350 cc, set at 40 mpg

The breakdown by use for the years 1974-76 is given by

$$F_{ut} = \sum_{c=1}^3 N_{ct} \frac{vmt_{uc}}{mpg_c} \quad (4)$$

where

F_{ut} = gasoline burned by cycles in year t for use u nationwide

N_{ct} = number of cycles in category c in year t [from formula (1)]

vmt_{uc} = average miles per bike nationwide in category c traveled for use u in 1977 (File 3)

$mpg_c = (n_{1c}/mpg_1 + n_{2c}/mpg_2)^{-1}$

n_{1c} = fraction of cycles nationwide in class c that have engine displacement under 350 cc (File 4)

n_{2c} = fraction of cycles nationwide in class c that have engine displacement of at least 350 cc (File 4)

mpg_1, mpg_2 as above

342. Government motorcycle fuel use (no data)

Although the number of Federal, state and local government motorcycles is reported by the Federal Highways Administration, no data are available on government bike-miles traveled or fuel used. Consequently there is no basis on which to make estimates.

Input Data Files

File 1. U.S. motorcycle registration by state, 1967-76. File name = CYCLES.340

Format: col.
 1-2 FIPS state code (see Sec.), right-justified integer
 4-9 1967 motorcycle registration, including private, commercial and publicly-owned cycles (right-justified integer)
 11-16 1968 registration
 18-23 1969 "
 25-30 1970 " (all numbers are
 32-37 1971 " right-justified integers)

39-44	1972 registration
46-51	1973 "
53-58	1974 "
60-65	1975 "
67-72	1976 "

Source: Ref. 6, Table MV-1

File 2. 1976 and 1977 motorcycle population by model type, Motorcycle Industry Council figures. File name = MIC.340

Format: col.
 1-2 FIPS state code (see Sec.), left-justified integer
 10-11 year
 20-29 number of on-road motorcycles (left-justified integer)
 30-39 number of off-road motorcycles (left-justified integer)
 40-49 number of dual-purpose motorcycles (left-justified integer)

Source: Ref. 3, p. 6

File 3. Average miles per motorcycle, by model type and use, 1977. File name = BYUSE.340

Format: col.
 1 use code*
 9-19 average miles ridden by street bikes (decimal point in col. 13)
 20-29 average miles, dual-purpose bikes (decimal point in col. 23)
 30-39 average miles, dirt bikes (decimal point in col. 33)
 (a decimal point alone indicates missing data or zero)
 *the use codes are:
 1 - general
 2 - trail/off road (miles per month)
 3 - recreation/fun riding (miles per month)
 4 - transportation to and from work/school (miles per month)
 5 - other business purposes (miles per month)
 6 - all purposes (miles per month)
 7 - touring/vacation travel (miles per year)
 8 - other types of riding (miles per month)
 9 - organized competition and practice (miles per month)

Note: Dual-purpose and off-road bikes were combined in this data set. Consequently the same figures appear for each.

File 4. Relative numbers of cycles by category in 1977: by model type by engine size by state by mileage class. File name = CELLS.340

Format: col.
 1 engine size*
 3 model type**

5 mileage class***
7-8 state code
10-on relative weight (left-justified, with possible decimal
 point)

*the engine size codes are:

1 - less than 50 cc
2 - 51-75 cc
3 - 76-99 cc
4 - 100-199 cc
5 - 200-299 cc
6 - 300-499 cc
7 - 500-699 cc
8 - 700-899 cc
9 - 900-999 cc
0 - at least 1000 cc
x - no answer
y - don't know

Note: 1/4 of the cycles in the 300-499cc
category were counted as having
less than 350 cc.

**the model type codes are:

1 - street bike
2 - dual-purpose bike
3 - other
4 - Motocross
5 - Enduro
6 - Trails bike
7 - Trail bike
8 - other dirt bike
9 - Min-Cycle
0 - Scooter
x - Moped
y - other minibike

Note: 1, 3, 9, 0, x, y are counted as
street bikes; 4-8 are counted as
dirt bikes.

***the mileage class codes are:

code	miles/yr	representative value used
1	under 500	250
2	500-999	750
3	1000-1999	1500
4	2000-2999	2500
5	3000-3999	3500
6	4000-4999	4500
7	5000-9999	7500
8	10,000-14,999	12,500
9	15,000-19,999	17,500
10	20,000-up	25,000
x	no answer	ignore

Source: Ref. 5

Data Quality Numbers

National and regional estimates	-- 2
State estimates	-- 3

References

1. "Cycle Road Tests," *Cycle*, Ziff Publishing Company, New York. Several issues in the 1975-79 period.
2. J. D. Power and Associates, *1977 Motorcycle Market Survey*, Los Angeles, pp. 50-58 in Volumes 2, 3 and 4.
3. "U.S. Motorcycle Population and Penetration by Region and State," *Motorcycle Statistical Annual*, Motorcycle Industry Council, Newport Beach, California, 1978, 79.
4. "Average Miles Per Year," *Survey of Motorcycle Ownership, Usage and Maintenance*, Motorcycle Industry Council, Newport Beach, California, 1975.
5. Motorcycle Marketing Survey tape, prepared by J. D. Power and Associates in conjunction with National Family Opinion, Inc., 1977.
6. U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics*, U.S. Government Printing Office, Washington, D.C., annually.

Method 400

MARINE

Categories used:

<u>year</u>	1967-78
<u>mode</u>	marine.....recreational commercial
<u>sector</u>	household (recreational boats) commercial (commercial vessels)
<u>range</u>	local (recreational boats) intercity (all commercial shipping, including that destined for foreign ports from the U.S.)
<u>fuel</u>	gasoline distillate oil residual oil
<u>use</u>	passenger nonpassenger.....freight
<u>carrier</u>	private (recreational boats; no breakdown for commercial shipping)
<u>region and state</u>	

N.B. All commercial shipping fuel use figures indicate sales of fuel in the U.S. for both foreign and domestic trade. The fuel use attributed to a particular state is the fuel sold in that state. The recreational boat fuel use attributed to a state is that used by boats registered in that state or (if not registered) owned by residents of that state.

No data were available for military shipping. This matter is discussed as part of Method 600.

401. Recreation boat fuel use, by fuel by state, 1967-78

Estimates of the number of boats in operation in 1973 and 1976 by size and type of boat (inboard/outboard) can be obtained from the Nationwide Boating Survey tape (Ref. 1). The four size classes are: less than 16 ft, 16-25 ft, 25-40 ft, and over 40 ft. The tape also

supplies reported estimates of the average annual fuel use of each type and size of boat, by fuel. These estimates are not based on actual sales records but are merely estimates provided by respondents to the survey. These data can form the basis of estimates of recreational boat energy use in the entire period 1967-78 broken down by state, with the help of two other sources of information. They are the boat registration statistics by state published by the Coast Guard (Ref. 2) and the registration requirements of each state, as reported by International Marine Expositions, Inc. (Ref. 3).

The first task is to estimate the number of boats of each type and in each size class, by state. Later, these estimates can be multiplied by the average fuel use of boats in each class to obtain the total fuel use. (The breakdown by type of fuel will be provided for shortly.) There are two obstacles to estimating the number of boats: not all states, especially in past years, have required registration of the smallest motorboats, and not all boats whose registration is required are in fact registered. The first difficulty is overcome by supposing that the size of the horsepower class of boats whose registration is not required in a given state bears the same ratio to the number of registered boats in that state as the size of that same horsepower class nationwide bears to the number of other boats nationwide. The national figures are obtained from the Boating Survey figures for the year closest to the year in question. That is,

$$R_{ijst} = \begin{cases} R_{ijst}^{r(st)}, \text{ as reported} & \text{if registration of all motorboats required by state } s \text{ in year } t \\ R_{ijst}^{r(st)} \left[1 + \frac{N_{ijy(t)}^{nr(st)}}{N_{ijy(t)} - N_{ijy(t)}^{nr(st)}} \right] & \text{otherwise} \end{cases} \quad (1)$$

where

i = outboard

j = less than 16 ft

R_{ijst} = adjusted number of registered recreational boats of type i and size j in state s in year t , increased to account for boats whose registration was not required

$R_{ijst}^{r(st)}$ = actual number of registered recreational boats of type i and size i , all in the horsepower class $r(st)$, in state s in year t (Ref. 2)

$r(st)$ = horsepower class of boats whose registration was required by state s in year t (e.g., all boats of 10 hp or more)

$N_{ijy(t)}$ = number of recreational boats in operation, of type i and size j , nationwide in year $y(t)$ (Ref. 1)

$$y(t) = \begin{cases} 1973 & \text{if } 1967 \leq t \leq 1974 \\ 1976 & \text{if } 1975 \leq t \leq 1978 \end{cases}$$

$N_{ijy(t)}^{nr(st)}$ = number of recreational boats in operation, of type i and size j , in year $y(t)$ and in horsepower class $nr(st)$ (Ref. 1)

$nr(st)$ = horsepower class of all boats not in $r(st)$; i.e., horsepower class of boats whose registration is not required by state s in year t

Note that it assumed that all boats whose registration is not required, since they are always the smallest boats, are outboard-motorboats less than 16 ft long.

The difficulty that not all boats whose registration is required are in fact registered is overcome simply by adjusting the state-by-state registrations to reflect the shortfall of the registration figures nationwide when compared with the Boating Survey estimates. That is,

$$N_{ijst} = \frac{N_{ijy(t)}}{R_{ijy(t)}} R_{ijst} \quad (2)$$

where

$R_{ijy(t)}$ = total adjusted registrations nationwide in year $y(t)$, computed by summing the state figures given in formula (1)

N_{ijst} = number of recreational boats of type i and size j in state s in year t

Now the fuel use in each state is computed by multiplying the number of boats by the reported average fuel use per boat per year:

$$F_{st} = \sum_i \sum_j f_{ijy(t)} N_{ijst} \quad (3)$$

where

F_{st} = fuel used by recreational boats in state s during year t

$f_{ijy(t)}$ = average annual fuel use of a boat of type i and size j in year $y(t)$

Note that if a resident of Indiana operates his motorboat solely on Tennessee lakes, his energy use is nonetheless charged against Indiana. Note also it is assumed that the average annual fuel use of a boat does

not vary significantly from state to state. Since this assumption is significantly false, the state-by-state figures are necessarily subject to considerable error. The national figures should be markedly better.

A breakdown by fuel is based on the fact that 98.3% of the fuel use reported in the Nationwide Boating Survey was gasoline. A state-by-state accounting of gasoline use is provided simply by taking 98.3% of the total fuel use in each state.

$$F_{st}^{gas} = F_{st} \cdot (98.3\%) \quad (4)$$

where

F_{st}^{gas} = gasoline used by recreational boats in state s during year t

F_{st} is given by formula (3) and is recorded in File 1

No attempt is made to allocate diesel fuel consumption to the states, since the errors would likely be enormous. Instead, we have

$$F_t^{diesel} = F_t \cdot (1.7\%) \quad (5)$$

where

F_t^{diesel} = total diesel fuel used by recreational boats in year t

F_t = total fuel used by recreational boats in year t [File 2, also given by formula (3)]

402. Commercial ship fuel use, by fuel by state, 1967-78

The Department of Energy accounts for U.S. bunker fuel sales by state in its *Energy Data Report* series (Ref. 4). Figures for distillate and residual oil sales are reported separately.

The portion of bunker fuel sold in the U.S. for foreign trade is reported in the Census Bureau's *U.S. Foreign Trade Bunker Fuels Annual* (Ref. 5) but it was found that in some states the foreign trade sales exceeded the total sales as reported by the Department of Energy. For this reason no attempt was made to obtain a breakdown by domestic and foreign trade. Various schemes were attempted for distinguishing coastal from inland shipping and for obtaining a breakdown by the size of ship, but without success. Consequently the data reported are simply

F_{fst} , as reported in Ref. 4 (and recorded in
Files 3 and 4)

where

F_{fst} = sales of fuel f (distillate or residual) in state s for
commercial shipping during year t

Input Data Files

File 1. Recreational boat fuel use (gasoline and diesel fuel), by state,
1967-78. File name - BOAT.400

Format: col.
2-3 state abbreviation
4-5 state FIPS code (see Sec. 8.2), right-justified
8-187 12 fields of 15 col. each, showing gallons of fuel
used by recreational boats in 1967-78 respectively
(right-justified, decimal point in last col. of field)

Source: Ref. 1

File 2. Recreational boat fuel use, national totals, 1967-78. File
name = TBOAT.400

Format: col.
8-187 12 fields of 15 col. each showing gallons of fuel used
by recreational boats in 1967-78 respectively
(right-justified, decimal point in last col. of field)

Source: Ref. 1

File 3. Commercial ship distillate oil use, by state, 1967-78. File
name = BOATD.400

Format: col.
1-2 state FIPS code (see Sec. 8.2.), right-justified
6 the number 4
9-80 12 fields of 6 col. each, showing diesel fuel used by
commercial vessels in thousands of barrels (right-
justified integers)

Source: Ref. 4

File 4. Commercial ship residual oil use, by state, 1967-78. File
name = BOATR.400

Format: col.
1-2 state FIPS code (see Sec. 8.2), right-justified
9-80 12 fields of 6 col. each, showing residual oil used by
commercial vessels in thousands of barrels (right-
justified integers)

Source: Ref. 4

Data Quality Numbers

All estimates -- 2

References

1. U.S. Coast Guard, *The National Boating Survey*, 1973 and 1976 surveys, Washington, D.C.
2. U.S. Coast Guard, *Boating Statistics*, 1967-78 editions, Washington, D.C.
3. International Marine Expositions, Inc., *State Boat Registration, 1968-78*, Chicago, Ill., 1979.
4. U.S. Dept. of Energy, *Energy Data Reports*, "Sales of Fuel Oil and Kerosine," 1967-78 editions, Table 11.
5. U.S. Dept. of Commerce, Bureau of the Census, *U.S. Foreign Trade Bunker Fuels Annual*, Washington, D.C., 1967-78.

Method 510

NATURAL GAS PIPELINE

Categories used:

<u>year</u>	1967 through 1977
<u>sector</u>	commercial
<u>fuel</u>	natural gas electricity all fuels
<u>use</u>	nonpassenger.....freight.....natural gas
<u>carrier</u>	private
<u>region and state</u>	

The energy consumption of a natural gas pipeline is taken to be the energy content of the fuel used to drive the pumps. Included are pumps attached to transmission, distribution and field gathering lines as well as to storage facilities.

The energy content of natural gas, which is extracted from the pipelines to power a majority of the pumps, is taken to be the higher heating value of the gas burned.

The consumption reported for Maine includes that for Vermont and New Hampshire, while the Vermont and New Hampshire consumption is reported as zero. Consumption reported for Maryland includes that for the District of Columbia. (These practices are imposed by Ref. 1.)

1. Consumption of natural gas, by year by state

The amount of natural gas consumed as pipeline fuel in a given year and state is reported in Ref. 1 (File 1). The figures are provided the Energy Information Administration in the Energy Department on Form 6-1341, submitted by all interstate and most intrastate pipeline companies. (The gas volumes are based on a pressure of 14.73 psia at 60°F, the Bureau of Mines standard.)

The energy content of this natural gas is found by multiplying the amount of gas consumed as pipeline fuel in a given state and year (in

cubic feet) by the average higher heating value of natural gas sold by utilities in the state and year in question. The heating values used are those reported annually to the American Gas Association by its membership and reported in Ref. 2 (File 2). It is assumed that the average heating value of the gas taken from the pipelines to drive the pumps in a given state is the same as that of the gas sold in that state, since the gas sold is taken from the same pipelines at roughly the same places. (The AGA misplaced the 1970 and 1971 data during its relocation in those years. Consequently the heating values for 1970 and 1971, nationwide and in each state and region, were calculated from a straight-line interpolation of the heating values for 1969 and 1972. Also the 1977 values were not yet available and were taken to be the average of the 1975 and 1976 values. These estimates are permissible because, over the years, the average heating value nationwide or in a given state fluctuates only a few Btu per cubic foot about a value in the vicinity of 1000 Btu per cubic foot.)

2. Consumption of all fuels, by year by state

The total energy consumed by natural gas pipelines (all fuels) was estimated by taking the amount of energy U_G consumed in the form of natural gas and increasing it slightly to reflect the fact that some 94% of the installed pumping horsepower nationwide is supplied by natural gas (Ref. 3, pp. 2-5). This sort of estimate is necessary because the consumption of other fuels is otherwise unknown. It does not suffice simply to divide U_G by 94%, however, since the remaining 6% of the horsepower is generated more efficiently (mostly by electric motors) than the 94%. The following calculations take into account the different efficiencies with which horsepower is provided by fuels other than natural gas.

First, it is convenient to define some symbols as shown below.

Type of engine	Efficiency of engine	Fraction of installed horsepower, nationwide
Gas turbine	$E_t = 18\%$ (Ref. 4, p. 12/359)	$H_t = 22\%$ (Ref. 3, p. 2-5)
Reciprocating (piston) gas engine	$E_p = 31\%$ (ibid.)	$H_p = 72\%$ (ibid.)
Steam turbine	$E_s = 36\%$ (ibid.)	$H_s = 1\%$ (ibid.)
Electric motor	$E_c = 93\%$ (Ref. 5, p. 15-46)	$H_e = 5\%$ (ibid.)

The gas is pumped by two types of compressors:

Type of compressor	Efficiency	Typically driven by
Centrifugal	$E_c = 82\%$ (Ref. 4, p. 8/51)	Gas turbines
Reciprocating	$E_r = 84\%$ (ibid.)	Reciprocating gas engines
		Steam turbines
		Electric motors

For purposes of comparison, the overall engine-pump efficiency of natural-gas-driven pumps was calculated to be

$$E_G = \frac{E_{tc} H_t + E_{rp} H_p}{H_t + H_p} = 23\%$$

The engine-pump efficiencies of steam-powered and electrically powered pumps, respectively, are approximately

$$E_S = E_s E_r = 30\%$$

$$E_E = E_e E_r = 78\%$$

The total energy consumed by steam-powered and electrically powered pumps was then estimated by taking a fraction of the gas-powered consumption based on the percentage of horsepower supplied by steam or electricity, and adjusting for the differing efficiencies:

$$U_S = \frac{E_G}{E_S} H_s \cdot U_G = .008 U_G \quad (\text{steam})$$

$$U_E = \frac{E_C}{E_E} H_e \cdot U_G = .015 U_G \quad (\text{electricity})$$

On the assumption that no significant amount of steam powering steam-driven pumps is generated by burning natural gas, the total pipeline energy consumption was estimated simply by adding the amounts consumed in the form of gas, steam and electricity:

$$U_G + U_S + U_E = 1.023 U_G$$

In other words, the total pipeline energy was computed by multiplying the energy consumed in the form of natural gas by the factor 1.023.

3. Consumption of electricity, by year by state

The consumption in the form of electricity was estimated by multiplying that consumed in the form of natural gas U_G by 0.015, a factor derived above. The resulting estimate is necessarily crude, much more so than the above estimate of total pipeline energy consumption. The consumption of electricity (regarded as a fuel) in kilowatt-hours was got simply by multiplying the energy use in Btu, just calculated, by the conversion factor 29.307×10^{-5} kwh/Btu.

4. Consumption of other fuels

Steam for steam-driven pumps could be produced by burning diesel or residual oil or even coal. But since no information on how much of each is used was available, no estimates of fuel use in these categories was attempted. It is known only that, together they consume about 0.008 times as much energy as natural-gas-driven pumps.

Input Data Files

File 1. Higher heating values of natural gas, by state by year.

Format: cols.

1-2 state alphabetic code (see Sec. 8.2). 10 indicates all of region 1, etc.; 01 = all of USA.
3-5 blank
6-59 11 fields of 5 columns each, containing heating values for 1967-77 in Btu/cu ft (right-justified integers). A zero indicates that a particular value was unavailable (occurs in years 1970 and 71 except for the national figure).

Source: Ref. 1

File 2. Natural gas consumed as pipeline fuel, by year by state.

Format: cols.

1-2 state code (same convention as above)
3-79 11 7-column fields containing natural gas consumption for 1967-77 in millions of cubic feet (right-justified integers).

Source: Ref. 2

Data Quality Numbers

Consumption of natural gas nationally and by region and state -- 1

Consumption of all pipeline energy and of energy in the form
of natural gas, nationally and by region and state -- 1

Consumption of electricity nationally and by region and state -- 3

References

1. "Consumption of natural gas by use and state," in Natural Gas Production and Consumption, *Mineral Industry Surveys*, Bureau of Mines, 1967-75; same document as part of the Energy Information Administration's *Energy Data Reports*, 1976-77.
2. "Gas utility industry sales by state and class of service," in *Gas Facts*, American Gas Association, 1967-76 (annually).
3. E. N. Cart et al., Exxon Research and Engineering Company, *Alternate Energy Sources for Non-Highway Transportation*, Dept. of Energy contract EC-77-C-05-5438, Dec. 15, 1978.
4. American Gas Association, *Gas Engineer's Handbook*, Industrial Press, 1966.
5. Baumeister et al., *Marks' Standard Handbook for Mechanical Engineers*, 8th edition, McGraw-Hill, 1978.

Method 520

LIQUIDS PIPELINE

Categories used:

<u>year</u>	1967-77 (same order-of-magnitude estimate provided for each year; slurry pipeline estimate for 1971-77 only)
<u>mode</u>	pipeline.....liquids
<u>sector</u>	commercial
<u>range</u>	intercity (oil & slurry pipelines only)
<u>fuel</u>	electricity
<u>use</u>	nonpassenger.....freight.....crude oil pipeline oil products pipeline water pipeline slurry pipeline
<u>carrier</u>	common (i.e., oil pipelines) private (other pipelines)

The energy consumption of crude oil, oil products and water pipelines is not known. Only order-of-magnitude estimates are available. The best of these have been put forward by William F. Banks (Ref. 1), who also estimates the energy consumption of the one coal slurry pipeline in the United States. His estimates are as follows:

crude oil pipelines	0.07 quads (i.e., quadrillion Btu)
products pipelines	0.068 quads
water pipelines	0.050 quads
coal slurry pipeline	0.0054 quads

These estimates are recorded on the data tapes for the sake of completeness. The first three are listed under each of the ten years 1967-76, since there have been no dramatic trends over the years, so that the change is probably far less than the margin of error. The coal slurry energy estimate is for 1971-77 only.

The oil pipeline figures include all energy used at the pumping stations, including that used to pump oil in and out of storage tanks. Although some pumps are driven by gas, diesel and LPG engines and even steam turbines, the bulk of the energy is provided by electricity. Consequently these "ball park" estimates are classified as consumption exclusively of electricity.

The water pipeline figure includes pumping energy only and excludes energy used in treatment. Nearly all this energy is used either to pump water into high-level storage tanks or through aqueducts, and nearly all of it is provided by electricity.

The coal slurry figure is of somewhat greater accuracy than the others. It includes the energy cost of supplying water and removing the coal from the slurry as well as that of pumping the slurry through the pipe. This quantity is estimable because there is only one operational coal slurry pipeline in the United States, the Black Mesa line in Arizona. All the energy is consumed in the form of electricity, most of it taken from the power grid.

Banks' calculations assume an efficiency of 0.22 in the conversion of primary fuel to electricity. Since the End Use Data Base ascribes to transportation only the electrical energy delivered to the motors, Banks' figures must be multiplied by 0.22 to yield the following estimates of electricity consumption:

	million kwh	billion Btu
crude oil pipelines	4520	15420
oil product pipelines	4350	14840
water pipelines	3490	11910
coal slurry pipeline	348	1190

Oil pipelines are generally common carriers and are so classified. The water and slurry lines are classified as other than common carriers. In analogy with public transit systems, water distribution systems are classified as part of the commercial sector even when they are municipally owned. Oil and slurry pipelines are of course part of the commercial sector.

An effort (by J. N. Hooker) to estimate more accurately the energy use of crude oil and oil product pipelines is underway at ORNL. The results should be forthcoming by April of 1980.

Data Quality Numbers

Crude oil, oil products and water pipelines	-- 4
Coal slurry pipeline	-- 3

Reference

1. William F. Banks, "Energy Consumption in the Pipeline Industry,"
U.S. Dept. of Energy Report SAN-1171-2, 1977, p. 2-2.

Method 600

MILITARY FUEL

Categories used:

year 1975-77 (1967-77 for breakdown by highway modes)

mode air (jet fuel only)
auto (no breakdown by fuel)
bus (no breakdown by fuel)
truck.....under 12,500 lb
12,500-17,000 lb
over 17,000 lb
(no breakdown by fuel)

sector government.....military

fuel motor gasoline (no breakdown by mode)
jet fuel.....naphtha-type
kerosine-type
distillate oil (no breakdown by mode)
residual oil (no breakdown by mode)

carrier private

region and state (no breakdown for estimates broken down by mode
or for jet fuel estimates)

In the area of military fuel use, data are unsurprisingly scarcest of all. Three sources have been tapped. One is the series of tables of aviation fuel consumption by the U.S. military, published in the *Energy Data Reports* series (Ref. 1). There is no breakdown by state. Another is a series of tables of fuel consumed by military highway vehicles, appearing in the Federal Motor Vehicle Fleet Report (Ref. 3). The types of fuel consumed are not indicated. The third source is a state-by-state accounting of military fuel use (excluding jet fuel) maintained by the Defense Fuel Supply Center in the Department of Defense (Ref. 2). These figures, also available from the Defense Energy Information System, an agency established in December of 1973, are broken down by fuel type but not by mode. It may be presumed, however, that since states having ports show by far the largest consumption of residual oil, the bulk of the residual oil consumption is ascribable to naval operations.

As for the air mode, all jet fuel consumption has been ascribed to it. It should be realized, however, that some jet fuel may be used to fuel tanks and other vehicles (Ref. 2). Opinions differ on this matter, and no official resolution could be obtained. Unlike commercial aircraft, which use almost entirely a kerosine-type of jet fuel, military aircraft

use prominently a naphtha-type (sometimes called a gasoline-type) fuel, usually JP-4 (jet propulsion fuel 4). JP-4 is somewhat more hazardous to handle on the ground than commercial jet fuel, but it offers a greater yield per barrel of crude. The major kerosine type of jet fuel used by the military is JP-5. A small unitemized portion of military aircraft fuel is counted here as of the naphtha type, since it is likely to include the naphtha-based fuels ordinarily used in high-altitude aircraft. The different heating values of naphtha-type and kerosine-type fuels are taken into account in the conversion of barrels to Btu (see Sec. 2.1).

The fuel use reported, then, is as follows:

$$F_{ft}^a,$$

where

f = naphtha and kerosine and

t = 1975-77

and where

F_{ft}^a = jet fuel of type f used by the military in year t (File 2)

$$F_{mt}^h,$$

where

m = auto

bus

truck, 0-12,500 lb

truck, 12,500-17,000 lb

truck, 17,000 lb-up and

t = 1967-77

and where

F_{mt}^h = fuel used by highway mode m in the military in year t (File 3)

$$F_{fst},$$

where

f = gasoline, distillate, residual oil

t = 1975-76

and where

F_{fst} = total fuel of type f used by the military in state s in year t
(File 1)

Input Data Files

File 1. Military fuel consumed, by state, 1975-78. File name = FUEL.600

Format: col.
1-2 year
4-5 state FIPS code (see Sec. 8.2), right-justified integer
10-69 5 10-column fields, containing consumption respectively of auto diesel fuel, diesel fuel #1, diesel fuel #2, distillate oil, motor gasoline, residual oil (decimal point in col. 8 of field). Due to an error in preparation for keypunching, figures show 1/42 of consumption in bbl.

Source: Ref. 2

File 2. Jet fuel consumed by the military, nationwide, 1974-77. File name = JET.600

Format: col.
free-form year (2 digits), followed by consumption of JP-4, followed by consumption of JP-5, followed by consumption of other jet fuels, in thousands of barrels (decimal points occur)

Source: Ref. 1

File 3. Military highway fuel consumed, by mode, 1967-77. File name = MODES.600

Format: col.
free-form year (2 digits), followed by auto fuel consumption, followed by bus fuel consumption, followed by three truck fuel consumption figures, respectively for trucks under 12,500 lb gross weight (i.e., 1-ton trucks), trucks from 12,500 to 17,000 lb gross weight (1½ to 2½ ton trucks), and trucks over 17,000 lb gross weight. Figures are in millions of gallons.

Source: Ref. 2

Data Quality Numbers

Consumption of jet fuel

classified as the consumption of military aircraft	-- 2
not so classified	-- 1

Military consumption of gasoline, distillate and residual oil	-- 1
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Military use of highway fuel, by mode	-- 1
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References

1. Crude Petroleum, Petroleum Products and Natural Gas Liquids (Annual Petroleum statement), in *Energy Data Reports* series, U.S. Dept. of Energy, 1975-77.
2. Data obtained directly from William Vance, Defense Fuel Supply Information Center, Cammeron St., Alexandria, VA, 22314.
3. *Federal Motor Vehicle Fleet Report* (annual), General Services Administration, 1967-76.

Method 900

AGGREGATIONS

All recorded consumption data that cite Method 900 as documentation are sums of data documented elsewhere in this report. They are sums over one or more breakdowns. To take an example, Method 332 describes explicitly how to estimate the gasoline used by local commercial trucks in 1976 in each of the states, but nowhere is there provided an explicit formula for estimating this quantity nationwide. Naturally all one needs to obtain a national estimate is to add together the estimates for the individual states, and this has been done; the resulting total is tagged as computed by Method 900. In like manner the energy use by local commercial trucks nationwide (all fuels) can be computed by adding the estimates for each combination of fuel and state; this, too, has been done. In general, all totals whose computation the available data permit are provided, with two minor exceptions noted in Sec. 3.9. See the introduction to Chap. 3 for an illustration of how aggregate data are computed, Sec. 6.1 for a mathematical analysis of the notion, and Sec. 6.2 for a technical description of how the aggregate data are generated.

When an aggregate datum and its method number, Method 900, are recorded, the data quality number and the units of measurement must be recorded as well. These are determined in the way described below.

Data Quality Numbers

Recall that each datum is assigned one of these quality numbers:

- 1 — less than 10% error
- 2 — less than 25% error
- 3 — less than 50% error
- 4 — quality unknown.

For present purposes we will assume the final category can be fairly represented by saying there is less than 100% error. We will also suppose each of these represents a confidence interval (a matter discussed further in Sec. 2.2), where p is the level of confidence (80%, 90% or whatever). That is, we will suppose that if a datum is given quality number 1 and if

$p = 90\%$, then one can be 90% sure that the reported value lies within $\pm 10\%$ of the true value.

Now suppose that n observed data $a_1, \dots, a_n$ are to be added together to get an aggregate datum. The true values corresponding to these n measurements are n unknown numbers $b_1, \dots, b_n$. Let us assume momentarily that if several measurements were available for a single true value b_i , the distribution of these measurements would be normal with a mean at the true value b_i and a variance σ_i^2 . In other words, these measurements afford an unbiased estimate of the true value, and their standard deviation from the true value is σ_i . Let us also suppose that the percentage confidence intervals that come with the n observations are $\pm r_1, \dots, \pm r_n$. Each r_i , then, stands for 10%, 25%, 50% or 100%, which correspond to the four quality codes. This means that one can have a confidence of p that the true value lies within $\pm r_i b_i$ of the true value b_i , for each i . These intervals can be written in terms of the standard deviations of the distributions,

$$r_i b_i = c_p \sigma_i \quad (1)$$

where c_p is the appropriate constant. If $p = 90\%$, then one can read from a table of the normal distribution that $c_p = 1.645$. Now if the n distributions of measurements are independent, the distribution of their sum $\sum_i a_i$ is also normal with mean $\sum_i b_i$ and variance $\sum_i \sigma_i^2$. The confidence interval for this sum distribution, which we can write as $r \sum_i b_i$, is again the constant c_p times the standard deviation:

$$r \sum_i b_i = c_p \sqrt{\sum_i \sigma_i^2}$$

Substituting $\sigma_i = r_i b_i / c_p$, from (1), we have

$$r \sum_i b_i = \sqrt{\sum_i (r_i b_i)^2}$$

or

$$r = \sqrt{\sum_i (r_i b_i)^2 / \sum_i b_i}$$

This provides a calculation of the percentage confidence interval of the sum in terms of the percentage intervals r_i for the addends and the true values b_i . Since the true values are not known, we must use a maximum likelihood estimate of the sum's confidence interval. Such an estimate can be had by substituting the observed data a_i for the true values b_i :

$$r_{\text{est.}} = \sqrt{\sum_i (r_i a_i)^2 / \sum_i a_i} \quad (2)$$

Formula (2) says that the data quality interval for the aggregation is a weighted root mean square of the intervals for the addends. There is an inherent tendency, then, for the percentage error to decrease as the level of aggregation becomes greater. In the special case in which the addends are of equal size, the addition of n addends each having a percentage confidence interval of $\pm r$ results in a sum having a confidence interval of $\pm r/\sqrt{n}$. The percentage error, then, varies roughly with the inverse square root of the number of terms added.

Unfortunately formula (2) is based on the false premise that the n error distributions are independent. In reality it is likely they will all be biased in the same direction; they may all, for example, be underestimates. Consequently the error does not decrease so rapidly with the level of aggregation as (2) implies. Formula (2) is in fact unusable, because it gratuitously puts nearly all of the high-level aggregations into the 10% error bracket, regardless of the error in the disaggregate data.

One approach to this problem is to attempt to quantify, if only in the crudest of ways, the portion of error that is due to bias and the portion due to random and independent deviations. Let us suppose that the i -th distribution still has a variance of σ_i^2 but has a mean at $b_i + k\sigma_i$ rather than at b_i . The i -th measurement, then, is a biased estimator of the true value b_i , and the amount of the bias is expressed as a fraction k of the standard deviation. Now, the distribution of the

sum $\sum_i a_i$ has a mean at $\sum_i b_i + k \sum_i \sigma_i$ and a variance of $\sum_i \sigma_i^2$. The problem is to derive the sum's percentage confidence interval $\pm r$ from the confidence intervals $\pm r_i$ for the addends.

Let us begin by defining r_i' to be the percentage confidence interval distribution i would have if its bias were removed without changing its variance. That is, suppose that the i -th distribution has variance σ_i^2 and has mean b_i rather than $b_i + k\sigma_i$. Suppose also that $A(a,b)$ is the area under a standard normal curve between the abscissas a and b . Let s_{ip} be the number that satisfies

$$A\left(\frac{-s_{ip}}{\sigma_i}, \frac{s_{ip}}{\sigma_i}\right) = p,$$

where p is again the level of confidence. Then

$$r_i' = s_{ip}/b_i.$$

The interval r_i can be defined in a parallel way with respect to a biased distribution. If t_{ip} is the number satisfying

$$A\left(k - \frac{t_{ip}}{\sigma_i}, k + \frac{t_{ip}}{\sigma_i}\right) = p$$

then $r_i = t_{ip}/b_i$. r_i is of course larger than r_i' , since a larger interval is required to take in a fixed area p when the distribution is off center. The shrinkage from r_i to r_i' is measured by the ratio

$$r_i/r_i' = t_{ip}/s_{ip}$$

and can be determined from tables of the normal curve for a given level of confidence p and a given value of k . Some sample ratios are shown in Table 1. Let us define m_k to be the ratio r_i/r_i' , at a stated level of confidence p , when the original bias is given by k . Since m_k does not vary much with the confidence level, the choice of p will not be critical.

Once values for m_k are available, the sum's percentage confidence interval $\pm r$ can be calculated in terms of the r_i 's. First recall that r_i' is defined so that

Table 1. The ratio r_i/r_i'

k	Level of confidence = p		
	80%	90%	95%
0	1	1	1
0.1	1.00	1.00	1.00
0.2	1.02	1.02	1.02
0.3	1.05	1.04	1.04
0.4	1.08	1.08	1.08
0.5	1.12	1.12	1.11
0.6	1.18	1.16	1.16
0.7	1.23	1.22	1.20
0.8	1.30	1.27	1.25
0.9	1.37	1.33	1.30
1.0	1.44	1.39	1.35
1.1	1.52	1.45	1.40
1.2	1.60	1.51	1.45
1.3	1.67	1.57	1.50
1.4	1.75	1.63	1.55
1.5	1.83	1.69	1.61
1.6	1.90	1.75	1.65
1.7	1.98	1.81	1.71
1.8	2.06	1.87	1.76
1.9	2.14	1.93	1.81
2.0	2.22	1.99	1.86
k > 2.0	$\frac{k + 0.84}{1.282}$	$\frac{k + 1.28}{1.645}$	$\frac{k + 1.64}{1.960}$

$$r_i \hat{b}_i = c_p \sigma_i, \quad (3)$$

where $r_i \hat{b}_i$ is the confidence interval (at level of confidence p) the i-th distribution would have if it were unbiased with variance σ_i^2 . If tr' is the percentage confidence interval the sum's distribution would have if its bias were removed (and its variance were still $\sum_i \sigma_i^2$), we can say in analogous fashion,

$$r' \sum_i b_i = c_p \sqrt{\sum_i \sigma_i^2} \quad (4)$$

Substituting r_i/m_k for r_i and solving Eq. (3) for σ_i , we get

$$\sigma_i = r_i b_i / m_k c_p \quad (5)$$

Substituting this into Eq. (4) yields,

$$r' \sum_i b_i = \frac{1}{m_k} \sqrt{\sum_i (r_i b_i)^2} \quad (6)$$

In order to find r in terms of r' , we need only recall that

$$r/r' = m_{k'} ,$$

where k' indicates the relative bias of the sum's distribution. But k' is the ratio of the absolute bias to the sum's standard deviation:

$$k' = k \sum_i \sigma_i / \sqrt{\sum_i \sigma_i^2}$$

Substituting the expression for σ_i in (5), k' can be written in terms of k times a correction factor:

$$k' = k \left[\sum_i r_i b_i / \sqrt{\sum_i (r_i b_i)^2} \right]$$

Once k' is found, $m_{k'}$ can be read from the above table, and we can substitute $r' = r/m_{k'}$ into (6) and solve for the sum's percentage confidence interval r :

$$r = \frac{m_{k'}}{m_k} \sqrt{\sum_i (r_i b_i)^2} / \sum_i b_i$$

Again a maximum likelihood estimate of k' and of r can be had by substituting a_i for b_i :

$$k' = k \left[\sum_i r_i a_i / \sqrt{\sum_i (r_i a_i)^2} \right] \quad (7)$$

$$r_{\text{est}} = \frac{m_{k'}}{m_k} \sqrt{\sum_i (r_i a_i)^2} / \sum_i a_i \quad (8)$$

where

$m_{k'}$, m_k are given by the above table of ratios r_i/r_i'

k = the ratio of the bias to the standard deviation of the addend distributions, to be set at a reasonable value shortly

k' = the same ratio for the sum's distribution, given by formula (7)

r_i = the percentage confidence interval given for the i -th addend
(r_i = 10%, 25%, 50% or 100%)

a_i = the observed value of the i -th addend

Comparison of formulas (8) and (2) reveals that the effect of adding bias to the addend distributions is simply to enlarge the sum's percentage confidence interval by a factor of $m_{k'}/m_k$.

The next task is to arrive at a reasonable value for k , which indicates the amount of bias in the addend distributions relative to the amount of random variation. Obviously there are no grounds for calculating or otherwise deducing a precise value for k , but the compilers of the End Use Data Base agree on two general observations that can suggest what a reasonable value would be. One is that random variation among the estimates for categories in a given breakdown normally makes a significant contribution to error. The other is that bias nonetheless generally dominates random variation as a source of error, and that bias among categories in a given breakdown is usually in the same direction. Let us say, then, that on the average about 2/3 of an estimate's error is attributable to bias, bias that lies in the same direction as that of other estimates in the breakdowns over which a sum is to be taken.

Now we must decide what it means to say that a certain portion of error is due to bias. The following analysis, while not the only reasonable one, seems to harmonize with the intuitions that delivered the 2/3 figure just mentioned. Let us say that the i -th distribution of estimates is biased downward by an amount $k\sigma_i$; that is, the mean of the distribution is $b_i - k\sigma_i$. If the observed value a_i is less than $b_i - k\sigma_i$, one is inclined to say that bias contributes $k\sigma_i$ to the error and random

variation contributes the rest, $b_i - a_i - k\sigma_i$. If a_i is greater than b_i , it is reasonable to say that the error is due entirely to random variation, since without the bias the error would have been even worse. If a_i is between $b_i - k\sigma_i$ and b_i , one is inclined to say that all of the error is due to bias, since the estimate would not have fallen short at all if the distribution had been unbiased. The postulate that, on the average, 2/3 of the error is due to bias can be approximately fulfilled by adjusting k so that half the time, bias contributes at least 2/3 of the error, and the rest of the time it contributes less than 2/3. So, the probability that a_i lies between $b_i - 1.5(k\sigma_i)$ and b_i should be 50%. If k is set at 0.54, this condition is met. Let us decree, then, that $k = 0.54$.

No further argument for this choice of k can be adduced, except to say that it seems reasonable and leads to reasonable results. The results can be judged in the table below. Here the effect on the confidence interval of adding n estimates of equal size is shown, first on the assumption that the distributions are independent and then that they are biased all in the same direction by an amount equal to $(0.54)\sigma_i$. The original percentage confidence interval of each addend is taken to be $\pm 50\%$, a figure at the upper end of data quality rating 3. The level of confidence is set at $p = 90\%$.

Effect of aggregation on percentage confidence interval

n	% confidence interval - data quality rating	
	Assuming independence	Assuming relative bias of $k = 0.54$
1	50% - 3	50% - 3
3	29% - 3	34% - 3
10	16% - 2	25% - 2
30	9% - 1	21% - 2
100	5% - 1	18% - 2
300	3% - 1	16% - 2
1000	2% - 1	15% - 2

The rate at which $k = 0.54$ slows the shrinkage of the confidence interval seems reasonable.

Units of Measurement

If all the data to be aggregated are expressed in the same units, their sum will of course be expressed in those same units. Otherwise, their sum is meaningless and is not taken. All energy values are expressed in the same units, Btu (on the data tape, billions of Btu), but the fuel units can vary. Fuel quantities are never added when the fuels are different, even if the units are the same; there is no point in adding barrels of gasoline to barrels of diesel fuel. The units of measurement are discussed in detail in Sec.

CHAPTER 6. TECHNICAL ARTICLES

6.1 Estimating the Number of Aggregate Data

The final data tapes containing the End Use Data Base must contain not only the data generated using the methods described herein, but all possible aggregations of these data as well. This section provides a feeling for the number of aggregate data likely to be generated, in order to gauge the magnitude of the task of adding them to the data base. The following section details an algorithm for adding them to the data base.

Ideally, the data base would consist of an n -dimensional array A whose every cell contains a number $a_{i_1 \dots i_n}$. A tiny illustrative data base, for instance, might break consumption down by mode of transportation fuel and year. If it covered 5 modes, 3 fuels and 10 years, its data would ideally fill a $5 \times 3 \times 10$ array. Cell a_{123} in the array would represent the consumption of fuel 1 by mode 2 in year 3. We will refer to the data in this array as elementary data.

Once the elementary data are known, the aggregate data, or sums over breakdowns, can be computed. If one computes a sum over k breakdowns, the result is a k -dimensional sum. For instance, the total consumption of fuel 1 by all modes in year 3, or $\sum_{i=1}^5 a_{1i3}$, is a 1-dimensional sum, whereas the consumption of fuel 1 by all modes in all years, or $\sum_{i=1}^5 \sum_{j=1}^{10} a_{1ij}$, is a 2-dimensional sum. In general, a k -dimensional sum is a sum over elementary data $a_{i_1 \dots i_n}$ where k of the indices are allowed to vary and the other $n - k$ are held fixed. Such a sum can be written

$$S(i_{t_1}, \dots, i_{t_{n-k}}) = \sum_{j_1} \dots \sum_{j_k} a_{i_1 \dots i_n}$$

where $t_1, \dots, t_{n-k}$ are all different from $j_1, \dots, j_k$. Here, the indices $i_{t_1}, \dots, i_{t_{n-k}}$ are fixed and the remaining indices $i_{j_1}, \dots, i_{j_k}$ vary.

A 0-dimensional sum $S(i_1, \dots, i_n)$ is simply the elementary datum $a_{i_1 \dots i_n}$, and the single n -dimensional sum $S()$ is the sum of all the elementary data. It should be understood that the notation $S(i_{t_1}, \dots, i_{t_{n-k}})$ is not complete until each i is given a subscript. To return to the above illustration, the notation $S(1_1, 3_3)$ refers to the total consumption of fuel 1 by all modes in year 3, but the notation $S(1, 3)$ is meaningless.

The estimation of the number of aggregate data can begin by supposing, for simplicity, that the data base in fact begins as an $r_1 \times r_2 \times \dots \times r_n$ array completely filled with elementary data. It is clear that the number of k -dimensional sums is just the number of collections of $n - k$ indices $i_{t_1}, \dots, i_{t_{n-k}}$. The choice of $t_1, \dots, t_{n-k}$ can be made in $\binom{n}{n-k} = \binom{n}{k}$ ways. For each choice the indices $i_{t_1}, \dots, i_{t_{n-k}}$ can jointly assume $r_{t_1} r_{t_2} \dots r_{t_{n-k}}$ possible values. So, the number of k -dimensional sums is

$$\sum_{c \in C} \binom{n}{n-k} \left(\prod_{i \in c} r_i \right) \quad (1)$$

where C^{n-k} is the set of all $\binom{n}{n-k}$ combinations of $n - k$ of the first n positive integers. The total number of aggregate and elementary data is the total number of k -dimensional sums as k varies from 0 to n :

$$\sum_{k=0}^n \sum_{c \in C^{n-k}} \left(\prod_{i \in c} r_i \right)$$

Note that the products $\prod_{i \in c} r_i$ are simply the cross-products in the expansion of

$$\prod_{i=1}^n (r_i + 1) \quad (2)$$

This last expression, then, provides a simpler calculation of the number of elementary and aggregate data. It also suggests that if the original

data base is conceived as an $r_1 \times \dots \times r_n$ array, the addition of aggregate data adds a layer of cells to n sides of this array, creating an $(r_1 + 1) \times \dots \times (r_n + 1)$ array. Indeed the added cells correspond to the k -dimensional sums in a systematic way. The new corner cell having coordinates $(r_1 + 1, \dots, r_n + 1)$ represents the n -dimensional sum $S()$; any k -dimensional face (or edge or vertex), one cell thick, on the expanded cube that contains this corner cell consists of cells representing sums of dimensions $n - k$ through n .

In the special case in which the original array of data is a cube, so that $r_1 = \dots = r_n = r$, the number of elementary and aggregate data is given by the simpler formula,

$$(r + 1)^n \quad (3)$$

An odd corollary of this formula is that the number of elementary and aggregate data can be computed in the same way as one computes compounded interest. If the volume r^n of the original n -dimensional cube represents the principal, then the volume $(r + 1)^n$ of the expanded cube represents the increased principal after n years at an annual interest rate of $1/r$, compounded annually. The number of data increases with dimension, then, exactly as one's bank account increases over the years. Perhaps one reason it is easy to underestimate the number of aggregate data that pertain to an array of n dimensions is that it is even more difficult to visualize the effect of several dimensions than that of several years.

A concrete example of the increase in the number of data can be had in the small data base described earlier. It begins with $5 \times 4 \times 10 = 150$ elementary data and spawns aggregate data that bring the total to $6 \times 5 \times 11 = 330$ data, more than double the original size. The expansion is even more dramatic in data bases having more than 3 dimensions. Formula (3) implies that the addition of aggregate data to a cubic array of n dimensions increases the number of data by a factor of $(1 + 1/r)^n$. Supposing conservatively that $n = 10$ and $r = 5$, the data become 6.2 times more numerous.

6.2 Adding Aggregate Data to the Data Base

The task of adding aggregate data to the End Use data base is far from trivial. In this section the nature of the task and the algorithm used to accomplish it are described.

The problem is to append to the data base all possible sums $S(i_{t_1}, \dots, i_{t_{n-k}})$ that can be constructed from the data already there. As argued in the previous section these sums may well outnumber the original data, and consequently it is imperative that a reasonably efficient algorithm be devised. The unpredictable nature and degree of completeness of the data, however, severely limit the speed of any algorithm.

Difficulties begin with the fact that the original data base is hardly the completely dense array of elementary data described in the previous section. On the contrary, very few if any of the data are likely even to be elementary. Rather, they are assorted k -dimensional sums where k varies over most of the range from 1 to n . One consequence of this spottiness in the data is that many of the sums one might desire cannot be computed simply because none of the original data are sufficiently disaggregate. For example, it may be impossible to compute the total fuel use by taxis in Pennsylvania in 1976 (summing over all other breakdowns) because nothing more finely categorized than fuel use by taxis nationwide is known in the first place. Put formally, a sum $S(i_{t_1}, \dots, i_{t_{n-k}})$ is unrecoverable when no sum recorded in the data base has $i_{t_1}, \dots, i_{t_{n-k}}$ among its indices.

Still other sums are likely to be unrecoverable because some of the addends are missing. For example, national fuel use by motorboats is unrecoverable if the only available data are motorboat fuel use figures for every state but Florida. Again in formal terms, $S(i_{t_1}, \dots, i_{t_{n-k}})$ is unrecoverable when for every value of j ($j \neq t_1, \dots, t_{n-k}$), a nonzero sum $S(i_j, i_{t_1}, \dots, i_{t_{n-k}})$ is missing or unrecoverable for at least one value of i_j .

The algorithm devised to generate aggregate data was required to circumvent these difficulties while overcoming a far greater obstacle: keeping an inordinate number of running totals in addressable storage at once. Generally speaking, the algorithm accomplishes its task by generating the sums in stages, storing the running totals on hundreds or thousands of ordered linked lists, and locating the beginning of each linked list with a hash code based on the pattern of indices of the totals in the list. (A linked list is a series of data records stored at random locations on some storage device, where each record contains a number or "pointer" that indicates the location of the next record in the list. The list is said to be ordered when the records are arranged in order according to some datum on the records. When the location of a data item is a computable function of some characteristic of the item, the value of that function for a given item is said to be the item's hash code.)

The algorithm runs as follows. As remarked earlier it generates the sums in stages. Each stage involves one pass over the data base that results from the previous pass. The first pass is of course a pass over the original data base, and it generates 1-dimensional sums only. Many of these sums, of course, are likely to occur in the data base already. When a certain 1-dimensional sum both occurs in the data base and can be generated by summing over elementary data, the preexistent sum is used rather than the computed sum. Since during the first pass only those data that are elementary data or 1-dimensional sums are relevant, the rest of the data are ignored.

The second pass is a pass over the union of the original data base with the sums created during the first pass. Only 1- and 2-dimensional sums in the input data are relevant this time, and 2-dimensional sums are generated. There is no need to process elementary data, since any 2-dimensional sum that can be recovered from the available elementary data can be more quickly recovered from the 1-dimensional sums just generated. This procedure continues in analogous fashion through a total of n passes, after which all recoverable aggregate data have been recovered.

The details of the algorithm can be seen by examining more closely the k-th pass, which generates k-dimensional sums. During this pass both (k-1)-dimensional and k-dimensional input sums are processed. These two types of input sums are treated separately below.

Case 1. A (k-1)-dimensional input sum is processed. For convenience, let us speak of k-dimensional sums of the form $S(i_{t_1}, \dots, i_{t_{n-k}})$, where $i_{t_1}, \dots, i_{t_{n-k}}$ are allowed to vary but $t_1, \dots, t_{n-k}$ are not, as being of the same type. The sum $S(i_{u_1}, \dots, i_{u_{n-k}})$ will be regarded as a k-dimensional sum of a different type if the set of indices $u_1, \dots, u_{n-k}$ is not identical to the set of indices $t_1, \dots, t_{n-k}$. Now note that the (k-1)-dimensional sum $S(i_{t_1}, \dots, i_{t_{n-k+1}})$ to be processed can become an addend in as many as $n - k + 1$ different types of k-dimensional sums. These types are simply sums of the form $S(i_{t_1}, \dots, i_{t_{n-k+1}}/i_j)$, where j varies over the values $t_1, \dots, t_{n-k+1}$, and where the $/i_j$ notation indicates that i_j is to be removed from among the indices $i_{t_1}, \dots, i_{t_{n-k+1}}$. A separate linked list of running totals is maintained in a computer disk file for each such type of k-dimensional sum. A total of n such lists are kept, but a given addend contributes to a sum in only $n - k + 1$ of them.

Within a given linked list, space is not reserved for a particular running total until an addend that would contribute to that total is encountered. When all the input data have been processed, it is assumed that all the running totals started during the process are now complete (i.e., all the required addends have been added in), unless a total has been marked otherwise. For it has been the policy in preparing the data base that any categories of energy consumption for which consumption is nonzero and yet unknown are represented in the data base by special data records containing "missing data" flags in place of the usual data. When the aggregate algorithm attempts to add one of these missing data flags to a running total, that total is itself marked as a total that cannot be completed because at least one of the necessary addends is missing. Since

presumably all missing data are flagged, unmarked totals are presumed complete.

Case 2. A k-dimensional input sum $S(i_{t_1}, \dots, i_{t_{n-k}})$ is processed. When such a sum is read from the data base, it must be entered in k of the linked lists described earlier. This is because running totals of this form can be generated in k different ways by adding together sums of any of k types. These k types are represented by the sums $S(i_j, i_{t_1}, \dots, i_{t_{n-k}})$ as j ranges over the integers from 1 to n other than $t_1, \dots, t_{n-k}$. If a given linked list contains a running total having the same indices as an incoming sum $S(i_{t_1}, \dots, i_{t_{n-k}})$, the running total is replaced by the incoming sum, in accordance with the policy noted earlier. The new total is marked as one taken directly from the data base, so that no further addends will be added to it, and so that it will not be inserted into a data base that already contains it. If no running total having the same indices as the incoming sum is found, the incoming sum is simply appended to the linked list and similarly marked.

These linked lists can unfortunately grow very long. Consider, for example, the ideal data base of the last section consisting of a cubic array of r^n elementary data. Immediately after the k-th pass the j-th linked list contains all sums of the form $S(i_{t_1}, \dots, i_{t_{n-k+1}}/i_j)$. The secondary indices $t_1, \dots, t_{n-k+1}$ (excepting j) can assume any of r^{n-k} combinations of values. For each of these the primary indices $i_{t_1}, \dots, i_{t_{n-k+1}}$ (excepting i_j) can assume $\binom{n-1}{n-k}$ combinations of values. Each linked list, then, has a length of $\binom{n-1}{n-k} r^{n-k}$ items after the k-th pass. Supposing conservatively that $n = 10$ and $r = 5$, the linked lists reach a peak length of 3.5 million items after the second pass. The search time in such a list is grossly prohibitive.

The search time is reduced to manageability by splitting each linked list into many sublists, each located by means of an index. Each incoming datum $S(i_{t_1}, \dots, i_{t_{n-k+1}})$ is assigned a hash code based on its type; each

of the $\binom{n}{n-k+1}$ possible types is assigned a unique code. The index just mentioned matches each code z to an array of n pointers. The j -th pointer is the location of the first total in a linked sublist. Each total in this sublist is the result of adding data having code z , where the value of the j -th key varies and the rest are fixed. To speed the search further the sums in each sublist are ordered by their primary indices

$$i_{t_1}, \dots, i_{t_{n-k}}$$

The j -th linked list accepts only those addends of the form $S(i_{t_1}, \dots, i_{t_{n-k+1}}/i_j)$. The number of possible hash codes assigned to data of this form is $\binom{n-1}{n-k}$. Consequently, since in the ideal case under consideration each linked list contains $\binom{n-1}{n-k} r^{n-k}$ totals, each of its sublists will contain $\binom{n-1}{n-k} r^{n-k} / \binom{n-1}{n-k} = r^{n-k}$ items. One might question the utility of defining these sublists, then, since immediately after the first pass each linked list contains only one sublist, which in turn contains r^{n-1} items. In the case where $n = 10$ and $r = 5$, for instance, each of the first-pass sublists contains 1.95 million items. It is little comfort that the sublists after subsequent passes are smaller. As it happens, however, the number of elementary data in the actual data base is practically zero, simply because data so finely categorized are not available. The most finely categorized data are already at least 3- or 4-dimensional sums, for which sublists become more numerous. And, up to a point, as k increases the number of k -dimensional sums in the data base increases along with the number of sublists in which the running totals are stored. If the sublists are yet expected to become too long, finer hashing codes can be tailored to particular passes. Upon the generation of sums during each pass, the number of sums generated can be counted in order to guide the formulation of a hashing code for the next pass.

A factor that complicates the generation of aggregate data is that a given k -dimensional sum $S(i_{t_1}, \dots, i_{t_{n-k}})$ can, as remarked earlier, be recovered in k different ways by summing over any of k types of $(k-1)$ -dimensional sums. Consequently a given total may occur among the linked

lists of totals as many as k times. Unfortunately it is necessary to maintain all of these duplicate totals, because it is not known until the end of a pass which totals will be discarded because of missing addends. It is easily possible that only one of the k totals will in the end be completed. This unavoidable duplication, however, requires that any duplicate totals be eliminated when the totals are finally appended to the data base after a pass is completed.

The following algorithm, which was used to eliminate duplicate totals, helps to minimize the time required for this considerable task. Beginning with the lowest-coded sublist of the first linked list of totals, the totals are examined one by one, in the order listed, for appendage to the data base. When a given total $S(i_{t_1}, \dots, i_{t_{n-k}})$ is examined, it is deleted if marked as an incomplete total. If it is not so marked, a duplicate is sought in the appropriate sublist in the linked lists already examined. Since a given total occurs only once in a single linked list, there is no need to scan the sublist containing the sum now under examination. Also there is no need to scan a sublist in the j -th linked list, whenever j is equal to one of the indices $t_1, \dots, t_{n-k}$. The proper sublist of any linked list j that is scanned is the one indexed by the hash code of sums of the form $S(i_j, i_{t_1}, \dots, i_{t_{n-k}})$. Consequently all duplicates of totals in a given linked sublist will be found, in the same order, in a single sublist. These and other factors permit duplicates to be found fairly quickly. If a duplicate total is found, it is replaced with the total having the better data quality number, and the total currently under examination is deleted. If no duplicate is found, the total under examination is simply kept. The result is that as more of the totals are examined, more totals are deleted from among those that must be scanned for duplicates each time a total is examined.

A FORTRAN implementation of the above algorithm was found to run intolerably slowly unless the input data were presorted in descending order. This presorting enabled each incoming datum to be placed at the head of the linked lists to which it is appended, thus reducing the number of disk accesses to a minimum. The time required for presorting is not

significant. The time required for removing duplicate totals was found to be only a fairly small fraction of that required to generate the totals, even after presorting was instituted.

A number of other, smaller efficiency improvements were also made. The resulting program is usable but slow. The difficulty lies partly in the inefficiency of the FORTRAN implementation. It is likely that a good assembly language coding, or even a carefully optimized FORTRAN coding, would speed the computation considerably. The main difficulty, however, stems from the inherent complexity of the problem. Recall that in the ideal case in which the input data fill an n -dimensional array containing r^n cells, the number of running totals in each of n linked lists is

$$\binom{n-1}{n-k} r^{n-k}$$

after the k -th pass. Consequently the number of totals computed through the n passes comes to

$$\sum_{k=1}^n n \binom{n-1}{n-k} r^{n-k} = n(r+1)^{n-1}/r$$

Since each total undergoes r additions, the complexity of any summation algorithm must be at least proportional to

$$n(r+1)^{n-1}$$

The complexity of the problem, then, is rather severely exponential. (The problem does not lie even in the class NP of problems that are soluble in polynomial time by a nondeterministic algorithm.) For this reason any implementation will run prohibitively slow when the input data set is large. The summations required for the End Use Data Base were calculable only through the painstaking use of corner-cutting techniques described at the end of Sec. 6.3.

6.3 Flagging the Absence of Data

It was mentioned in the previous section that when one of the nonzero addends of a sum is missing, the data base contains a record representing the missing addend and bearing a missing-data flag in place of a datum. It is this flag that signals the summation algorithm, described in the same section, that the total to which the missing addend would be added cannot be completed.

The difficulty with this policy of flagging absent data is that the missing-data flags are likely to be very numerous, perhaps more so than the data that are present. Some calculations to follow substantiate this. This difficulty, as well as a simple technique that was used to circumvent it, are the subject of this section.

Before going further it is important to point out that although the technique of using missing-data flags has an alternative, the alternative is even worse. The alternative is simply to omit from the data base all records representing missing data and to include a record for each datum equal to zero. The summation routine would be informed of the possible values of every key and would reject every running total one or more of whose possible addends are not found in the data base. The number of zero-valued sums that would have to be made part of the data base, however, would exceed even the number of missing-data flags discussed above. This is because most subcategories of a given category are as necessarily empty as the passenger subcategory of pipeline transport or the coal-fueled subcategory of auto transport. Furthermore, this profusion of superfluous zeros cannot be alleviated in the way the profusion of missing-data flags was alleviated, a way to be described at the end of this section.

To get an idea of the number of missing-data flags that may be necessary, consider the typical situation in which

- (a) all sums of the form $S(g_1, h_2, i_3, \dots, i_k)$, where g_1 and h_2 are fixed but $i_3, \dots, i_k$ ($3 \leq k \leq d$) vary, are known, and in which
- (b) all sums of the form $S(g_1, h_2, i_3, \dots, i_n)$, where $i_3, \dots, i_n$ vary, are unknown.

This might occur if h_2 were the auto category and g_1 and g_1' respectively were the gasoline and diesel oil categories. That is, it might be that the consumption of gasoline in all the intersections of auto subcategories $h_2, i_3, \dots, i_k$ ($k \leq d$) is known but the consumption of diesel oil in the intersections of auto subcategories $h_2, i_3, \dots, i_n$ is unknown, simply because nothing at all is known about auto consumption of diesel oil. The known sums $S(g_1, h_2, i_3, \dots, i_k)$ would trigger, among others, all running totals of the form $S(h_2, i_3, \dots, i_k)$, each of which is incompletable. To cause each to be recognized as incompletable, each missing sum $S(g_1', h_2, i_3, \dots, i_k)$, $k \leq d$, must be represented by a missing-data flag. The number of these flags is potentially

$$\sum_{k=3}^d \binom{d-2}{k-2} r^{k-2},$$

which is exactly the number of known sums $S(g_1, h_2, i_3, \dots, i_k)$.

This is perhaps tolerable, but the situation is even worse than this. It is easily possible that sums of the form $S(g_1, i_{t_1}, \dots, i_{t_j})$ exist, where at least one of the indices $t_1, \dots, t_j$ is greater than d and all are greater than 2. Each of these would trigger an incompletable missing sum of the form $S(i_{t_1}, \dots, i_{t_j})$, among others. Consequently all missing sums of the form $S(g_1', i_{t_1}, \dots, i_{t_j})$ would have to be flagged to ensure that any of these incompletable sums are so recognized. These additional flags, combined with the flags already enumerated above, number

$$\sum_{j=1}^{n-2} \binom{n-2}{j} r^j = (r+1)^{n-2} - 1$$

Consider the case in which $n = 10$ and $r = 5$. If we reasonably suppose that $d = 6$, then the number of known sums $S(g_1, h_2, i_3, \dots, i_k)$, $3 \leq k \leq d$, comes to 1275. The number of missing-data flags would be 1,679,615.

The absurdity of recording 1300 times as many missing-data flags as data was avoided in the following way. The convention was adopted that

sums over certain breakdowns are always considered to have missing nonzero addends except possibly when the addends all represent subcategories of a single mode. That is, certain distinguished breakdowns j are such that any total $S(i_j, i_{t_1}, \dots, i_{t_k})$ is considered a priori to be incompletionable unless one of the indices $t_1, \dots, t_k$ represents a breakdown by mode. If one of the indices does represent a breakdown by mode, the sum is not presumed incompletionable; it is treated as such only if a missing-data flag is discovered in place of one of its addends. Naturally, the distinguished breakdowns j are chosen so that sums over them are in fact incompletionable in the instances described. It was decided that sums within a mode, rather than sums within some other type of category, would not be presumed incompletionable because (a) the data are generated a portion at a time, each portion corresponding to a mode, and (b) sums are very often incompletionable across modes when they are completionable within modes.

To illustrate the utility of this simple convention, return to the above example and make the reasonable assumption that breakdowns 3, 4, ..., d have been distinguished as ones over which transmodal sums are presumed incompletionable. Then any sum of the form $S(g_1', i_{t_1}, \dots, i_{t_j})$, where at least one of $t_1, \dots, t_j$ is greater than d and all are greater than 2, is recognized a priori to be incompletionable, so that no missing-data flag need be inserted for its sake. The result is that the missing-data flags needed are merely those for the sums $S(g_1', h_2, i_3, \dots, i_k)$, which are 1275 in number. This is not ideal, but in nearly every case the known sums recorded within a particular mode considerably outnumber the unknown nonzero sums within that mode. This is because, to use the present instance, values of i_1 for which $S(i_1, h_2, i_3, \dots, i_k)$ exist typically outnumber values of i_1 for which nonzero sums of this form are missing.

The technique just described is easily implemented in the summation algorithm of the previous section. Before an addend is permitted to start a running total, it is routinely checked to see whether it contains an index corresponding to one of the distinguished breakdowns but no index

corresponding to the mode breakdown. If so, no running total is started. Also, if a sum over modes is about to be taken, the first addend is checked to see whether it contains an index corresponding to a distinguished breakdown. If it does, no running total is started. (An addend is considered to have an index corresponding to the mode breakdown if and only if it is classified under AIR, RAIL, AUTO, BUS, TRUCK, MOTORCYCLE, MARINE, or PIPELINE. A sum is considered to be a sum over modes when it is either a sum over MODEL with MODE fixed at HIGHWAY, or else a sum over MODE.)

The greatest improvement was achieved by decomposing the problem into smaller problems that were later combined. For instance, the procedure below was followed with respect to the modes:

- (a) Run the summation algorithm separately on each mode, in each case summing only over those breakdowns that need summation within that particular mode.
- (b) Concatenate the results of these summation runs, and run the summation program again, this time summing only over undistinguished breakdowns, and summing over modes only when data are not classified under a category within one or more distinguished breakdowns. (The input to this stage can be trimmed by purging all missing data flags classified under a category in any of the distinguished breakdowns.)

This procedure has a double advantage. It reduces the time and space required by reducing the number of keys over which sums are taken. Recall that the time and space requirements vary exponentially with the number of summing keys. A second advantage is that it reduces, also in an exponential fashion, the number of missing data flags necessary. When fewer sums are attempted, fewer flags are needed to stop them.

The summation algorithm is somewhat sluggish and sprawling because it is completely general: it requires no prior information whatever about the combination of elementary data, aggregate data and missing data flags it will be fed. The decomposition described above permits one to appropriate his prior knowledge of what sorts of sums need be attempted

by choosing a limited number of summation keys at each stage. This choice in effect conveys to the summation algorithm certain information about the structure of the incoming data, and the result is an enormous improvement in performance.

In order to expedite further the summation process — indeed, to make it affordable — the same decomposition was applied to the data corresponding to some of the individual modes. On occasion the components of a single mode were themselves further decomposed. The resulting aggregations formed part of these modes' input to stage (a) above.

CHAPTER 7. THE RETRIEVAL PROGRAM "DBRS"

A computer program designed especially to retrieve data from the End Use Energy Consumption Data Base is now in operation at ORNL. It operates "on line," meaning that one can sit at a computer terminal, ask for data of his specification, and wait a few seconds for a response. This retrieval program, called DBRS by its developers, is currently set up to read the data provided on the ORNL data tape (see Sec. 1), but it is capable of retrieving data from any data set. One need only specify the format of the data set in a manner discussed in Sec. 7.2 below. The developers of the program are Niket K. Patwardhan and Danny G. Johnson, working under the direction of Professor Derrell V. Foster of the Computer Science Department at Vanderbilt University. It is intended for those who wish to have on-line retrieval availability of the end use data, as well as, for ORNL's own use. It was written with the aim of making it as transportable as possible, so that it could be installed on most machines with on-line capabilities in a few days at worst.

Section 7.1 below provides simple instructions for using the program, which is designed so that one with no background in computing should be able to learn to use it rather easily. Section 7.2 discusses the installation of the program. A more complete presentation of these matters can be found in the *DBRS Manual: User's Guide to DBRS Version 1.3*, prepared by the authors of the program, and submitted to the Office of the Consumption Data System along with this report. The point of the instructions in Section 7.1 is to provide something less formal and addressed more to the layman than the relatively technical presentation in the manual. Section 7.2 supplements the manual's installation instructions with tips based on experience gained since the manual was written.

7.1 How to Use It

Begin by typing whatever command your computer requires to begin execution of DBRS. (At ORNL, where the program is installed on a PDP-10 computer, the command is RUN DBRS.)

The computer will respond,
ENTER NAME OF DATABASE:
whereupon you should type in the name your installation is using for the data base from which you wish to retrieve data. (At ORNL, the End Use Energy Consumption Data Base is named ENDUSE.) When the computer then says,
ENTER NAME OF RETRIEVE OUTPUT FILE:
type in the name of a file in which you want a record of your dialogue with the computer saved. You will probably need to consult with your local computer programmers to learn what sort of name is suitable. (At ORNL, any PDP-10 file name will do.)

After a few seconds the computer will say,
READY
indicating that it is ready for your first command. You should never try to give the computer a command until it has finished obeying your previous command and has indicated as much by saying READY.

The computer will obey any of eight commands. They are,
RETRIEVE ... WHERE ... retrieves data from the data base
TYPE ... controls the number of data printed on your terminal
HELP ... lists commands, attributes or their values
EXIT
SUM ... WHERE ... sums over breakdowns
INPUT ... switches to a new data base
OUTPUT ... switches to a new output file
KEEP saves numerical data in a special output file
Any of these commands can be abbreviated by using the first letter only. A user of DBKS need know only the first four, and they are described first below.

7.1.1 The RETRIEVE Command

The RETRIEVE command, the most basic one, is the command that actually fetches the data you want. It reads more or less like ordinary English. For instance, two RETRIEVE commands might be:

```
RETRIEVE ENERGY WHERE MODEL EQ AUTO AND STATE EQ NY AND YEAR EQ 76
R YEAR, ENERGY, EUNIT W MODEL EQ AUTO AND STATE EQ ALL
```

(Note that "RETRIEVE" and "WHERE" are abbreviated in the second command.) Since EQ stands for "equals" or "is," the first command says, "retrieve all energy use figures where the mode is auto, the state New York and the year 1976." The second command retrieves all national energy use figures for autos, as well as the year to which each figure pertains and the unit in which it is expressed. The import of STATE EQ ALL is to suppress all auto energy use figures broken down by state; national totals alone will be retrieved. When printed on your terminal, the retrieved data might look like this:

67	1234 BILLION BTU
68	2345 BILLION BTU
69	3456 BILLION BTU
70	4567 BILLION BTU

.
 .
 .

76	6789 BILLION BTU
----	------------------

You can use the TYPE command (Sec. 7.1.3) to make this output appear on your terminal.

It is important to understand that a command may retrieve more figures than you expect. Let us suppose, for example, that the data base from which the data are to be retrieved is the base of transportation energy use data documented in this reported and recorded on the ORNL data tape. Then the first command above will not retrieve just one datum, representing the total energy consumption of autos in New York in 1976, but will retrieve many others as well. The reason is that this total is broken down by SECTOR, USE1, USE2, INCOME, CARRIER and RANGE (see Method 310). All these breakdown figures will be retrieved as well, since they fall under the heading of auto energy use in New York in 1976. For instance, a figure for commercial autos other than common carriers operating in New York in 1976 will appear, as will a figure for the intercity business use of household autos in New York in 1976 by families with incomes between \$10,000 and \$12,000, and so on. Let us suppose, then, that you want to see only the total New York figure along with its breakdown by SECTOR. In this instance the following command will suffice:

```
R SECTOR, ENERGY, EUNIT W MODEL EQ AUTO AND STATE EQ NY AND YEAR EQ 76;
AND RANGE EQ ALL AND CARRIER EQ ALL
```

(Note that a semicolon must be used to indicate a continuation of the command on the next line.) Since "ALL" is synonymous with "total," the clauses RANGE EQ ALL and CARRIER EQ ALL serve to exclude all figures broken down by RANGE or by CARRIER. The output might be,

HOUSEHOLD	3456 BILLION BTU
COMMERCIAL	2345 BILLION BTU
GOVERNMENT	1234 BILLION BTU
ALL	7035 BILLION BTU

In this case it is not necessary to add the clauses USE1 EQ ALL, USE2 EQ ALL and INCOME EQ ALL, since these breakdowns are provided for intercity travel only. In general, when more numbers than expected are returned, there are two ways to correct the situation. One is to consult documentation of the database, such as the method descriptions in this report, to see which extra conditions must be imposed to remove unwanted breakdowns (if they are in fact unwanted). Another is to reissue the command while asking for more data items to be printed out, in order to

see which unwanted breakdowns are being provided. For example, the above command might have been augmented with requests for SECTOR, USE1, etc., on a trial and error basis, to discover which of these attributes vary among the data retrieved.

EQ is not the only relation that can be used in a WHERE clause. There are also

- GT (greater than)
- GE (greater than or equal to)
- LT (less than)
- LE (less than or equal to)

These relations can of course be used only with attributes with numeric values. For example, if you want to know which states used more than a trillion (1000 billion) Btu's of energy to run taxis in 1976, you can say

```
R STATE, ENERGY, EUNIT W YEAR EQ 76 AND SECTOR EQ COMMERCIAL AND;  
MODEL EQ AUTO AND CARRIER EQ COMMON AND ENERGY GE 1000
```

7.1.2 The TYPE Command

The TYPE command specifies how many of the data retrieved are to be printed on the terminal. By itself:

TYPE

the command causes all retrieved data, no matter how many, to be printed. It is safer to specify a maximum number of lines you want to see in response to any given RETRIEVE command, such as:

TYPE 35

If the number of lines is set at 25 or greater, "values missing" messages generated by the SUM command will also be printed on the terminal (see Sec. 7.1.5). Regardless of how many lines of data or how many "values missing" messages are printed on your terminal, all the data retrieved and all the missing value messages generated are recorded in the output file.

7.1.3 The Help Command

The HELP command provides you with instant information about how to use DBRS. By itself,

HELP

the command causes a list of the permissible commands and their formats to be printed on your terminal. To obtain a list of the attributes recorded in the data base you are now using (MODE, YEAR, etc.), type
HELP *

To obtain a list of the possible values of any given attribute, such as MODE, type the command

HELP MODE

If the attribute specified is numeric, as is ENERGY, a message to that effect will be the response. (The numeric attributes in the transportation data base are YEAR, METHOD, QUALITY, FUELUSE and ENERGY; the rest take on predefined values.)

7.1.4 The EXIT Command

When you are done, type
EXIT
and the execution of the DBRS program will stop.

7.1.5 The SUM Command

The SUM command is a powerful instruction that computes all necessary sums over breakdowns in order to deliver a specified aggregate figure. It is not needed for the transportation data base in its delivered form, since all sums that can be derived from the available data are already recorded in the data base and can be examined with the RETRIEVE command (see Method 900). The SUM command is useful for data bases in which not all sums are recorded. Although the computer implementation of the summation algorithms appears to be working correctly, it is yet an experimental implementation and may run prohibitively slow when the data base is very large or if there are more than a dozen nonnumeric attributes.

To see how the SUM command works, suppose that total 1976 energy use figures for all states except New York are recorded for each fuel. Suppose further that the total New York energy use figures, by fuel, in the commercial and in the household sectors are recorded. The government sector totals are not recorded, by the figures for civilian and for military uses are recorded by fuel. The command

SUM ENERGY WHERE YEAR EQ 1976

will compute a national energy use figure as follows: for each fuel it will add the civilian and military figures for New York to get a government sector total for that state; then for each fuel it will add up the energy used in the three sectors in New York; then for each fuel it will add up the energy consumption of the states; finally it will add up the energy consumption for each fuel, yielding a national total for 1976. The algorithm that accomplishes this is recursive in nature and is completely general, so that it can accommodate any request and any configuration of recorded data, however complex may be the pattern of missing aggregations. It also prints a complete list of all values that would be needed to form a complete sum but that were missing in the data base; these missing value messages are triggered by missing-data flags in the data base (see Sec. 6.3).

7.1.6 The INPUT Command

The INPUT command switches you to another data base. To start retrieving data from the database FUEL, for instance, type
INPUT FUEL

7.1.7 The OUTPUT Command

The OUTPUT command switches you to another output file. If you want to start sending the retrieved data and sums to file NEWOUT, for instance, type
OUTPUT NEWOUT

7.1.8 The KEEP Command

The KEEP command, added to DBRS as a convenience in making tables at ORNL, saves retrieved numbers of your choice in a special output file that contains numbers only and omits all the identifying information that is recorded in the main output file. It works like this. If the last SUM or RETRIEVE command was a SUM command, the resulting sum ("grand total") is recorded in the special file. If the last SUM or RETRIEVE command was a RETRIEVE command, then the last numeric value in each line of output is recorded in the special file, one number per line. For instance, if the response to a RETRIEVE command is

AUTO	HOUSEHOLD	1234 BILLION BTU
BUS	HOUSEHOLD	0 BILLION BTU
TRUCK	HOUSEHOLD	123 BILLION BTU
CYCLE	HOUSEHOLD	234 BILLION BTU

then if the KEEP command is used, the following will appear in the special output file:

```
1234
  0
123
234
```

These numbers will be right-justified in a field eleven characters wide. In the current implementation, at most 100 numbers can be saved with each KEEP command.

The name of the special output file is a matter of local implementation. At ORNL, the filename is the main output file name, minus its extension (if any), plus the extension .N. For example, if the main output file is OUT.DAT, the special output file would be OUT.N.

7.2 How to Install It

The following pointers on the installation of DBRS are intended only as a supplement to Sec. III of *DBRS Manual: User's Guide to DBRS Version 1.3*, by Derrell Foster, Niket Patwardhan and Danny Johnson.

7.2.1 Adapting the Programs to the Local Computer

Three FORTRAN programs are necessary for the operation of DBRS. Other than DBRS itself, they are BUILDS, which builds a schema file describing the format of the data base, and BUILDI, which builds an index. (Note that the data base must be sorted before using BUILDI.) These programs were originally developed on a DEC-1099 computer at Vanderbilt University and are currently operating on another DEC-10 machine at ORNL. Consequently the installation of the programs on some computer of another make will require several changes, especially with respect to input and output. Although DBRS was written so as to be as transportable as possible, complete compatibility with other machines is impossible, and its installation will have to be the responsibility of a computer programmer familiar both with FORTRAN and with his local system.

Practically all the necessary changes in DBRS are likely to be confined to subroutine OPENF, which opens files and constructs file names, and subroutine INIT, which reads the schema file and does similar housekeeping chores. These subroutines, written with the features of FORTRAN-10, have been especially well documented in order to ease any rewriting that may be necessary. One change that may affect users is a redefinition of the convention for naming the schema, index, data and output files.

Another necessary change, if DBRS is installed on other than a DEC-10 computer, is replacement of all INCLUDE 'COMMON.DGJ' statements with the contents of file COMMON.DGJ, which contains most of the declarations and common statements. FORTRAN-10 automatically makes this substitution, but such an inclusion feature may not be available on other machines.

The remainder of DBRS is deliberately written in universal FORTRAN and should require few alterations. The supporting programs, BUILDS and BUILDI, will require some modifications to accommodate the local input/output and file naming conventions. Questions concerning the installation of DBRS may be directed to

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Transportation Energy Group
Oak Ridge National Laboratory, Mail Stop G-22
P.O. Box X
Oak Ridge, Tennessee 37830

7.2.2 Creating the Data Base

The instructions on Sec. III of the DBRS manual should suffice, but for two caveats. It is that the data and schema files are read, by DBRS, with random access read statements of the form READ (1#n,123) ... and

consequently may need to be written with statements of the same form. In particular, the DEC-10 system at ORNL requires that records to be randomly accessed be recorded by writing the records with a WRITE (1/#n,nn) ... statement. Failure to do so wrecks any attempt to access the file randomly, and editing of these files with TECO or SOS destroys any alignment that may have existed beforehand.

A second caveat is that retrieval may be slow if the entire database is placed on line, depending on the efficiency of the local equipment. It may prove convenient to split the data into several data sets, perhaps one for each mode, to speed retrieval.

1.2.3 The SUM Algorithm

Since the implementation of the SUM command in DBRS is not as well documented in the source code as that of the other commands, the following description of its operation, written by Niket Patwardhan, is provided.

First, the retrieval routines are called with a range specification that would include all records that could be useful in generating the sum. Each attribute of any record retrieved, then, must have a value within the range specified for that attribute. If a value for an attribute is specified in the SUM command, then the allowed range for that attribute consists simply of that specified value; otherwise, any value is permitted. The record showing a zero for a given attribute, if it exists, always precedes records showing other values. When a record with a zero entry for a given attribute is retrieved, the range specification for that attribute is narrowed to include zero only by setting a sum-found flag for that attribute. The retrieval routines will then not retrieve any record that is included in this sum. This takes care of multiple counting.

The sum found flag for an attribute is reset to false whenever a record is retrieved that has a different value for a higher-level attribute, so that the full range is again used for this attribute. An example would help at this stage. Consider a data base with three nonnumeric attributes, each of which can take on one of three values besides zero. The records contained in the database are shown below.

```
0 1 1
0 1 2
0 1 3
0 2 0
0 2 1
0 3 1
1 3 0
1 3 1
1 3 2
2 3 0
```

2 3 1
2 3 2
3 3 2

Let us say we want to sum over all attributes. Now when the summing routine picks up the first record, since the zero has been found for attribute 1, it chops the search range for this attribute to zero alone. The record is then passed to the CHECK routine, which notes missing items. (It learns which values are missing by consulting the value codes in the schema file.) On this pass these records are used in computing the sum and are also the ones retrieved:

0 1 1
0 1 2
0 1 3
0 2 0
0 3 1

As can be seen record 0-3-1 is also retrieved. CHECK generates a request for these sums: 0-3-2 and 0-3-3. The process is then restarted with 0-3-2 as a search criterion. The records retrieved this time are

1 3 2
2 3 2
3 3 2

The 0-3-3 search criterion retrieves no records and so is dumped on the missing value stack, and the process ends.

The flags controlling the process are implemented in a very simple fashion. When a missing value, missing record or no sum flag is encountered in the data base, the retrieved flag is of course not added to the total, and one of three actions is taken. (1) If the flag is a no-sum flag, the record is passed to the CHECK routine, thus inhibiting the generation of a missing value request. (2) If it is a missing value flag, the record is dumped on the missing value stack and is also passed to the check routine to prevent the calculation of the sum. (3) If it is a missing record flag, the record is ignored, and the sum-found flag is not set.

CHAPTER 8. THE TAPE FORMATS

The transportation energy use data documented in this report are submitted on two tapes having two different formats. The two tapes contain exactly the same energy and fuel consumption data, categorized in essentially the same way. One, however, uses a format and coding scheme that has been convenient for use at ORNL, and the other is recorded with a format and coding scheme more convenient for the Energy Information Administration (EIA).

One principal difference is that the EIA tape breaks down an energy consumption estimate by year within a single record, whereas the ORNL devotes a separate record to each year. That is, the EIA tape provides space for several years' data on a single record, whereas the ORNL tape provides space for only one year on a single record.

Another difference is more subtle but more important. The ORNL tape is coded in such a way that all the categories in one breakdown that are subsumed by the categories in another breakdown are given distinct codes. For instance, the MODE1 categories are all subcategories of particular MODE categories, and all the MODE1 categories are given distinct codes. The EIA tape, however, provides subcategory codes that are distinct only among the subcategories of one particular subsuming category. For instance, the EIA tape assigns both the light rail subcategory of the RAIL category and the TRUCK subcategory of the HIGHWAY category the code 1, while the ORNL assigns these categories the distinct codes 3 and 5, respectively. Consequently one cannot retrieve energy use figures for a subcategory from the EIA tape by specifying the subcategory code alone; he must specify the codes of the subsuming category (or categories, if there are more than one level of subsumption) as well. To emphasize this, all four levels of the MODE category codes, for instance, are concatenated and denoted with a single name, MODE, in the EIA tape, rather than given the separate names MODE, MODE1, MODE2 and MODE3. One can retrieve energy use estimates for trucks from the ORNL tape by specifying MODE1 = 5, but to retrieve such estimates from the EIA tape he must specify MODE = 3100 (where the 3 = highway, the 1 = truck under highway, and the zeros indicate that no further breakdown by mode is desired). The same principle holds for the SECTOR/CIVMIL, FUEL/FUEL1 and USE/USE1/USE2/USE3 families of breakdowns.

As a result of these differences the EIA tape is somewhat more compact, while the ORNL tape is better suited to certain types of retrieval. The user need only choose the tape best suited to his purposes. The format and coding scheme for each tape are laid out in the following sections.

Both tapes are 9-track, 1600 bpi tapes with the IBM standard label. The EIA tape has the volume serial number JNH001, and the ORNL tape the serial number JNH002. The dataset on the former is given the dataset name ENDUSE.TRNSPORT.EIA.FEB80 and on the latter the name ENDUSE.TRNSPORT.ORNL.FEB80.

8.1 The EIA Tape

The format and coding scheme of the EIA tape are as follows.

field	format	datum	category codes
1	I1	the digit '5',	indicating transportation data
2-6	I5	MODE	00000 - total 10000 - air 11000 - narrow-body aircraft 11200 - 2 jet engines 11300 - 3 jet engines 11400 - 4 jet engines 11500 - propeller-driven craft 11600 - other aircraft 12000 - wide-body aircraft 12300 - 3 jet engines 12400 - 4 jet engines 20000 - rail 21000 - light rail 22000 - heavy rail 30000 - highway 31000 - automobile 32000 - bus 32100 - school bus 32200 - other bus 33000 - truck 33100 - light truck (under 10,000 lb gross weight; under 12,500 lb for military trucks) 33101 - pickup, panel, multi-stop or walk-in truck 33102 - platform truck 33103 - cattle rack 33104 - insulated van (nonrefrigerated) 33105 - refrigerated van 33106 - furniture van 33107 - open-top van

33108 - other enclosed van
 33109 - beverage truck
 33110 - utility truck
 33111 - garbage or refuse truck
 33112 - winch or crane
 33113 - wrecker
 33114 - pole or logging truck
 33115 - auto transport truck
 33116 - dump truck
 33117 - tank truck for liquids
 33118 - tank truck for dry bulk
 33119 - concrete mixer truck
 33120 - other truck
 33200 - medium truck (10,000-20,000 lb;
 12,500-17,000 lb for military
 trucks)
 33201-33220 - same as above
 33300 - light-heavy truck (20,000-26,000
 lb; over 17,000 lb for military
 trucks)
 33301-33320 - same as above
 33400 - heavy-heavy truck (over 26,000 lb)
 33401-33420 - same as above
 34000 - motorcycle
 40000 - marine
 41000 - recreational boats
 42000 - commercial ships
 50000 - pipeline
 51000 - gas pipeline
 52000 - liquids pipeline

7	II	SECTOR (of the economy)	0 - total 1 - household 2 - commercial 3 - government
8	II	CIVMIL	0 - total 1 - civilian 2 - military 0
9	II	RANGE	0 - total 1 - local 2 - intercity 3 - regional 4 - international

10	11	CARRIER	0 - total 1 - common carrier 2 - other than a common carrier
11-15	15	USE	00000 - total 10000 - passenger 11000 - business 12000 - personal 12010 - commuting to work 12020 - family business 12030 - educational 12040 - outdoor recreation 12041 - pleasure riding 12042 - racing and competition 12043 - off-road riding 12044 - other outdoor recreation 12050 - visit friends or relatives 12060 - vacation travel and sightseeing 12070 - entertainment 12080 - other personal uses 20000 - nonpassenger 21000 - freight 21010 - agriculture 21020 - construction 21030 - manufacturing 21040 - trade (wholesale and retail) 21050 - utilities 21060 - for-hire 21070 - forestry and lumber 21080 - mining 21090 - other 21100 - natural gas pipeline 21110 - crude oil pipeline 21120 - oil products pipeline 21130 - water pipeline 21140 - slurry pipeline 22000 - services
16-17	12	FUEL	00 - total 10 - coal (not used) 20 - motor gasoline 30 - aviation gasoline 40 - jet fuel 41 - naphtha-type jet fuel 42 - kerosine-type jet fuel 50 - distillate (diesel) oil 60 - residual oil 70 - natural gas 80 - electricity

18-19 I2

STATE

00 - ALL states
10 - NE (Northeast)
11 - CT
12 - ME
13 - MA
14 - NH
15 - RI
16 - VT
20 - MA (Mid-Atlantic)
21 - NJ
22 - NY
23 - PA
30 - SA (South Atlantic)
31 - DE
32 - DC
33 - FL
34 - GA
35 - MD
36 - NC
37 - SC
38 - VA
39 - WV
40 - ENC (East North Central)
41 - IL
42 - IN
43 - MI
44 - OH
45 - WI
50 - ESC (East South Central)
51 - AL
52 - KY
53 - MS
54 - TN
60 - WNC (West North Central)
61 - IO
62 - KS
63 - MN
64 - MO
65 - NE
66 - ND
67 - SD
70 - WSC (West South Central)
71 - AR
72 - LA
73 - OK
74 - TX
80 - MTN (Mountain)
81 - AZ
82 - CO
83 - ID

84 - MT
 85 - NV
 86 - NM
 87 - UT
 88 - WY
 90 - PAC (Pacific)
 91 - AK
 92 - CA
 93 - HA
 94 - OR
 95 - WA

20	I1	CERTIFICATE	0 - total 1 - certificated air carrier 2 - other air carrier
24-131	12I9	ENERGY	energy use in 1967, 68, ..., 78 respectively, in billions of Btu; a blank field indicates missing data
132-239	12I9	FUELUSE	fuel use in 1967, 68, ..., 78 respectively, in the appropriate units (see Sec. 2.1); a zero indicates either that the datum is missing or that the corresponding energy figure covers more than one fuel
240-251	12I1	QUALITY	data quality numbers for 1967, ..., 78 respectively; a zero indicates that the corresponding energy datum is not supplied

8.2 The ORNL Tape

The format and coding of the ORNL tape are as follows.

field	format*	datum	category codes
-----	-----	-----	-----
1-2	I2	YEAR	67 for 1967, 68 for 1968; etc.
3	I1	MODE	0 - total all 1 - air 2 - rail 3 - highway

*All numbers are right-justified in their respective fields, with no leading zeros.

			4 - marine
			5 - pipeline
4-5	I2	MODEL	0 - total
			1 - narrow-body aircraft
			2 - wide-body aircraft
			3 - light rail
			4 - heavy rail
			5 - auto
			6 - bus
			7 - truck
			8 - motorcycle
			9 - recreational
			10 - commercial
			11 - gas pipeline
			12 - liquids pipeline
6-7	I2	MODE2	0 - total
			1 - not used
			2 - 2 jet engines
			3 - 3 jet engines
			4 - 4 jet engines
			5 - propeller-driven craft
			6 - other aircraft
			7 - school bus
			8 - other bus
			9 - light truck (under 10,000 lb gross weight)
			10 - medium truck (10,000-20,000 lb)
			11 - light-heavy truck (20,000-26,000 lb)
			12 - heavy-heavy truck (over 26,000 lb)
8	I1	SECTOR	0 - total
			1 - household sector of the economy
			2 - commercial sector
			3 - government sector
9	I1	CIVMIL	0 - total
			1 - civilian
			2 - military
10	I1	RANGE	0 - total
			1 - local
			2 - intercity
			3 - regional
			4 - foreign (international)
11	I1	FUEL	0 - total
			1 - coal (not used)
			2 - motor gasoline
			3 - aviation gasoline

			4 - jet fuel
			5 - distillate (diesel) oil
			6 - residual oil
			7 - natural gas
			8 - electricity
12	I1	FUEL1	0 - total
			1 - naphtha-type jet fuel
			2 - kerosine-type jet fuel
13	I1	USE	0 - total
			1 - passenger
			2 - nonpassenger
14	I1	USE1	0 - total
			1 - business
			2 - personal
			3 - freight
			4 - services
15-16	I2	USE2	0 - total
			1 - commuting to work
			2 - family business
			3 - educational
			4 - outdoor recreation
			5 - visit friends or relatives
			6 - vacation travel and sightseeing
			7 - entertainment
			8 - other personal
			9 - not used
			10 - agriculture
			11 - construction
			12 - manufacturing
			13 - trade (wholesale and retail)
			14 - utilities
			15 - for-hire
			16 - forestry and lumber
			17 - mining
			18 - other
			19 - natural gas pipeline
			20 - crude oil pipeline
			21 - oil products pipeline
			22 - water pipeline
			23 - slurry pipeline
17	I1	USE3	0 - total
			1 - pleasure riding
			2 - racing and competition
			3 - off-road riding
			4 - other outdoor recreation

18	I1	CARRIER	0 - total 1 - common carrier 2 - not a common carrier
----	----	---------	---

19	I1	REGION	0 - total 1 - Northeast 2 - Mid-Atlantic 3 - South Atlantic 4 - East North Central 5 - East South Central 6 - West North Central 7 - West South Central 8 - Mountain 9 - Pacific
----	----	--------	---

20-21	I2	STATE	0 - total over region	FIPS code*	alphabetic code*
			11 - Connecticut	09	07
			12 - Maine	23	20
			13 - Massachusetts	25	22
			14 - New Hampshire	33	30
			15 - Rhode Island	44	40
			16 - Vermont	50	46
			21 - New Jersey	34	31
			22 - New York	36	33
			23 - Pennsylvania	42	39
			31 - Delaware	10	08
			32 - District of Columbia	11	09
			33 - Florida	12	10
			34 - Georgia	13	11
			35 - Maryland	24	21
			36 - North Carolina	37	34
			37 - South Carolina	45	41
			38 - Virginia	51	47
			39 - West Virginia	54	49
			41 - Illinois	17	14
			42 - Indiana	18	15
			43 - Michigan	26	23
			44 - Ohio	39	36
			45 - Wisconsin	55	50
			51 - Alabama	01	01

*These state codes are often used in the input data sets and are reproduced here for the reader's convenience. The FIPS codes number 56 U.S. states, territories and possessions alphabetically, while the "alphabetic" codes number the 51 U.S. states alphabetically.

	FIPS code	alphabetic code
52 - Kentucky	21	18
53 - Mississippi	28	25
54 - Tennessee	47	43
61 - Iowa	19	16
62 - Kansas	20	17
63 - Minnesota	27	24
64 - Missouri	29	26
65 - Nebraska	31	28
66 - North Dakota	38	35
67 - South Dakota	46	42
71 - Arkansas	05	04
72 - Louisiana	22	19
73 - Oklahoma	40	37
74 - Texas	48	44
81 - Arizona	04	03
82 - Colorado	08	06
83 - Idaho	16	13
84 - Montana	30	27
85 - Nevada	32	29
86 - New Mexico	35	32
87 - Utah	49	45
88 - Wyoming	56	51
91 - Alaska	02	02
92 - California	06	05
93 - Hawaii	15	12
94 - Oregon	41	38
95 - Washington	53	48

22-23 I2 INCOME 0 - total
1, ..., 14 - meaning of the codes varies,
depending on the mode of transport
concerned. See Methods 315 and 324
for the codes.

24-25 I2 MODE3 0 - total
1 - pickup, panel, multi-stop or walk-in truck
2 - platform truck
3 - cattle rack
4 - insulated van (nonrefrigerated)
5 - refrigerated van
6 - furniture van
7 - open-top van
8 - other enclosed van
9 - beverage truck
10 - utility truck
11 - garbage or refuse truck
12 - winch or crane
13 - wrecker

			14 - pole or logging truck
			15 - auto transport truck
			16 - dump truck
			17 - tank truck for liquids
			18 - tank truck for dry bulk
			19 - concrete mixer truck
			20 - other truck
26-27	I2	FUNIT	0 - no fuel data provided (appears on records that represents sums over several fuels)
			10 - thousands of barrels
			20 - tons (not used)
			30 - millions of cubic feet
			40 - millions of kilowatt-hours
28	I1	EUNIT	9 - billions of Btu
29	I1	QUALITY	1 - less than $\pm 10\%$ error
			2 - less than $\pm 25\%$ error
			3 - less than $\pm 50\%$ error
			4 - error unknown (see Sec. 2.2)
30-32	I3	METHOD	3-digit number indicating the method used to derive the data; see Chap. 5
33-35	I3	CERTIFICATE	0 - total
			1 - certificated air carrier
			2 - other air carrier
36-45	I10	FUELUSE	fuel consumption (a 999999997 indicates that the record represents a sum over several fuels, so that only an energy figure is provided)
46-55	I10	ENERGY	energy consumption, in billions of Btu

TABLE 1.1A -- SUMMARY OF TRANSPORT ENERGY USE,
BY MODE AND TYPE OF TRANSPORT, 1967-76
(FIRST OF TWO PAGES)

ENERGY USE IN TRILLIONS OF BTU

MODE AND SECTOR	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
ALL MODES, TOTAL [SEE NOTE 1]	12932	13813	14664	15357	15961	17032	17924	17235	18132	19114		
HOUSEHOLD [2]	6687	7169	7605	8063	8602	9360	9843	9684	10137	10803		
COMMERCIAL [3]	5866	6215	6592	6879	6939	7212	7561	7471	7302	7631		
FEDERAL CIVILIAN	74	78	78	74	79	81	88	87	90	94		
MILITARY [4]	14	14	14	12	12	12	11	11	611	595	580	
AIR, TOTAL [5]	1057	1244	1402	1417	1397	1427	1505	1393	1890	1915	1964	
AIR CARRIERS [6]	761	900	1021	1081	1061	1053	1075	1206	1205	1258	1312	
GENERAL AVIATION								197	206	184	185	
MILITARY									479	473	466	
RAIL, TOTAL	567	533	541	546	526	587	622	622	562	586	595	597
PASSENGER	77	68	63	58	31	31	31	30	30	32	32	32
FREIGHT	490	465	478	488	495	557	591	592	532	554	564	566
HIGHWAY, TOTAL	9825	10485	11140	11662	12329	13280	13973	13453	13785	14603		
HOUSEHOLD [7]	6463	6939	7357	7812	8333	9089	9560	9132	9570	10235		
COMMERCIAL [7]	3280	3460	3638	3771	3912	4105	4323	4132	4124	4273		
FEDERAL CIVILIAN	67	72	72	67	72	75	80	78	81	85		
MILITARY	14	14	14	12	12	12	11	11	10	10		

SOURCES: SEE TABLES PERTAINING TO INDIVIDUAL MODES

NOTES:

- [1] 1967-74 FIGURES EXCLUDE ALL MILITARY CONSUMPTION EXCEPT HIGHWAY FUELS.
- [2] 1974-77 ESTIMATES INCLUDE ALL GENERAL AVIATION, BUT 1967-73 ESTIMATES OMIT AIR TRAVEL. ALL ESTIMATES INCLUDE HOUSEHOLD AUTOS AND TRUCKS, MOTORCYCLES, AND RECREATIONAL BOATS.
- [3] INCLUDES AIR CARRIERS, ALL RAIL, COMMERCIAL AUTOS AND TRUCKS, COMMERCIAL BUSES (INTERCITY AND TRANSIT), COMMERCIAL SHIPPING AND PIPELINES.
- [4] SHOWS HIGHWAY ENERGY USE ONLY IN 1967-74; SHOWS ALL ENERGY USE, INCLUDING THAT OF SHIPS, IN 1975-77.
- [5] 1967-74 FIGURES EXCLUDE MILITARY FUEL USE.
- [6] 1967-73 ESTIMATES REPRESENT DOMESTIC OPERATIONS OF U.S. CERTIFICATED CARRIERS ONLY.
- [7] HERE, COMMERCIAL AUTOS INCLUDE TAXIS AND AUTOS IN FLEETS OF FOUR OR MORE. HOUSEHOLD FIGURES INCLUDE FUEL USE OF OTHER COMMERCIAL AUTOS.

SPECIAL NOTE:

HERE AND IN ALL SUBSEQUENT TABLES, LOSSES IN THE GENERATION AND DISTRIBUTION OF ELECTRICITY ARE NOT ACCOUNTED FOR. ONLY THE ENERGY VALUE OF DELIVERED ELECTRICITY IS REGISTERED. GENERATION LOSSES ARE RECORDED IN THE END USE ENERGY CONSUMPTION DATA BASE AS PART OF THE CONSUMPTION OF UTILITIES.

TABLE 1.1B -- SUMMARY OF TRANSPORT ENERGY USE,
BY MODE AND TYPE OF TRANSPORT, 1967-76
(LAST OF TWO PAGES)

ENERGY USE IN TRILLIONS OF BTU

MODE AND SECTOR	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
AUTO, TOTAL	7048	7527	8010	8421	8891	9586	10035	9650	9980	10594		
HOUSEHOLD [7]	5980	6401	6772	7162	7619	8292	8696	8305	8639	9221		
COMMERCIAL [7]	1060	1117	1229	1249	1263	1285	1330	1334	1330	1362		
FEDERAL CIVILIAN	6	7	7	7	7	7	8	8	9	9		
MILITARY	2	3	3	2	2	2	2	2	2	2	2	
BUS, TOTAL	125	127	123	122	120	119	124	126	134	141		
COMMERCIAL (INTERCITY AND TRANSIT)	86	85	81	80	76	75	77	81	86	89		
FEDERAL AND SCHOOL	37	41	40	40	43	43	46	45	47	51		
MILITARY	2	1	1	1	1	1	1	1	1	1	1	
TRUCK, TOTAL	2642	2819	2995	3106	3300	3555	3791	3637	3633	3830		
HOUSEHOLD [8]	473	527	583	636	697	777	841	837	892	975		
COMMERCIAL [8]	2134	2258	2378	2441	2572	2745	2916	2767	2708	2822		
FEDERAL CIVILIAN	25	24	25	20	22	25	26	26	25	26		
MILITARY	10	10	10	9	9	8	8	8	8	8	9	
MOTORCYCLE [9] (HOUSEHOLD ONLY)	10	11	12	15	18	20	23	40	39	39		
MARINE, TOTAL	833	886	873	929	885	890	1020	1023	1121	1287	1415	
RECREATIONAL	224	230	238	250	268	271	283	306	361	384	409	
COMMERCIAL	609	657	635	679	617	619	737	717	760	904	1006	
PIPELINE, TOTAL	650	665	708	803	824	848	804	744	652	615	599	
GAS PIPELINE	608	623	666	761	781	805	761	701	609	572	556	
LIQUIDS PIPELINE, TOTAL	42	42	42	42	43	43	43	43	43	43	43	
CRUDE OIL [10]	15	15	15	15	15	15	15	15	15	15	15	
OIL PRODUCTS [10]	15	15	15	15	15	15	15	15	15	15	15	
WATER [10]	12	12	12	12	12	12	12	12	12	12	12	
COAL SLURRY	0	0	0	0	1	1	1	1	1	1	1	

NOTES:

[7] SEE PREVIOUS PAGE.

[8] SEE TABLE 7.1 FOR A DEFINITION OF HOUSEHOLD AND COMMERCIAL TRUCKING.

[9] 1967-74 FIGURES REPRESENT REGISTERED MOTORCYCLES ONLY.

[10] ORDER-OF-MAGNITUDE ESTIMATES.

TABLE 1.2A -- SUMMARY OF TRANSPORT ENERGY USE,
BY MODE BY FUEL TYPE
(FIRST OF THREE PAGES)

FUEL USE IN MILLIONS OF BBL, OR BILLIONS OF KWH OR CUBIC FEET
FOLLOWED BY ENERGY USE IN TRILLIONS OF BTU

MODE AND FUEL	1957	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
ALL MODES [SEE NOTE 1]												
MOTOR GASOLINE	1773 9308	1883 9885	1993 10463	2087 10950	2194 11515	2351 12338	2450 12860	2355 12367	2438 12799	2576 13523		
AVIATION GASOLINE	15 78	13 66	11 55	10 51	9 46	9 46	11 57	11 57	10 53	11 55		
JET FUEL	173 978	208 1178	238 1347	241 1366	238 1351	244 1381	255 1448	236 1336	326 1836	331 1860		
DIESEL FUEL	223 1301	234 1366	252 1468	264 1536	283 1646	316 1843	357 2083	355 2069	351 2046	377 2196		
RESIDUAL OIL	86 507	92 551	87 525	92 565	80 495	79 490	94 581	92 573	107 669	127 795		
NATURAL GAS	576 594	591 609	631 651	722 744	743 763	766 787	728 744	669 685	583 595	548 559		
ELECTRICITY	22 75	22 76	22 77	23 79	23 79	23 79	23 78	23 78	22 77	22 76		
LPG	4 14	4 16	5 18	5 19	6 21	7 23	7 26	7 24	7 23	7 25		
AIRCRAFT [2]												
AVIATION GASOLINE	15 78	13 66	11 55	10 51	9 46	9 46	11 57	11 57	10 53	11 55	11 57	
JET FUEL	173 978	208 1178	238 1347	241 1366	238 1351	244 1381	255 1448	236 1336	326 1836	331 1860	339 1907	

SOURCES: SEE TABLES PERTAINING TO INDIVIDUAL MODES.

[1] 1967-74 FIGURES EXCLUDE MILITARY FUEL USE EXCEPT FOR MILITARY AUTOS
AND BUSES. ALL FIGURES OMIT FUEL CONSUMPTION BY FEDERAL CIVILIAN
TRUCKS.

[2] 1967-74 FIGURES EXCLUDE MILITARY FUEL USE.

TABLE 1.2B -- SUMMARY OF TRANSPORT ENERGY USE,
BY MODE BY FUEL TYPE
(SECOND OF THREE PAGES)

FUEL USE IN MILLIONS OF BBL, OR BILLIONS OF KWH OR CUBIC FEET
FOLLOWED BY ENERGY USE IN TRILLIONS OF BTU

MODE AND FUEL	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
RAIL												
DIESEL FUEL	89 517	84 490	86 504	88 515	86 503	97 565	103 599	103 600	93 543	98 568	99 579	100 582
RESIDUAL OIL	6 35	4 27	3 21	2 14	1 8	1 7	1 8	1 7	1 4	0 3	0 2	0 1
ELECTRICITY	5 16	5 16	5 16	5 17	5 15	4 15	5 16	4 15	5 15	4 15	4 15	4 14
AUTO												
MOTOR GASOLINE	1343 7048	1434 7527	1526 8010	1604 8421	1694 8891	1826 9586	1912 10035	1838 9650	1901 9980	2018 10594	0	0
BUS												
MOTOR GASOLINE	9 45	9 48	9 47	9 46	9 48	9 47	9 49	9 46	9 49	10 52		
DIESEL FUEL	12 68	12 68	11 64	11 64	11 62	11 62	11 66	12 71	13 76	14 79		
ELECTRICITY	3 9	3 9	3 9	3 9	3 9	2 8	2 8	3 9	3 9	3 9		
LPG	1 3	1 3	1 3	1 3	1 2	1 2	0 1	0 0	0 0	0 0		
TRUCK [3]												
MOTOR GASOLINE	378 1986	395 2076	412 2161	423 2222	437 2296	461 2419	472 2476	444 2331	448 2355	465 2440		
DIESEL FUEL	105 611	119 696	135 785	144 838	164 955	186 1082	216 1256	214 1249	210 1222	229 1332		
LPG	3 11	4 13	4 15	5 16	5 19	6 21	7 25	7 24	7 23	7 24		

SOURCES: SEE TABLES PERTAINING TO INDIVIDUAL MODES.

NOTE:

[3] EXCLUDES GOVERNMENT CONSUMPTION, CIVILIAN AND MILITARY.

TABLE 1.2C -- SUMMARY OF TRANSPORT ENERGY USE,
BY MODE BY FUEL TYPE
(LAST OF THREE PAGES)

FUEL USE IN MILLIONS OF BBL, OR BILLIONS OF KWH OR CUBIC FEET
FOLLOWED BY ENERGY USE IN TRILLIONS OF BTU

MODE AND FUEL	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
MOTORCYCLE [5]												
MOTOR GASOLINE	2 10	2 11	2 12	3 15	3 18	4 20	4 23	8 40	7 39	7 39		
MARINE [6]												
MOTOR GASOLINE	42 220	43 225	45 234	47 246	50 263	51 266	53 278	57 300	67 354	72 377	76 401	79 417
DIESEL FUEL (DISTILLATE)	18 106	19 111	20 114	20 118	22 127	23 134	28 161	26 150	27 159	30 172	35 203	39 227
RESIDUAL OIL	81 507	88 551	84 525	90 565	79 495	78 490	92 581	91 573	97 608	118 739	171 811	158 990
GAS PIPELINE												
NATURAL GAS	576 594	591 609	631 651	722 744	743 763	766 787	728 744	669 685	583 595	548 559	537 544	
ELECTRICITY	3 9	3 9	3 10	3 11	3 12	4 12	3 11	3 10	3 9	3 8	2 8	
LIQUIDS PIPELINE [7]												
ELECTRICITY	12 42	12 42	12 42	12 42	13 43	13 43	13 43	13 42	13 43	13 43	13 43	

SOURCES: SEE TABLES PERTAINING TO INDIVIDUAL MODES.

[4] EXCLUDES FEDERAL GOVERNMENT AND MILITARY CONSUMPTION.

[5] INCLUDES HOUSEHOLD MOTORCYCLES ONLY. 1967-73 FIGURES COVER REGISTERED
BIKES ONLY.

[6] EXCLUDES MILITARY CONSUMPTION.

[7] OTHER FUELS ACCOUNT FOR ABOUT 1% OF PIPELINE ENERGY USE.

TABLE 2.1 -- SUMMARY OF CATEGORIES OF TRANSPORT ENERGY USE FOR WHICH ESTIMATES ARE PROVIDED

A GUIDE TO READING THIS TABLE CAN BE FOUND ON THE FOLLOWING PAGE

METHOD	DESCRIPTION	YEAR	MODE				SECTOR		RANGE	FUEL		USE				CARRIER	STATE		INCOME CERTIF
			MODE	MOD 1	MOD 2	MOD 3	SEC- TOR	CIV- MIL		FU- EL	FU- EL1	USE 1	USE 2	USE 3	USE 4		REG- ION	STATE	
101	U.S. CERTIFICATED CARRIERS	74-77*	AIR	X	X		COMM	CIV	X	X		X				COMMON	X	X	YES
102	NONCERT. DOMESTIC FLIGHTS	74-77	AIR				COMM	CIV	REG	JET		X				COMMON			NO
102,3	INTERNATIONAL FLIGHTS	74-77	AIR				COMM	CIV	FOR	JET		X				COMMON	X	X	NO
104	U.S. GENERAL AVIATION	74-77	AIR					CIV	REG*	X		PASS				PRIV*	X	X	NO
104	ALL AVIATION	67-77	AIR					CIV		X							X	X	
201	RAIL TRANSIT	68-77	RAIL	X*			COMM	CIV	LOC	ELEC.		PASS				COMMON	X	X	
202	COMMUTER RAIL	67-78	RAIL	HEAVY			COMM	CIV	REG	X		PASS				COMMON	X	X	
203	INTERCITY PASSENGER RAIL	67-78	RAIL	HEAVY			COMM	CIV	ICTY	X		PASS				COMMON	X	X	
204	FREIGHT RAIL	67-77	RAIL	HEAVY			COMM	CIV	ICTY	X		NPAS	PRT			COMMON	X	X	
311	COMMERCIAL AUTO, EXC. TAXI	67-76	HIWAY	AUTO			COMM*	CIV		GAS		PASS				PRIV	X	X	
312	TAXICABS	67-76	HIWAY	AUTO			COMM	CIV	LOC	GAS		PASS				COMMON	X	X	
313	FEDERAL AUTOS	67-76	HIWAY	AUTO			GOVT*	CIV		GAS		PASS				PRIV	X	X	
314	HOUSEHOLD AUTOS	67-76	HIWAY	AUTO			HOUS*	CIV		GAS		PASS				PRIV	X	X	
		72-76	HIWAY	AUTO			HOUS*	CIV	X	GAS		PASS				PRIV	X	X	
315	HOUSEHOLD AUTOS	72-76	HIWAY	AUTO			HOUS*	CIV	ICTY	GAS		PASS	X	X		PRIV	X	X	
		72,76	HIWAY	AUTO			HOUS*	CIV	ICTY	GAS		PASS				PRIV	X		X*
		72,76	HIWAY	AUTO			HOUS*	CIV	ICTY	GAS		PASS	X	X		PRIV			X*
316	HOUSEHOLD AUTOS	75	HIWAY	AUTO			HOUS*	CIV	LOC	GAS		PASS	PER	CHUT		PRIV	X	X	
321	SCHOOL BUSES	67-76	HIWAY	BUS	SCH		GOVT	CIV	LOC	GAS		PASS	PER	ED		PRIV	X	X	
322	FEDERAL BUSES	67-76	HIWAY	BUS	OTR		GOVT	CIV		GAS		PASS	BUS.			PRIV	X	X	
323	TRANSIT BUSES	67-77	HIWAY	BUS	OTR		COMM	CIV	LOC	X		PASS				COMMON			
		76	HIWAY	BUS	OTR		COMM	CIV	LOC	DIES		PASS				COMMON	X	X	
324	INTERCITY BUSES	67-76	HIWAY	BUS	OTR		COMM	CIV	ICTY	DIES		PASS	X			COMMON			
		67,72,76	HIWAY	BUS	OTR		COMM	CIV	ICTY	DIES		PASS	X	X		COMMON			
		67,72,76	HIWAY	BUS	OTR		COMM	CIV	ICTY	DIES		PASS				COMMON			X*
331	HOUSEHLD & COMMCL TRUCKS	67-76*	HIWAY	TRK	X	X	X*	CIV	X	X		X*							
332	LOCAL H & C TRUCKS	67-76*	HIWAY	TRK			X*	CIV	LOC	X		X*					X	X	
333	INTERCITY H & C TRUCKS	67-76*	HIWAY	TRK			COMM	CIV	ICTY	DIES		NPAS					X	X	
334	INTERCITY H & C TRUCKS	67-76*	HIWAY	TRK	X		X*	CIV	ICTY	GAS		X*					X	X	
335	INTERCITY H & C TRUCKS	67-76*	HIWAY	TRK	X		X*	CIV	ICTY	X		X*	X	X					
336	FEDERAL TRUCKS	67-76	HIWAY	TRK	X		GOVT*	CIV		X		NPAS				PRIV	X	X	
341	MOTORCYCLES	67-73*	HIWAY	CYC			HOUS	CIV		GAS		PASS				PRIV			
		74-76	HIWAY	CYC			HOUS	CIV		GAS		PASS				PRIV	X	X	
		74-76	HIWAY	CYC			HOUS	CIV		GAS		PASS	PER	X	X	PRIV			
401	RECREATIONAL BOATS	67-77	MARI	RECR			HOUS	CIV		X		PASS				PRIV			
		67-77	MARI	RECR			HOUS	CIV		GAS		PASS				PRIV	X	X	
402	COMMERCIAL SHIPS	67-77	MARI	COMM			COMM	CIV		X		NPAS					X	X	
510	NATURAL GAS PIPELINES	67-77	PIPE	GAS			COMM	CIV	ICTY	X*		NPAS	PRT	GAS		PRIV	X	X	
520	LIQUIDS PIPELINES	67-77*	PIPE	LIQ			COMM	CIV	X	X*		NPAS	PRT	X		X*			
600	MILITARY FUEL	75-77	*				GOVT	MIL		X						PRIV	X	X	
		75-77	AIR*				GOVT	MIL		JET	X					PRIV			
		67-77	HIWAY	X			GOVT	MIL								PRIV			

GUIDE TO READING TABLE 2.1

TABLE 2.1 ATTEMPTS TO DEPICT ON ONE PAGE THE CATEGORIES OF TRANSPORT ENERGY USE FOR WHICH ESTIMATES ARE PROVIDED. A COMPLETE ACCOUNT OF THE CATEGORIES PROVIDED IS GIVEN AT THE BEGINNING OF EACH METHOD DESCRIPTION, AND ASTERISKS IN TABLE 2.1 SIGNAL THAT THESE DESCRIPTIONS SHOULD BE CONSULTED FOR QUALIFICATIONS. A GLOSSARY OF ABBREVIATIONS USED IN TABLE 2.1 APPEARS BELOW.

EACH LINE OF THE TABLE REPRESENTS A COLLECTION OF FUEL AND ENERGY USE ESTIMATES THAT LIE IN THE CATEGORIES MENTIONED. THE FIRST LINE, FOR INSTANCE, REPRESENTS A COLLECTION OF ESTIMATES FOR U.S. CERTIFICATED AIR COMMON CARRIERS IN THE COMMERCIAL SECTOR. BREAKDOWNS WITHIN THIS COLLECTION ARE SIGNALLED BY X'S. AN X APPEARING UNDER A CERTAIN BREAKDOWN MEANS THAT ESTIMATES ARE PROVIDED FOR EACH RELEVANT CATEGORY IN THAT BREAKDOWN. THE FIRST X IN THE FIRST LINE, FOR INSTANCE, INDICATES THAT U.S. CERTIFICATED AIR CARRIERS IN THE COMMERCIAL SECTOR ARE BROKEN DOWN BY MODE1 (WHICH, IN THE CASE OF AIR TRANSPORT, IS A BREAKDOWN INTO WIDE-BODY AND NARROW-BODY AIRCRAFT). WHEN MORE THAN ONE X APPEARS IN A LINE, ESTIMATES ARE PROVIDED FOR EVERY COMBINATION OF CATEGORIES IN THE BREAKDOWNS MARKED BY THE X'S. THE X'S IN THE FIRST LINE IMPLY THAT AN ESTIMATE IS PROVIDED FOR EVERY COMBINATION OF BODY TYPE (MODE1), ENGINE CONFIGURATION (MODE2), RANGE, FUEL, USE, REGION AND STATE FOR WHICH ENERGY IS CONSUMED. ALSO EVERY POSSIBLE AGGREGATION OF THESE ESTIMATES IS PROVIDED.

IT IS LEFT TO THE READER TO DEDUCE THOSE BREAKDOWNS THAT ARE PROVIDED FOR AN ENTIRE MODE OF TRANSPORT, OR FOR TRANSPORTATION AS A WHOLE. IT CAN BE INFERRED, FOR INSTANCE, THAT THERE IS NO BREAKDOWN BY STATE FOR AIR TRAVEL AS A WHOLE, SINCE PART OF THE FUEL CONSUMED (VIZ., THAT CONSUMED BY U.S. SUPPLEMENTAL AIR CARRIERS) IS NOT BROKEN DOWN BY STATE. SIMILARLY, THERE IS NO BREAKDOWN OF TOTAL TRANSPORT ENERGY CONSUMPTION BY RANGE, NOR BY MODE, NOR BY REGION, ETC. BUT THERE IS A BREAKDOWN BY FUEL, AND THERE IS A BREAKDOWN OF CIVILIAN ENERGY USE BY MODE. THE TOTALITY OF INFERENCES OF THIS SORT THAT CAN BE DRAWN ARE TOO NUMEROUS TO CATALOG HERE.

ABBREVIATIONS:

BUS.	- BUSINESS	JET	- JET FUEL
CIV	- CIVILIAN	LIQ	- LIQUIDS
CHUT	- COMMUTING TO WORK	MARI	- MARINE
COMM	- COMMERCIAL	MOD	- MODE OF TRANSPORT
CYC	- MOTORCYCLE	NPAS	- NON-PASSENGER
DIES	- DIESEL	OTH	- OTHER
ED	- EDUCATIONAL	PASS	- PASSENGER
ELEC	- ELECTRICITY	PER	- PERSONAL TRANSPORTATION
FOR	- FOREIGN (INTERNATIONAL)	PIPE	- PIPELINE
FRT	- FREIGHT	PRIV	- PRIVATE
GAS	- MOTOR GASOLINE	RECH	- RECREATION
GOVT	- GOVERNMENT	REG	- REGIONAL
HOUS	- HOUSEHOLD	SCH	- SCHOOL BUS
ICTY	- INTERCITY	TRK	- TRUCK

TABLE 3.1 -- TOTAL CIVILIAN CONSUMPTION OF AVIATION FUEL,
BY FUEL BY TYPE OF ACTIVITY, 1967-77

FUEL USE IN THOUSANDS OF BARRELS
ENERGY USE IN BILLIONS OF BTU

TYPE OF ACTIVITY	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
ALL AIR TRAVEL											
AVIATION GASOLINE	15028	12634	10524	9761	8874	8856	10945	10866	10191	10499	10916
JET FUEL	172534	207738	237561	240918	238304	243475	255349	235614	239410	244627	254106
TOTAL ENERGY	1056537	1243676	1401784	1416841	1397405	1426634	1504835	1392527	1410529	1441720	1497632
U.S. CERTIFICATED											
AIR CARRIERS											
AVIATION GASOLINE						274	228	142	126	88	53
JET FUEL						199507	213608	193734	193720	202317	211230
TOTAL ENERGY						1132535	1212349	1099218	1099053	1147602	1197959
AIR CARRIERS OTHER THAN											
CERTIFICATED CARRIERS											
JET FUEL								17080	18509	19324	20048
TOTAL ENERGY								96844	105527	110199	114327
GENERAL AVIATION											
AVIATION GASOLINE								10723	10064	10410	10862
JET FUEL								24799	27078	22875	22712
TOTAL ENERGY								196465	205949	183919	185346

SOURCE: METHOD 100

DATA QUALITY: 1 (TOTALS AND CERTIFICATED), 2(OTHER)

TABLE 3.2A -- U.S. CERTIFICATED AIRCRAFT FUEL AND ENERGY USE,
BY FUEL BY AIRCRAFT TYPE, 1967-77
(FIRST IN A SERIES OF THREE TABLES)

AVIATION GASOLINE USE IN THOUSANDS OF BARRELS
FOLLOWED BY JET FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY LUBRICATING OIL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

AIRCRAFT TYPE	1972	1973	1974	1975	1976	1977
ALL AIRCRAFT	274 199507 29 1132817	228 213608 31 1212544	142 193734 27 1099390	125 193729 27 1099221	88 202317 27 1147770	53 211230 29 1198141
2 JET ENGINES	0 31912 4 180969	0 33445 4 189662	0 31426 4 178213	0 30405 3 172425	0 32190 4 182545	0 33145 4 187964
3 JET ENGINES	0 66192 9 375368	0 80886 10 458692	0 86823 11 492361	0 94363 12 535118	0 103679 12 587939	0 113052 14 641103
4 JET ENGINES	0 96886 11 549414	0 94792 11 537542	0 72245 8 409683	0 66531 3 377303	0 63786 8 361721	0 62453 8 354163
PROPELLER-DRIVEN [1]	274 0 3 1449	228 0 3 1211	142 0 2 757	126 0 2 670	88 0 1 471	53 0 0 286
OTHER [1]	0 4516 1 25614	0 4484 1 25436	0 3239 0 18373	0 2416 0 13703	0 2661 0 15093	0 2578 0 14624

SOURCE: METHOD 101 DATA QUALITY: 1

[1] TURBO-PROPS ARE INCLUDED UNDER "OTHER"

TABLE 3.2B -- U.S. CERTIFICATED AIRCRAFT FUEL AND ENERGY USE,
BY FUEL BY AIRCRAFT TYPE, 1967-77
(SECOND IN A SERIES OF THREE TABLES)

AVIATION GASOLINE USE IN THOUSANDS OF BARRELS
FOLLOWED BY JET FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY LUBRICATING OIL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

AIRCRAFT TYPE	1972	1973	1974	1975	1976	1977
ALL NARROW-BODY AIRCRAFT	274 171678 25 975006	228 173807 26 986838	142 152848 22 867538	126 147960 21 839727	88 150983 20 856671	53 155331 22 881151
2 JET ENGINES	0 31912 4 180969	0 33445 4 189662	0 31426 4 178213	0 30405 3 172425	0 32190 4 182545	0 33145 4 187964
3 JET ENGINES	0 59821 8 339240	0 64595 8 366313	0 64191 9 364023	0 66455 8 376855	0 71327 8 404485	0 78240 10 443694
4 JET ENGINES	0 75428 8 427732	0 71281 8 404215	0 53991 5 306169	0 48683 6 276072	0 44804 5 254075	0 41366 5 234581
PROPELLER-DRIVEN	274 0 3 1449	228 0 3 1211	142 0 2 757	126 0 2 670	88 0 1 471	53 0 0 286
OTHER	0 4516 1 25614	0 4484 1 25436	0 3239 0 18373	0 2416 0 13703	0 2661 0 15093	0 2578 0 14624

SOURCE: METHOD 101

DATA QUALITY: 1

TABLE 3.2C -- U.S. CERTIFICATED AIRCRAFT FUEL AND ENERGY USE,
BY FUEL BY AIRCRAFT TYPE, 1967-77
(LAST IN A SERIES OF THREE TABLES)

AVIATION GASOLINE USE IN THOUSANDS OF BARRELS
FOLLOWED BY JET FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY LUBRICATING OIL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

AIRCRAFT TYPE	1972	1973	1974	1975	1976	1977
ALL WIDE-BODY AIRCRAFT	0 27828 3 157810	0 39801 4 225706	0 40885 5 231851	0 45759 6 259493	0 51333 6 291099	0 55898 7 316990
3 JET ENGINES	0 6371 0 36127	0 16290 1 92379	0 22631 2 128337	0 27908 3 158263	0 32351 3 183453	0 34812 3 197409
4 JET ENGINES	0 21457 2 121682	0 23511 3 133326	0 18253 2 103513	0 17850 2 101230	0 18982 2 107646	0 21086 3 119581

SOURCE: METHOD 101 DATA QUALITY: 1

TABLE 3.3A -- U.S. CERTIFICATED PASSENGER AIRCRAFT FUEL AND ENERGY USE,
BY FUEL BY AIRCRAFT TYPE, 1967-77
(FIRST IN A SERIES OF THREE TABLES)

AVIATION GASOLINE USE IN THOUSANDS OF BARRELS
FOLLOWED BY JET FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY LUBRICATING OIL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

AIRCRAFT TYPE	1972	1973	1974	1975	1976	1977
ALL AIRCRAFT	274 196131 28 1113677	228 209932 30 1191700	142 190090 27 1078730	126 189863 26 1077346	88 198522 26 1126252	53 207783 28 1178593
2 JET ENGINES	0 31912 4 180969	0 33445 4 189662	0 31426 4 178213	0 30405 3 172425	0 32190 4 182545	0 33145 4 187964
3 JET ENGINES	0 66029 9 374442	0 80775 10 458064	0 86737 11 491876	0 94296 11 534736	0 103678 12 587935	0 113052 14 641103
4 JET ENGINES	0 93674 10 531201	0 91227 10 517326	0 68687 8 389508	0 62744 7 355810	0 59993 7 340207	0 59006 7 334615
PROPELLER-DRIVEN [1]	274 0 3 1449	228 0 3 1211	142 0 2 757	126 0 2 670	88 0 1 471	53 0 0 286
OTHER [1]	0 4516 1 25614	0 4484 1 25436	0 3239 0 18373	0 2416 0 13703	0 2661 0 15093	0 2578 0 14624

SOURCE: METHOD 101 DATA QUALITY: 1

[1] TURBO-PROPS ARE INCLUDED UNDER "OTHER"

TABLE 3.3B -- U.S. CERTIFICATED PASSENGER AIRCRAFT FUEL AND ENERGY USE,
BY FUEL BY AIRCRAFT TYPE, 1967-77
(SECOND IN A SERIES OF THREE TABLES)

AVIATION GASOLINE USE IN THOUSANDS OF BARRELS
FOLLOWED BY JET FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY LUBRICATING OIL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

AIRCRAFT TYPE	1972	1973	1974	1975	1976	1977
ALL NARROW-BODY AIRCRAFT	274 168303 25 955867	228 170131 25 965993	142 149331 22 847592	126 144703 20 821251	88 148014 20 839828	53 152897 21 867348
2 JET ENGINES	0 31912 4 180969	0 33445 4 189662	0 31426 4 178213	0 30405 3 172425	0 32190 4 182545	0 33145 4 187964
3 JET ENGINES	0 59658 8 338314	0 64484 8 365684	0 64106 9 363538	0 66387 8 376473	0 71327 8 404481	0 78240 10 443694
4 JET ENGINES	0 72216 8 409519	0 67716 7 383999	0 50559 5 286707	0 45493 5 257978	0 41835 4 237236	0 38932 4 220778
PROPELLER-DRIVEN	274 0 3 1449	228 0 3 1211	142 0 2 757	126 0 2 670	88 0 1 471	53 0 0 286
OTHER	0 4516 1 25614	0 4484 1 25436	0 3239 0 18373	0 2416 0 13703	0 2661 0 15093	0 2578 0 14624

SOURCE: METHOD 101 DATA QUALITY: 1

TABLE 3.3C -- U.S. CERTIFICATED PASSENGER AIRCRAFT FUEL AND ENERGY USE,
BY FUEL BY AIRCRAFT TYPE, 1967-77
(LAST IN A SERIES OF THREE TABLES)

AVIATION GASOLINE USE IN THOUSANDS OF BARRELS
FOLLOWED BY JET FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY LUBRICATING OIL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

AIRCRAFT TYPE	1972	1973	1974	1975	1976	1977
ALL WIDE-BODY AIRCRAFT	0 27828 3 157810	0 39801 4 225706	0 40759 5 231138	0 45160 5 256095	0 50508 6 286424	0 54885 6 311245
3 JET ENGINES	0 6371 0 36127	0 16290 1 92379	0 22631 2 128337	0 27908 3 158263	0 32351 3 183453	0 34812 3 197409
4 JET ENGINES	0 21457 2 121682	0 23511 3 133326	0 18127 2 102800	0 17251 2 97831	0 18157 2 102970	0 20073 3 113836

SOURCE: METHOD 101 DATA QUALITY: 1

TABLE 3.4A -- U.S. CERTIFICATED FREIGHT AIRCRAFT FUEL AND ENERGY USE,
BY FUEL BY AIRCRAFT TYPE, 1967-77
(FIRST IN A SERIES OF THREE TABLES)

AVIATION GASOLINE USE IN THOUSANDS OF BARRELS
FOLLOWED BY JET FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY LUBRICATING OIL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

AIRCRAFT TYPE	1972	1973	1974	1975	1976	1977
ALL AIRCRAFT	0	0	0	0	0	0
	3375	3675	3643	3856	3794	3446
	0	0	0	1	0	0
	19139	20844	20660	21874	21518	19547
2 JET ENGINES	0	0	0	0	0	0
	0	0	0	0	0	0
	0	0	0	0	0	0
	0	0	0	0	0	0
3 JET ENGINES	0	0	0	0	0	0
	163	110	85	67	0	0
	0	0	0	0	0	0
	926	628	485	381	4	0
4 JET ENGINES	0	0	0	0	0	0
	3211	3565	3557	3789	3793	3446
	0	0	0	0	0	0
	18212	20215	20174	21492	21514	19547
PROPELLER-DRIVEN [1]	0	0	0	0	0	0
	0	0	0	0	0	0
	0	0	0	0	0	0
	0	0	0	0	0	0
OTHER [1]	0	0	0	0	0	0
	0	0	0	0	0	0
	0	0	0	0	0	0
	0	0	0	0	0	0

SOURCE: METHOD 101 DATA QUALITY: 1

[1] TURBO-PROPS INCLUDED UNDER "OTHER"

TABLE 3.4B -- U.S. CERTIFICATED FREIGHT AIRCRAFT FUEL AND ENERGY USE,
BY FUEL BY AIRCRAFT TYPE, 1967-77
(SECOND IN A SERIES OF THREE TABLES)

AVIATION GASOLINE USE IN THOUSANDS OF BARRELS
FOLLOWED BY JET FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY LUBRICATING OIL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

AIRCRAFT TYPE	1972	1973	1974	1975	1976	1977
ALL NARROW-BODY AIRCRAFT	0	0	0	0	0	0
	3375	3675	3517	3257	2969	2433
	0	0	0	0	0	0
	19139	20844	19946	18476	16842	13803
2 JET ENGINES	0	0	0	0	0	0
	0	0	0	0	0	0
	0	0	0	0	0	0
	0	0	0	0	0	0
3 JET ENGINES	0	0	0	0	0	0
	163	110	85	67	0	0
	0	0	0	0	0	0
	926	628	485	381	4	0
4 JET ENGINES	0	0	0	0	0	0
	3211	3565	3432	3190	2968	2433
	0	0	0	0	0	0
	18212	20215	19461	18094	16838	13803
PROPELLER-DRIVEN	0	0	0	0	0	0
	0	0	0	0	0	0
	0	0	0	0	0	0
	0	0	0	0	0	0
OTHER	0	0	0	0	0	0
	0	0	0	0	0	0
	0	0	0	0	0	0
	0	0	0	0	0	0

SOURCE: METHOD 101

DATA QUALITY: 1

TABLE 3.4C -- U.S. CERTIFICATED FREIGHT AIRCRAFT FUEL AND ENERGY USE,
BY FUEL BY AIRCRAFT TYPE, 1967-77
(LAST IN A SERIES OF THREE TABLES)

AVIATION GASOLINE USE IN THOUSANDS OF BARRELS
FOLLOWED BY JET FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY LUBRICATING OIL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

AIRCRAFT TYPE	1972	1973	1974	1975	1976	1977
ALL WIDE-BODY AIRCRAFT	0	0	0	0	0	0
.	0	0	125	599	824	1013
.	0	0	0	0	0	0
.	0	0	713	3398	4675	5744
.						
3 JET ENGINES	0	0	0	0	0	0
.	0	0	0	0	0	0
.	0	0	0	0	0	0
.	0	0	0	0	0	0
.						
4 JET ENGINES	0	0	0	0	0	0
.	0	0	125	599	824	1013
.	0	0	0	0	0	0
.	0	0	713	3398	4675	5744

SOURCE: METHOD 101

DATA QUALITY: 1

TABLE 3.5A -- U.S. CERTIFICATED AIRCRAFT FUEL AND ENERGY USE,
BY FUEL BY STATE, 1972-77
(FIRST IN A SERIES OF NINE TABLES)

AVIATION GASOLINE USE IN THOUSANDS OF BARRELS
FOLLOWED BY JET FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1972	1973	1974	1975	1976	1977
UNITED STATES	274 199507 1132817	228 213608 1212544	142 193734 1099390	126 193720 1099221	88 202317 1147770	53 211230 1198141
NEW ENGLAND	0 7283 41303	0 7603 43117	0 7225 40972	7 6845 38862	0 6814 38647	0 7515 42621
CONNECTICUT	0 1310 7431	0 1489 8444	0 1414 8018	0 1364 7737	0 1348 7646	0 1361 7720
MAINE	0 219 1246	0 310 1760	0 292 1656	2 310 1773	0 301 1708	0 315 1791
MASSACHUSETTS	0 5225 29634	0 5267 29871	0 5050 28639	5 4728 26841	0 4720 26769	0 5365 30424
NEW HAMPSHIRE	0 58 329	0 76 433	0 73 417	0 52 298	0 52 295	0 52 298
RHODE ISLAND	0 387 2195	0 387 2199	0 323 1835	0 309 1753	0 311 1769	0 335 1905
VERMONT	0 82 465	0 71 407	0 71 404	0 80 457	0 80 457	0 84 479

SOURCE: METHOD 101

DATA QUALITY: 1

NOTE: TOTAL ENERGY FIGURE INCLUDES THE ENERGY CONTENT OF LUBRICATING OIL USED.

TABLE 3.5B -- U.S. CERTIFICATED AIRCRAFT FUEL AND ENERGY USE,
BY FUEL BY STATE, 1972-77
(SECOND IN A SERIES OF NINE TABLES)

AVIATION GASOLINE USE IN THOUSANDS OF BARRELS
FOLLOWED BY JET FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1972	1973	1974	1975	1976	1977
MID-ATLANTIC	0 33109 187755	0 34183 193847	0 29901 169566	0 29503 167340	0 30121 170811	0 31193 176893
NEW JERSEY	0 68 387	0 69 391	0 51 291	0 128 729	0 76 432	0 59 336
NEW YORK	0 25267 143288	0 25974 147296	0 22616 128252	0 22146 125590	0 22770 129125	0 23626 133984
PENNSYLVANIA	0 7773 44079	0 8139 46159	0 7233 41021	0 7233 41019	0 7274 41253	0 7507 42572

SOURCE: METHOD 101 DATA QUALITY: 1

NOTE: TOTAL ENERGY FIGURE INCLUDES THE ENERGY CONTENT OF LUBRICATING OIL USED.

TABLE 3.5C -- U.S. CERTIFICATED AIRCRAFT FUEL AND ENERGY USE,
BY FUEL BY STATE, 1972-77
(THIRD IN A SERIES OF NINE TABLES)

AVIATION GASOLINE USE IN THOUSANDS OF BARRELS
FOLLOWED BY JET FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1972	1973	1974	1975	1976	1977
SOUTH ATLANTIC	83 33486 190338	69 37376 212323	49 32825 186415	41 33410 189687	24 35714 202658	13 37669 213693
DELAWARE	0 40 227	0 25 144	0 20 117	0 18 104	0 75 425	0 20 114
D.C.	0 5360 30396	0 5769 32719	0 5206 29524	0 5240 29715	0 5601 31763	0 5827 33044
FLORIDA	5 13727 77873	2 15538 88125	0 12984 73639	0 13158 74621	0 14339 81317	0 15182 86099
GEORGIA	61 7879 45010	53 9330 53193	38 8799 50102	35 9123 51926	22 9583 54469	13 10170 57747
MARYLAND	0 2026 11489	0 1916 10867	0 1485 8424	0 1443 8186	0 1416 8030	0 1522 8632
NORTH CAROLINA	1 2241 12719	1 2374 13473	1 2126 12066	0 2251 12768	0 2325 13187	0 2383 13515
SOUTH CAROLINA	15 695 4025	12 808 4650	9 770 4417	5 830 4739	1 938 5331	0 984 5582
VIRGINIA	0 1247 7073	0 1334 7566	0 1157 6561	0 1078 6118	0 1162 6595	0 1285 7289
WEST VIRGINIA	0 268 1523	0 278 1580	0 275 1560	0 265 1507	0 271 1538	0 294 1668

SOURCE: METHOD 101

DATA QUALITY: 1

NOTE: TOTAL ENERGY FIGURE INCLUDES THE ENERGY CONTENT OF LUBRICATING OIL USED.

TABLE 3.5D -- U.S. CERTIFICATED AIRCRAFT FUEL AND ENERGY USE,
BY FUEL BY STATE, 1972-77
(FOURTH IN A SERIES OF NINE TABLES)

AVIATION GASOLINE USE IN THOUSANDS OF BARRELS
FOLLOWED BY JET FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1972	1973	1974	1975	1976	1977
EAST NORTH CENTRAL	3 34173 193803	12 36592 207574	11 33448 189739	11 32926 186732	6 34071 193248	0 35342 200421
ILLINOIS	0 19091 108261	0 20092 113940	0 18185 103124	0 17755 106741	0 18660 105816	0 19456 110333
INDIANA	0 1652 9372	0 1798 10201	0 1818 10314	0 1770 10042	0 1858 10541	0 1857 10532
MICHIGAN	1 4779 27110	5 5565 31591	4 4996 28360	4 4804 27257	2 4836 27445	0 5230 29660
OHIO	1 7252 41135	6 7526 42717	6 6836 38803	7 6925 35313	3 6950 39436	0 7052 39995
WISCONSIN	0 1397 7923	0 1608 9123	0 1611 9135	0 1660 5417	0 1765 10008	0 1745 9899

SOURCE: METHOD 101

DATA QUALITY: 1

NOTE: TOTAL ENERGY FIGURE INCLUDES THE ENERGY CONTENT OF LUBRICATING OIL USED.

TABLE 3.5E -- U.S. CERTIFICATED AIRCRAFT FUEL AND ENERGY USE,
BY FUEL BY STATE, 1972-77
(FIFTH IN A SERIES OF NINE TABLES)

AVIATION GASOLINE USE IN THOUSANDS OF BARRELS
FOLLOWED BY JET FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1972	1973	1974	1975	1976	1977
EAST SOUTH CENTRAL	124 5232 30328	103 6086 35067	58 5650 32357	45 5866 33510	37 6186 35285	24 6489 36932
ALABAMA	32 1127 6567	27 1322 7647	17 1191 6846	16 1190 6837	12 1286 7364	7 1345 7665
KENTUCKY	0 980 5560	0 1093 6203	0 944 5357	0 1012 5743	0 1098 6230	0 1124 6378
MISSISSIPPI	47 379 2400	37 512 3104	27 480 2869	18 494 2904	15 488 2848	11 513 2971
TENNESSEE	44 2744 15799	38 3158 18112	14 3034 17285	11 3168 18025	9 3313 18841	6 3506 19917

SOURCE: METHOD 101

DATA QUALITY: 1

NOTE: TOTAL ENERGY FIGURE INCLUDES THE ENERGY CONTENT OF LUBRICATING OIL USED.

TABLE 3.5F — U.S. CERTIFICATED AIRCRAFT FUEL AND ENERGY USE,
BY FUEL BY STATE, 1972-77
(SIXTH IN A SERIES OF NINE TABLES)

AVIATION GASOLINE USE IN THOUSANDS OF BARRELS
FOLLOWED BY JET FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1972	1973	1974	1975	1976	1977
EST NORTH CENTRAL	0	0	0	0	1	1
	11776	11972	11913	12074	12708	13259
	66780	67895	67561	68474	72074	75202
IOWA	0	0	0	0	0	0
	779	742	806	831	909	997
	4419	4209	4573	4716	5155	5656
KANSAS	0	0	0	0	0	1
	543	531	560	525	547	611
	3083	3015	3180	3034	3111	3474
MINNESOTA	0	0	0	0	0	0
	2778	3365	3141	3196	3290	3384
	15757	19083	17813	18125	18661	19191
MISSOURI	0	0	0	0	0	0
	6018	5598	5628	5789	5929	6240
	34127	31750	31916	32832	33625	35391
NEBRASKA	0	0	0	0	0	0
	908	926	970	922	1162	1142
	5153	5255	5505	5233	6592	6477
NORTH DAKOTA	0	0	0	0	0	0
	363	426	413	397	460	496
	2059	2421	2342	2254	2610	2814
SOUTH DAKOTA	0	0	0	0	0	0
	384	380	392	401	408	387
	2178	2160	2228	2276	2315	2198

SOURCE: METHOD 101

DATA QUALITY: 1

NOTE: TOTAL ENERGY FIGURE INCLUDES THE ENERGY CONTENT OF LUBRICATING OIL USED.

TABLE 3.5G -- U.S. CERTIFICATED AIRCRAFT FUEL AND ENERGY USE,
BY FUEL BY STATE, 1972-77
(SEVENTH IN A SERIES OF NINE TABLES)

AVIATION GASOLINE USE IN THOUSANDS OF BARRELS
FOLLOWED BY JET FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1972	1973	1974	1975	1976	1977
WEST SOUTH CENTRAL	7 16440 93266	5 18521 105064	1 17723 100516	0 17743 100621	0 18456 104662	0 19514 110667
ARKANSAS	0 471 2672	0 574 3255	0 517 2936	0 475 2697	0 534 3033	0 607 3447
LOUISIANA	6 2711 15408	5 3106 17645	1 2501 14193	0 2598 14735	0 2909 16501	0 3026 17161
OKLAHOMA	0 1857 10537	0 1910 10836	0 1870 10608	0 1898 10768	0 1966 11151	0 2138 12126
TEXAS	0 11400 64648	0 12930 73327	0 12833 72778	0 12770 72419	0 13044 73974	0 13742 77930

SOURCE: METHOD 101 DATA QUALITY: 1

NOTE: TOTAL ENERGY FIGURE INCLUDES THE ENERGY CONTENT OF LUBRICATING OIL USED.

TABLE 3.5H -- U.S. CERTIFICATED AIRCRAFT FUEL AND ENERGY USE,
BY FUEL BY STATE, 1972-77
(EIGHTH IN A SERIES OF NINE TABLES)

AVIATION GASOLINE USE IN THOUSANDS OF BARRELS
FOLLOWED BY JET FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1972	1973	1974	1975	1976	1977
MOUNTAIN	19 13684 77707	21 15207 86353	12 14304 81180	9 14858 84309	3 15893 90146	0 16663 94499
ARIZONA	0 2702 15323	0 3321 18835	0 2998 17004	1 3182 14053	0 3271 18555	0 3284 18629
COLORADO	19 5131 29201	21 5394 30706	12 5178 29431	7 5290 34042	2 5724 32472	0 6204 35186
IDAHO	0 454 2576	0 494 2805	0 485 2772	0 522 2952	0 582 3305	0 620 3517
MONTANA	0 584 3317	0 818 4643	0 783 4473	0 820 4651	0 839 4760	0 888 5039
NEVADA	0 2855 16193	0 3126 17729	0 2904 16471	0 3126 17727	0 3443 19526	0 3576 20282
NEW MEXICO	0 764 4335	0 830 4707	0 832 4721	0 774 4391	0 794 4505	0 882 5003
UTAH	0 1017 5769	0 1041 5908	0 934 5298	0 994 5640	0 1069 6064	0 1043 5919
WYOMING	0 174 991	0 179 1017	0 176 1001	0 147 839	0 168 956	0 162 921

SOURCE: METHCD 101

DATA QUALITY: 1

NOTE: TOTAL ENERGY FIGURE INCLUDES THE ENERGY CONTENT OF LUBRICATING OIL USED.

TABLE 3.5I -- U.S. CERTIFICATED AIRCRAFT FUEL AND ENERGY USE,
BY FUEL BY STATE, 1972-77
(LAST IN A SERIES OF NINE TABLES)

AVIATION GASOLINE USE IN THOUSANDS OF BARRELS
FOLLOWED BY JET FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1972	1973	1974	1975	1976	1977
PACIFIC	37 44321 251532	15 46063 261300	8 40740 231081	8 40485 229632	15 42349 240237	13 43580 247210
ALASKA	36 1474 8556	15 1477 8457	8 1874 10677	5 2120 12054	12 2113 12053	6 1858 10574
CALIFORNIA	0 28647 162452	0 29444 166973	0 25730 145913	3 25565 144994	2 26916 152653	7 27993 158783
HAWAII	0 6988 39633	0 6936 39335	0 5813 32966	0 5404 30651	0 5449 30903	0 5683 32228
OREGON	0 2417 13711	0 2566 14553	0 2333 13234	0 2304 13068	0 2290 12988	0 2402 13622
WASHINGTON	0 4793 27179	0 5639 31980	0 4988 28289	0 5089 28864	0 5579 31638	0 5643 32001

SOURCE: METHOD 101

DATA QUALITY: 1

NOTE: TOTAL ENERGY FIGURE INCLUDES THE ENERGY CONTENT OF LUBRICATING OIL USED.

TABLE 3.6A -- U.S. CERTIFICATED PASSENGER AIRCRAFT FUEL AND ENERGY USE,
BY FUEL BY STATE, 1972-77
(FIRST IN A SERIES OF NINE TABLES)

AVIATION GASOLINE USE IN THOUSANDS OF BARRELS
FOLLOWED BY JET FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1972	1973	1974	1975	1976	1977
UNITED STATES	274 196131 1113677	228 209932 1191700	142 190090 1078730	126 189863 1077346	88 198522 1126252	53 207783 1178593
NEW ENGLAND	0 7107 40306	0 7426 42115	0 7046 39957	7 6706 38070	0 6676 37864	0 7370 41798
CONNECTICUT	0 1310 7431	0 1488 8440	0 1410 7997	0 1359 7707	0 1342 7614	0 1358 7701
MAINE	0 218 1239	0 308 1750	0 277 1572	2 290 1663	0 289 1644	0 311 1765
MASSACHUSETTS	0 5051 28644	0 5093 28884	0 4890 27731	5 4613 26190	0 4599 26083	0 5228 29647
NEW HAMPSHIRE	0 58 329	0 76 433	0 73 417	0 52 298	0 52 295	0 52 298
RHODE ISLAND	0 387 2195	0 387 2199	0 323 1835	0 309 1753	0 311 1769	0 335 1905
VERMONT	0 82 465	0 71 407	0 71 404	0 80 457	0 80 457	0 84 479

SOURCE: METHOD 101

DATA QUALITY: 1

NOTE: TOTAL ENERGY FIGURE INCLUDES THE ENERGY CONTENT OF LUBRICATING OIL USED.

TABLE 3.6B -- U.S. CERTIFICATED PASSENGER AIRCRAFT FUEL AND ENERGY USE,
BY FUEL BY STATE, 1972-77
(SECOND IN A SERIES OF NINE TABLES)

AVIATION GASOLINE USE IN THOUSANDS OF BARRELS
FOLLOWED BY JET FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1972	1973	1974	1975	1976	1977
MID-ATLANTIC	0 32184 182513	0 33100 187705	0 28774 163172	0 28404 161078	0 29172 165433	0 30331 172006
NEW JERSEY	0 65 373	0 66 374	0 51 291	0 57 323	0 24 136	0 38 218
NEW YORK	0 24349 138081	0 24905 141235	0 21507 121966	0 21191 120173	0 21928 124350	0 22834 129492
PENNSYLVANIA	0 7769 44058	0 8128 46095	0 7214 40914	0 7156 40580	0 7220 40945	0 7458 42295

SOURCE: METHOD 101

DATA QUALITY: 1

NOTE: TOTAL ENERGY FIGURE INCLUDES THE ENERGY CONTENT OF LUBRICATING OIL USED.

TABLE 3.6C -- U.S. CERTIFICATED PASSENGER AIRCRAFT FUEL AND ENERGY USE,
BY FUEL BY STATE, 1972-77
(REIRD IN A SERIES OF NINE TABLES)

AVIATION GASOLINE USE IN THOUSANDS OF BARRELS
FOLLOWED BY JET FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1972	1973	1974	1975	1976	1977
SOUTH ATLANTIC	83 33339 189503	69 37192 211282	49 32616 185230	41 33153 183233	24 35411 200943	13 37338 211817
DELAWARE	0 33 189	0 24 138	0 20 117	0 6 37	0 10 58	0 2 14
D.C.	0 5360 30396	0 5769 32718	0 5206 29522	0 5238 23705	0 5599 31755	0 5826 33042
FLORIDA	5 13619 77262	2 15422 87471	0 12858 72925	0 13048 73994	0 14244 80775	0 15052 85359
GEORGIA	61 7848 44832	53 9268 52840	38 8716 49636	35 9044 51476	22 9489 53932	13 10007 56825
MARYLAND	0 2025 11486	0 1913 10852	0 1485 8422	0 1442 8130	0 1415 8024	0 1522 8631
NORTH CAROLINA	1 2240 12715	1 2374 13473	1 2126 12065	0 2251 12758	0 2325 13186	0 2382 13511
SOUTH CAROLINA	15 695 4025	12 806 4642	9 770 4417	5 779 4450	1 895 5082	0 965 5475
VIRGINIA	0 1247 7072	0 1334 7565	0 1157 6561	0 1077 6111	0 1161 6589	0 1285 7289
WEST VIRGINIA	0 268 1523	0 278 1580	0 275 1560	0 255 1507	0 271 1538	0 294 1668

SOURCE: METHOD 101

DATA QUALITY: 1

NOTE: TOTAL ENERGY FIGURE INCLUDES THE ENERGY CONTENT OF LUBRICATING OIL USED.

TABLE 3.6D -- U.S. CERTIFICATED PASSENGER AIRCRAFT FUEL AND ENERGY USE,
BY FUEL BY STATE, 1972-77
(FOURTH IN A SERIES OF NINE TABLES)

AVIATION GASOLINE USE IN THOUSANDS OF BARRELS
FOLLOWED BY JET FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1972	1973	1974	1975	1976	1977
EAST NORTH CENTRAL	3	12	11	11	6	0
	33482	35680	32519	32175	33398	34627
	189886	202399	184474	182522	189433	196364
ILLINOIS	0	0	0	0	0	0
	18559	19416	17535	17295	18188	18979
	105244	110103	99439	98076	103140	107630
INDIANA	0	0	0	0	0	0
	1651	1798	1818	1768	1843	1840
	9365	10201	10313	10027	10453	10439
MICHIGAN	1	5	4	4	2	0
	4671	5371	4812	4668	4736	5102
	26498	30492	27315	26499	26873	28936
OHIO	1	6	6	7	3	0
	7202	7484	6742	6782	6867	6959
	40854	42478	38270	38501	38963	39465
WISCONSIN	0	0	0	0	0	0
	1397	1608	1610	1660	1763	1744
	7923	9122	9134	9415	10001	9892

SOURCE: METHOD 101

DATA QUALITY: 1

NOTE: TOTAL ENERGY FIGURE INCLUDES THE ENERGY CONTENT OF LUBRICATING OIL USED.

TABLE 3.6E -- U.S. CERTIFICATED PASSENGER AIRCRAFT FUEL AND ENERGY USE,
BY FUEL BY STATE, 1972-77
(FIFTH IN A SERIES OF NINE TABLES)

AVIATION GASOLINE USE IN THOUSANDS OF BARRELS
FOLLOWED BY JET FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1972	1973	1974	1975	1976	1977
EAST SOUTH CENTRAL	124 5232 30327	103 6086 35067	58 5650 32355	45 5665 33503	37 6185 35279	24 6488 36926
ALABAMA	32 1127 6567	27 1322 7647	17 1191 6845	16 1190 6836	12 1286 7361	7 1344 7663
KENTUCKY	0 980 5560	0 1093 6203	0 944 5357	0 1012 5743	0 1098 6230	0 1124 6378
MISSISSIPPI	47 379 2400	37 512 3104	27 480 2867	18 493 2897	15 488 2848	11 513 2971
TENNESSEE	44 2744 15799	38 3158 18112	14 3034 17285	11 3168 13025	9 3313 18838	6 3505 19914

SOURCE: METHOD 101

DATA QUALITY: 1

NOTE: TOTAL ENERGY FIGURE INCLUDES THE ENERGY CONTENT OF LUBRICATING OIL USED.

TABLE 3.6P -- U.S. CERTIFICATED PASSENGER AIRCRAFT FUEL AND ENERGY USE,
BY FUEL BY STATE, 1972-77
(SIXTH IN A SERIES OF NINE TABLES)

AVIATION GASOLINE USE IN THOUSANDS OF BARRELS
FOLLOWED BY JET FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1972	1973	1974	1975	1976	1977
EST NORTH CENTRAL	0 11776 66780	0 11972 67895	0 11913 67561	0 12065 68421	1 12697 72013	1 13256 75183
IOWA	0 779 4419	0 742 4209	0 806 4573	0 831 4716	0 909 5155	0 997 5656
KANSAS	0 543 3083	0 531 3015	0 560 3180	0 535 3034	0 546 3105	1 610 3471
MINNESOTA	0 2778 15757	0 3365 19083	0 3141 17813	0 3195 18121	0 3289 18652	0 3384 19191
MISSOURI	0 6018 34127	0 5598 31750	0 5628 31916	0 5788 32826	0 5929 33624	0 6239 35383
NEBRASKA	0 908 5153	0 926 5255	0 970 5505	0 916 5197	0 1154 6548	0 1140 6468
NORTH DAKOTA	0 363 2059	0 426 2421	0 413 2342	0 396 2248	0 460 2610	0 496 2814
SOUTH DAKOTA	0 384 2178	0 380 2160	0 392 2228	0 401 2276	0 408 2315	0 387 2198

SOURCE: METHOD 101

DATA QUALITY: 1

NOTE: TOTAL ENERGY FIGURE INCLUDES THE ENERGY CONTENT OF LUBRICATING OIL USED.

TABLE 3.6G -- U.S. CERTIFICATED PASSENGER AIRCRAFT FUEL AND ENERGY USE,
BY FUEL BY STATE, 1972-77
(SEVENTH IN A SERIES OF NINE TABLES)

AVIATION GASOLINE USE IN THOUSANDS OF BARRELS
FOLLOWED BY JET FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1972	1973	1974	1975	1976	1977
WEST SOUTH CENTRAL	7 16380 92932	5 18435 104573	1 17626 99970	0 17631 93984	0 18365 104146	0 19411 110081
ARKANSAS	0 471 2672	0 574 3255	0 517 2936	0 475 2697	0 533 3027	0 607 3443
LOUISIANA	6 2708 15395	5 3106 17645	1 2500 14186	0 2595 14717	0 2909 16498	0 3025 17160
OKLAHOMA	0 1849 10492	0 1909 10830	0 1870 10608	0 1892 10734	0 1965 11144	0 2138 12126
TEXAS	0 11351 64371	0 12844 72841	0 12738 72239	0 12667 71835	0 12956 73476	0 13639 77350

SOURCE: METHOD 101

DATA QUALITY: 1

NOTE: TOTAL ENERGY FIGURE INCLUDES THE ENERGY CONTENT OF LUBRICATING OIL USED.

TABLE 3.6H -- U.S. CERTIFICATED PASSENGER AIRCRAFT FUEL AND ENERGY USE,
BY FUEL BY STATE, 1972-77
(EIGHTH IN A SERIES OF NINE TABLES)

AVIATION GASOLINE USE IN THOUSANDS OF BARRELS
FOLLOWED BY JET FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1972	1973	1974	1975	1976	1977
MOUNTAIN	19 13684 77705	21 15205 86345	12 14303 81177	9 14856 84294	3 15890 90127	0 16661 94490
ARIZONA	0 2702 15323	0 3321 18833	0 2998 17003	1 3182 18053	0 3270 18549	0 3283 18625
COLORADO	19 5131 29201	21 5393 30701	12 5178 29431	7 5290 30040	2 5723 32471	0 6204 35185
IDAHO	0 454 2576	0 494 2805	0 488 2772	0 522 2962	0 582 3305	0 620 3517
MONTANA	0 584 3317	0 818 4643	0 789 4479	0 820 4651	0 838 4754	0 888 5039
NEVADA	0 2855 16192	0 3126 17727	0 2904 16469	0 3124 17716	0 3442 19522	0 3576 20280
NEW MEXICO	0 764 4335	0 830 4707	0 832 4721	0 774 4391	0 794 4505	0 882 5002
UTAH	0 1017 5767	0 1041 5908	0 934 5298	0 994 5639	0 1069 6064	0 1043 5917
WYOMING	0 174 991	0 179 1017	0 176 1001	0 147 839	0 168 956	0 162 921

SOURCE: METHOD 101

DATA QUALITY: 1

NOTE: TOTAL ENERGY FIGURE INCLUDES THE ENERGY CONTENT OF LUBRICATING OIL USED.

TABLE 3.61 -- U.S. CERTIFICATED PASSENGER AIRCRAFT FUEL AND ENERGY USE,
BY FUEL BY STATE, 1972-77
(NINTH IN A SERIES OF NINE TABLES)

AVIATION GASOLINE USE IN THOUSANDS OF BARRELS
FOLLOWED BY JET FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1972	1973	1974	1975	1976	1977
PACIFIC	37 42944 243722	15 44832 254315	8 39638 224830	8 39004 221237	15 40722 231010	13 42296 239924
ALASKA	36 1399 8130	15 1452 8317	8 1861 10603	5 1719 9781	12 1700 9707	6 1573 8958
CALIFORNIA	0 27808 157696	0 28614 162266	0 24890 141148	3 24759 140423	2 26082 147919	7 27280 154739
HAWAII	0 6958 39458	0 6927 39284	0 5808 32939	0 5401 30629	0 5446 30884	0 5678 32202
OREGON	0 2412 13660	0 2556 14494	0 2327 13201	0 2298 13036	0 2288 12975	0 2401 13620
WASHINGTON	0 4365 24756	0 5281 29951	0 4749 26936	0 4825 27365	0 5206 29523	0 5361 30403

SOURCE: METHOD 101 DATA QUALITY: 1

NOTE: TOTAL ENERGY FIGURE INCLUDES THE ENERGY CONTENT OF LUBRICATING OIL USED.

TABLE 3.7A -- U.S. CERTIFICATED FREIGHT AIRCRAFT FUEL AND ENERGY USE,
BY FUEL BY STATE, 1972-77
(FIRST IN A SERIES OF NINE TABLES)

AVIATION GASOLINE USE IN THOUSANDS OF BARRELS
FOLLOWED BY JET FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1972	1973	1974	1975	1976	1977
UNITED STATES	0 3375 19139	0 3675 20844	0 3643 20660	0 3856 21874	0 3794 21518	0 3446 19547
NEW ENGLAND	0 175 996	0 176 1002	0 178 1014	0 139 791	0 137 782	0 145 822
CONNECTICUT	0 0 0	0 0 4	0 3 21	0 5 29	0 5 32	0 3 19
MAINE	0 1 7	0 1 10	0 14 84	0 19 110	0 11 63	0 4 26
MASSACHUSETTS	0 174 989	0 174 987	0 160 908	0 114 651	0 121 686	0 136 776
NEW HAMPSHIRE	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0
RHODE ISLAND	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0
VERMONT	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0

SOURCE: METHOD 101

DATA QUALITY: 1

NOTE: TOTAL ENERGY FIGURE INCLUDES THE ENERGY CONTENT OF LUBRICATING OIL USED.

TABLE 3.7B -- U.S. CERTIFICATED FREIGHT AIRCRAFT FUEL AND ENERGY USE,
BY FUEL BY STATE, 1972-77
(SECOND IN A SERIES OF NINE TABLES)

AVIATION GASOLINE USE IN THOUSANDS OF BARRELS
FOLLOWED BY JET FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1972	1973	1974	1975	1976	1977
MID-ATLANTIC	0 924 5241	0 1083 6142	0 1127 6393	0 1104 6262	0 948 5378	0 861 4887
NEW JERSEY	0 2 13	0 3 17	0 0 0	0 71 406	0 52 295	0 20 118
NEW YORK	0 918 5206	0 1068 6060	0 1108 6286	0 955 5417	0 841 4774	0 792 4491
PENNSYLVANIA	0 3 21	0 11 63	0 18 107	0 77 438	0 54 308	0 48 276

SOURCE: METHOD 101 DATA QUALITY: 1

NOTE: TOTAL ENERGY FIGURE INCLUDES THE ENERGY CONTENT OF LUBRICATING OIL USED.

TABLE 3.7C -- U.S. CERTIFICATED FREIGHT AIRCRAFT FUEL AND ENERGY USE,
BY FUEL BY STATE, 1972-77
(THIRD IN A SERIES OF NINE TABLES)

AVIATION GASOLINE USE IN THOUSANDS OF BARRELS
FOLLOWED BY JET FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1972	1973	1974	1975	1976	1977
SOUTH ATLANTIC	0 147 834	0 183 1040	0 208 1185	0 256 1454	0 302 1715	0 330 1876
DELAWARE	0 6 38	0 1 6	0 0 0	0 11 66	0 64 366	0 17 100
D.C.	0 0 0	0 0 1	0 0 2	0 1 10	0 1 8	0 0 1
FLORIDA	0 107 610	0 115 654	0 125 713	0 110 626	0 95 542	0 130 739
GEORGIA	0 31 177	0 62 353	0 82 466	0 79 449	0 94 536	0 162 922
MARYLAND	0 0 2	0 2 15	0 0 2	0 0 5	0 1 5	0 0 0
NORTH CAROLINA	0 0 3	0 0 0	0 0 0	0 0 0	0 0 0	0 0 3
SOUTH CAROLINA	0 0 0	0 1 8	0 0 0	0 50 288	0 43 248	0 18 107
VIRGINIA	0 0 1	0 0 1	0 0 0	0 1 7	0 1 6	0 0 0
WEST VIRGINIA	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0

SOURCE: METHOD 101

DATA QUALITY: 1

NOTE: TOTAL ENERGY FIGURE INCLUDES THE ENERGY CONTENT OF LUBRICATING OIL USED.

TABLE 3.7D -- U.S. CERTIFICATED FREIGHT AIRCRAFT FUEL AND ENERGY USE,
BY FUEL BY STATE, 1972-77
(FOURTH IN A SERIES OF NINE TABLES)

AVIATION GASOLINE USE IN THOUSANDS OF BARRELS
FOLLOWED BY JET FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1972	1973	1974	1975	1976	1977
EAST NORTH CENTRAL	0	0	0	0	0	0
	690	912	928	751	672	715
	3916	5175	5264	4263	3815	4056
ILLINOIS	0	0	0	0	0	0
	532	676	649	469	471	476
	3016	3837	3684	2664	2675	2702
INDIANA	0	0	0	0	0	0
	1	0	0	2	15	16
	7	0	1	15	88	92
MICHIGAN	0	0	0	0	0	0
	107	193	184	135	100	127
	611	1098	1045	767	571	724
OHIO	0	0	0	0	0	0
	49	42	94	143	83	93
	281	238	533	811	472	529
WISCONSIN	0	0	0	0	0	0
	0	0	0	0	1	1
	0	0	0	1	7	6

SOURCE: METHOD 101

DATA QUALITY: 1

NOTE: TOTAL ENERGY FIGURE INCLUDES THE ENERGY CONTENT OF LUBRICATING OIL USED.

TABLE 3.7E — U.S. CERTIFICATED FREIGHT AIRCRAFT FUEL AND ENERGY USE,
BY FUEL BY STATE, 1972-77
(FIFTH IN A SERIES OF NINE TABLES)

AVIATION GASOLINE USE IN THOUSANDS OF BARRELS
FOLLOWED BY JET FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1972	1973	1974	1975	1976	1977
EAST SOUTH CENTRAL	0	0	0	0	0	0
	0	0	0	1	0	0
	1	0	2	7	5	5
ALABAMA	0	0	0	0	0	0
	0	0	0	0	0	0
	0	0	1	1	2	2
KENTUCKY	0	0	0	0	0	0
	0	0	0	0	0	0
	0	0	0	0	0	0
MISSISSIPPI	0	0	0	0	0	0
	0	0	0	1	0	0
	0	0	1	6	0	0
TENNESSEE	0	0	0	0	0	0
	0	0	0	0	0	0
	0	0	0	0	2	3

SOURCE: METHOD 101

DATA QUALITY: 1

NOTE: TOTAL ENERGY FIGURE INCLUDES THE ENERGY CONTENT OF LUBRICATING OIL USED.

TABLE 3.7F — U.S. CERTIFICATED FREIGHT AIRCRAFT FUEL AND ENERGY USE,
BY FUEL BY STATE, 1972-77
(SIXTH IN A SERIES OF NINE TABLES)

AVIATION GASOLINE USE IN THOUSANDS OF BARRELS
FOLLOWED BY JET FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1972	1973	1974	1975	1976	1977
EST NORTH CENTRAL	0	0	0	0	0	0
	0	0	0	5	10	3
	0	0	0	52	60	19
IOWA	0	0	0	0	0	0
	0	0	0	0	0	0
	0	0	0	0	0	0
KANSAS	0	0	0	0	0	0
	0	0	0	0	1	0
	0	0	0	0	6	2
MINNESOTA	0	0	0	0	0	0
	0	0	0	0	1	0
	0	0	0	4	8	0
MISSOURI	0	0	0	0	0	0
	0	0	0	1	0	1
	0	0	0	5	0	8
NEBRASKA	0	0	0	0	0	0
	0	0	0	6	7	1
	0	0	0	35	44	8
NORTE DAKOTA	0	0	0	0	0	0
	0	0	0	1	0	0
	0	0	0	6	0	0
SOUTE DAKOTA	0	0	0	0	0	0
	0	0	0	0	0	0
	0	0	0	0	0	0

SOURCE: METHOD 101

DATA QUALITY: 1

NOTE: TOTAL ENERGY FIGURE INCLUDES THE ENERGY CONTENT OF LUBRICATING OIL USED.

TABLE 3.7G — U.S. CERTIFICATED FREIGHT AIRCRAFT FUEL AND ENERGY USE,
BY FUEL BY STATE, 1972-77
(SEVENTH IN A SERIES OF NINE TABLES)

AVIATION GASOLINE USE IN THOUSANDS OF BARRELS
FOLLOWED BY JET FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1972	1973	1974	1975	1976	1977
WEST SOUTH CENTRAL	0	0	0	0	0	0
	59	86	96	112	90	103
	334	491	545	636	515	585
ARKANSAS	0	0	0	0	0	0
	0	0	0	0	1	0
	0	0	0	0	5	3
LOUISIANA	0	0	0	0	0	0
	2	0	1	3	0	0
	13	0	6	18	3	1
OKLAHOMA	0	0	0	0	0	0
	7	0	0	6	1	0
	44	5	0	34	7	0
TEXAS	0	0	0	0	0	0
	48	85	95	103	87	102
	276	486	538	584	498	580

SOURCE: METHOD 101

DATA QUALITY: 1

NOTE: TOTAL ENERGY FIGURE INCLUDES THE ENERGY CONTENT OF LUBRICATING OIL USED.

TABLE 3.7H -- U.S. CERTIFICATED FREIGHT AIRCRAFT FUEL AND ENERGY USE,
BY FUEL BY STATE, 1972-77
(EIGHTH IN A SERIES OF NINE TABLES)

AVIATION GASOLINE USE IN THOUSANDS OF BARRELS
FOLLOWED BY JET FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1972	1973	1974	1975	1976	1977
.. MOUNTAIN	0	0	0	0	0	0
..	0	1	0	2	3	1
..	2	7	2	14	18	9
..						
.. ARIZONA	0	0	0	0	0	0
..	0	0	0	0	1	0
..	0	1	0	0	6	3
.. COLORADO	0	0	0	0	0	0
..	0	0	0	0	0	0
..	0	4	0	1	1	1
.. IDAHO	0	0	0	0	0	0
..	0	0	0	0	0	0
..	0	0	0	0	0	0
.. MONTANA	0	0	0	0	0	0
..	0	0	0	0	1	0
..	0	0	0	0	6	0
.. NEVADA	0	0	0	0	0	0
..	0	0	0	2	0	0
..	0	1	1	11	4	2
.. NEW MEXICO	0	0	0	0	0	0
..	0	0	0	0	0	0
..	0	0	0	0	0	0
.. UTAH	0	0	0	0	0	0
..	0	0	0	0	0	0
..	1	0	0	0	0	1
.. WYOMING	0	0	0	0	0	0
..	0	0	0	0	0	0
..	0	0	0	0	0	0

SOURCE: METHOD 101.

DATA QUALITY: 1

NOTE: TOTAL ENERGY FIGURE INCLUDES THE ENERGY CONTENT OF LUBRICATING OIL USED.

TABLE 3.7I -- U.S. CERTIFICATED FREIGHT AIRCRAFT FUEL AND ENERGY USE,
BY FUEL BY STATE, 1972-77
(NINTH IN A SERIES OF NINE TABLES)

AVIATION GASOLINE USE IN THOUSANDS OF BARRELS
FOLLOWED BY JET FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1972	1973	1974	1975	1976	1977
PACIFIC	0 1377 7810	0 1231 6984	0 1102 6251	0 1480 8395	0 1626 9227	0 1284 7285
ALASKA	0 75 426	0 24 139	0 12 73	0 400 2273	0 413 2346	0 284 1615
CALIFORNIA	0 838 4755	0 830 4707	0 840 4765	0 805 4570	0 834 4733	0 712 4043
HAWAII	0 30 174	0 8 50	0 4 27	0 3 21	0 3 18	0 4 26
OREGON	0 5 30	0 10 58	0 5 32	0 5 31	0 2 13	0 0 1
WASHINGTON	0 427 2423	0 357 2028	0 238 1352	0 264 1498	0 372 2115	0 281 1597

SOURCE: METHOD 101

DATA QUALITY: 1

NOTE: TOTAL ENERGY FIGURE INCLUDES THE ENERGY CONTENT OF LUBRICATING OIL USED.

TABLE 3.8 -- AIR CARRIER JET FUEL USE BY OTHER THAN U.S. CERTIFICATED CARRIERS,
BY RANGE, 1974-77

JET FUEL USE IN THOUSANDS OF BARRELS,
FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

RANGE	1974	1975	1976	1977
ALL RANGES	17080 96844	18611 105527	19435 113199	20162 114327
DOMESTIC	2397 13591	2130 12077	2143 12150	2081 11803
INTERNATIONAL	14683 83253	16481 93450	17292 98649	18081 102524

SOURCE: METHODS 102, 105

DATA QUALITY: 1 (DOMESTIC), 2 (INTERNATIONAL)

TABLE 3.9A -- FOREIGN-FLAG AIR CARRIER JET FUEL AND ENERGY USE,
BY STATE, 1974-77
(FIRST IN A SERIES OF FIVE TABLES)

JET FUEL USE IN THOUSANDS OF BARRELS, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1974	1975	1976	1977
UNITED STATES	12050 68346	14114 80046	14914 84583	15437 87540
NEW ENGLAND	430 2441	431 2446	436 2476	475 2695
CONNECTICUT	4 26	5 33	7 45	8 49
MAINE	4 24	2 14	5 32	32 183
MASSACHUSETTS	421 2390	423 2399	423 2398	434 2462
NEW HAMPSHIRE	0 0	0 0	0 0	0 0
RHODE ISLAND	0 0	0 0	0 0	0 0
VERMONT	0 0	0 0	0 0	0 0
MID-ATLANTIC	4550 25800	4837 27428	5307 30095	5445 30876
NEW JERSEY	0 0	0 2	2 13	0 3
NEW YORK	4459 25286	4760 26993	5216 29579	5375 30481
PENNSYLVANIA	90 514	76 433	88 502	69 391

SOURCE: METHOD 103

QUALITY: 2

TABLE 3.9B -- FOREIGN-FLAG AIR CARRIER JET FUEL AND ENERGY USE,
BY STATE, 1974-77
(SECOND IN A SERIES OF FIVE TABLES)

JET FUEL USE IN THOUSANDS OF BARRELS, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1974	1975	1976	1977
SOUTH ATLANTIC	2387 13539	2791 15825	2865 16244	3112 17647
DELAWARE	0 0	0 0	0 0	0 0
D.C.	0 0	0 0	0 0	0 0
FLORIDA	2315 13127	2701 15316	2718 15111	2909 16498
GEORGIA	0 0	0 3	0 2	1 11
MARYLAND	0 1	0 3	0 0	11 62
NORTH CAROLINA	0 0	0 0	0 0	0 0
SOUTH CAROLINA	0 0	0 0	0 0	0 0
VIRGINIA	72 410	88 501	146 830	189 1074
WEST VIRGINIA	0 0	0 0	0 0	0 0

SOURCE: METHOD 103

QUALITY: 2

TABLE 3.9C -- FOREIGN-FLAG AIR CARRIER JET FUEL AND ENERGY USE,
BY STATE, 1974-77
(THIRD IN A SERIES OF FIVE TABLES)

JET FUEL USE IN THOUSANDS OF BARRELS, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1974	1975	1976	1977
EAST NORTH CENTRAL	890 5051	768 4359	764 4333	718 4071
ILLINOIS	782 4434	689 3907	710 4026	690 3914
INDIANA	0 0	0 0	0 0	0 0
MICHIGAN	104 591	76 434	50 287	21 122
OHIO	4 25	2 16	3 18	6 34
WISCONSIN	0 0	0 0	0 0	0 0
EAST SOUTH CENTRAL	0 1	0 0	0 0	0 2
ALABAMA	0 0	0 0	0 0	0 0
KENTUCKY	0 0	0 0	0 0	0 0
MISSISSIPPI	0 0	0 0	0 0	0 0
TENNESSEE	0 0	0 0	0 0	0 1

SOURCE: METHOD 103

QUALITY: 2

TABLE 3.9D -- FOREIGN-FLAG AIR CARRIER JET FUEL AND ENERGY USE,
BY STATE, 1974-77
(FOURTH IN A SERIES OF FIVE TABLES)

JET FUEL USE IN THOUSANDS OF BARRELS, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1974	1975	1976	1977
WEST NORTH CENTRAL	18 102	40 230	41 233	50 284
IOWA	0 0	0 0	0 1	0 3
KANSAS	1 6	17 96	15 87	15 85
MINNESOTA	0 3	2 11	5 32	15 87
MISSOURI	16 93	21 121	19 111	19 107
NEBRASKA	0 0	0 0	0 0	0 0
NORTH DAKOTA	0 0	0 0	0 0	0 0
SOUTH DAKOTA	0 0	0 0	0 0	0 0
WEST SOUTH CENTRAL	623 3535	719 4079	730 4144	857 4861
ARKANSAS	0 0	0 0	0 0	0 0
LOUISIANA	222 1260	279 1582	285 1619	308 1748
OKLAHOMA	0 0	0 0	0 0	0 0
TEXAS	401 2274	440 2496	445 2525	549 3112

SOURCE: METHOD 103

QUALITY: 2

TABLE 3.9E -- FOREIGN-FLAG AIR CARRIER JET FUEL AND ENERGY USE,
BY STATE, 1974-77
(LAST IN A SERIES OF FIVE TABLES)

JET FUEL USE IN THOUSANDS OF BARRELS, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1974	1975	1976	1977
MOUNTAIN	158 899	391 2222	436 2474	327 1854
ARIZONA	73 414	266 1513	330 1871	237 1345
COLORADO	85 482	123 701	106 601	89 508
IDAHO	0 0	0 0	0 0	0 0
MONTANA	0 0	0 0	0 0	0 0
NEVADA	0 0	0 0	0 0	0 0
NEW MEXICO	0 1	0 4	0 0	0 0
UTAH	0 0	0 2	0 1	0 0
WYOMING	0 0	0 0	0 0	0 0
PACIFIC	2994 16978	4137 23457	4335 24584	4453 25250
ALASKA	384 2180	795 4512	355 2014	364 2067
CALIFORNIA	1375 7796	1917 10873	2427 13762	2625 14887
HAWAII	1110 6296	1321 7491	1442 8177	1348 7644
OREGON	0 0	0 0	0 0	0 0
WASHINGTON	124 704	102 579	111 630	114 650

TABLE 3.10A -- GENERAL AVIATION USE OF AVIATION GASOLINE, BY STATE, 1974-77
(FIRST IN A SERIES OF FIVE TABLES)

AVIATION GASOLINE IN 1000'S OF BBL, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1974	1975	1976	1977
UNITED STATES	10723 55850	10064 52415	10410 54217	10862 56569
NEW ENGLAND	305 1593	303 1580	314 1636	342 1784
CONNECTICUT	69 359	71 372	74 387	79 415
MAINE	46 241	46 241	47 246	49 257
MASSACHUSETTS	130 677	125 654	127 663	141 736
NEW HAMPSHIRE	25 134	25 130	25 131	29 152
RHODE ISLAND	17 91	18 94	21 112	23 123
VERMONT	17 89	16 86	18 94	18 98
MID-ATLANTIC	640 3337	516 2688	539 2809	560 2918
NEW JERSEY	224 1169	121 634	137 713	161 841
NEW YORK	220 1148	208 1086	201 1048	196 1025
PENNSYLVANIA	195 1019	185 967	201 1047	201 1051

SOURCE: METHOD 104

QUALITY: 2

TABLE 3.10B -- GENERAL AVIATION USE OF AVIATION GASOLINE, BY STATE, 1974-77
(SECOND IN A SERIES OF FIVE TABLES)

AVIATION GASOLINE IN 1000'S OF BBL, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1974	1975	1976	1977
SOUTH ATLANTIC	1600 8333	1546 8052	1614 8406	1696 8835
DELAWARE	25 134	18 98	24 129	35 186
D.C.	0 0	0 0	0 4	0 0
FLORIDA	846 4408	821 4277	794 4139	831 4329
GEORGIA	183 955	183 956	225 1172	231 1204
MARYLAND	86 451	81 426	84 439	91 475
NORTH CAROLINA	185 966	176 917	195 1019	202 1056
SOUTH CAROLINA	84 438	82 430	95 496	101 527
VIRGINIA	139 727	128 668	133 695	141 737
WEST VIRGINIA	48 250	53 278	59 308	61 317

SOURCE: METHOD 104

QUALITY: 2

TABLE 3.10C -- GENERAL AVIATION USE OF AVIATION GASOLINE, BY STATE, 1974-77
(THIRD IN A SERIES OF FIVE TABLES)

AVIATION GASOLINE IN 100G'S OF BBL, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1974	1975	1976	1977
EAST NORTH CENTRAL	1290 6719	1243 6476	1411 7348	1457 7592
ILLINOIS	299 1557	308 1607	337 1757	323 1684
INDIANA	212 1107	212 1105	231 1206	225 1172
MICHIGAN	355 1852	284 1479	334 1741	383 1995
OHIO	269 1402	279 1456	331 1724	351 1831
WISCONSIN	153 799	158 826	176 918	174 907
EAST SOUTH CENTRAL	522 2723	521 2716	555 2892	586 3056
ALABAMA	146 763	138 721	145 759	160 835
KENTUCKY	97 506	95 497	98 512	97 510
MISSISSIPPI	100 524	112 584	116 606	123 641
TENNESSEE	178 928	175 914	194 1013	205 1070

SOURCE: METHOD 104

QUALITY: 2

TABLE 3.10D -- GENERAL AVIATION USE OF AVIATION GASOLINE, BY STATE, 1974-77
(FOURTH IN A SERIES OF FIVE TABLES)

AVIATION GASOLINE IN 1000'S OF BBL, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1974	1975	1976	1977
WEST NORTH CENTRAL	1065 5549	1067 5560	1214 6324	1231 6411
IOWA	160 837	165 859	192 1001	183 954
KANSAS	233 1215	248 1296	294 1533	292 1524
MINNESOTA	158 827	168 875	192 1000	195 1017
MISSOURI	268 1395	223 1161	239 1249	273 1425
NEBRASKA	120 628	129 672	145 758	141 736
NORTH DAKOTA	61 319	69 361	77 405	71 371
SOUTH DAKOTA	62 323	64 333	72 376	73 381
WEST SOUTH CENTRAL	1329 6922	1394 7263	1496 7795	1565 8153
ARKANSAS	166 868	182 948	196 1024	200 1041
LOUISIANA	221 1155	226 1179	234 1223	256 1335
OKLAHOMA	175 915	188 979	216 1125	213 1109
TEXAS	764 3983	798 4156	849 4422	896 4666

SOURCE: METHOD 104

QUALITY: 2

TABLE 3.10E -- GENERAL AVIATION USE OF AVIATION GASOLINE, BY STATE, 1974-77
(LAST IN A SERIES OF FIVE TABLES)

AVIATION GASOLINE IN 1000'S OF BBL, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1974	1975	1976	1977
MOUNTAIN	1000 5211	997 5193	1108 5772	1181 6152
ARIZONA	243 1266	240 1254	259 1348	273 1423
COLORADO	179 933	179 935	201 1049	218 1136
IDAHO	103 540	99 519	113 593	112 585
MONTANA	92 481	93 487	113 592	114 596
NEVADA	110 574	104 542	104 546	122 639
NEW MEXICO	123 641	124 650	139 725	150 782
UTAH	86 449	89 468	102 534	107 561
WYOMING	62 323	64 335	73 382	81 425
PACIFIC	2968 15459	2473 12882	2156 11231	2239 11663
ALASKA	333 1737	338 1763	343 1787	390 2031
CALIFORNIA	2197 11443	1675 8726	1298 6760	1274 6635
HAWAII	65 343	77 402	93 488	114 593
OREGON	156 813	155 807	173 904	197 1031
WASHINGTON	215 1122	227 1183	247 1290	263 1371

SOURCE: METEOD 104

QUALITY: 2

TABLE 3.11A — TOTAL CIVILIAN CONSUMPTION OF AVIATION FUELS,
BY FUEL BY STATE, 1967-77
(FIRST IN A SERIES OF NINE TABLES)

AVIATION GASOLINE USE IN THOUSANDS OF BARRELS
FOLLOWED BY JET FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
UNITED STATES	15028 172534 1056537	12634 207738 1243676	10524 237561 1401784	9761 240918 1416841	8874 238304 1397405	8856 243475 1426634	10945 255349 1504835	10866 235614 1392527	10191 239410 1410529	10499 244627 1441720	10916 254106 1497632
NEW ENGLAND	524 6094 37285	302 7915 46455	272 9504 55308	271 10214 59329	267 9766 56771	275 10065 58508	313 10210 59527	305 9281 54217	311 8823 51649	314 9018 52774	342 10029 58653
CONNECTICUT	75 1433 8517	76 2042 11978	70 2350 13691	69 2566 14915	59 1810 10571	62 2046 11929	72 1861 10932	69 1840 10797	71 1613 9520	74 1582 9362	79 1744 10306
MAINE	42 9 274	35 70 582	40 390 2426	40 567 3428	44 625 3775	46 614 3723	49 806 4831	46 552 3371	48 479 2970	47 512 3151	49 780 4679
MASSACHUSETTS	356 4549 27653	138 5665 32843	110 6623 38129	110 6906 39736	112 7197 41395	112 7210 41471	130 7325 42215	130 6685 38581	130 6430 37145	127 6643 38336	141 7240 41788
NEW HAMPSHIRE	18 30 268	20 31 284	19 28 261	20 32 292	23 21 246	23 27 281	27 41 373	25 34 327	25 38 349	25 44 384	29 54 460
RHODE ISLAND	14 45 329	16 80 539	17 78 535	15 94 619	13 78 514	14 120 762	16 123 787	17 115 744	18 203 1247	21 184 1156	23 154 999
VERMONT	17 26 239	15 25 223	14 32 261	14 45 335	14 33 264	15 45 337	16 52 383	17 53 392	16 57 412	18 50 380	18 56 415

SOURCE: METHOD 104

QUALITY: 1 (NATIONAL), 2 (STATE)

TABLE 3.11B -- TOTAL CIVILIAN CONSUMPTION OF AVIATION FUELS,
BY FUEL BY STATE, 1967-77
(SECOND IN A SERIES OF NINE TABLES)

AVIATION GASOLINE USE IN THOUSANDS OF BARRELS
FOLLOWED BY JET FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
MID-ATLANTIC	1361	996	815	702	578	553	630	640	516	539	560
	36885	42180	46491	46035	43768	43827	45242	40474	40313	41048	42210
	216230	244353	267351	264681	251177	251387	259810	232824	231268	235553	242249
NEW JERSEY	414	310	261	196	135	191	207	224	121	137	161
	5050	6293	4925	4649	4344	4743	4860	4093	3680	3719	3966
	30791	37298	29291	27389	25341	27892	23637	24376	21500	21800	23332
NEW YORK	544	342	265	248	221	194	227	220	208	201	196
	27057	29775	33901	33376	32320	32178	32965	29136	29795	30328	31237
	156254	170612	193601	190534	184409	183463	183097	166352	170027	173008	178143
PENNSYLVANIA	403	343	288	257	221	168	196	195	185	201	201
	4776	6111	7664	8009	7102	6905	7417	7244	6838	7001	7005
	29183	36441	44959	46756	41423	40031	43075	42094	39740	40743	40772

SOURCE: METHOD 104 QUALITY: 1 (NATIONAL), 2 (STATE)

TABLE 3.11C -- TOTAL CIVILIAN CONSUMPTION OF AVIATION FUELS,
BY FUEL BY STATE, 1967-77
(THIRD IN A SERIES OF NINE TABLES)

AVIATION GASOLINE USE IN THOUSANDS OF BARRELS
FOLLOWED BY JET FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
SOUTH ATLANTIC	2924 24715 155362	2459 30493 185707	2005 36130 215303	1696 36486 215708	1534 37308 219531	1487 38475 225897	1664 41250 242559	1649 34544 204460	1588 35914 211904	1638 38822 228655	1710 41911 246544
DELAWARE	41 67 594	36 135 956	28 180 1168	27 154 1015	16 51 379	13 52 365	36 67 569	25 55 446	18 49 381	24 57 456	35 73 600
D.C.	0 1 6	0 0 2	0 9 52	0 0 0	1 0 11	0 2 16	0 0 4	0 0 0	0 0 0	0 0 4	0 0 0
FLORIDA	1231 12015 74542	937 14354 86276	912 16741 99675	768 16042 94959	746 17073 100697	750 19124 112346	831 18896 111475	847 15275 91025	821 15776 93732	794 17194 101632	831 18794 110892
GEORGIA	399 4468 27421	414 5772 34888	350 7222 42773	316 7910 46498	263 8494 49534	228 8421 48941	227 10615 61376	222 8743 50732	219 9461 54788	248 10108 58608	244 10752 62239
MARYLAND	152 2145 12957	148 2713 16161	94 2873 16783	88 2907 16944	76 2378 13885	72 2010 11776	85 2002 11798	86 1662 9878	81 1564 9296	84 1719 10187	91 1879 11132
NORTH CAROLINA	292 838 6272	288 1117 7842	234 1380 9048	172 1642 10208	163 1479 9241	176 1114 7241	205 1165 7673	186 1111 7273	176 1134 7353	195 1189 7763	202 1413 9073
SOUTH CAROLINA	167 112 1506	131 289 2327	119 378 2766	120 413 2974	89 368 2549	82 392 2653	94 359 2529	93 316 2283	88 337 2372	96 332 2387	101 394 2763
VIRGINIA	541 4992 31125	411 5998 36156	207 7172 41747	152 7237 41829	133 7346 42351	122 7280 41915	137 8062 46424	139 7285 42036	128 7453 42931	133 8066 46432	141 8430 48535
WEST VIRGINIA	98 73 931	90 109 1092	58 172 1283	49 179 1272	43 114 874	40 75 637	46 81 703	48 93 780	53 135 1047	59 153 1176	61 173 1301

TABLE 3.11D — TOTAL CIVILIAN CONSUMPTION OF AVIATION FUELS,
BY FUEL BY STATE, 1967-77
(FOURTH IN A SERIES OF NINE TABLES)

AVIATION GASOLINE USE IN THOUSANDS OF BARRELS
FOLLOWED BY JET FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
EAST NORTH CENTRAL	2487 22324 139536	1953 27604 166686	1432 30984 183141	1313 31656 186332	1195 31678 185845	1167 33369 195281	1418 35434 208535	1301 30708 180897	1255 30160 177548	1417 31967 188639	1457 33996 200351
ILLINOIS	384 6919 41232	355 8938 52532	321 10023 58501	311 10232 59641	295 10613 61717	281 11445 66358	312 13597 78726	299 20215 116178	308 19823 114003	337 20978 120706	323 22202 127571
INDIANA	767 8723 53461	481 10204 60364	249 10621 61523	230 11396 65817	217 11122 64191	193 12159 69954	233 11418 65960	212 1494 9579	212 1537 9821	231 1614 10360	225 1603 10265
MICHIGAN	544 2818 18813	473 3628 23038	338 4477 27150	310 4439 26793	265 3960 23836	301 3607 22022	406 3900 24228	360 3473 21572	288 2989 18454	337 3156 19655	383 3555 22153
OHIO	532 3158 20681	449 3752 23614	372 4429 27054	320 4236 25690	283 4476 26855	256 4637 27627	311 4794 28806	276 3848 23261	286 4086 24665	334 4445 26949	351 4807 29090
WISCONSIN	258 705 5341	193 1081 7135	151 1432 8909	140 1350 8388	134 1506 9241	135 1519 9316	154 1773 10861	153 1676 10303	158 1723 10600	176 1772 10965	174 1827 11267

SOURCE: METHOD 104

QUALITY: 1 (NATIONAL), 2 (STATE)

TABLE 3.11E -- TOTAL CIVILIAN CONSUMPTION OF AVIATION FUELS,
BY FUEL BY STATE, 1967-77
(FIFTH IN A SERIES OF NINE TABLES)

AVIATION GASOLINE USE IN THOUSANDS OF BARRELS
FOLLOWED BY JET FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
EAST SOUTH CENTRAL	1033 3531 25409	852 4707 31128	714 5945 37430	623 6311 39034	606 5537 34554	624 5171 32576	636 5739 35860	581 5511 34279	567 5671 35112	593 5992 37064	611 6324 39042
ALABAMA	193 246 2405	179 468 3585	168 696 4827	157 787 5287	161 699 4804	166 671 4675	181 729 5083	163 737 5032	155 765 5148	158 774 5219	167 844 5657
KENTUCKY	253 1742 11204	164 2118 12866	128 2448 14552	103 2512 14786	93 2002 11844	88 1588 9467	98 1744 10401	97 1463 8806	95 1550 9290	98 1612 9652	97 1648 9858
MISSISSIPPI	190 104 1587	184 216 2185	154 291 2457	145 292 2412	137 277 2286	147 289 2410	138 325 2565	128 325 2510	130 321 2504	131 334 2583	134 356 2719
TENNESSEE	395 1437 10211	324 1904 12490	262 2508 15591	217 2718 16546	213 2558 15619	221 2622 16021	218 2940 17807	192 2984 17927	186 3032 18167	204 3270 19607	211 3474 20805

SOURCE: METHOD 104

QUALITY: 1 (NATIONAL), 2 (STATE)

TABLE 3.11F -- TOTAL CIVILIAN CONSUMPTION OF AVIATION FUELS,
BY FUEL BY STATE, 1967-77
(SIXTH IN A SERIES OF NINE TABLES)

AVIATION GASOLINE USE IN THOUSANDS OF BARRELS
FOLLOWED BY JET FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
EST NORTH CENTRAL	1347 9264 59550	1192 11467 71228	958 12866 77942	919 12313 74606	895 11929 72306	914 12498 75631	1136 12328 78658	1065 13033 79451	1067 13459 81877	1215 13333 81931	1232 13554 83273
IOWA	174 236 2247	148 382 2941	141 505 3604	144 508 3635	146 413 3106	145 480 3482	167 475 3563	160 507 3715	165 578 4136	192 711 5032	183 735 5125
KANSAS	266 525 4370	269 537 4448	230 641 4838	204 663 4825	182 566 4159	186 542 4045	239 566 4460	233 558 4379	248 505 4163	295 488 4305	294 620 5050
MINNESOTA	268 2313 14514	221 2825 17174	162 3527 20847	158 3005 17865	152 3265 19306	151 3682 21664	159 4233 24837	158 4560 26685	168 4562 26746	192 4417 26046	195 4351 25689
MISSOURI	337 5561 33289	279 6815 40097	218 7023 40960	208 7129 41512	195 6689 38945	214 6877 40112	331 6565 38952	268 6275 36976	223 6742 39390	239 6550 38388	273 6584 38761
NEBRASKA	166 497 3690	144 601 4158	105 722 4648	107 662 4314	109 613 4048	105 587 3877	115 627 4157	120 723 4731	129 657 4399	145 725 4868	141 756 5026
NORTH DAKOTA	57 94 835	62 191 1410	45 275 1799	44 197 1349	56 250 1711	55 199 1417	63 200 1467	61 239 1679	69 242 1738	77 269 1931	71 302 2083
SOUTH DAKOTA	75 36 599	67 113 995	53 169 1240	51 146 1101	53 131 1026	56 129 1028	60 153 1217	62 168 1277	64 170 1298	72 172 1354	73 203 1534

SOURCE: METHOD 104

QUALITY: 1 (NATIONAL), 2 (STATE)

TABLE 3.11G -- TOTAL CIVILIAN CONSUMPTION OF AVIATION FUELS,
BY FUEL BY STATE, 1967-77
(SEVENTH IN A SERIES OF NINE TABLES)

AVIATION GASOLINE USE IN THOUSANDS OF BARRELS
FOLLOWED BY JET FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
WEST SOUTH CENTRAL	1993 13804 88651	1844 16198 101452	1721 19372 118811	1631 20132 122646	1362 19165 115761	1289 20049 120396	1473 21528 129737	1330 22594 135042	1394 22368 134095	1496 21203 128021	1565 22107 133503
ARKANSAS	176 112 1557	164 161 1771	162 233 2168	164 244 2244	144 238 2104	146 252 2192	171 275 2454	166 257 2327	182 305 2680	196 307 2765	200 352 3038
LOUISIANA	391 2391 15594	437 2657 17341	327 3234 20046	277 3275 20015	227 3047 18461	206 3062 18436	235 3276 19807	223 4964 29310	226 3464 20824	234 2816 17192	256 2998 18335
OKLAHOMA	266 1175 8054	237 1410 9234	231 1535 9915	232 1690 10792	211 1506 9643	204 1427 9156	193 1530 9683	175 1478 9300	188 1491 9434	216 1665 10566	213 1765 11117
TEXAS	1159 10124 63442	1004 11970 73103	999 14369 86678	957 14922 89591	778 14372 85549	731 15308 90609	872 16445 97791	764 15894 94101	798 17107 101154	849 16415 97495	896 16991 101009

SOURCE: METHOD 104

QUALITY: 1 (NATIONAL), 2 (STATE)

TABLE 3.11H -- TOTAL CIVILIAN CONSUMPTION OF AVIATION FUELS,
BY FUEL BY STATE, 1967-77
(EIGHTH IN A SERIES OF NINE TABLES)

AVIATION GASOLINE USE IN THOUSANDS OF BARRELS
FOLLOWED BY JET FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
MOUNTAIN	1123 9229 58183	965 11765 71737	843 13329 79966	878 13767 82636	847 13339 80048	870 14013 83989	995 15101 90808	1012 14749 88903	1006 14862 89511	1111 15814 95458	1182 16632 100463
ARIZONA	191 1885 11688	206 2287 14042	198 2453 14947	199 2377 14517	210 2210 13630	219 2380 14643	236 2994 18211	243 2965 18078	242 3000 18273	259 2946 18055	274 3239 19791
COLORADO	290 4484 26939	206 5423 31827	154 5991 34780	160 6495 37668	155 6313 36609	167 6283 36495	193 6242 36399	191 5954 34756	187 5705 33327	203 6368 37170	218 6466 37798
IDAHO	81 67 805	69 114 1009	74 151 1243	80 168 1378	78 172 1385	86 195 1558	107 226 1840	103 248 1950	99 248 1929	113 306 2333	112 284 2196
MONTANA	102 278 2111	85 366 2519	76 511 3297	80 395 2660	79 469 3073	76 468 3059	98 480 3239	92 499 3310	93 531 3501	113 497 3411	114 504 3457
NEVADA	146 1219 7678	135 1744 10599	100 2279 13446	89 2269 13333	88 2304 13523	88 2756 16088	99 3179 16545	110 3141 18387	104 3419 19927	104 3841 22325	122 4052 23617
NEW MEXICO	124 732 4801	109 966 6051	107 893 5628	114 1082 6735	115 852 5437	107 837 5307	129 881 5671	123 873 5592	124 871 5594	139 769 5088	150 839 5542
UTAH	111 501 3418	83 779 4856	74 949 5770	57 901 5412	55 944 5642	65 989 5951	74 991 6006	86 960 5895	89 1011 6205	102 1003 6226	107 1150 7081
WYOMING	77 59 737	68 83 828	56 97 848	95 76 929	64 71 741	58 102 882	55 105 890	62 106 927	64 72 749	73 81 843	81 96 973

SOURCE: METHOD 104

QUALITY: 1 (NATIONAL), 2 (STATE)

TABLE 3.11I -- TOTAL CIVILIAN CONSUMPTION OF AVIATION FUELS,
BY FUEL BY STATE, 1967-77
(LAST IN A SERIES OF NINE TABLES)

AVIATION GASOLINE USE IN THOUSANDS OF BARRELS
FOLLOWED BY JET FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
PACIFIC	2231 46684 276325	2068 55405 324920	1760 62937 366024	1723 64000 371860	1586 65810 381406	1674 66003 382960	2676 67962 399284	2977 64716 382445	2482 67836 397559	2171 67426 393619	2253 67338 393544
ALASKA	347 2436 15622	346 2773 17528	352 4405 26813	269 4775 28478	234 5190 30654	252 5566 32877	280 5132 30560	342 5197 31253	343 5133 30896	355 5312 31974	396 5667 34196
CALIFORNIA	1294 30006 176878	1266 35605 208474	1065 39407 228987	1097 40000 232517	1027 39957 231910	1060 40725 236440	1979 41323 244611	2197 39068 232960	1678 41038 241432	1301 41143 240057	1281 40971 238981
HAWAII	201 7911 45907	92 9363 53568	54 10151 57841	48 10591 60306	54 11685 66536	59 11582 65980	64 11970 68205	65 10601 60451	77 10506 59974	93 10322 59018	114 10761 61609
OREGON	172 1251 7988	163 1755 10804	116 2008 11992	122 1744 10530	115 1631 9849	127 1623 9870	146 1884 11445	156 1743 10695	155 1609 9934	173 1638 10192	198 1838 11457
WASHINGTON	216 5079 29925	199 5908 34540	172 6964 40386	186 6888 40025	155 7344 42452	173 6505 37790	205 7652 44459	215 8105 47082	227 9547 55318	247 9009 52374	263 8099 47297

SOURCE: METHOD 104

QUALITY: 1 (NATIONAL), 2 (STATE)

TABLE 4.1 -- TOTAL RAIL FUEL & ENERGY USE, BY FUEL BY TYPE OF OPERATION, 1967-78

DIESEL FUEL USE IN THOUSANDS OF BARRELS
 FOLLOWED BY RESIDUAL OIL USE IN THOUSANDS OF BARRELS
 FOLLOWED BY ELECTRICITY USE IN MILLIONS OF KWH
 FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

TYPE OF OPERATION	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
ALL RAIL OPERATIONS	88693	84036	86434	88421	86277	97006	102832	102954	93197	97473	99310	99905
	5494	4296	3381	2222	1262	1137	1214	1176	583	423	329	206
	4633	4684	4769	5040	4499	4439	4548	4425	4460	4435	4315	4120
	567028	532540	541049	546261	525885	587398	622192	622244	561800	585614	595315	597343
RAIL TRANSIT	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	3117	3143	3248	3315	3245	3259	3273	3129	3157	3086	3034	2929
	10636	10726	11084	11314	11074	11122	11168	10677	10775	10529	10352	9996
COMMUTER RAIL	1000	984	1048	1018	1023	874	942	971	959	1020	982	980
	0	0	0	0	0	0	0	0	0	0	0	0
	912	888	905	991	1014	1002	1005	1023	1033	1081	1023	935
	8942	8765	9198	9315	9420	8513	8920	9151	9115	9634	9215	8901
INTERCITY PASSENGER RAIL	9501	7944	6975	6031	1736	1759	1788	1664	1622	1806	1919	2080
	0	0	0	0	0	0	0	0	0	0	0	0
	604	653	616	734	240	178	270	273	270	268	258	256
	57408	48505	42734	37637	10931	10854	11337	10624	10370	11435	12059	12990
RAIL FREIGHT	78192	75108	78411	81372	83518	94373	100102	100319	90616	94647	96409	96845
	5494	4296	3381	2222	1262	1137	1214	1176	583	423	329	206
	0	0	0	0	0	0	0	0	0	0	0	0
	490042	464544	478033	487995	494460	556909	590767	591792	531540	554016	563689	565456

SOURCE: METHOD 400 DATA QUALITY: GENERALLY 2)

TABLE 4.2A -- RAIL TRANSIT ELECTRICITY AND ENERGY USE, BY STATE, 1967-78
(FIRST IN A SERIES OF FIVE TABLES)

ELECTRICITY USE IN MILLIONS OF KWH, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
UNITED STATES	3117 10636	3143 10726	3248 11084	3315 11314	3245 11074	3259 11122	3273 11168	3129 10677	3157 10775	3086 10529	3034 10352	2929 9996
NEW ENGLAND	247 843	237 810	225 768	218 747	221 756	244 833	229 781	225 768	219 747	207 708	211 721	215 735
CONNECTICUT	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
MAINE	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
MASSACHUSETTS	247 843	237 810	225 768	218 747	221 756	244 833	229 781	225 768	219 747	207 708	211 721	215 735
NEW HAMPSHIRE	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
RHODE ISLAND	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
VERMONT	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
MID-ATLANTIC	2438 8320	2510 8566	2631 8978	2694 9193	2634 8988	2600 8871	2533 8644	2387 8146	2361 8058	2290 7815	2223 7585	2091 7138
NEW JERSEY	33 114	35 120	70 240	72 248	74 253	77 266	74 254	75 258	75 258	74 254	70 239	70 240
NEW YORK	2213 7553	2293 7826	2339 7982	2394 8169	2341 7988	2303 7860	2240 7645	2083 7110	2081 7101	2006 6846	1967 6713	1826 6230
PENNSYLVANIA	191 652	181 619	221 755	227 776	218 746	218 744	218 744	227 777	204 697	209 714	185 632	195 666

SOURCE: METHOD 201

DATA QUALITY: 1

TABLE 4.2B -- RAIL TRANSIT ELECTRICITY AND ENERGY USE, BY STATE, 1967-78
(SECOND IN A SERIES OF FIVE TABLES)

ELECTRICITY USE IN MILLIONS OF KWH, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
SOUTH ATLANTIC	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
DELAWARE	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
D.C.	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
FLORIDA	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
GEORGIA	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
MARYLAND	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
NORTH CAROLINA	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
SOUTH CAROLINA	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
VIRGINIA	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
WEST VIRGINIA	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0

SOURCE: METHOD 201

DATA QUALITY: 1

TABLE 4.2C -- RAIL TRANSIT ELECTRICITY AND ENERGY USE, BY STATE, 1967-78
(THIRD IN A SERIES OF FIVE TABLES)

ELECTRICITY USE IN MILLIONS OF KWH, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
EAST NORTH CENTRAL	353 1205	319 1089	315 1078	329 1125	320 1093	322 1100	317 1082	270 921	286 978	288 986	311 1061	329 1123
ILLINOIS	299 1022	265 904	262 896	275 941	270 921	274 936	271 925	225 768	241 825	245 838	266 909	282 963
INDIANA	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
MICHIGAN	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 1	0 1
OHIO	53 183	54 184	53 182	53 183	50 172	48 164	45 156	44 152	44 152	43 147	44 150	46 158
WISCONSIN	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
EAST SOUTH CENTRAL	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
ALABAMA	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
KENTUCKY	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
MISSISSIPPI	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
TENNESSEE	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0

SOURCE: METHOD 201

DATA QUALITY: 1

TABLE 4.2D -- RAIL TRANSIT ELECTRICITY AND ENERGY USE, BY STATE, 1967-78
(FOURTH IN A SERIES OF FIVE TABLES)

ELECTRICITY USE IN MILLIONS OF KWH, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
WEST NORTH CENTRAL	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
IOWA	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
KANSAS	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
MINNESOTA	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
MISSOURI	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
NEBRASKA	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
NORTH DAKOTA	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
SOUTH DAKOTA	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
WEST SOUTH CENTRAL	5 19	4 15	4 15	3 13	3 13	4 14	4 13	3 13	3 11	3 12	3 13	3 13
ARKANSAS	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
LOUISIANA	4 16	3 13	3 13	3 10	3 10	3 11	3 11	3 11	2 9	3 10	3 10	3 10
OKLAHOMA	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
TEXAS	0 2	0 2	0 2	0 2	0 2	0 2	0 2	0 2	0 2	0 2	0 2	0 2

TABLE 4.2E -- RAIL TRANSIT ELECTRICITY AND ENERGY USE, BY STATE, 1967-78
(LAST IN A SERIES OF FIVE TABLES)

ELECTRICITY USE IN MILLIONS OF KWH, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
MOUNTAIN	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
ARIZONA	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
COLORADO	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
IDAHO	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
MONTANA	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
NEVADA	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
NEW MEXICO	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
UTAH	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
WYOMING	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
PACIFIC	72 247	71 245	71 244	68 234	65 222	88 302	189 646	242 826	287 979	295 1007	284 971	288 985
ALASKA	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
CALIFORNIA	62 214	61 211	62 212	61 209	58 200	82 280	182 624	234 801	278 951	286 978	276 943	288 983
HAWAII	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
OREGON	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
WASHINGTON	9 33	9 33	9 31	7 24	6 21	6 22	6 22	7 25	8 28	8 28	8 28	0 2

SOURCE: METHOD 201

DATA QUALITY: 1

TABLE 4.3A -- COMMUTER RAIL FUEL AND ENERGY USE, BY FUEL BY STATE, 1967-78
(FIRST IN A SERIES OF NINE TABLES)

DIESEL FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY ELECTRICITY USE IN MILLIONS OF KILOWATT-HOURS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
UNITED STATES	1000 912 8942	984 888 8765	1048 905 9198	1018 991 9315	1023 1014 9420	874 1002 8513	942 1005 8920	971 1023 9151	959 1033 9115	1020 1081 9634	982 1023 9215	980 935 8901
NEW ENGLAND	91 125 962	91 125 962	91 125 960	95 125 982	99 125 1008	97 125 997	96 125 987	90 125 956	68 125 824	102 142 1085	85 122 915	81 110 849
CONNECTICUT	10 125 486	10 125 486	10 125 486	10 125 486	10 125 486	10 125 486	10 125 486	10 125 436	10 125 486	10 142 547	10 122 476	10 110 436
MAINE	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0
MASSACHUSETTS	81 0 475	81 0 475	81 0 474	85 0 495	89 0 521	87 0 510	86 0 501	90 0 470	57 0 337	92 0 538	75 0 438	71 0 413
NEW HAMPSHIRE	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0
RHODE ISLAND	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0
VERMONT	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0

SOURCE: METHOD 202

DATA QUALITY: SOME 1, SOME 2 (SEE METHOD 202)

TABLE 4.3B -- COMMUTER RAIL FUEL AND ENERGY USE, BY FUEL BY STATE, 1967-78
(SECOND IN A SERIES OF NINE TABLES)

DIESEL FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY ELECTRICITY USE IN MILLIONS OF KILOWATT-HOURS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
MID-ATLANTIC	439	432	472	440	453	435	419	421	428	447	415	421
	716	691	705	793	816	807	806	827	840	873	837	761
	5002	4879	5158	5273	5428	5292	5195	5280	5360	5585	5275	5056
NEW JERSEY	240	240	240	240	240	240	240	240	240	250	235	234
	170	170	170	170	170	170	170	170	170	168	166	177
	1979	1979	1979	1979	1979	1979	1979	1979	1979	2034	1935	1969
NEW YORK	167	163	203	171	184	166	149	152	158	163	153	158
	378	354	367	456	478	469	469	490	502	506	472	480
	2270	2162	2441	2556	2710	2572	2473	2561	2639	2681	2505	2562
PENNSYLVANIA	31	28	28	28	28	29	29	29	29	32	27	29
	167	167	167	167	167	167	167	167	167	198	198	103
	753	736	736	737	738	740	741	739	741	869	834	524

SOURCE: METHOD 202 DATA QUALITY: SOME 1, SOME 2 (SEE METHOD 202)

TABLE 4.3C -- COMMUTER RAIL FUEL AND ENERGY USE, BY FUEL BY STATE, 1967-78
(THIRD IN A SERIES OF NINE TABLES)

DIESEL FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY ELECTRICITY USE IN MILLIONS OF KILOWATT-HOURS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
SOUTH ATLANTIC	9 2 63	9 2 63	9 2 63	9 2 63	9 2 63	9 2 63	9 2 63	9 2 63	9 2 63	9 2 62	9 2 60	9 2 65
DELAWARE	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0
D.C.	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0
FLORIDA	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0
GEORGIA	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0
MARYLAND	8 2 54	8 2 54	8 2 54	8 2 54	8 2 54	8 2 54	8 2 54	8 2 54	8 2 54	8 2 53	7 2 52	8 2 56
NORTH CAROLINA	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0
SOUTH CAROLINA	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0
VIRGINIA	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0
WEST VIRGINIA	1 0 9	1 0 9	1 0 9	1 0 9	1 0 9	1 0 9	1 0 9	1 0 9	1 0 9	1 0 9	1 0 8	1 0 9

SOURCE: METHOD 202

DATA QUALITY: SOME 1, SOME 2 (SEE METHOD 202)

TABLE 4.3D -- COMMUTER RAIL FUEL AND ENERGY USE, BY FUEL BY STATE, 1967-78
(FOURTH IN A SERIES OF NINE TABLES)

DIESEL FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY ELECTRICITY USE IN MILLIONS OF KILOWATT-HOURS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
EAST NORTH CENTRAL	405	395	420	418	405	276	362	394	399	406	417	412
	68	69	73	70	70	67	70	68	65	63	61	60
	2595	2541	2697	2677	2600	1840	2355	2531	2547	2581	2644	2610
ILLINOIS	364	354	378	377	364	244	326	354	355	364	376	371
	51	54	57	56	56	54	58	55	54	53	53	52
	2300	2251	2402	2389	2314	1608	2100	2253	2259	2305	2374	2340
INDIANA	3	3	3	3	3	3	3	3	3	2	4	5
	16	15	15	13	14	13	12	12	10	9	8	8
	78	76	75	69	71	67	64	67	59	45	55	58
MICHIGAN	7	7	7	7	7	7	7	7	7	7	7	7
	0	0	0	0	0	0	0	0	0	0	0	0
	42	42	42	42	42	42	42	42	42	42	42	42
OHIO	3	3	3	3	3	3	3	3	3	3	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	19	19	19	19	19	19	19	19	19	19	0	0
WISCONSIN	26	26	27	26	26	17	22	25	28	28	29	28
	0	0	0	0	0	0	0	0	0	0	0	0
	153	151	157	157	152	102	128	149	166	167	171	168

SOURCE: METHOD 202 DATA QUALITY: SOME 1, SOME 2 (SEE METHOD 202)

TABLE 4.3E -- COMMUTER RAIL FUEL AND ENERGY USE, BY FUEL BY STATE, 1967-78.
(FIFTH IN A SERIES OF NINE TABLES)

DIESEL FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY ELECTRICITY USE IN MILLIONS OF KILOWATT-HOURS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
EAST SOUTH CENTRAL	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
ALABAMA	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
KENTUCKY	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
MISSISSIPPI	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
TENNESSEE	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0

SOURCE: METHOD 202 DATA QUALITY: SOME 1, SOME 2 (SEE METHOD 202)

TABLE 4.3F -- COMMUTER RAIL FUEL AND ENERGY USE, BY FUEL BY STATE, 1967-78
(SIXTH IN A SERIES OF NINE TABLES)

DIESEL FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY ELECTRICITY USE IN MILLIONS OF KILOWATT-HOURS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
EST NORTH CENTRAL	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
IOWA	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
KANSAS	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
MINNESOTA	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
MISSOURI	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
NEBRASKA	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
NORTH DAKOTA	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
SOUTH DAKOTA	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0

SOURCE: METHOD 202 DATA QUALITY: SOME 1, SOME 2 (SEE METHOD 202)

TABLE 4.3G -- COMMUTER RAIL FUEL AND ENERGY USE, BY FUEL BY STATE, 1967-78
(SEVENTH IN A SERIES OF NINE TABLES)

DIESEL FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY ELECTRICITY USE IN MILLIONS OF KILOWATT-HOURS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
WEST SOUTH CENTRAL	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
ARKANSAS	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
LOUISIANA	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
OKLAHOMA	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
TEXAS	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0

SOURCE: METHOD 202 DATA QUALITY: SOME 1, SOME 2 (SEE METHOD 202)

TABLE 4.3B -- COMMUTER RAIL FUEL AND ENERGY USE, BY FUEL BY STATE, 1967-78
(EIGHTH IN A SERIES OF NINE TABLES)

DIESEL FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY ELECTRICITY USE IN MILLIONS OF KILOWATT-HOURS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
MOUNTAIN	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
ARIZONA	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
COLORADO	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
IDAHO	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
MONTANA	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
NEVADA	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
NEW MEXICO	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
UTAH	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
WYOMING	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0

SOURCE: METHOD 202

DATA QUALITY: SOME 1, SOME 2 (SEE METHOD 202)

TABLE 4.3I -- COMMUTER RAIL FUEL AND ENERGY USE, BY FUEL BY STATE, 1967-78
(LAST IN A SERIES OF NINE TABLES)

DIESEL FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY ELECTRICITY USE IN MILLIONS OF KILOWATT-HOURS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
PACIFIC	54 0 319	54 0 319	54 0 319	54 0 319	54 0 319	54 0 319	54 0 319	54 0 319	54 0 319	54 0 319	54 0 319	54 0 319
ALASKA	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0
CALIFORNIA	54 0 319	54 0 319	54 0 319	54 0 319	54 0 319	54 0 319	54 0 319	54 0 319	54 0 319	54 0 319	54 0 319	54 0 319
HAWAII	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0
OREGON	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0
WASHINGTON	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0

SOURCE: METHOD 202 DATA QUALITY: SOME 1, SOME 2 [SEE METHOD 202]

TABLE 4.4A -- INTERCITY PASSENGER RAIL FUEL & ENERGY USE,
BY FUEL BY STATE, 1967-78
(FIRST IN A SERIES OF NINE TABLES)

DIESEL FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY ELECTRICITY USE IN MILLIONS OF KILOWATT-HOURS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
UNITED STATES	9501 604 57408	7944 653 48505	6975 616 42734	6031 734 37637	1736 240 10931	1759 178 10854	1788 270 11337	1664 273 10624	1622 270 10370	1806 268 11435	1919 258 12059	2080 256 12990
NEW ENGLAND	191 142 1597	191 153 1634	190 145 1601	188 173 1685	94 56 738	96 41 699	97 63 780	90 64 742	88 63 727	97 63 780	104 60 810	112 60 857
CONNECTICUT	78 56 645	78 60 659	78 57 648	78 68 686	51 22 372	52 16 357	53 25 394	49 25 370	48 25 364	53 25 394	57 24 413	61 24 437
MAINE	17 0 99	17 0 99	15 0 87	14 0 81	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0
MASSACHUSETTS	83 36 606	83 39 616	83 37 609	83 44 633	31 14 228	32 10 220	32 16 241	30 16 229	29 16 223	32 16 241	34 15 249	37 15 266
NEW HAMPSHIRE	0 0 0	0 0 0	1 0 5	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0
RHODE ISLAND	13 0 75	13 0 75	13 0 75	13 0 75	12 0 69	12 0 69	12 0 69	11 0 64	11 0 64	12 0 69	13 0 75	14 0 81
VERMONT	0 50 170	0 54 184	0 51 174	0 61 208	0 20 68	0 15 51	0 22 75	0 23 78	0 22 75	0 22 75	0 21 71	0 21 71

SOURCE: METHOD 203

DATA QUALITY: 2

TABLE 4.4B -- INTERCITY PASSENGER RAIL FUEL & ENERGY USE,
BY FUEL BY STATE, 1967-78
(SECOND IN A SERIES OF NINE TABLES)

DIESEL FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY ELECTRICITY USE IN MILLIONS OF KILOWATT-HOURS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
MID-ATLANTIC	1166	1232	1132	1028	161	163	166	155	151	168	178	194
	316	342	323	384	127	94	142	143	142	140	136	134
	7870	8343	7696	7298	1371	1270	1451	1390	1364	1456	1500	1587
NEW JERSEY	210	233	218	194	20	20	21	19	19	21	22	24
	70	76	72	86	28	21	32	32	32	31	30	30
	1452	1616	1515	1423	212	188	231	219	219	228	230	242
NEW YORK	493	445	458	430	63	64	65	61	59	66	70	76
	137	148	140	166	55	41	61	62	61	61	59	58
	3339	3097	3145	3071	554	512	586	566	551	592	609	640
PENNSYLVANIA	463	554	456	404	78	79	80	75	73	81	86	94
	109	118	111	132	44	32	49	49	49	48	47	46
	3069	3629	3035	2803	604	569	633	604	592	635	661	704

SOURCE: METHOD 203

DATA QUALITY: 2

TABLE 4.4C -- INTERCITY PASSENGER RAIL FUEL & ENERGY USE,
BY FUEL BY STATE, 1967-78
(THIRD IN A SERIES OF NINE TABLES)

DIESEL FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY ELECTRICITY USE IN MILLIONS OF KILOWATT-HOURS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
SOUTH ATLANTIC	1806 146 11018	1667 158 10250	1447 148 8934	1155 177 7332	379 57 2402	385 43 2389	391 65 2499	364 66 2345	354 65 2283	395 65 2522	420 62 2658	454 62 2856
DELAWARE	19 13 155	28 14 210	21 13 166	19 16 165	1 5 22	1 4 19	1 6 26	1 6 26	1 6 26	2 6 32	2 5 28	2 5 28
D.C.	16 12 134	20 13 160	16 12 134	15 14 135	4 4 36	4 3 33	4 5 40	4 5 40	3 5 34	4 5 40	4 5 40	5 5 46
FLORIDA	301 0 1753	264 0 1537	232 0 1351	188 0 1095	98 0 570	99 0 576	101 0 588	94 0 547	92 0 535	102 0 594	108 0 629	117 0 681
GEORGIA	295 0 1718	255 0 1485	227 0 1322	161 0 937	42 0 244	43 0 250	43 0 250	41 0 238	39 0 227	44 0 256	47 0 273	51 0 297
MARYLAND	184 121 1484	217 131 1711	174 123 1433	154 147 1398	24 48 303	25 36 268	25 54 329	23 55 321	23 54 318	25 54 329	27 52 334	29 52 346
NORTH CAROLINA	317 0 1846	284 0 1654	253 0 1473	195 0 1135	50 0 291	51 0 297	52 0 302	48 0 279	47 0 273	52 0 302	55 0 320	60 0 349
SOUTH CAROLINA	215 0 1252	192 0 1118	171 0 996	131 0 763	71 0 413	71 0 413	73 0 425	68 0 396	66 0 384	73 0 425	78 0 454	84 0 489
VIRGINIA	331 0 1928	300 0 1747	257 0 1497	211 0 1229	63 0 367	64 0 372	65 0 378	60 0 349	59 0 343	66 0 384	70 0 407	75 0 436
WEST VIRGINIA	128 0 745	107 0 623	96 0 559	81 0 471	26 0 151	27 0 157	27 0 157	25 0 145	24 0 139	27 0 157	29 0 168	31 0 180

TABLE 4.4D -- INTERCITY PASSENGER RAIL FUEL & ENERGY USE,
BY FUEL BY STATE, 1967-78
(FOURTH IN A SERIES OF NINE TABLES)

DIESEL FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY ELECTRICITY USE IN MILLIONS OF KILOWATT-HOURS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
EAST NORTH CENTRAL	2070 0 12058	1850 0 10776	1616 0 9413	1458 0 8493	261 0 1520	265 0 1543	268 0 1561	250 0 1456	244 0 1421	273 0 1590	290 0 1689	313 0 1823
ILLINOIS	806 0 4695	630 0 3670	528 0 3075	475 0 2767	106 0 617	108 0 629	109 0 634	102 0 594	99 0 576	111 0 646	118 0 687	127 0 739
INDIANA	411 0 2394	447 0 2603	381 0 2219	346 0 2015	52 0 302	52 0 302	53 0 308	49 0 285	48 0 279	54 0 314	57 0 332	62 0 361
MICHIGAN	182 0 1060	165 0 961	165 0 961	156 0 908	15 0 87	15 0 87	15 0 87	14 0 81	14 0 81	16 0 93	17 0 99	18 0 104
OHIO	481 0 2802	449 0 2615	417 0 2429	375 0 2184	64 0 372	65 0 378	66 0 384	62 0 361	60 0 349	67 0 390	71 0 413	77 0 448
WISCONSIN	190 0 1106	159 0 926	125 0 728	106 0 617	24 0 139	25 0 145	25 0 145	23 0 133	23 0 133	25 0 145	27 0 157	29 0 168

SOURCE: METHOD 203

DATA QUALITY: 2

TABLE 4.4E -- INTERCITY PASSENGER RAIL FUEL & ENERGY USE,
BY FUEL BY STATE, 1967-78
(FIFTH IN A SERIES OF NINE TABLES)

DIESEL FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY ELECTRICITY USE IN MILLIONS OF KILOWATT-HOURS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
EAST SOUTH CENTRAL	801	657	543	424	39	40	42	38	38	42	44	48
	0	0	0	0	0	0	0	0	0	0	0	0
	4666	3827	3163	2469	227	233	244	221	221	244	256	279
ALABAMA	257	216	188	133	12	12	12	11	11	12	13	14
	0	0	0	0	0	0	0	0	0	0	0	0
	1497	1258	1095	774	69	69	69	64	64	69	75	81
KENTUCKY	171	141	108	92	10	11	11	10	10	11	12	13
	0	0	0	0	0	0	0	0	0	0	0	0
	996	821	629	535	58	64	64	58	58	64	69	75
MISSISSIPPI	147	114	99	89	9	9	10	9	9	10	10	11
	0	0	0	0	0	0	0	0	0	0	0	0
	856	664	576	518	52	52	58	52	52	58	58	64
TENNESSEE	226	186	148	110	8	8	9	8	8	9	9	10
	0	0	0	0	0	0	0	0	0	0	0	0
	1316	1083	862	640	46	46	52	46	46	52	52	58

SOURCE: METHOD 203

DATA QUALITY: 2

TABLE 4.4F -- INTERCITY PASSENGER RAIL FUEL & ENERGY USE,
BY FUEL BY STATE, 1967-78
(SIXTH IN A SERIES OF NINE TABLES)

DIESEL FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY ELECTRICITY USE IN MILLIONS OF KILOWATT-HOURS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
EST NORTH CENTRAL	1221	911	781	682	213	217	220	205	199	222	236	256
	0	0	0	0	0	0	0	0	0	0	0	0
	7112	5306	4549	3972	1240	1264	1281	1134	1159	1293	1374	1491
IOWA	289	185	148	100	21	21	21	20	19	22	23	25
	0	0	0	0	0	0	0	0	0	0	0	0
	1693	1077	862	582	122	122	122	116	110	128	133	145
KANSAS	156	154	140	122	56	57	58	54	52	58	62	67
	0	0	0	0	0	0	0	0	0	0	0	0
	957	897	815	710	326	332	337	314	302	337	361	390
MINNESOTA	233	201	185	167	35	36	36	34	33	37	39	42
	0	0	0	0	0	0	0	0	0	0	0	0
	1357	1170	1077	972	203	209	209	198	192	215	227	244
MISSOURI	251	148	113	101	49	50	51	47	46	51	54	59
	0	0	0	0	0	0	0	0	0	0	0	0
	1462	862	658	586	285	291	297	273	267	297	314	343
NEBRASKA	133	88	69	68	23	24	24	22	22	24	26	28
	0	0	0	0	0	0	0	0	0	0	0	0
	774	512	401	396	133	139	139	23	128	139	151	163
NORTH DAKOTA	136	125	118	117	29	29	30	23	27	30	32	35
	0	0	0	0	0	0	0	0	0	0	0	0
	792	728	687	681	168	168	174	163	157	174	186	203
SOUTH DAKOTA	13	10	8	7	0	0	0	8	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	75	58	46	40	0	0	0	0	0	0	0	0

SOURCE: METHOD 203

DATA QUALITY: 2

TABLE 4.4G -- INTERCITY PASSENGER RAIL FUEL & ENERGY USE,
BY FUEL BY STATE, 1967-78
(SEVENTH IN A SERIES OF NINE TABLES)

DIESEL FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY ELECTRICITY USE IN MILLIONS OF KILOWATT-HOURS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
WEST SOUTH CENTRAL	548 0 3192	291 0 1695	228 0 1328	198 0 1153	102 0 594	102 0 594	104 0 605	97 0 565	95 0 553	105 0 611	112 0 652	121 0 704
ARKANSAS	33 0 192	20 0 116	11 0 64	7 0 40	4 0 23	4 0 23	5 0 29	4 0 23	4 0 23	5 0 29	5 0 29	5 0 29
LOUISIANA	71 0 413	52 0 302	39 0 227	35 0 203	13 0 75	13 0 75	13 0 75	12 0 69	12 0 69	13 0 75	14 0 81	15 0 87
OKLAHOMA	79 0 460	41 0 238	35 0 203	30 0 174	16 0 93	16 0 93	16 0 93	15 0 87	15 0 87	16 0 93	17 0 99	19 0 110
TEXAS	365 0 2126	178 0 1036	143 0 833	126 0 734	69 0 401	69 0 401	70 0 407	66 0 384	64 0 372	71 0 413	76 0 442	82 0 477

SOURCE: METHOD 203

DATA QUALITY: 2

TABLE 4.4H — INTERCITY PASSENGER RAIL FUEL & ENERGY USE,
BY FUEL BY STATE, 1967-78.
(EIGHTH IN A SERIES OF NINE TABLES)

DIESEL FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY ELECTRICITY USE IN MILLIONS OF KILOWATT-HOURS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1957	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
MOUNTAIN	1175 0 6844	772 0 4497	700 0 4077	607 0 3536	245 0 1427	246 0 1433	251 0 1462	234 0 1363	228 0 1328	253 0 1473	269 0 1567	293 0 1706
ARIZONA	281 0 1636	145 0 844	131 0 763	119 0 693	49 0 285	50 0 291	51 0 297	47 0 273	46 0 267	51 0 297	54 0 314	59 0 343
COLORADO	213 0 1240	133 0 774	118 0 687	84 0 489	30 0 174	30 0 174	31 0 180	29 0 168	28 0 163	31 0 180	33 0 192	36 0 209
IDAHO	23 0 133	22 0 128	21 0 122	21 0 122	18 0 104	18 0 104	19 0 110	17 0 99	17 0 99	19 0 110	20 0 116	22 0 128
MONTANA	235 0 1358	211 0 1229	197 0 1147	197 0 1147	47 0 273	47 0 273	48 0 279	45 0 262	44 0 256	49 0 285	52 0 302	56 0 326
NEVADA	54 0 372	49 0 285	47 0 273	23 0 133	22 0 128	22 0 128	22 0 128	21 0 122	20 0 116	22 0 128	24 0 139	26 0 151
NEW MEXICO	254 0 1479	133 0 774	118 0 687	108 0 629	40 0 233	40 0 233	41 0 238	38 0 221	37 0 215	41 0 238	44 0 256	48 0 279
UTAH	62 0 244	35 0 203	32 0 186	19 0 110	15 0 87	15 0 87	15 0 87	14 0 81	14 0 81	15 0 87	16 0 93	18 0 104
WYOMING	63 0 367	44 0 256	36 0 209	36 0 209	24 0 139	24 0 139	24 0 139	23 0 133	22 0 128	25 0 145	26 0 151	28 0 163

SOURCE: METHOD 203

DATA QUALITY: 2

TABLE 4.4I -- INTERCITY PASSENGER RAIL FUEL & ENERGY USE,
BY FUEL BY STATE, 1967-78
(LAST IN A SERIES OF NINE TABLES)

DIESEL FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY ELECTRICITY USE IN MILLIONS OF KILOWATT-HOURS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
PACIFIC	523	373	338	291	242	245	249	231	225	251	266	289
	0	0	0	0	0	0	0	0	0	0	0	0
	3046	2172	1968	1695	1409	1427	1450	1345	1310	1462	1549	1683
ALASKA	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
CALIFORNIA	305	178	151	136	145	147	149	139	135	151	160	173
	0	0	0	0	0	0	0	0	0	0	0	0
	1776	1036	879	792	844	856	867	809	786	879	932	1007
HAWAII	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
OREGON	24	17	16	15	36	36	37	34	33	37	39	43
	0	0	0	0	0	0	0	0	0	0	0	0
	139	99	93	87	209	209	215	198	192	215	227	250
WASHINGTON	194	178	171	140	61	62	63	58	57	63	67	73
	0	0	0	0	0	0	0	0	0	0	0	0
	1130	1036	996	815	355	361	367	337	332	367	390	425

SOURCE: METHOD 203

DATA QUALITY: 2

TABLE 4.5A -- FREIGHT RAIL FUEL AND ENERGY USE, BY FUEL BY STATE, 1967-78
(FIRST IN A SERIES OF NINE TABLES)

DIESEL FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY RESIDUAL OIL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
UNITED STATES	78192 5494 490042	75108 4296 464544	78411 3381 478033	81372 2222 487995	83518 1262 494460	94373 1137 556909	100102 1214 590767	100319 1176 591792	90616 583 531540	94647 423 554016	96409 329 563689	96845 206 565456
NEW ENGLAND	1201 175 8096	1189 177 8039	1090 118 7091	1088 69 6771	979 63 6099	1136 13 6699	1196 31 7162	1252 33 7500	1188 28 7096	983 13 5808	756 2 4416	555 11 3302
CONNECTICUT	389 104 2919	397 104 2966	377 50 2510	397 10 2375	337 7 2007	323 0 1881	336 0 1957	335 0 1951	278 0 1619	267 0 1555	246 0 1433	185 0 1077
MAINE	295 36 1944	303 38 2004	310 34 2019	352 26 2214	289 26 1847	220 0 1281	266 26 1713	304 29 1953	279 26 1788	301 11 1822	283 2 1661	241 7 1447
MASSACHUSETTS	439 12 2632	414 11 2480	313 12 1898	228 10 1391	272 5 1615	513 0 2988	522 2 3053	518 2 3030	523 2 3059	309 2 1812	115 0 669	56 4 351
NEW HAMPSHIRE	12 0 69	3 0 17	4 0 23	19 0 110	23 0 133	17 0 99	3 0 17	2 0 11	0 0 0	1 0 5	4 0 23	2 0 11
RHODE ISLAND	12 23 214	9 24 203	25 22 283	26 23 296	12 25 227	8 13 128	14 3 100	61 2 367	57 0 332	47 0 273	34 0 198	6 0 34
VERMONT	54 0 314	63 0 367	61 0 355	66 0 384	46 0 267	55 0 320	55 0 320	32 0 186	51 0 297	58 0 337	74 0 431	65 0 378

SOURCE: METHOD 203

DATA QUALITY: 2

TABLE 4.5B -- FREIGHT RAIL FUEL AND ENERGY USE, BY FUEL BY STATE, 1967-78
(SECOND IN A SERIES OF NINE TABLES)

DIESEL FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY RESIDUAL OIL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
MID-ATLANTIC	7664	6010	6011	6025	6025	6028	6065	6034	5759	7685	7194	6433
	897	906	441	182	161	156	86	59	64	40	23	0
	50285	40707	37789	36242	36110	36096	35871	35521	33950	45019	42052	37474
NEW JERSEY	1207	1150	1299	929	852	935	976	1011	851	639	907	613
	54	28	8	2	3	1	1	1	10	0	0	0
	7370	6875	7617	5424	4982	5453	5691	5895	5020	3722	5283	3570
NEW YORK	3011	1847	1839	1964	2036	1885	1793	1748	1684	2737	2486	1856
	756	733	364	67	76	98	45	16	4	0	0	0
	22293	15368	13001	11862	12338	11597	10727	10283	9835	15944	14481	10811
PENNSYLVANIA	3446	3013	2873	3132	3137	3208	3296	3275	3224	4309	3801	3964
	87	145	69	113	82	57	40	42	50	40	23	0
	20621	18463	17170	18955	18789	19046	19452	19342	19095	25353	22286	23091

SOURCE: METHOD 203

DATA QUALITY: 2

TABLE 4.5C -- FREIGHT RAIL FUEL AND ENERGY USE, BY FUEL BY STATE, 1967-78
(THIRD IN A SERIES OF NINE TABLES)

DIESEL FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY RESIDUAL OIL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
SOUTH ATLANTIC	9948 333 60044	10141 186 60244	10913 86 64113	12238 74 71756	11958 46 69949	11983 52 70132	12357 51 72305	12269 42 71735	10288 41 60189	10779 40 63043	11887 27 69416	10588 21 61811
DELAWARE	30 0 174	45 0 262	22 0 128	37 26 379	48 26 443	17 34 312	29 28 344	20 27 286	19 30 299	16 12 168	17 0 99	18 0 104
D.C.	86 2 513	122 5 742	122 3 729	120 1 705	113 0 658	161 2 950	146 4 875	178 2 1049	153 2 903	183 2 1078	205 1 1200	138 0 803
FLORIDA	2672 32 12271	2673 18 15684	2653 16 15555	2757 9 16117	2582 4 15066	2366 0 13782	2270 0 13223	2076 0 12093	1451 0 8452	1609 0 9373	2024 0 11790	1817 0 10584
GEORGIA	1762 50 10578	1660 10 9733	1837 9 10757	2049 8 11986	2279 0 13276	2557 0 14895	2802 0 16322	2586 0 15064	2413 0 14056	2380 0 13864	2549 0 14848	2208 0 12862
MARYLAND	1546 49 9314	1482 2 8645	1268 1 7392	1494 1 8709	1326 1 7730	1195 2 6973	1283 5 7505	1409 2 8220	1338 0 7794	1404 0 8178	1339 0 7800	959 0 5586
NORTH CAROLINA	1944 24 11475	1294 9 7594	1410 13 8295	1590 7 9306	1632 7 9551	1629 5 9521	1821 2 10625	1816 1 10585	1489 1 8680	1443 1 8412	1485 0 8650	1330 0 7747
SOUTH CAROLINA	109 12 710	143 27 1002	187 14 1177	308 10 1857	368 2 2156	350 2 2051	440 1 2569	411 2 2406	264 2 1550	263 7 1576	429 9 2555	369 8 2199
VIRGINIA	1856 52 11350	1895 35 11259	2665 5 15556	2953 7 17246	2939 6 17158	2721 7 15894	2639 11 15442	2465 8 15574	2022 6 11816	2507 18 14717	2406 17 14122	2227 13 13054
WEST VIRGINIA	543 72 3615	827 80 5320	749 25 4520	930 5 5449	671 0 3908	987 0 5749	927 0 5400	1108 0 6454	1139 0 6635	974 0 5673	1433 0 8347	1522 0 8866

SOURCE: METHOD 203

DATA QUALITY: 2

TABLE 4.5D -- FREIGHT RAIL FUEL AND ENERGY USE, BY FUEL BY STATE, 1967-78
(FOURTH IN A SERIES OF NINE TABLES)

DIESEL FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY RESIDUAL OIL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
EAST NORTH CENTRAL	14296	12102	12963	14114	14379	19119	19281	18272	16488	17813	15491	15452
	863	713	633	585	265	256	302	286	83	64	50	33
	88705	74981	79494	85897	85429	112985	114218	108239	96571	104170	90555	90221
ILLINOIS	6123	5931	5972	6525	6526	8724	8644	8351	7268	7594	7043	5940
	241	198	188	117	59	117	122	129	43	33	26	9
	37184	35795	35971	38746	38387	51556	51121	49458	42609	44445	41191	34659
INDIANA	1829	891	1825	2255	2237	2535	2684	2803	2476	2200	2482	2738
	251	192	132	104	52	0	0	0	0	0	0	0
	12232	6397	11461	13790	13358	14767	15635	16328	14423	12815	14458	15949
MICHIGAN	1417	944	1317	1392	1300	3004	2993	2668	2177	2219	2133	1967
	126	98	99	70	43	88	130	133	30	5	0	0
	9046	6115	8294	8549	7843	18052	18252	16378	12870	12957	12425	11458
OHIO	3923	3439	2981	2955	3348	3920	3983	3502	3757	4969	3038	3908
	236	214	205	292	105	0	0	0	0	0	0	0
	24336	21379	18654	19049	20163	22835	23202	20400	21886	28946	17697	22765
WISCONSIN	1004	897	868	987	968	936	977	948	810	831	795	899
	9	11	9	2	6	51	50	24	10	26	24	24
	5905	5294	5113	5762	5676	5773	6005	5673	4781	5004	4782	5387

SOURCE: METHOD 203

DATA QUALITY: 2

TABLE C.5E -- FREIGHT RAIL FUEL AND ENERGY USE, BY FUEL BY STATE, 1967-78
(FIFTH IN A SERIES OF NINE TABLES)

DIESEL FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY RESIDUAL OIL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
EAST SOUTH CENTRAL	5013 148 30133	5113 164 30816	5144 143 30864	5390 147 32323	5661 49 33285	6241 0 36356	6584 1 38360	7033 3 40988	6717 3 39148	7908 7 46111	8035 0 46807	9292 0 54129
ALABAMA	1043 0 6075	1521 0 8860	1691 0 9850	1876 0 10928	1796 0 10462	2207 0 12856	2533 0 14755	2732 0 15914	2712 0 15798	2858 5 16680	3067 0 17866	2827 0 16468
KENTUCKY	1744 39 11033	1271 155 8378	1118 137 7374	1115 144 7400	1221 48 7414	1231 0 7171	1341 0 7811	1426 0 8307	1554 0 9052	2446 0 14248	2247 0 13089	2869 0 16713
MISSISSIPPI	200 0 1165	300 0 1747	337 0 1963	362 0 2108	441 0 2569	435 0 2534	505 0 2941	615 0 3582	234 0 1363	320 0 1864	349 0 2033	365 0 2126
TENNESSEE	2026 9 11858	2021 9 11829	1998 6 11676	2037 3 11885	2203 1 12839	2368 0 13794	2205 1 12851	2260 3 13184	2217 3 12933	2284 2 13317	2372 0 13817	3231 0 18821

SOURCE: METHOD 203

DATA QUALITY: 2

TABLE 4.5F -- FREIGHT RAIL FUEL AND ENERGY USE, BY FUEL BY STATE, 1967-78
(SIXTH IN A SERIES OF NINE TABLES)

DIESEL FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY RESIDUAL OIL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
EST NORTH CENTRAL	9713	10406	10103	10493	10356	11233	12257	11846	10953	11220	12705	13706
	348	427	395	326	224	217	220	217	198	119	109	46
	58770	63303	61337	63175	61736	66801	72785	70372	65050	66109	74697	80132
IOWA	989	1073	1190	1124	1289	1402	1581	1581	1725	1418	1454	1294
	44	24	23	26	6	0	0	0	0	19	13	7
	6037	6401	7076	6711	7546	8167	9209	9209	10048	8379	8551	7582
KANSAS	2486	1970	2010	2294	2239	2088	2236	2436	2313	1971	2661	3497
	0	5	3	2	13	26	41	29	0	21	38	22
	14481	11507	11727	13376	13124	12326	13283	14373	13474	11613	15740	20509
MINNESOTA	1715	1606	1749	1862	1751	1546	2002	2033	1982	1838	1390	1433
	31	74	61	18	2	7	8	9	0	0	0	0
	10185	9820	10572	10960	10212	9050	11712	11899	11545	10707	8097	8347
MISSOURI	2166	2967	2455	2497	2443	2865	2741	2475	2016	2706	2723	2468
	0	36	23	10	10	4	5	6	55	42	31	11
	12617	17510	14445	14608	14294	16714	15998	14455	12089	16027	16057	14446
NEBBASKA	1339	1758	1726	2051	2054	2495	2526	2264	1879	2297	3217	3684
	219	198	202	223	171	180	166	173	142	36	26	5
	9177	11485	11324	13349	13040	15666	15758	14276	11838	13607	18903	21492
NORTH DAKOTA	850	832	737	459	366	666	946	841	780	697	1020	1093
	49	84	76	41	18	0	0	0	0	0	0	0
	5259	5374	4771	2931	2245	3879	5510	4899	4543	4060	5941	6367
SOUTH DAKOTA	168	200	236	206	214	171	225	216	258	293	240	237
	5	6	7	6	4	0	0	0	1	1	1	1
	1010	1202	1418	1237	1271	996	1310	1258	1509	1713	1404	1386

SOURCE: METHOD 203

DATA QUALITY: 2

TABLE 4.5G -- FREIGHT RAIL FUEL AND ENERGY USE, BY FUEL BY STATE, 1967-78
(SEVENTH IN A SERIES OF NINE TABLES)

DIESEL FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY RESIDUAL OIL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
WEST SOUTH CENTRAL	7611 211 45663	7594 149 45174	8635 122 51069	10022 87 58929	10240 40 59903	15658 14 91302	17468 155 102732	18862 110 110570	17297 83 101283	16317 75 95524	16410 54 95934	15553 79 91099
ARKANSAS	1076 0 6268	897 0 5225	927 2 5412	1188 2 6933	993 0 5784	1647 0 9594	2055 5 12002	2452 7 14327	2387 3 13924	2079 0 12111	1683 2 9816	1522 4 8891
LOUISIANA	928 20 5531	935 15 5541	927 3 5450	908 5 5320	1015 0 5912	2588 0 15076	2988 0 17406	2309 0 16363	2439 0 14208	2175 0 12670	2453 0 14289	2536 0 14773
OKLAHOMA	353 96 5572	618 87 4147	433 86 3063	645 59 4128	376 30 2378	238 0 1386	289 0 1683	446 0 2598	580 23 3523	977 0 5691	854 0 4974	568 0 3308
TEXAS	4754 95 28291	5144 47 30261	6348 26 37143	7281 21 42546	7856 10 45827	11185 14 65245	12136 150 71640	13155 103 77280	11891 57 69628	11086 75 65051	11420 52 66853	10927 75 64125

SOURCE: METHOD 203

DATA QUALITY: 2

TABLE 4.5H -- FREIGHT RAIL FUEL AND ENERGY USE, BY FUEL BY STATE, 1967-78
(EIGHTH IN A SERIES OF NINE TABLES)

DIESEL FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY RESIDUAL OIL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
MOUNTAIN	10586 2370 76568	9843 1410 66204	10381 1359 69018	9704 658 60666	9744 341 58906	10309 318 62053	12177 272 72646	12276 346 73688	11445 38 66910	11635 57 68136	12720 52 74426	13989 4 81516
ARIZONA	914 0 5324	1121 0 6530	1169 0 6809	914 0 5324	426 0 2481	871 0 5073	1829 0 10654	1226 0 7141	1013 0 5901	1062 0 6186	1479 0 8615	1489 0 8674
COLORADO	1267 361 9650	1084 211 7641	1170 204 8098	850 99 5574	1107 50 6763	1488 22 8806	1511 20 8927	1651 42 9881	1459 0 8499	1633 3 9531	1882 7 11007	1977 3 11535
IDAHO	685 0 3990	353 11 2125	605 7 3568	671 2 3921	649 0 3780	629 0 3664	730 0 4252	1002 0 5837	990 0 5767	1013 0 5901	1068 0 6221	1072 0 6244
MONTANA	1127 228 7998	1059 185 7332	1272 179 8535	1426 74 8772	1627 40 9729	1761 32 10459	1870 28 11069	2257 44 13424	1955 38 11627	1906 0 11103	1773 0 10328	1898 0 11056
NEVADA	808 0 4706	913 0 5318	921 0 5365	675 0 3932	390 0 2271	257 0 1497	412 0 2400	230 0 1339	233 0 1357	397 0 2312	438 0 2551	586 0 3413
NEW MEXICO	1563 12 9180	1235 5 7225	1239 2 7230	1312 11 7712	1429 7 8368	1540 0 8971	1680 0 9786	1258 0 7328	1387 0 8079	1578 0 9192	1960 0 11417	2304 0 13421
UTAH	2277 53 13597	1722 57 10389	1714 43 10255	1696 4 9905	1549 10 9086	1455 20 8601	1817 24 10735	2114 37 12547	2124 0 12373	1964 0 11441	1728 0 10066	1955 0 11388
WYOMING	1945 1716 22119	2356 941 19641	2291 924 19155	2160 468 15525	2567 234 16425	2308 244 14979	2328 200 14819	2538 223 16186	2284 0 13305	2082 54 12468	2392 45 14217	2708 1 15781

SOURCE: METHOD 203

DATA QUALITY: 2

TABLE 4.5I -- FREIGHT RAIL FUEL AND ENERGY USE, BY FUEL BY STATE, 1967-78
(LAST IN A SERIES OF NINE TABLES)

DIESEL FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY RESIDUAL OIL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
PACIFIC	12160 149 71773	12710 164 75071	13171 86 77254	12298 94 72231	14176 73 83039	12666 111 74482	12717 96 74685	12475 80 73174	10481 45 61338	10307 8 60092	11211 12 65384	11277 12 65768
ALASKA	8 9 103	10 11 127	13 0 75	17 8 149	20 5 147	103 6 637	102 7 638	100 6 620	163 3 968	158 0 920	169 0 984	148 0 862
CALIFORNIA	9510 41 55657	9971 70 58525	10388 14 60602	9891 30 57807	11076 25 64679	8605 57 50485	8327 54 48847	8213 48 48145	6378 28 37330	5634 7 32864	6051 9 35306	5721 12 33402
HAWAII	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 8 50	0 6 37	0 2 12	0 2 12	1 0 5	2 0 11	2 0 11
OREGON	2065 47 12324	2113 40 12560	2235 33 13227	1959 33 11619	2533 22 14894	2739 29 16138	2854 23 16770	2629 21 15447	2186 10 12797	2410 0 14039	2651 2 15455	2906 0 16928
WASHINGTON	577 52 3698	616 43 3858	535 37 3349	431 23 2655	547 21 3318	1219 11 7170	1434 6 8391	1533 3 3949	1754 2 10230	2104 1 12262	2338 1 13626	2500 0 14563

SOURCE: METHOD 203

DATA QUALITY: 2

TABLE 5.1 -- TOTAL CIVILIAN AUTO GASOLINE AND ENERGY USE, BY SECTOR, 1967-76

GASOLINE USE IN THOUSANDS OF BBL, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

SECTOR OF THE ECONOMY	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
TOTALS	1342005 7045732	1433231 7524669	1525208 8007560	1603423 8418199	1693080 8888872	1825442 9583782	1911118 10033607	1837606 9647668	1900523 9977942	2017466 10591923
HOUSEHOLD AUTOS (SEE NOTE BELOW)	1139008 5979792	1219238 6400999	1289898 6771964	1364098 7161493	1451323 7619445	1579389 8291792	1656322 8695690	1581935 8305158	1645576 8639274	1756425 9221231
TAXICABS	9900 52088	11046 58095	13891 73032	14267 75021	14846 78043	15435 81132	16435 86403	15757 82831	16071 84460	19417 102040
OTHER COMMERCIAL AUTOS (SEE NOTE BELOW)	191893 1007528	201681 1058924	220153 1155917	223683 1174444	225651 1184766	229352 1204212	236890 1243788	238332 1251369	237240 1245619	239933 1259773
FEDERAL AUTOS	1204 6324	1266 6651	1266 6647	1379 7241	1260 6618	1266 6646	1471 7726	1582 8310	1636 8589	1691 8879

SOURCE: METHOD 310

DATA QUALITY: 2 (HOUSEHOLD AUTOS, NATIONAL TOTALS ONLY)
 3 (TAXICABS AND OTHER COMMERCIAL AUTOS)
 1 (FEDERAL AUTOS, NATIONAL TOTALS ONLY)

NOTE: HOUSEHOLD AUTO FIGURES INCLUDE GASOLINE USED BY STATE AND LOCAL GOVERNMENT AUTOS, AS WELL AS THAT USED BY COMMERCIAL AUTOS NOT BELONGING TO FLEETS OF 4 OR MORE CARS. IT ALSO INCLUDES AN INSIGNIFICANT AMOUNT OF GASOLINE USED BY STATE AND LOCAL GOVERNMENT TRUCKS AND BY BUSES OTHER THAN COMMON CARRIERS (EXCEPT SCHOOL AND FEDERAL BUSES).

THE COMMERCIAL AUTO FIGURES, THEN, INCLUDE ONLY THOSE COMMERCIAL AUTOS BELONGING TO FLEETS OF 4 OR MORE.

TABLE 5.2A -- COMMERCIAL AUTO GASOLINE AND ENERGY USE, BY STATE, 1967-76
 EXCLUDING TAXICABS
 (FIRST IN A SERIES OF 5 TABLES)
 GASOLINE USE IN THOUSANDS OF BBL, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
UNITED STATES	191893 1007528	201681 1058924	220153 1155917	223683 1174444	225651 1184766	229352 1204212	236890 1243788	238332 1251369	237240 1245619	239933 1259773
NEW ENGLAND	10842 56926	11395 59830	12438 65309	12637 66356	12748 66941	12958 68039	13384 70274	13464 70704	13403 70377	13555 71177
CONNECTICUT	5123 26896	5384 28268	5877 30857	5971 31351	6024 31627	6123 32146	6324 33202	6362 33405	6333 33251	6405 33629
MAINE	340 1785	357 1876	390 2047	396 2080	399 2099	406 2133	419 2203	422 2217	420 2206	425 2231
MASSACHUSETTS	4487 23558	4716 24760	5148 27028	5230 27461	5276 27702	5363 28157	5539 29082	5573 29259	5547 29125	5610 29456
NEW HAMPSHIRE	287 1510	302 1587	330 1732	335 1760	338 1776	343 1805	355 1864	357 1876	355 1867	359 1888
RHODE ISLAND	507 2662	533 2798	581 3054	591 3103	596 3131	606 3182	626 3287	629 3307	627 3291	634 3329
VERMONT	98 515	103 541	112 591	114 601	115 606	117 616	121 636	121 640	121 637	122 644
MID-ATLANTIC	38717 203272	40692 213642	44420 233211	45132 236947	45529 239030	46275 242953	47797 250939	48087 252467	47868 251308	48411 254163
NEW JERSEY	10835 56886	11388 59788	12431 65265	12630 66310	12741 66893	12950 67991	13376 70226	13457 70654	13396 70329	13548 71128
NEW YORK	18826 98038	19786 103880	21599 113395	21945 115212	22138 116225	22501 118132	23241 122015	23382 122758	23275 122195	23539 123583
PENNSYLVANIA	9356 47548	9518 49974	10390 54551	10557 55425	10650 55912	10824 56830	11180 56698	11248 59055	11197 58784	11324 59452

SOURCE: METHOD 311

DATA QUALITY: 3

NOTE: FIGURES SHOWN ARE FUEL USE ESTIMATES FOR AUTOS IN FLEETS OF 4 OR MORE.
 FUEL USE BY OTHER COMMERCIAL AUTOS IS INSEPARABLE FROM HOUSEHOLD FUEL USE
 TABLE 5.5

TABLE 5.2B -- COMMERCIAL AUTO GASOLINE AND ENERGY USE, BY STATE, 1967-76
EXCLUDING TAXICABS
(SECOND IN A SERIES OF 5 TABLES)
GASOLINE USE IN THOUSANDS OF BBL, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
SOUTH ATLANTIC	27157 142596	28544 149871	31159 163597	31657 166219	31936 167680	32459 170433	33527 176033	33730 177106	33574 176293	33958 178297
DELAWARE	641 3367	674 3538	735 3863	747 3924	754 3959	766 4024	791 4156	796 4182	792 4162	801 4210
D.C.	4029 21155	4235 22234	4623 24271	4697 24660	4738 24877	4816 25285	4974 26116	5004 26275	4981 26154	5038 26452
FLORIDA	6065 31845	6375 33470	6959 36535	7070 37121	7132 37447	7249 38062	7488 39313	7533 39552	7499 39371	7584 39818
GEORGIA	3767 19778	3959 20787	4322 22691	4391 23054	4429 23257	4502 23639	4650 24415	4679 24564	4657 24451	4710 24729
MARYLAND	4592 24109	4826 25339	5268 27660	5353 28103	5400 28350	5488 28816	5669 29763	5703 29944	5677 29807	5742 30145
NORTH CAROLINA	3165 16616	3326 17464	3631 19063	3689 19369	3721 19539	3782 19860	3907 20512	3931 20637	3912 20543	3957 20776
SOUTH CAROLINA	1189 6246	1250 6565	1365 7166	1386 7281	1399 7345	1422 7465	1468 7711	1477 7758	1470 7722	1487 7810
VIRGINIA	2885 15149	3032 15922	3310 17380	3363 17659	3393 17814	3448 18106	3562 18701	3583 18815	3567 18729	3608 18942
WEST VIRGINIA	824 4331	867 4552	946 4968	961 5048	970 5092	986 5176	1018 5346	1024 5379	1019 5354	1031 5415

SOURCE: METHOD 311

DATA QUALITY: 3

TABLE 5.2C -- COMMERCIAL AUTO GASOLINE AND ENERGY USE, BY STATE, 1967-76
 EXCLUDING TAXICABS
 (THIRD IN A SERIES OF 5 TABLES)
 GASOLINE USE IN THOUSANDS OF BBL, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
EAST NORTH CENTRAL	45653 239682	47982 251909	52376 274983	53215 279390	53683 281846	54564 286471	56357 295886	56701 297689	56440 296322	57082 299688
ILLINOIS	11409 59898	11991 62954	13089 68720	13299 69821	13416 70435	13636 71591	14084 73944	14170 74394	14105 74053	14265 74894
INDIANA	2922 15340	3071 16123	3352 17600	3406 17882	3436 18039	3492 18335	3507 18937	3629 19053	3612 18965	3653 19181
MICHIGAN	19364 101662	20352 106848	22216 116635	22572 118504	22770 119546	23144 121507	23905 125501	24050 126266	23940 125686	24212 127114
OHIO	8793 46163	9241 48518	10088 52962	10249 53811	10339 54284	10509 55175	10854 56988	10921 57335	10870 57072	10994 57720
WISCONSIN	3165 16619	3327 17466	3631 19066	3689 19372	3722 19542	3783 19863	3907 20516	3931 20641	3913 20546	3958 20779
EAST SOUTH CENTRAL	4232 22224	4447 23357	4855 25497	4933 25906	4976 26133	5057 26562	5223 27436	5256 27603	5232 27477	5291 27788
ALABAMA	1096 5757	1152 6051	1258 6505	1278 6711	1289 6770	1310 6881	1353 7108	1362 7151	1355 7118	1371 7199
KENTUCKY	1020 5356	1072 5629	1170 6145	1189 6243	1199 6298	1219 6401	1259 6612	1267 6652	1261 6622	1275 6697
MISSISSIPPI	383 2011	402 2113	439 2307	446 2344	450 2364	457 2403	472 2432	475 2497	473 2486	478 2514
TENNESSEE	1733 9100	1821 9564	1988 10240	2020 10608	2038 10701	2071 10877	2139 11234	2152 11303	2143 11251	2167 11378

SOURCE: METHOD 311

DATA QUALITY: 3

TABLE 5.2D -- COMMERCIAL AUTO GASOLINE AND ENERGY USE, BY STATE, 1967-76
EXCLUDING TAXICABS
(FOURTH IN A SERIES OF 5 TABLES)
GASOLINE USE IN THOUSANDS OF BBL, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
WEST NORTH CENTRAL	13301 69844	13980 73409	15260 80133	15505 81417	15641 82132	15898 83482	16419 86224	16522 86750	16446 86351	16630 87333
IOWA	946 4970	995 5224	1086 5702	1103 5794	1113 5845	1131 5941	1168 6136	1175 6173	1170 6145	1183 6215
KANSAS	942 4945	990 5198	1080 5674	1098 5765	1107 5815	1125 5911	1162 6105	1170 6142	1164 6114	1177 6184
MINNESOTA	7183 37713	7549 39637	8241 43267	8373 43961	8447 44347	8585 45075	8867 46556	8922 46840	8881 46625	8981 47155
MISSOURI	3131 16441	3291 17280	3593 18863	3650 19165	3682 19334	3743 19651	3866 20297	3889 20421	3871 20327	3915 20558
NEBRASKA	688 3614	723 3799	789 4147	802 4213	809 4250	822 4320	849 4462	855 4489	851 4468	860 4519
NORTH DAKOTA	241 1265	253 1330	276 1452	281 1475	283 1488	288 1513	297 1562	299 1572	298 1565	301 1582
SOUTH DAKOTA	170 896	179 941	195 1028	198 1044	200 1053	204 1071	210 1106	212 1113	211 1107	213 1120
WEST SOUTH CENTRAL	13515 70961	14204 74580	15505 81411	15754 82716	15893 83443	16154 84813	16684 87601	16785 88134	16709 87730	16898 88726
ARKANSAS	678 3563	713 3744	778 4087	791 4153	798 4189	811 4258	837 4398	842 4425	839 4405	848 4455
LOUISIANA	1576 8275	1656 8697	1808 9494	1837 9646	1853 9731	1884 9891	1945 10216	1957 10278	1948 10231	1970 10347
OKLAHOMA	1910 10029	2007 10541	2191 11506	2226 11690	2246 11793	2283 11987	2358 12381	2372 12456	2361 12399	2388 12540
TEXAS	9351 49094	9828 51598	10728 56324	10900 57227	10996 57730	11176 58677	11544 60606	11614 60975	11561 60695	11692 61384

SOURCE: METHOD 311

DATA QUALITY: 3

TABLE 5.2E -- COMMERCIAL AUTO GASOLINE AND ENERGY USE, BY STATE, 1967-76
EXCLUDING TAXICABS
(LAST IN A SERIES OF 5 TABLES)
GASOLINE USE IN THOUSANDS OF BBL, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
MOUNTAIN	6153 32319	6466 33965	7058 37077	7172 37673	7236 38003	7354 38627	7596 39896	7642 40140	7607 39954	7693 40410
ARIZONA	1876 9850	1971 10352	2152 11300	2187 11481	2206 11582	2242 11772	2316 12159	2330 12233	2319 12177	2345 12316
COLORADO	1680 8820	1765 9270	1927 10120	1958 10282	1975 10372	2008 10542	2074 10889	2086 10955	2077 10905	2100 11029
IDAHO	366 1926	385 2024	420 2209	427 2245	431 2264	438 2302	452 2377	455 2392	453 2381	458 2408
MONTANA	222 1166	233 1225	254 1337	258 1359	261 1371	265 1393	274 1439	275 1448	274 1441	277 1457
NEVADA	364 1912	382 2010	418 2194	424 2229	428 2249	435 2286	449 2361	452 2375	450 2364	455 2391
NEW MEXICO	480 2525	505 2653	551 2896	560 2943	565 2969	574 3017	593 3117	597 3136	594 3121	601 3157
UTAH	972 5106	1022 5366	1115 5858	1133 5952	1143 6004	1162 6103	1200 6303	1208 6342	1202 6312	1216 6384
WYOMING	193 1014	203 1065	221 1163	225 1182	227 1192	230 1212	238 1251	239 1259	238 1253	241 1268
PACIFIC	32323 169704	33971 178361	37082 194699	37678 197820	38009 199558	38633 202832	39503 209499	40145 210776	39961 209807	40415 212191
ALASKA	237 1248	249 1312	272 1432	277 1455	279 1468	284 1492	293 1541	295 1551	294 1543	297 1561
CALIFORNIA	26757 140474	28121 147640	30597 161163	31189 153746	31463 165185	31980 167895	33031 173414	33232 174470	33079 173669	33455 175642
HAWAII	749 3933	787 4134	859 4513	873 4585	881 4625	895 4701	925 4856	930 4885	926 4863	936 4918
OREGON	2166 11374	2277 11954	2485 13049	2525 13259	2547 13375	2589 13595	2674 14041	2690 14127	2678 14062	2709 14222
WASHINGTON	2414 12675	2537 13321	2769 14542	2814 14775	2839 14905	2885 15149	2930 15647	2998 15743	2984 15670	3018 15848

SOURCE: METHOD 311

DATA QUALITY: 3

TABLE 5.3A -- TAXICAB GASOLINE AND ENERGY USE, BY STATE, 1967-76
(FIRST IN A SERIES OF 5 TABLES).

GASOLINE USE IN THOUSANDS OF BBL, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
UNITED STATES	9900 52088	11046 58095	13891 73032	14267 75021	14846 78043	15435 81132	16435 86403	15757 82831	16071 84460	19417 102040
NEW ENGLAND	964 5072	1075 5656	1351 7111	1390 7304	1444 7599	1503 7900	1601 8413	1533 8066	1564 8223	1890 9935
CONNECTICUT	402 2111	448 2355	563 2960	579 3041	602 3163	626 3288	667 3502	639 3357	652 3423	787 4136
MAINE	101 530	112 591	141 743	145 763	151 794	157 826	167 879	160 843	163 859	197 1038
MASSACHUSETTS	42 224	47 249	59 314	61 322	63 335	66 348	70 371	67 356	69 363	83 438
NEW HAMPSHIRE	356 1874	398 2090	500 2627	514 2698	534 2807	555 2918	592 3108	567 2979	578 3038	699 3670
RHODE ISLAND	22 118	25 131	31 165	32 170	33 177	35 184	37 196	35 188	36 191	44 231
VERMONT	41 215	45 240	57 302	59 310	61 323	64 336	68 357	65 343	66 349	80 422
MID-ATLANTIC	387 2038	432 2274	544 2859	557 2937	581 3054	604 3176	642 3382	616 3242	629 3306	760 3994
NEW JERSEY	95 502	106 560	134 705	137 724	143 753	149 783	158 834	152 799	155 815	187 985
NEW YORK	278 1461	310 1630	390 2049	400 2105	417 2189	433 2276	461 2424	442 2324	451 2369	545 2862
PENNSYLVANIA	14 75	16 84	20 105	20 108	21 112	22 117	23 124	22 119	23 122	28 147

SOURCE: METHOD 312

DATA QUALITY: 2

TABLE 5.3B -- TAXICAB GASOLINE AND ENERGY USE, BY STATE, 1967-76
(SECOND IN A SERIES OF 5 TABLES)

GASOLINE USE IN THOUSANDS OF BBL, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
SOUTH ATLANTIC	5341 28063	5958 31296	7488 39339	7695 40411	8004 42039	8321 43702	8862 46542	8495 44618	8662 45495	10466 54962
DELAWARE	245 1291	274 1439	344 1809	354 1859	368 1934	382 2010	407 2141	390 2052	398 2092	481 2528
D.C.	2824 14829	3150 16539	3959 20789	4067 21354	4231 22215	4398 23093	4584 24594	4491 23578	4579 24041	5532 29043
FLORIDA	572 3005	638 3351	802 4212	824 4327	857 4501	891 4679	949 4984	910 4778	927 4871	1121 5885
GEORGIA	343 801	382 2008	480 2525	494 2593	513 2698	534 2805	569 2987	545 2863	556 2920	671 3527
MARYLAND	177 931	197 1038	248 1305	255 1341	265 1395	276 1450	294 1544	282 1480	287 1510	347 1824
NORTH CAROLINA	105 556	118 620	148 779	152 801	158 833	165 866	175 922	168 884	171 901	207 1089
SOUTH CAROLINA	18 95	20 106	25 133	26 137	27 142	28 148	30 157	28 151	29 154	35 186
VIRGINIA	182 957	203 1067	255 1341	262 1378	273 1433	283 1490	302 1587	289 1521	295 1551	357 1874
WEST VIRGINIA	875 4598	976 5128	1227 5446	1261 6621	1312 6888	1364 7161	1452 7626	1392 7311	1420 7455	1715 9006

SOURCE: METHOD 312

DATA QUALITY: 2 (NATIONAL), 3 (STATES)

TABLE 5.3C -- TAXICAB GASOLINE AND ENERGY USE, BY STATE, 1967-76
(THIRD IN A SERIES OF 5 TABLES)

GASOLINE USE IN THOUSANDS OF BBL, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
EAST NORTH CENTRAL	515 2717	576 3032	725 3812	743 3915	775 4074	805 4234	857 4509	821 4323	838 4408	1012 5326
ILLINOIS	194 1018	216 1136	272 1428	279 1467	290 1526	302 1586	321 1689	308 1619	314 1651	380 1995
INDIANA	124 655	139 731	175 919	179 944	187 982	194 1021	207 1087	198 1042	202 1063	244 1284
MICHIGAN	90 476	101 531	127 668	130 686	136 714	141 742	150 791	144 758	147 773	177 934
OHIO	101 532	113 594	142 747	146 767	152 798	158 829	168 883	161 847	164 863	198 1043
WISCONSIN	6 36	7 40	9 50	9 51	10 54	10 56	11 59	10 57	11 58	13 70
EAST SOUTH CENTRAL	483 2548	539 2842	680 3572	697 3670	725 3817	755 3969	802 4226	771 4051	785 4132	949 4992
ALABAMA	53 280	59 313	75 393	77 404	80 420	83 437	88 465	85 446	86 455	104 550
KENTUCKY	18 98	20 109	26 137	26 141	27 146	29 152	30 162	29 155	30 158	36 191
MISSISSIPPI	374 1968	418 2195	525 2759	539 2834	561 2948	583 3065	621 3264	596 3129	607 3191	734 3855
TENNESSEE	38 202	42 225	54 283	55 291	57 303	60 315	63 335	61 321	62 328	75 396

SOURCE: METHOD 312

DATA QUALITY: 2 (NATIONAL), 3 (STATES)

TABLE 5.3C -- TAXICAB GASOLINE AND ENERGY USE, BY STATE, 1967-76
(FOURTH IN A SERIES OF 5 TABLES)

GASOLINE USE IN THOUSANDS OF BBL, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
WEST NORTH CENTRAL	552 2909	616 3247	775 4080	796 4192	827 4360	861 4533	917 4828	878 4629	898 4719	1083 5702
IOWA	93 492	104 549	131 690	135 708	140 737	146 766	155 816	149 782	152 798	183 964
KANSAS	153 304	170 897	214 1127	220 1158	229 1204	238 1252	254 1333	243 1278	248 1303	300 1575
MINNESOTA	19 101	21 113	27 142	27 146	29 152	30 158	32 158	30 161	31 164	37 199
MISSOURI	77 405	86 452	108 568	111 584	115 607	120 631	128 672	122 645	125 657	151 794
NEBRASKA	87 457	97 510	122 641	125 659	130 685	135 713	144 759	138 728	141 742	170 896
NORTH DAKOTA	74 391	83 437	104 549	107 564	111 587	116 610	123 650	118 623	121 635	146 767
SOUTH DAKOTA	49 259	55 289	69 363	71 373	73 388	76 403	81 430	78 412	80 420	96 507
WEST SOUTH CENTRAL	564 2969	629 3311	791 4163	813 4276	845 4448	879 4624	936 4926	897 4721	916 4814	1107 5816
ARKANSAS	329 1729	367 1928	451 2424	474 2490	493 2590	512 2693	546 2868	523 2749	534 2803	645 3387
LOUISIANA	35 185	39 207	49 250	50 267	52 278	55 289	58 308	56 295	57 301	69 363
OKLAHOMA	154 864	183 963	230 1211	237 1244	246 1294	256 1345	272 1433	261 1373	266 1400	322 1692
TEXAS	36 191	40 213	51 268	52 275	54 286	56 297	60 317	57 304	59 310	71 374

SOURCE: METHOD 312

DATA QUALITY: 2

TABLE 5.3E -- TAXICAB GASOLINE AND ENERGY USE, BY STATE, 1967-76
(LAST IN A SERIES OF 5 TABLES)

GASOLINE USE IN THOUSANDS OF BBL, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
MOUNTAIN	654 3454	731 3852	920 4845	942 4976	984 5177	1021 5381	1088 5730	1044 5493	1064 5602	1286 6768
ARIZONA	4 25	5 27	6 35	6 36	7 37	7 38	7 41	7 39	7 40	9 49
COLORADO	71 377	80 420	100 528	103 543	107 565	111 587	119 625	114 599	116 611	140 738
IDAHO	91 480	102 536	128 674	131 692	137 720	142 748	151 797	145 764	148 779	179 941
MONTANA	178 936	198 1044	250 1313	256 1348	267 1403	277 1458	295 1553	283 1489	289 1518	349 1834
NEVADA	207 1090	231 1215	291 1528	298 1569	311 1633	323 1697	344 1807	330 1733	336 1767	406 2134
NEW MEXICO	83 440	93 491	117 617	120 634	125 659	130 686	139 730	133 700	136 714	164 862
UTAH	11 57	12 64	15 81	15 83	16 86	17 90	18 95	17 91	17 93	21 113
WYOMING	9 49	10 55	13 69	13 71	14 74	14 77	15 82	15 78	15 80	18 97
PACIFIC	440 2318	490 2585	617 3251	634 3340	661 3475	686 3613	730 3847	702 3698	715 3761	864 4545
ALASKA	33 178	37 198	47 250	48 256	50 267	52 277	56 295	54 283	55 289	66 349
CALIFORNIA	11 59	12 66	15 83	16 86	17 89	17 93	18 99	18 95	18 96	22 117
HAWAII	252 1324	281 1477	353 1857	363 1907	378 1984	393 2063	418 2197	401 2106	409 2148	494 2595
OREGON	122 641	136 715	171 899	176 924	183 961	190 999	202 1064	194 1020	198 1040	239 1257
WASHINGTON	22 116	24 129	31 162	31 167	33 174	34 181	36 192	35 184	35 188	43 227

TABLE 5.4A -- FEDERAL CIVILIAN AUTO GASOLINE AND ENERGY USE, BY STATE, 1967-76
(FIRST IN A SERIES OF 5 TABLES)

GASOLINE USE IN THOUSANDS OF BBL, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
UNITED STATES	1204 6324	1266 6651	1266 6647	1379 7241	1260 6618	1266 6646	1471 7726	1582 8310	1636 8589	1691 8879
NEW ENGLAND	51 268	54 285	58 307	62 328	57 300	58 305	71 376	73 386	66 349	71 375
CONNECTICUT	11 62	12 65	14 74	14 78	14 74	14 75	17 94	18 97	14 76	14 75
MAINE	4 26	5 29	6 31	6 31	5 29	5 28	6 32	7 38	6 31	6 34
MASSACHUSETTS	24 130	26 137	27 146	30 159	27 141	27 146	34 79	33 174	31 167	35 185
NEW HAMPSHIRE	1 9	1 10	1 9	1 10	2 10	1 10	2 11	2 11	2 11	2 10
RHODE ISLAND	4 21	4 22	4 22	4 22	4 23	4 22	5 29	6 32	5 30	6 31
VERMONT	3 18	3 19	4 22	5 27	4 21	4 22	5 27	6 32	6 32	7 37
MID-ATLANTIC	126 666	135 710	139 731	163 859	154 809	166 873	208 1093	215 1130	223 1173	236 1242
NEW JERSEY	20 110	22 116	22 119	25 133	23 122	25 133	31 164	32 170	35 186	39 205
NEW YORK	63 332	68 357	71 374	83 440	80 422	86 452	105 555	113 593	114 600	125 657
PENNSYLVANIA	42 223	44 235	45 238	54 285	50 263	54 287	71 373	69 366	73 386	72 379

SOURCE: METHOD 313 DATA QUALITY: 1 (NATIONAL), 2 (STATES)

TABLE 5.4B -- FEDERAL CIVILIAN AUTO GASOLINE AND ENERGY USE, BY STATE, 1967-76
(SECOND IN A SERIES OF 5 TABLES)

GASOLINE USE IN THOUSANDS OF BBL, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
SOUTH ATLANTIC	197 1036	209 1100	207 1087	223 1174	205 1078	205 1080	236 1242	256 1346	284 1492	283 1487
DELAWARE	1 6	1 8	1 7	1 8	1 9	1 8	1 9	1 9	1 10	1 8
D.C.	34 183	36 193	37 198	42 222	37 194	39 207	43 229	48 256	51 270	53 279
FLORIDA	54 286	57 302	56 294	56 298	51 267	49 258	56 297	57 302	66 348	64 337
GEORGIA	24 130	25 132	25 135	30 159	27 146	26 137	31 163	35 187	40 212	41 216
MARYLAND	19 104	21 113	20 107	22 116	19 104	19 104	22 119	23 125	25 135	26 137
NORTH CAROLINA	17 90	18 95	18 96	18 99	16 87	16 86	19 103	24 126	26 141	28 147
SOUTH CAROLINA	14 78	16 87	15 82	16 87	15 81	15 82	18 95	19 102	21 114	21 110
VIRGINIA	19 104	21 111	21 110	23 124	20 109	21 112	25 134	27 143	29 154	27 141
WEST VIRGINIA	9 50	10 56	10 54	11 58	14 77	15 81	17 89	17 94	19 104	20 106

SOURCE: METHOD 313 DATA QUALITY: 1 (NATIONAL), 2 (STATES)

TABLE 5.4C -- FEDERAL CIVILIAN AUTO GASOLINE AND ENERGY USE, BY STATE, 1967-76
(THIRD IN A SERIES OF 5 TABLES)

GASOLINE USE IN THOUSANDS OF BBL, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
EAST NORTH CENTRAL	145 764	147 775	150 790	166 872	161 848	162 851	183 963	206 1085	183 962	188 989
ILLINOIS	42 220	43 228	45 236	51 272	49 257	52 274	56 294	62 328	54 286	54 288
INDIANA	14 76	14 78	14 74	15 81	15 82	16 87	18 96	20 107	21 112	22 117
MICHIGAN	30 157	30 158	31 167	32 171	32 171	31 163	38 203	42 220	39 209	40 210
OHIO	37 195	38 200	38 199	42 220	39 208	39 206	43 228	53 279	48 253	50 266
WISCONSIN	21 114	21 110	21 111	24 126	24 128	22 119	26 140	28 148	19 100	20 106
EAST SOUTH CENTRAL	90 474	94 495	89 471	95 500	90 477	89 472	100 528	108 569	116 611	117 617
ALABAMA	19 101	20 107	19 101	21 112	18 96	19 99	21 113	22 117	25 131	26 137
KENTUCKY	18 96	17 92	16 84	17 91	19 102	18 98	20 106	23 125	25 133	24 131
MISSISSIPPI	13 69	14 74	14 75	15 82	14 73	14 73	16 35	18 94	18 95	17 92
TENNESSEE	39 207	42 220	39 209	41 215	38 204	38 200	42 222	44 231	47 250	48 255

SOURCE: METHOD 313 DATA QUALITY: (NATIONAL), 2 (STATES)

TABLE 5.4D — FEDERAL CIVILIAN AUTO GASOLINE AND ENERGY USE, BY STATE, 1967-76
(FOURTH IN A SERIES OF 5 TABLES)

GASOLINE USE IN THOUSANDS OF BBL, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
WEST NORTH CENTRAL	111 582	116 610	112 592	123 647	108 569	110 582	119 628	130 684	128 675	130 684
IOWA	7 39	8 42	7 41	8 46	7 40	7 38	8 45	10 53	11 60	11 62
KANSAS	7 41	8 43	7 38	8 42	6 35	6 34	7 38	8 44	8 42	8 45
MINNESOTA	26 139	27 145	27 142	29 152	26 139	24 129	28 149	31 164	23 125	24 127
MISSOURI	38 202	35 188	38 200	41 218	35 188	37 198	40 212	45 239	46 245	48 255
NEBRASKA	14 77	13 73	14 74	15 81	13 72	10 57	12 64	13 73	15 81	15 79
NORTH DAKOTA	9 49	15 79	11 61	13 72	12 64	12 64	13 73	15 79	17 89	16 85
SOUTH DAKOTA	6 33	6 35	6 32	6 33	5 27	11 59	8 45	5 29	5 30	5 28
WEST SOUTH CENTRAL	126 662	129 679	127 668	137 719	122 642	122 643	142 749	158 832	155 817	163 860
ARKANSAS	9 51	10 54	9 51	11 58	9 50	8 46	10 54	12 64	12 66	13 68
LOUISIANA	22 116	23 122	22 117	26 138	22 116	21 111	25 133	28 149	27 144	27 143
OKLAHOMA	23 121	24 127	24 129	24 127	22 115	22 115	24 130	25 136	26 137	28 147
TEXAS	71 372	71 374	70 371	75 394	68 359	70 369	82 431	91 481	89 469	95 501

SOURCE: METHOD 313 DATA QUALITY: 1 (NATIONAL), 2 (STATES)

TABLE 5.4E -- FEDERAL CIVILIAN AUTO GASOLINE AND ENERGY USE, BY STATE, 1967-76
(LAST IN A SERIES OF 5 TABLES)

GASOLINE USE IN THOUSANDS OF BBL, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
MOUNTAIN	166 875	174 916	167 880	182 956	155 817	145 763	167 878	176 927	190 1000	195 1026
ARIZONA	21 114	23 122	22 117	24 127	22 117	21 112	24 128	27 142	28 147	31 163
COLORADO	30 159	28 148	27 144	34 181	27 146	27 144	31 167	32 170	35 186	34 181
IDAHO	12 66	13 70	12 67	12 67	12 63	10 54	11 60	11 62	13 70	13 70
MONTANA	23 124	25 131	25 131	22 116	19 103	17 91	19 100	20 110	22 115	22 116
NEVADA	24 130	26 139	25 134	26 138	22 116	20 107	21 112	20 110	23 122	23 120
NEW MEXICO	31 163	33 177	31 166	36 192	29 153	28 149	31 166	31 164	32 168	32 172
UTAH	15 82	16 89	15 82	17 92	15 81	15 78	17 89	17 92	19 99	18 98
WYOMING	6 34	7 38	6 36	7 39	6 34	5 31	10 53	14 76	16 87	19 102
PACIFIC	189 993	205 1077	212 1117	224 1180	204 1074	203 1069	241 1265	256 1346	287 1506	304 1596
ALASKA	7 38	7 41	7 41	8 47	7 39	8 42	8 44	8 47	9 49	10 54
CALIFORNIA	113 595	122 644	128 676	136 718	128 673	127 668	153 807	160 844	188 988	202 1065
HAWAII	6 33	7 37	6 35	8 43	7 36	6 36	7 39	8 45	9 52	9 49
OREGON	15 83	24 128	17 93	17 91	21 113	20 109	24 126	29 154	27 146	28 150
WASHINGTON	46 242	43 226	51 270	53 280	40 210	40 211	47 247	48 255	51 269	52 276

TABLE 5.5A -- HOUSEHOLD AUTO GASOLINE AND ENERGY USE, BY STATE, 1967-76
(INCLUDES STATE AND LOCAL GOVERNMENT AUTO GASOLINE USE)
(FIRST IN A SERIES OF FIVE TABLES)
GASOLINE USE IN THOUSANDS OF BBL, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
UNITED STATES	1139008 5979792	1219238 6400999	1289898 6771964	1364094 7161493	1451323 7619445	1579389 8291792	1656322 8695690	1581935 8305158	1645576 8639274	1756425 9221231
NEW ENGLAND	66543 349361	71188 373745	73562 386218	79266 416165	83391 437809	89095 467761	91587 480843	88272 463441	90685 476105	94211 494624
CONNECTICUT	15593 81864	16774 88067	17457 91650	18662 97980	19801 103958	21076 110649	21650 113667	21084 110694	21798 114441	22664 118990
MAINE	6715 35256	7067 37103	7192 37762	7636 40093	8121 42638	8643 45380	8894 46694	8668 45511	8939 46930	9403 49370
MASSACHUSETTS	31875 167346	34051 178768	35266 185150	38040 199714	39662 208226	42530 223284	44117 231615	42024 220626	42902 225235	44781 235102
NEW HAMPSHIRE	4466 23448	5000 26250	5322 27943	5900 30978	6426 33737	6911 36284	7174 37666	6991 36704	7276 38199	7771 40799
RHODE ISLAND	4970 26095	5252 27573	5269 27664	5706 29959	5836 30639	6128 32174	6005 31527	5955 31266	6207 32591	5904 31000
VERMONT	2924 15352	3044 15984	3056 16049	3322 17441	3545 18611	3807 19590	3747 19674	3550 18640	3563 18709	3688 19363
MID-ATLANTIC	179938 944682	188888 991670	196177 1029934	202790 1064660	217709 1142982	234840 1232913	237159 1245093	216522 1136747	219993 1154968	240886 1264662
NEW JERSEY	37040 194462	39477 207259	40269 211414	43691 229382	45915 241056	51748 271678	52846 277444	51646 271145	54419 285701	56569 296989
NEW YORK	78954 414512	81435 427537	87798 460940	88957 467028	95965 503821	99235 520985	102675 539046	90534 475307	91015 477832	100981 530154
PENNSYLVANIA	63944 335708	67976 356874	68110 357580	70142 368250	75829 398105	83857 440250	81638 428603	74342 390295	74559 391435	83336 437519

SOURCE: METHOD 314

DATA QUALITY: 3

NOTE: FIGURES INCLUDE A RELATIVELY INSIGNIFICANT AMOUNT OF FUEL USED BY STATE AND LOCAL GOVERNMENT TRUCKS AND BY BUSES THAT ARE NOT COMMON CARRIERS (OTHER THAN SCHOOL AND FEDERAL BUSES). SEE ALSO NOTE UNDER TABLE 5.2A.

TABLE 5.5B -- HOUSEHOLD AUTO GASOLINE AND ENERGY USE, BY STATE, 1967-76
 (INCLUDES STATE AND LOCAL GOVERNMENT AUTO GASOLINE USE)
 (SECOND IN A SERIES OF FIVE TABLES)
 GASOLINE USE IN THOUSANDS OF BEL, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1957	1968	1969	1970	1971	1972	1973	1974	1975	1976
SOUTH ATLANTIC	173355 910129	188376 988983	204751 1074963	220392 1157069	237897 1248966	262532 1378308	281513 1477961	272833 1432385	281986 1480443	297519 1561996
DELAWARE	3732 19597	3952 20748	4198 22041	4446 23342	4744 24906	4948 25978	5325 27958	5037 26445	5202 27310	5529 29028
D.C.	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
FLORIDA	39688 208362	43866 230301	48092 252485	52746 276919	57420 301457	66012 346563	74296 390055	71269 374165	73794 387422	76309 400627
GEORGIA	27384 143770	30333 159250	33016 173335	35263 185131	38576 202525	42262 221877	44875 235596	42927 225367	43354 227612	45512 238939
MARYLAND	19950 104738	21462 112676	22929 120380	24911 130785	26642 139870	28940 151935	29809 156498	28586 150080	29943 157203	31642 166123
NORTH CAROLINA	30977 162631	32746 171917	35510 186432	37731 198092	39811 209009	44093 231492	45931 241142	45606 239434	46520 244232	49411 259412
SOUTH CAROLINA	16243 85278	17736 93117	19118 100373	20587 108081	22381 117500	24595 129126	25904 136000	25395 133325	26548 139380	28469 149465
VIRGINIA	26282 137982	28624 150277	32018 168095	34091 178979	37128 194923	40167 210881	42779 224591	41493 217839	43076 226151	46006 241534
WEST VIRGINIA	9899 47771	9657 50702	9870 51822	10617 55740	11195 58776	11515 60456	12594 66121	12520 65730	13549 71133	14641 76868

SOURCE: METHOD 314

DATA QUALITY: 3

NOTE: SEE METHOD 314 FOR A DISCUSSION OF SPECIAL PROBLEMS ENCOUNTERED
 IN ESTIMATING DISTRICT OF COLUMBIA FUEL USE.

TABLE 5.5C -- HOUSEHOLD AUTO GASOLINE AND ENERGY USE, BY STATE, 1967-76
 (INCLUDES STATE AND LOCAL GOVERNMENT AUTO GASOLINE USE)
 (THIRD IN A SERIES OF FIVE TABLES)
 GASOLINE USE IN THOUSANDS OF BBL, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
EAST NORTH CENTRAL	237200 1245311	252044 1323241	263551 1383655	273859 1437773	283061 1486088	305899 1605979	319393 1676824	303046 1591000	312051 1638273	328183 1722971
ILLINOIS	62800 329703	66159 347336	68369 358938	70753 371456	71789 376896	79374 416715	82081 430926	77419 406449	81772 429305	85466 446699
INDIANA	34938 183427	37151 195042	38231 200716	40204 211074	41927 220121	44537 233821	46549 244386	43782 229859	44547 233872	46835 245887
MICHIGAN	48004 252025	52235 274238	54684 287093	55282 290231	58143 305253	63308 332367	66375 348469	62116 326113	63387 332785	68393 359063
OHIO	65430 343507	68868 361559	72503 380643	76138 399729	77992 409462	82879 435118	87175 457671	83452 438124	85028 446397	88178 462937
WISCONSIN	26028 136649	27631 145066	29764 156265	31482 165283	33210 174356	35801 187958	37213 195372	36277 190455	37317 195914	39311 206385
EAST SOUTH CENTRAL	79079 415177	83486 438312	88968 467093	94007 493549	101621 533516	110647 580906	117777 618341	115709 607484	120279 631476	127704 670456
ALABAMA	21074 110641	22235 116734	23349 122585	25163 132108	27142 142498	29082 152685	30913 162298	30892 162187	32041 168217	34227 179694
KENTUCKY	20254 106335	21513 112947	22639 118855	24010 126057	25930 136136	27382 143756	28565 149970	28151 147793	29343 154055	31036 162941
MISSISSIPPI	12735 66863	13675 71798	14874 78092	15766 82774	16822 88316	18843 98926	19264 101139	19126 100415	18945 99465	19992 104961
TENNESSEE	25016 131338	26063 136833	28106 147561	29068 152610	31727 166566	35340 185539	39035 204934	37540 197089	39950 209739	42449 222860

SOURCE: METHOD 314

DATA QUALITY: 3

TABLE 5.5J -- HOUSEHOLD AUTO GASOLINE AND ENERGY USE, BY STATE, 1967-76
 (INCLUDES STATE AND LOCAL GOVERNMENT AUTO GASOLINE USE)
 (FOURTH IN A SERIES OF FIVE TABLES)
 GASOLINE USE IN THOUSANDS OF BBL, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
WEST NORTH CENTRAL	95675 523312	105740 555153	110459 579923	115428 606006	124259 652375	133136 698977	137817 723552	130641 685876	135025 708895	144927 760881
IOWA	19177 106680	19781 103854	20547 107873	20307 106612	22985 120672	23934 125657	26843 140927	24404 128122	24878 130612	27064 142089
KANSAS	14548 76381	15655 82190	16323 85697	16380 85999	16668 87509	18576 97525	18414 96677	18368 96436	19648 103153	21727 114067
MINNESOTA	18660 97969	19878 104364	21178 111187	22788 119641	24808 130243	26084 136943	27571 144750	25797 135438	26254 137835	27552 144648
MISSOURI	31550 166165	33686 176855	35317 185417	37348 196077	39756 208722	41782 219358	40997 215235	39888 209412	40684 213593	43032 225923
NEBRASKA	8706 45708	9410 49404	9346 51693	10509 55172	11122 56391	12555 65917	13587 71333	12205 64076	12655 66441	13671 71775
NORTH DAKOTA	2735 14360	2955 15516	3010 15804	3357 17624	3691 19382	4209 22098	4646 24332	4424 23228	5042 26474	5577 29282
SOUTH DAKOTA	4199 22049	4375 22970	4238 22252	4739 24881	5229 27456	5996 31479	5755 30236	5555 29164	5864 30787	6304 33097
WEST SOUTH CENTRAL	113346 595074	123925 550610	132996 698234	142831 749871	153713 806999	170042 892725	183040 960970	179830 944112	193505 1015913	210015 1102587
ARKANSAS	9874 51840	11091 58227	12139 63733	13053 68533	14631 76813	16666 87496	17970 94344	18223 95671	19274 101193	21009 110300
LOUISIANA	18587 99683	20512 107689	21455 112639	22692 119135	23733 124601	26616 139737	28464 149440	28399 149098	30564 160462	33624 176527
OKLAHOMA	15656 79047	16118 84623	17227 90442	18791 98654	19988 104937	21769 114288	23000 120753	22577 118530	24311 127637	26249 137812
TEXAS	69429 364504	76204 400071	82175 431420	88295 463549	95361 500648	104991 551204	113606 596433	110631 580813	119356 626621	129133 677948

SOURCE: METHOD 314

DATA QUALITY: 3

TABLE 5.5E -- HOUSEHOLD AUTO GASOLINE AND ENERGY USE, BY STATE, 1967-76
(INCLUDES STATE AND LOCAL GOVERNMENT AUTO GASOLINE USE)
(LAST IN A SERIES OF FIVE TABLES)
GASOLINE USE IN THOUSANDS OF BBL, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
MOUNTAIN	45828 240611	50361 264409	55736 292626	61446 322604	66712 350253	74977 393642	80763 424015	77024 404393	82290 432042	88248 463314
ARIZONA	8160 42840	9263 48631	11124 58401	12230 64208	13443 70578	15594 81869	17379 91244	15858 83256	16830 88360	17811 93508
COLORADO	11613 60971	12944 67956	13916 73059	15612 81965	16997 89237	19021 99863	19992 104959	18930 99386	20158 105833	20839 109406
IDAHO	4169 21889	4402 23114	4958 26031	5745 30163	5990 31448	6871 36073	6981 36651	6995 36726	7604 39921	8740 45885
MONTANA	3863 20283	4241 22265	4602 24163	4778 25087	5182 27207	5581 29302	6430 33758	6198 32542	6039 31709	6985 36674
NEVADA	3581 18801	3987 20936	4164 21862	4832 25368	5182 27208	5885 30901	6346 33317	6194 32519	6889 36172	7226 37940
NEW MEXICO	6361 33395	6698 35164	7312 38389	7779 40840	8797 46185	9601 50405	10488 55062	10122 53145	11010 57804	11921 62585
UTAH	5481 28778	6029 31656	6616 34736	7229 37956	7783 40864	8646 45393	8955 47014	8690 45623	9106 47807	9594 50369
WYOMING	2600 13654	2797 14687	3044 15985	3241 17017	3338 17526	3778 19836	4192 22010	4037 21196	4654 24436	5132 26947
PACIFIC	145531 764046	156658 822461	165499 868879	175865 923299	184606 969191	199742 1048653	208479 1094530	199454 1047147	210967 1107587	226416 1188693
ALASKA	852 4473	674 3539	864 4538	986 5180	1214 6375	993 5214	1109 5822	1387 7286	1974 10367	2463 12934
CALIFORNIA	108019 567103	116875 613595	123398 647843	130957 687526	137189 720243	149930 787135	155845 818190	148490 779574	156863 823534	167690 880372
HAWAII	2912 15292	3140 16485	3344 17556	3806 19982	4044 21235	4342 22795	4685 24600	4537 23820	4799 25198	5057 26551
OREGON	13919 73074	14546 76370	15361 80647	16655 87440	18000 94501	19481 102278	20470 107471	19383 101763	20235 106234	22099 116021
WASHINGTON	19829 104104	21423 112472	22532 118295	23461 123171	24159 126837	24996 131231	26370 138447	25657 134704	27096 142254	29107 152815

TABLE 5.6A -- INTERCITY HOUSEHOLD AUTO GASOLINE & ENERGY USE, BY STATE, 1972-76
(FIRST IN A SERIES OF FIVE TABLES)

GASOLINE USE IN THOUSANDS OF BBL, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1972	1973	1974	1975	1976
UNITED STATES	188076 987996	177762 933882	171515 901035	167924 882228	167522 880161
NEW ENGLAND	8099 42592	7464 39260	7094 37307	6939 36503	6942 36535
CONNECTICUT	2450 12874	2228 11712	2086 10959	1395 10481	1962 10318
MAINE	809 4255	711 3738	649 3418	510 3221	590 3115
MASSACHUSETTS	3791 19912	3646 19154	3572 18768	3598 18906	3678 19326
NEW HAMPSHIRE	392 2078	321 1706	291 1535	277 1466	275 1458
RHODE ISLAND	561 2958	487 2568	438 2309	406 2142	386 2038
VERMONT	96 515	71 382	58 318	53 287	51 280
MID-ATLANTIC	20997 110270	19602 102948	18666 98034	18141 95273	17983 94451
NEW JERSEY	4270 22434	4092 21500	3985 20933	3941 20702	3948 20738
NEW YORK	9187 48241	8652 45433	8294 43554	8088 42475	8037 42208
PENNSYLVANIA	7540 39595	6858 36015	6387 33547	6112 32096	5998 31505

SOURCE: METHOD 314

DATA QUALITY: 2

NOTE: INTERCITY TRAVEL CONSISTS OF TRIPS THAT REACH A POINT AT LEAST 100 MILES FROM THE ORIGIN OF THE TRIP AND THAT RETURN TO THE ORIGIN.

DATA FOR YEARS BETWEEN 1972 AND 1976 IS BASED ON INTERPOLATION.

TABLE 5.6B -- INTERCITY HOUSEHOLD AUTO GASOLINE & ENERGY USE, BY STATE, 1972-76
(SECOND IN A SERIES OF FIVE TABLES)

GASOLINE USE IN THOUSANDS OF BBL, FOLLOVED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1972	1973	1974	1975	1976
SOUTH ATLANTIC	27393 143943	26400 138698	26045 136837	25759 135355	26195 137616
DELAWARE	422 2226	380 2009	352 1863	336 1777	329 1733
D.C.	344 1824	380 2002	436 2298	520 2745	657 3466
FLORIDA	7429 39019	7154 37571	6978 36648	6901 36246	6914 36308
GEORGIA	3790 19915	3645 19151	3547 18634	3501 18394	3493 18346
MARYLAND	3650 19177	3435 18044	3429 18009	3124 16413	3163 16620
NORTH CAROLINA	3310 17384	3497 18372	3752 19705	4059 21324	4443 23340
SOUTH CAROLINA	3610 18971	3200 16803	2866 15061	2597 13644	2363 12414
VIRGINIA	3764 19777	3748 19688	3794 19930	3881 20393	4028 21155
WEST VIRGINIA	1074 5650	961 5059	891 4689	840 4419	805 4234

SOURCE: METHOD 314

DATA QUALITY: 2

NOTE: INTERCITY TRAVEL CONSISTS OF TRIPS THAT REACH A POINT AT LEAST
100 MILES FROM THE ORIGIN OF THE TRIP AND THAT RETURN TO THE
ORIGIN.

DATA FOR YEARS BETWEEN 1972 AND 1976 IS BASED ON INTERPOLATION.

TABLE 5.6C -- INTERCITY HOUSEHOLD AUTO GASOLINE & ENERGY USE, BY STATE, 1972-76
(THIRD IN A SERIES OF FIVE TABLES)

GASOLINE USE IN THOUSANDS OF BBL, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1972	1973	1974	1975	1976
EAST NORTH CENTRAL	41473 217790	38943 204520	37148 195097	35972 188924	35350 185657
ILLINOIS	11503 60403	10740 56401	10216 53647	9902 52001	9738 51141
INDIANA	5535 29069	5139 26997	4874 25604	4698 24681	4605 24188
MICHIGAN	9383 49273	8660 45484	8129 42689	7774 40820	7554 39676
OHIO	10398 54602	9844 51689	9386 49288	8997 47250	8716 45770
WISCONSIN	4654 24443	4560 23949	4543 23869	4601 24172	4737 24882
EAST SOUTH CENTRAL	9117 47903	9028 47455	9051 47562	9149 48085	9356 49170
ALABAMA	2933 15409	2822 14828	2732 14358	2644 13895	2586 13592
KENTUCKY	2203 11577	2079 10931	1992 10468	1927 10130	1887 9916
MISSISSIPPI	1251 6574	1231 6479	1235 6495	1252 6587	1284 6753
TENNESSEE	2730 14343	2896 15217	3092 16241	3326 17473	3599 18909

SOURCE: METHOD 314

DATA QUALITY: 2

NOTE: INTERCITY TRAVEL CONSISTS OF TRIPS THAT REACH A POINT AT LEAST 100 MILES FROM THE ORIGIN OF THE TRIP AND THAT RETURN TO THE ORIGIN.

DATA FOR YEARS BETWEEN 1972 AND 1976 IS BASED ON INTERPOLATION.

TABLE 5.6D -- INTERCITY HOUSEHOLD AUTO GASOLINE & ENERGY USE, BY STATE, 1972-76
(FOURTH IN A SERIES OF FIVE TABLES)

GASOLINE USE IN THOUSANDS OF BBL, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1972	1973	1974	1975	1976
WEST NORTH CENTRAL	18934 99482	18280 96071	18133 95275	18377 96569	18993 99811
IOWA	2124 11160	2397 12596	2730 14347	3143 16509	3655 19204
KANSAS	3155 16573	2966 15586	2907 15270	2927 15382	3005 15789
MINNESOTA	5906 31017	5541 29108	5273 27692	5092 26740	4993 26223
MISSOURI	4575 24026	4416 23194	4376 22987	4420 23215	4534 23820
NEBRASKA	2173 11423	2021 10620	1890 9932	1776 9337	1677 8815
NORTH DAKOTA	390 2060	355 1885	356 1881	375 1987	414 2193
SOUTH DAKOTA	611 3223	584 3082	601 3166	644 3399	715 3767
WEST SOUTH CENTRAL	22182 116510	21291 111827	20702 108738	20341 106833	20230 106268
ARKANSAS	1804 9484	1767 9292	1762 9260	1777 9337	1812 9529
LOUISIANA	2924 15368	2719 14288	2543 13362	2397 12601	2277 11976
OKLAHOMA	2683 14097	2788 14650	2937 15437	3131 16443	3377 17741
TEXAS	14771 77561	14017 73597	13460 70679	13036 68452	12764 67022

SOURCE: METHOD 314

DATA QUALITY: 2

NOTE: INTERCITY TRAVEL CONSISTS OF TRIPS THAT REACH A POINT AT LEAST
100 MILES FROM THE ORIGIN OF THE TRIP AND THAT RETURN TO THE
ORIGIN.

DATA FOR YEARS BETWEEN 1972 AND 1976 IS BASED ON INTERPOLATION.

TABLE 5.6E -- INTERCITY HOUSEHOLD AUTO GASOLINE & ENERGY USE, BY STATE, 1972-76
(FIFTH IN A SERIES OF FIVE TABLES)

GASOLINE USE IN THOUSANDS OF BBL, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1972	1973	1974	1975	1976
MOUNTAIN	11151 58627	10157 53420	9610 50540	9349 49174	9430 49620
ARIZONA	2178 11448	2156 11331	2140 11238	2134 11221	2135 11220
COLORADO	2710 14234	2649 13926	2618 13758	2594 13625	2589 13611
IDAHO	830 4369	693 3651	599 3157	531 2799	503 2652
MONTANA	1266 6653	1020 5372	914 4810	887 4669	921 4853
NEVADA	366 1930	357 1880	354 1869	359 1897	391 2068
NEW MEXICO	1023 5376	1028 5407	1099 5785	1215 6390	1378 7243
UTAH	2377 12495	1875 9851	1503 7904	1225 6445	1055 5556
WYOMING	401 2122	379 2002	383 2019	404 2128	458 2417
PACIFIC	28730 150879	26597 139683	25066 131645	23897 125512	23043 121033
ALASKA	1517 7977	1372 7209	1261 6635	1169 6147	1107 5826
CALIFORNIA	21256 111603	19861 104285	18794 98679	17963 94318	17307 90874
HAWAII	43 229	0 0	0 0	0 0	0 0
OREGON	2478 13020	2461 12932	2480 13032	2507 13176	2563 13465
WASHINGTON	3436 18050	2903 15257	2531 13299	2258 11871	2066 10868

TABLE 5.7A -- INTERCITY HOUSEHOLD AUTO GASOLINE & ENERGY USE, BY STATE
 BY TRIP PURPOSE, 1976 (FIRST IN A SERIES OF 5 TABLES)
 GASOLINE USE IN THOUSANDS OF BBL, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	ALL PURPOSES	BUSINESS TOTAL	PERSONAL: TOTAL	OUTDOOR RECREATION	VISIT FRIENDS	VACATION; SIGHTSEEING	ENTER- TAINMENT	OTHER PERSONAL
UNITED STATES	167522 880161	34844 183045	132678 697116	23593 123984	73852 387832	14051 73885	12359 64984	8823 46431
NEW ENGLAND	6942 36535	1436 7560	5506 28975	1284 6758	2679 14082	452 2386	747 3934	344 1815
CONNECTICUT	1962 10318	354 1862	1608 8456	401 2110	701 3683	129 678	212 1115	165 870
MAINE	590 3115	223 1174	367 1941	34 180	231 1216	38 203	50 266	14 76
MASSACHUSETTS	3678 19326	792 4162	2886 15164	778 4085	1365 7169	257 1353	353 1856	133 701
NEW HAMPSHIRE	275 1458	4 25	271 1433	10 57	153 805	12 66	82 432	14 73
RHODE ISLAND	386 2038	62 329	324 1709	46 243	201 1058	15 80	50 265	12 63
VERMONT	51 280	1 8	50 272	15 83	28 151	1 6	0 0	6 32
MID-ATLANTIC	17983 94451	3588 18847	14395 75604	2860 15024	7512 39445	1381 7256	1570 8247	1072 5632
NEW JERSEY	3948 20738	813 4273	3135 16465	573 3012	1699 8919	416 2188	289 1517	158 829
NEW YORK	8037 42208	1771 9299	6266 32909	1229 6456	3343 17554	511 2683	579 3041	604 3175
PENNSYLVANIA	5998 31505	1004 5275	4994 26230	1058 5556	2470 12972	454 2385	702 3689	310 1628

SOURCE: METHOD 315 DATA QUALITY: 2

NOTE: INTERCITY TRAVEL CONSISTS OF TRIPS THAT REACH A POINT AT LEAST
 100 MILES FROM THE ORIGIN OF THE TRIP AND THAT RETURN TO THE
 ORIGIN.

TABLE 5.7B — INTERCITY HOUSEHOLD AUTO GASOLINE & ENERGY USE, BY STATE
BY TRIP PURPOSE, 1976 (SECOND IN A SERIES OF 5 TABLES)
GASOLINE USE IN THOUSANDS OF BBL, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	ALL PURPOSES	BUSINESS TOTAL	PERSONAL: TOTAL	OUTDOOR RECREATION	VISIT FRIENDS	VACATION; SIGHTSEEING	ENTER- TAINMENT	OTHER PERSONAL
SOUTH ATLANTIC	26195 137616	5304 27859	20891 109757	3373 17733	12901 67742	2026 10656	1344 7071	1247 6555
DELAWARE	329 1733	46 241	283 1492	14 76	212 1114	22 118	0 0	35 184
D.C.	657 3466	62 326	595 3140	165 871	352 1851	29 155	6 35	43 228
FLORIDA	6914 36308	1031 5416	5883 30892	471 2477	4175 21918	347 1824	368 1933	522 2740
GEORGIA	3493 18346	745 3911	2748 14435	491 2580	1636 8585	233 1227	283 1487	105 552
MARYLAND	3163 16620	465 2444	2698 14176	519 2729	1364 7164	469 2463	202 1062	144 758
NORTH CAROLINA	4443 23340	1255 6591	3188 16749	684 3593	1841 9668	387 2034	161 850	115 604
SOUTH CAROLINA	2363 12414	570 2993	1793 9421	299 1570	1104 5799	187 982	127 669	76 401
VIRGINIA	4028 21155	1013 5322	3015 15833	607 3190	1837 9644	271 1424	112 588	188 987
WEST VIRGINIA	805 4234	117 615	688 3619	123 647	380 1995	81 429	85 447	19 101

SOURCE: METHOD 315 DATA QUALITY: 2

NOTE: INTERCITY TRAVEL CONSISTS OF TRIPS THAT REACH A POINT AT LEAST 100 MILES FROM THE ORIGIN OF THE TRIP AND THAT RETURN TO THE ORIGIN.

TABLE 5.7C -- INTERCITY HOUSEHOLD AUTO GASOLINE & ENERGY USE, BY STATE
BY TRIP PURPOSE, 1976 (THIRD IN A SERIES OF 5 TABLES)
GASOLINE USE IN THOUSANDS OF BBL, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	ALL PURPOSES	BUSINESS TOTAL	PERSONAL: TOTAL	OUTDOOR RECREATION	VISIT FRIENDS	VACATION; SIGHTSEEING	ENTER- TAINMENT	OTHER PERSONAL
EAST NORTH CENTRAL	35350 185657	6074 31902	29276 153755	5475 28754	14662 76986	3098 16274	3690 19381	2351 12360
ILLINOIS	9738 51141	1568 8235	8170 42906	1633 8577	4264 22389	732 3845	994 5221	547 2874
INDIANA	4605 24188	723 3796	3882 20392	537 2823	1985 10422	589 3094	552 2899	219 1154
MICHIGAN	7554 39676	1099 5774	6455 33902	1524 8002	2934 15405	644 3384	800 4204	553 2907
OHIO	8716 45770	1725 9059	6991 36711	915 4804	3665 19246	611 3209	929 4877	871 4575
WISCONSIN	4737 24882	959 5038	3778 19844	866 4548	1814 9524	522 2742	415 2180	161 850
EAST SOUTH CENTRAL	9356 49170	2628 13805	6728 35365	775 4076	3824 20084	1091 5735	657 3460	381 2010
ALABAMA	2586 13592	657 3454	1929 10138	271 1425	1130 5934	270 1418	142 750	116 611
KENTUCKY	1887 9916	410 2153	1477 7763	214 1125	692 3636	266 1398	224 1176	81 428
MISSISSIPPI	1284 6753	371 1948	913 4805	87 458	570 2995	126 665	73 387	57 300
TENNESSEE	3599 18909	1190 6250	2409 12659	203 1068	1432 7519	429 2254	218 1147	127 671

SOURCE: METHOD 315 DATA QUALITY: 2

NOTE: INTERCITY TRAVEL CONSISTS OF TRIPS THAT REACH A POINT AT LEAST
100 MILES FROM THE ORIGIN OF THE TRIP AND THAT RETURN TO THE
ORIGIN.

TABLE 5.7D — INTERCITY HOUSEHOLD AUTO GASOLINE & ENERGY USE, BY STATE
BY TRIP PURPOSE, 1975 (FOURTH IN A SERIES OF 5 TABLES)
GASOLINE USE IN THOUSANDS OF BBL, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	ALL PURPOSES	BUSINESS TOTAL	PERSONAL: TOTAL	OUTDOOR RECREATION	VISIT FRIENDS	VACATION; SIGHTSEEING	ENTER- TAINMENT	OTHER PERSONAL
WEST NORTH CENTRAL	18993 99811	4244 22299	14749 77512	2244 11795	9131 47954	1093 5758	1399 7354	882 4651
IOWA	3655 19204	565 2971	3090 16233	519 2726	1610 8457	303 1595	348 1827	310 1628
KANSAS	3005 15789	918 4823	2087 10966	259 1361	1440 7563	114 602	195 1024	79 419
MINNESOTA	4993 26223	1037 5444	3956 20779	873 4584	2325 12203	190 1002	365 1916	203 1069
MISSOURI	4534 23820	1255 6592	3279 17228	410 2157	2250 11817	246 1292	261 1371	112 591
NEBRASKA	1677 8815	441 2316	1236 6499	133 701	666 3497	159 836	149 785	129 680
NORTH DAKOTA	414 2193	13 76	401 2123	23 123	283 1489	31 166	46 246	18 99
SOUTH DAKOTA	715 3767	15 83	700 3684	27 143	557 2926	50 265	35 185	31 165
WEST SOUTH CENTRAL	20230 06268	5561 29204	14669 77064	2172 11414	9533 50057	1332 7004	744 3913	888 4676
ARKANSAS	1812 9529	522 2745	1290 6784	133 698	848 4454	145 765	109 574	55 293
LOUISIANA	2277 11976	604 3174	1673 8802	181 954	1074 5643	216 1138	65 343	137 724
OKLAHOMA	3377 17741	930 4883	2447 12858	420 2208	1549 8134	219 1152	78 411	181 953
TEXAS	12764 67022	3505 18402	9259 48620	1438 7554	6062 31826	752 3949	492 2585	515 2706

SOURCE: METHOD 315

DATA QUALITY: 2

NOTE: INTERCITY TRAVEL CONSISTS OF TRIPS THAT REACH A POINT AT LEAST
100 MILES FROM THE ORIGIN OF THE TRIP AND THAT RETURN TO THE
ORIGIN.

TABLE 5.7E -- INTERCITY HOUSEHOLD AUTO GASOLINE & ENERGY USE, BY STATE
 BY TRIP PURPOSE, 1976 (FIFTH IN A SERIES OF 5 TABLES)
 GASOLINE USE IN THOUSANDS OF BBL, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	ALL PURPOSES	BUSINESS TOTAL	PERSONAL: TOTAL	OUTDOOR RECREATION	VISIT FRIENDS	VACATION; SIGHTSEEIN	ENTER- TAINMENT	OTHER PERSONAL
MOUNTAIN	9430 49620	1904 10013	7526 39607	1153 6073	4191 22018	813 4287	650 3435	719 3794
ARIZONA	2135 11220	500 2627	1635 8593	171 900	864 4536	220 1159	173 910	207 1088
COLORADO	2589 13611	623 3274	1966 10337	363 1906	1015 5333	172 907	181 955	235 1236
IDAHO	503 2652	31 164	472 2488	26 137	336 1767	44 231	8 46	58 307
MONTANA	921 4853	64 338	857 4515	108 571	522 2741	93 493	60 317	74 393
NEVADA	391 2068	60 317	331 1751	69 367	133 699	61 321	6 36	62 328
NEW MEXICO	1378 7243	438 2303	940 4940	188 987	649 3409	46 243	46 243	11 58
UTAH	1055 5556	180 947	875 4609	183 964	442 2324	141 743	81 427	28 151
WYOMING	458 2417	8 43	450 2374	45 241	230 1209	36 190	95 501	44 233
PACIFIC	23043 121033	4105 21556	18938 99477	4257 22357	9419 49464	2765 14529	1558 8189	939 4938
ALASKA	1107 5826	21 112	1086 5714	264 1387	619 3254	185 975	18 98	0 0
CALIFORNIA	17307 90874	3382 17755	13925 73119	3421 17964	6526 34265	2082 10932	1223 6421	673 3537
HAWAII	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
OREGON	2563 13465	573 3008	1990 10457	427 2242	984 5169	233 1226	230 1209	116 611
WASHINGTON	2066 10868	129 681	1937 10187	145 764	1290 6776	265 1396	87 461	150 790

TABLE 5.8A -- INTERCITY HOUSEHOLD AUTO GASOLINE AND ENERGY USE,
BY FAMILY INCOME BY TRIP PURPOSE, 1972 AND 1976
(FIRST OF TWO TABLES)
GASOLINE USE IN THOUSANDS OF BARRELS
FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

FAMILY INCOME	ALL PURPOSES	BUSINESS TOTAL	PERSONAL: TOTAL	OUTDOOR RECREATION	VISIT FRIENDS	VACATION; SIGHTSEEING	ENTER- TAINMENT	OTHER PERSONAL
1972: ALL INCOMES (1972 DOLLARS)	188180 987949	40683 213586	147497 774363	20250 106313	71420 374955	19774 103815	7450 39114	28603 150166
UNDER \$1000/YR	1318 6932	218 1148	1100 5784	.93 491	714 3751	38 199	57 299	198 1044
\$1000-1999	2494 13108	351 1845	2143 11263	170 893	1422 7469	149 784	76 403	326 1714
\$2000-2999	4680 24581	598 3141	4082 21440	337 1772	2484 13041	470 2469	121 637	670 3521
\$3000-3999	4575 24029	697 3660	3878 20369	323 1695	2095 11000	425 2235	135 713	900 4726
\$4000-4999	5859 30774	869 4566	4990 26208	472 2478	2698 14166	569 2992	201 1057	1050 5515
\$5000-5999	10299 54087	1889 9922	8410 44165	730 3835	4579 24041	921 4840	330 1735	1850 9714
\$6000-7499	15007 78800	2548 13378	12459 65422	1461 7671	6949 36495	1329 6982	598 3142	2122 11142
\$7500-9999	30849 161979	5605 29429	25244 132550	3072 16132	12922 67845	3681 19329	1044 5485	4525 23759
\$10,000-14,999	60228 316206	14546 76358	45682 239838	6803 35717	21159 111137	6410 33656	2457 12902	8843 46426
\$15,000-24,999	33540 176099	8230 43208	25310 132891	4191 22007	10596 56154	3807 19991	1446 7594	5170 27145
OVER \$25,000	10893 57203	3288 17262	7605 39941	1690 8873	2660 13969	1049 5512	563 2957	1643 8630
UNCLASSIFIED	8401 44121	1839 9655	6562 34466	903 4745	3026 15891	918 4821	416 2185	1299 6824

SOURCE: METHOD 315

DATA QUALITY: 2

NOTE: 1 INTERCITY TRAVEL CONSISTS OF TRIPS THAT REACH A POINT AT LEAST
1 MILES FROM THE ORIGIN OF THE TRIP AND THAT RETURN TO THE ORIGIN.
INCOMES ARE EXPRESSED IN 1972 DOLLARS.

TABLE 5.8B -- INTERCITY HOUSEHOLD AUTO GASOLINE AND ENERGY USE,
BY FAMILY INCOME BY TRIP PURPOSE, 1972 AND 1976
(SECOND OF TWO TABLES)
GASOLINE USE IN THOUSANDS OF BARRELS
FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

FAMILY INCOME	ALL PURPOSES	BUSINESS TOTAL	PERSONAL: TOTAL	OUTDOOR RECREATION	VISIT FRIENDS	VACATION; SIGHTSEEING	ENTER- TAINMENT	OTHER PERSONAL
1976: ALL INCOMES (1976 DOLLARS)	167675 880307	36363 190909	131312 689398	23240 122014	73118 383873	13975 73369	12248 64304	8731 45838
UNDER \$2000	3585 18830	368 1934	3217 16896	516 2710	2128 11172	285 1501	147 773	141 740
\$2000-2999	3054 16054	401 2109	2653 13945	272 1432	1807 9489	188 989	197 1038	189 997
\$3000-3999	3390 17812	354 1860	3036 15952	434 2282	2050 10762	235 1238	217 1141	100 529
\$4000-4999	4016 21100	533 2800	3483 18300	455 2392	2139 11232	281 1478	310 1629	298 1569
\$5000-5999	4590 24108	743 3903	3847 20205	440 2311	2344 12310	382 2008	294 1544	387 2032
\$6000-7499	6999 36756	812 4267	6187 32489	762 4003	3986 20930	503 2641	514 2699	422 2216
\$7500-9999	11391 59810	1863 9780	9528 50030	1287 6758	5660 29718	846 4444	1030 5408	705 3702
\$10,000-11,999	13927 73135	2329 12231	11598 60904	1417 7440	7024 36878	1311 6887	1142 5999	704 3700
\$12,000-14,999	22312 117147	5442 28570	16870 88577	3008 15794	9517 49965	1828 9600	1525 8006	992 5212
\$15,000-19,999	30522 160252	7089 37217	23433 123035	4182 21959	12819 67302	2312 12139	2532 13297	1588 8338
\$20,000-24,999	24546 128878	5588 29341	18958 99537	3771 19798	9533 50052	2246 11792	2008 10544	1400 7351
\$25,000-34,999	24250 127323	6241 32770	18009 94553	4070 21368	9212 48367	2283 11985	1585 8321	859 4512
\$35,000-49,999	10346 54318	3081 16175	7265 38143	1646 8641	3580 18795	892 4684	483 2537	664 3486
OVER \$50,000	4711 24745	1513 7946	3198 16799	975 5120	1313 6894	376 1975	259 1362	275 1448

TABLE 5.9A -- INTERCITY HOUSEHOLD AUTO GASOLINE AND ENERGY USE,
BY FAMILY INCOME BY REGION, 1972 AND 1976
(FIRST OF TWO TABLES)
GASOLINE USE IN THOUSANDS OF BARRELS
FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

FAMILY INCOME	UNITED STATES	NORTH-EAST	MID-ATLANTIC	SOUTH ATLANTIC	EAST N. CENTRAL	EAST S. CENTRAL	WEST N. CENTRAL	WEST S. CENTRAL	MOUNTAIN	PACIFIC
1972: ALL INCOMES	188432 989287	8116 42613	22615 118731	27470 144218	42607 223688	9140 47989	17888 93913	22208 116594	11174 58665	27214 142876
UNDER \$1000/YR	1305 6870	20 109	69 364	364 1914	206 1081	30 162	205 1077	197 1035	112 591	102 537
\$1000-1999	2475 13017	130 683	137 721	504 2649	358 1884	144 758	305 1603	286 1505	189 996	422 2218
\$2000-2999	4695 24667	135 709	974 5114	613 3223	1015 5332	266 1400	494 2593	486 2555	215 1131	497 2610
\$3000-3999	4565 23995	87 461	309 1625	629 3305	1143 6004	298 1564	599 3149	537 2823	364 1915	599 3149
\$4000-4999	5818 30562	199 1045	344 1810	1076 5649	889 4670	274 1440	579 3040	942 4950	374 1967	1141 5991
\$5000-5999	10292 54055	190 1001	910 4781	1652 8675	2187 11485	294 1548	1369 7190	1586 8330	1078 5659	1026 5386
\$6000-7499	14941 78465	646 3391	1166 6126	2553 13406	2794 14668	916 4812	1144 6009	1921 10090	1386 7280	2415 12683
\$7500-9999	30841 161938	1402 7363	3162 16605	4610 24206	6817 35794	2027 10642	2881 15128	3831 20114	2025 10632	4086 21454
\$10,000-14,999	60407 317159	2607 13690	7250 38065	7883 41389	14952 78502	2596 13629	5717 30015	7063 37082	2946 15470	9393 49317
\$15,000-24,999	33678 175827	1424 7478	4923 25848	4517 23716	8252 43324	1351 7094	2730 14337	3337 17521	1855 9739	5289 27770
OVER \$25,000	19927 57380	679 3568	2233 11723	1944 10209	1967 10328	377 1980	802 4211	1169 6140	350 1840	1406 7381
UNCLASSIFIED	8436 44305	592 3109	1132 5943	1119 5875	2020 10609	562 2954	1058 5557	846 4444	274 1439	833 4375

SOURCE: METHOD 315

DATA QUALITY: 2

NOTE: INTERCITY TRAVEL CONSISTS OF TRIPS THAT REACH A POINT AT LEAST
MILES FROM THE ORIGIN OF THE TRIP AND THAT RETURN TO THE ORIGIN.
INCOME CATEGORIES ARE EXPRESSED IN 1972 DOLLARS.

TABLE 5.9B -- INTERCITY HOUSEHOLD AUTO GASOLINE AND ENERGY USE,
BY FAMILY INCOME BY REGION, 1972 AND 1976
(SECOND OF TWO TABLES)
GASOLINE USE IN THOUSANDS OF BARRELS
FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

FAMILY INCOME	UNITED STATES	NORTH-EAST	MID-ATLANTIC	SOUTH ATLANTIC	EAST N. CENTRAL	EAST S. CENTRAL	WEST N. CENTRAL	WEST S. CENTRAL	MOUNTAIN	PACIFIC
1976: ALL INCOMES	167704 880473	6962 36554	17992 94460	26250 137814	35365 185671	9367 49181	19015 99831	20243 106277	9455 49642	23055 121043
UNDER \$2000	3567 18747	51 271	311 1633	663 3483	693 3641	225 1184	569 2987	263 1383	262 1378	530 2787
\$2000-2999	3058 16072	87 461	130 685	491 2580	526 2766	228 1197	641 3365	285 1498	148 777	522 2743
\$3000-3999	3402 17883	109 572	444 2336	704 3699	504 2649	144 757	444 2334	492 2586	88 466	473 2484
\$4000-4999	4079 21437	154 813	491 2582	438 2303	783 4110	205 1077	944 4959	472 2481	162 854	430 2258
\$5000-5999	4572 24029	256 1345	586 3077	676 3551	590 3102	222 1170	368 1934	1022 5369	309 1626	543 2855
\$6000-7499	7003 36785	407 2138	719 3777	1207 6338	1080 5670	462 2430	830 4360	1031 5417	310 1630	957 5025
\$7500-9999	9884 51908	503 2642	1471 7726	2138 11227	1957 10274	665 3492	1307 6866	1115 5856	728 3825	1478 7760
\$10,000-11,999	12180 63962	491 2580	1222 6415	2477 13004	3052 16025	819 4301	1293 6793	1839 9658	987 5182	1690 8876
\$12,000-14,999	19308 101377	787 4134	2249 11807	3842 20173	5022 26366	1485 7800	2197 11536	2482 13030	1244 6531	2975 15619
\$15,000-19,999	26437 138812	1309 6874	2731 14340	4126 21665	6933 36403	1363 7158	3949 20734	4116 21609	1910 10029	4130 21687
\$20,000-24,999	21439 112572	1315 6906	3315 17407	3529 18527	4719 24777	1623 8524	2064 10837	3121 16388	1753 9206	3037 15945
\$25,000-34,999	20392 107082	902 4739	2530 13286	3880 20373	6018 31598	933 4898	2634 13831	2440 12814	1055 5543	3895 20451
\$35,000-49,999	8632 45338	308 1621	1487 7808	1565 8220	2157 11324	782 4110	1106 5810	933 4900	294 1545	1736 9118
OVER \$50,000	4098 21529	276 1452	299 1571	507 2664	1325 6959	205 1078	662 3478	625 3282	199 1045	653 3428

TABLE 5.10A -- COMPUTER AUTO GASOLINE AND ENERGY USE, BY STATE, 1975
(FIRST IN A SERIES OF FIVE TABLES)

REGION, STATE	GASOLINE USE THOUSANDS OF BBL	ENERGY USE BILLIONS OF BTU
UNITED STATES	321236	1686600
NEW ENGLAND	19279	101227
CONNECTICUT	4977	26132
MAINE	1453	7631
MASSACHUSETTS	9611	50459
NEW HAMPSHIRE	1153	6055
RHODE ISLAND	1452	7627
VERMONT	633	3323
MID-ATLANTIC	58963	309563
NEW JERSEY	11946	62719
NEW YORK	28031	147165
PENNSYLVANIA	18986	99679

SOURCE: METHOD 316

DATA QUALITY: 3

TABLE 5.10B -- COMMUTER AUTO GASOLINE AND ENERGY USE, BY STATE, 1975
(SECOND IN A SERIES OF FIVE TABLES)

REGION, STATE	GASOLINE USE THOUSANDS OF BBL	ENERGY USE BILLIONS OF BTU
SOUTH ATLANTIC	50539	265351
DELAWARE	986	5178
D.C.	2017	10589
FLORIDA	12206	64084
GEORGIA	7126	37416
MARYLAND	6159	32339
NORTH CAROLINA	7910	41527
SOUTH CAROLINA	4082	21434
VIRGINIA	7714	40500
WEST VIRGINIA	2339	12284

SOURCE: METHOD 316

DATA QUALITY: 3

TABLE 5.10C -- COMMUTER AUTO GASOLINE AND ENERGY USE, BY STATE, 1975
(THIRD IN A SERIES OF FIVE TABLES)

REGION, STATE	GASOLINE USE THOUSANDS OF BBL	ENERGY USE BILLIONS OF BTU
EAST NORTH CENTRAL	64975	341130
ILLINOIS	18846	98946
INDIANA	8102	42537
MICHIGAN	13804	72472
OHIO	17076	89650
WISCONSIN	7147	37525
EAST SOUTH CENTRAL	17698	92919
ALABAMA	4660	24465
KENTUCKY	4355	22868
MISSISSIPPI	2755	14464
TENNESSEE	5928	31122

SOURCE: METHOD 316

DATA QUALITY: 3

TABLE 5.10D -- COMMUTER AUTO GASOLINE AND ENERGY USE, BY STATE, 1975
(FOURTH IN A SERIES OF FIVE TABLES)

REGION, STATE	GASOLINE USE THOUSANDS OF BBL	ENERGY USE BILLIONS OF BTU
WEST NORTH CENTRAL	25139	132000
IOWA	4122	21644
KANSAS	3334	17506
MINNESOTA	6385	33524
MISSOURI	7298	38317
NEBRASKA	2271	11923
NORTH DAKOTA	861	4524
SOUTH DAKOTA	868	4562
WEST SOUTH CENTRAL	29144	153011
ARKANSAS	2569	13487
LOUISIANA	5008	26293
OKLAHOMA	3698	19417
TEXAS	17869	93814

SOURCE: METHOD 316

DATA QUALITY: 3

TABLE 5.10E -- COMPUTER AUTO GASOLINE AND ENERGY USE, BY STATE, 1975
(LAST IN A SERIES OF FIVE TABLES)

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REGION, STATE	GASOLINE USE THOUSANDS OF BBL	ENERGY USE BILLIONS OF BTU
MOUNTAIN	14025	73650
ARIZONA	3198	16790
COLORADO	3818	20045
IDAHO	1097	5764
MONTANA	962	5051
NEVADA	1073	5633
NEW MEXICO	1443	7580
UTAH	1834	9633
WYOMING	600	3154
PACIFIC	41474	217749
ALASKA	723	3797
CALIFORNIA	31127	163420
HAWAII	1230	6459
OREGON	3406	17884
WASHINGTON	4988	26189

SOURCE: METHOD 316

DATA QUALITY: 3

TABLE 6.1 -- TOTAL BUS FUEL AND ENERGY USE, BY BUS TYPE BY FUEL, 1967-76

FUEL, BUS TYPE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
TOTAL ENERGY BILLIONS OF BTU	123161	125678	121497	120475	119291	117993	122833	125133	132916	139607
TOTAL GASOLINE THOUSANDS OF BBL	8351	8821	8655	8558	8882	8669	9045	8644	9135	9806
BILLIONS OF BTU	43852	46310	45438	44928	46629	45511	47485	45380	47957	51480
TOTAL DIESEL FUEL THOUSANDS OF BBL	11651	11639	11061	11015	10589	10664	11348	12105	12998	13606
BILLIONS OF BTU	67871	67801	64433	64166	61684	62121	66106	70515	75717	79260
TOTAL ELECTRICITY MILLIONS OF KWH	2531	2586	2618	2561	2556	2428	2331	2630	2646	2576
BILLIONS OF BTU	8636	8823	8932	8738	8721	8284	7953	8973	9028	8789
TOTAL LPG THOUSANDS OF BBL	785	766	752	738	630	580	360	74	60	22
BILLIONS OF BTU	2812	2744	2594	2643	2257	2077	1289	265	214	78
SCHOOL BUSES GASOLINE, 1000'S OF BBL	6670	7429	7420	7394	7919	7941	8489	8221	8786	9439
BILLIONS OF BTU	35017	39002	38955	38818	41574	41690	44567	43160	46126	49554
FEDERAL BUSES GASOLINE, 1000'S OF BBL	305	304	283	279	263	261	263	246	230	244
BILLIONS OF BTU	1601	1596	1485	1464	1380	1370	1380	1291	1207	1281
TRANSIT BUSES GASOLINE, 1000'S OF BBL	1376	1088	952	885	700	467	293	177	119	123
DIESEL FUEL, 1000'S BBL	6435	6528	6519	6442	6114	6029	6729	7532	8691	9266
ELECTRICITY, MILLIONS KWH	2531	2586	2618	2561	2556	2428	2331	2630	2646	2576
LPG, 1000'S OF BBL	785	766	752	738	630	580	360	74	60	22
TOTAL BILLIONS OF BTU	56158	55307	54599	53554	50269	47933	49979	54043	60494	63490
INTERCITY BUSES DIESEL FUEL, 1000'S BBL	5216	5111	4542	4573	4475	4635	4619	4573	4307	4340
BILLIONS OF BTU	30385	29773	26458	26639	26068	27000	26907	26639	25089	25282

SOURCE: METHOD 320

DATA QUALITY: SEE TABLES 6.2-6.6

NOTE: BUS FIGURES EXCLUDE A SMALL AMOUNT OF FUEL USED BY PRIVATE SCHOOL BUSES AND CHURCH BUSES, AND IN GENERAL BUSES OTHER THAN PUBLIC SCHOOL BUSES THAT ARE NOT COMMON CARRIERS.

TABLE 6.2A — SCHOOL BUS GASOLINE AND ENERGY CONSUMPTION, BY STATE, 1967-76
(FIRST IN A SERIES OF 5 TABLES)

GASOLINE CONSUMPTION IN THOUSANDS OF BARRELS
FOLLOWED BY ENERGY CONSUMPTION IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
UNITED STATES	6670 35017	7429 39002	7420 38955	7394 38818	7919 41574	7941 41690	8489 44567	8221 43160	8786 46126	9439 49554
NEW ENGLAND	259 1412	302 1585	329 1727	362 1900	373 1958	368 1932	399 2094	400 2100	452 2373	485 2546
CONNECTICUT	64 336	80 420	88 462	93 488	97 509	90 472	97 509	111 582	106 556	113 593
MAINE	49 257	58 304	60 315	64 336	65 341	72 373	74 388	51 267	79 414	103 540
MASSACHUSETTS	97 509	105 551	106 556	129 677	132 693	127 666	142 745	147 771	171 897	175 918
NEW HAMPSHIRE	27 141	26 136	29 152	30 157	32 168	32 168	32 168	36 189	36 189	37 194
RHODE ISLAND	12 63	13 68	19 99	18 94	18 94	18 94	20 105	20 105	20 105	24 126
VERMONT	20 105	20 105	27 141	28 147	29 152	29 152	34 178	35 183	40 210	33 173
MID-ATLANTIC	1113 5843	1163 6105	1249 6557	1202 6310	1323 6945	1355 7113	1486 7801	1084 5691	1451 7617	1381 7250
NEW JERSEY	201 1055	193 1013	200 1050	121 635	215 1128	328 1722	339 1779	125 656	214 1123	133 698
NEW YORK	509 2672	527 2766	617 3239	630 3307	574 3013	549 2882	646 3391	441 2315	651 3417	648 3402
PENNSYLVANIA	403 2115	443 2325	432 2268	451 2367	534 2803	478 2509	501 2630	518 2719	586 3076	600 3150

SOURCE: METHOD 321

DATA QUALITY: 2

TABLE 6.2B -- SCHOOL BUS GASOLINE AND ENERGY CONSUMPTION, BY STATE, 1967-76
(SECOND IN A SERIES OF 5 TABLES)

GASOLINE CONSUMPTION IN THOUSANDS OF BARRELS
FOLLOWED BY ENERGY CONSUMPTION IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
SOUTH ATLANTIC	1032 5418	1073 5633	1207 6336	1193 6263	1328 6972	1320 6930	1374 7213	1475 7743	1551 8142	1812 9513
DELAWARE	19 99	20 105	23 120	23 120	28 147	28 147	27 141	33 173	31 162	40 210
D.C.	0 0	2 10	2 10	6 31	3 15	3 15	2 10	3 15	3 15	4 21
FLORIDA	126 661	133 698	165 866	159 834	196 1029	199 1044	211 1107	265 1391	276 1449	533 2798
GEORGIA	182 955	181 950	183 960	181 950	232 1218	225 1181	243 1275	265 1391	283 1485	197 1034
MARYLAND	124 651	135 708	192 1008	184 966	211 1107	202 1060	209 1097	211 1107	208 1092	259 1359
NORTH CAROLINA	208 1092	212 1113	228 1197	220 1155	231 1212	237 1244	242 1270	269 1412	283 1485	290 1522
SOUTH CAROLINA	125 656	136 714	130 682	146 766	147 771	143 750	143 750	147 771	155 813	166 871
VIRGINIA	170 892	175 918	183 960	190 997	192 1008	192 1008	198 1039	208 1092	216 1134	225 1181
WEST VIRGINIA	78 409	79 414	101 530	84 441	88 462	91 477	99 519	74 388	96 504	98 514

SOURCE: METHOD 321

DATA QUALITY: 2

TABLE 6.2C -- SCHOOL BUS GASOLINE AND ENERGY CONSUMPTION, BY STATE, 1967-76
(THIRD IN A SERIES OF 5 TABLES)

GASOLINE CONSUMPTION IN THOUSANDS OF BARRELS
FOLLOWED BY ENERGY CONSUMPTION IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
EAST NORTH CENTRAL	1163 6105	1491 7827	1257 6599	1313 6893	1330 6982	1374 7213	1451 7617	1509 7922	1558 8179	1659 8709
ILLINOIS	230 1207	227 1191	258 1354	248 1302	257 1349	266 1396	338 1774	319 1674	357 1874	400 2100
INDIANA	163 855	164 861	151 792	103 540	157 824	211 1107	148 777	203 1065	195 1023	221 1160
MICHIGAN	267 1401	296 1554	270 1417	287 1506	285 1496	287 1506	317 1664	320 1680	338 1774	348 1827
OHIO	320 1680	599 3144	352 1848	357 1874	384 2016	373 1958	410 2152	428 2247	431 2262	447 2346
WISCONSIN	183 960	205 1076	226 1186	318 1669	247 1296	237 1244	238 1249	239 1254	237 1244	243 1275
EAST SOUTH CENTRAL	598 3139	749 3932	628 3297	616 3234	649 3407	597 3134	597 3134	645 3386	659 3459	653 3428
ALABAMA	142 745	143 750	145 761	144 756	140 735	138 724	136 714	137 719	138 724	144 756
KENTUCKY	154 808	157 824	167 876	163 855	170 892	171 897	176 924	180 945	183 960	203 1065
MISSISSIPPI	150 787	150 787	132 693	147 771	140 735	127 666	127 666	123 645	122 640	115 603
TENNESSEE	152 798	299 1569	184 966	162 850	199 1044	161 845	158 829	205 1076	216 1134	191 1002

SOURCE: METHOD 321

DATA QUALITY: 2

TABLE 6.2D -- SCHOOL BUS GASOLINE AND ENERGY CONSUMPTION, BY STATE, 1967-76
(FOURTH IN A SERIES OF 5 TABLES)

GASOLINE CONSUMPTION IN THOUSANDS OF BARRELS
FOLLOWED BY ENERGY CONSUMPTION IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
WEST NORTH CENTRAL	878 4609	988 5187	991 5202	1003 5265	1083 5685	1019 5349	1036 5439	1040 5460	1088 5712	1134 5953
IOWA	180 945	187 981	188 987	193 1013	190 997	175 918	178 934	183 960	179 939	186 976
KANSAS	129 677	140 735	146 766	170 892	155 813	136 714	144 756	88 462	145 761	149 782
MINNESOTA	208 1092	250 1312	216 1134	197 1034	264 1386	262 1375	255 1338	313 1643	291 1527	309 1622
MISSOURI	195 1023	213 1118	229 1202	239 1254	246 1291	236 1239	245 1286	255 1338	265 1391	271 1422
NEBRASKA	53 278	67 351	74 388	65 341	82 430	69 362	78 409	65 341	73 383	85 446
NORTH DAKOTA	84 444	85 446	88 462	85 446	87 456	83 435	80 420	80 420	79 414	80 420
SOUTH DAKOTA	29 152	46 241	50 262	54 283	59 309	58 304	56 294	56 294	56 294	54 283
WEST SOUTH CENTRAL	653 3454	694 3643	673 3533	608 3192	675 3543	729 3827	845 4436	788 4137	806 4231	871 4572
ARKANSAS	117 614	145 761	121 635	111 582	122 640	127 666	121 635	114 598	126 661	187 981
LOUISIANA	162 850	162 850	165 866	147 771	171 897	172 903	168 882	174 913	175 918	174 913
OKLAHOMA	98 514	96 504	112 588	77 404	113 593	116 609	204 1071	132 693	137 719	142 745
TEXAS	281 1475	291 1527	275 1443	273 1433	269 1412	314 1648	352 1848	368 1932	368 1932	368 1932

TABLE 6.2E -- SCHOOL BUS GASOLINE AND ENERGY CONSUMPTION, BY STATE, 1967-76
(LAST IN A SERIES OF 5 TABLES)

GASOLINE CONSUMPTION IN THOUSANDS OF BARRELS
FOLLOWED BY ENERGY CONSUMPTION IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
MOUNTAIN	335 1758	318 1669	346 1816	387 2031	383 2010	396 2079	467 2451	399 2094	455 2388	472 2478
ARIZONA	45 236	42 220	58 304	77 404	60 315	62 325	92 483	76 399	78 409	82 430
COLORADO	75 393	90 472	92 483	104 546	107 561	103 567	140 735	133 698	130 682	124 651
IDAHO	81 425	43 225	42 220	42 220	44 231	43 225	44 231	4 21	47 246	49 257
MONTANA	41 215	43 225	49 257	49 257	49 257	49 257	47 246	48 252	50 262	51 267
NEVADA	13 68	14 73	16 84	16 84	17 89	18 94	21 110	24 126	25 131	28 147
NEW MEXICO	45 236	48 252	50 262	51 267	52 273	55 341	73 383	54 283	73 383	77 404
UTAH	19 99	22 115	22 115	30 157	34 178	34 178	32 168	35 183	29 152	36 189
WYOMING	16 84	16 84	17 89	18 94	20 105	17 89	18 94	25 131	23 120	25 131
PACIFIC	624 3276	651 3417	740 3885	710 3727	775 4068	783 4110	834 4378	881 4625	766 4021	972 5103
ALASKA	9 47	9 47	10 52	12 63	13 68	14 73	17 89	18 94	20 105	19 99
CALIFORNIA	421 2210	433 2273	510 2677	478 2509	513 2693	527 2765	587 3081	609 3197	488 2562	672 3528
HAWAII	5 26	5 26	9 47	8 42	11 57	11 57	13 68	13 68	13 68	14 73
OREGON	72 378	80 420	85 446	82 430	104 546	95 498	88 462	106 556	106 556	99 519
WASHINGTON	117 614	124 651	126 661	130 682	134 703	136 714	129 677	135 708	139 729	168 882

TABLE 6.3A -- FEDERAL BUS GASOLINE AND ENERGY CONSUMPTION, BY STATE, 1967-76
(FIRST IN A SERIES OF 5 TABLES)

GASOLINE CONSUMPTION IN THOUSANDS OF BARRELS
FOLLOWED BY ENERGY CONSUMPTION IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
UNITED STATES	305 1601	304 1596	283 1485	279 1464	263 1380	261 1370	263 1380	246 1291	230 1207	244 1281
NEW ENGLAND	1 5	0 0	0 0	2 10	0 0	0 0	0 0	7 36	0 0	0 0
CONNECTICUT	1 5	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
MAINE	0 0	0 0	0 0	1 5	0 0	0 0	0 0	6 31	0 0	0 0
MASSACHUSETTS	0 0	0 0	0 0	0 0	0 0	0 0	0 0	1 5	0 0	0 0
NEW HAMPSHIRE	0 0	0 0	0 0	1 5	0 0	0 0	0 0	0 0	0 0	0 0
RHODE ISLAND	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
VERMONT	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
MID-ATLANTIC	13 68	14 73	8 42	9 47	9 47	10 52	12 63	10 52	10 52	10 52
NEW JERSEY	5 26	2 10	0 0	1 5	2 10	2 10	2 10	1 5	3 15	2 10
NEW YORK	5 26	9 47	6 31	6 31	5 26	6 31	5 26	4 21	3 15	4 21
PENNSYLVANIA	3 15	3 15	2 10	2 10	2 10	2 10	5 26	5 26	4 21	4 21

SOURCE: METHOD 322

DATA QUALITY: 1

TABLE 6.3B -- FEDERAL BUS GASOLINE AND ENERGY CONSUMPTION, BY STATE, 1967-76
(SECOND IN A SERIES OF 5 TABLES)

GASOLINE CONSUMPTION IN THOUSANDS OF BARRELS
FOLLOWED BY ENERGY CONSUMPTION IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
SOUTH ATLANTIC	25 131	33 173	32 168	38 199	37 194	35 183	37 194	36 189	37 194	39 204
DELAWARE	0 0	0 0	0 0	0 0	0 0	0 0	0 0	16 84	0 0	0 0
D.C.	7 36	6 31	9 47	9 47	10 52	11 57	13 68	6 31	17 89	15 78
FLORIDA	7 36	9 47	10 52	11 57	8 42	7 35	8 42	4 21	5 26	6 31
GEORGIA	1 5	2 10	1 5	4 21	4 21	4 21	4 21	0 0	3 15	3 15
MARYLAND	3 15	5 26	5 26	5 26	5 26	5 26	5 26	0 0	4 21	5 26
NORTH CAROLINA	2 10	3 15	2 10	2 10	2 10	2 5	2 10	2 10	2 10	2 10
SOUTH CAROLINA	0 0	0 0	0 0	1 5	1 5	1 5	1 5	1 5	0 0	1 5
VIRGINIA	5 26	6 31	5 26	6 31	7 36	6 31	4 21	7 36	6 31	6 31
WEST VIRGINIA	0 0	2 10	0 0	0 0	0 0	0 0	0 0	0 0	0 0	1 5

SOURCE: METHOD 322

DATA QUALITY: 1

TABLE 6.3C — FEDERAL BUS GASOLINE AND ENERGY CONSUMPTION, BY STATE, 1967-76
(THIRD IN A SERIES OF 5 TABLES)

GASOLINE CONSUMPTION IN THOUSANDS OF BARRELS
FOLLOWED BY ENERGY CONSUMPTION IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
EAST NORTH CENTRAL	16 84	9 47	5 26	7 36	7 36	11 57	12 63	7 36	10 52	10 52
ILLINOIS	2 10	2 10	2 10	2 10	2 10	3 15	3 15	2 10	3 15	3 15
INDIANA	5 26	2 10	0 0	0 0	0 0	3 15	4 21	0 0	2 10	2 10
MICHIGAN	4 21	1 5	1 5	1 5	1 5	1 5	1 5	1 5	1 5	1 5
OHIO	2 10	3 15	2 10	3 15	3 15	3 15	3 15	3 15	3 15	3 15
WISCONSIN	3 15	1 5	0 0	1 5	1 5	1 5	1 5	1 5	1 5	1 5
EAST SOUTH CENTRAL	19 99	20 105	17 89	17 89	15 78	15 78	15 78	10 52	14 73	16 84
ALABAMA	1 5	3 15	1 5	2 10	2 10	1 5	1 5	1 5	1 5	1 5
KENTUCKY	7 36	5 26	3 15	4 21	3 15	5 26	5 26	1 5	5 26	6 31
MISSISSIPPI	8 42	8 42	9 47	8 42	7 36	6 31	5 26	4 21	5 26	5 26
TENNESSEE	3 15	4 21	4 21	3 15	3 15	3 15	4 21	4 21	3 15	4 21

SOURCE: METHOD 322

DATA QUALITY: 1

TABLE 6.3D -- FEDERAL BUS GASOLINE AND ENERGY CONSUMPTION, BY STATE, 1967-76
(FOURTH IN A SERIES OF 5 TABLES)

GASOLINE CONSUMPTION IN THOUSANDS OF BARRELS
FOLLOWED BY ENERGY CONSUMPTION IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
WEST NORTH CENTRAL	27 141	21 110	15 78	14 73	17 89	16 84	15 78	23 120	14 73	13 68
IOWA	0 0	1 5	1 5	0 0	1 5	1 5	1 5	0 0	0 0	0 0
KANSAS	0 0	0 0	0 0	0 0	0 0	0 0	0 0	5 26	0 0	0 0
MINNESOTA	0 0	1 5	0 0	1 5	1 5	1 5	1 5	5 26	1 5	1 5
MISSOURI	2 10	3 15	2 10	2 10	4 21	3 15	4 21	5 26	5 26	4 21
NEBRASKA	5 26	1 5	0 0	1 5	1 5	0 0	0 0	0 0	0 0	0 0
NORTH DAKOTA	11 57	7 36	6 31	5 26	5 26	6 31	5 26	4 21	4 21	4 21
SOUTH DAKOTA	9 47	8 42	6 31	5 26	5 26	5 26	4 21	4 21	4 21	4 21
WEST SOUTH CENTRAL	25 131	21 110	17 89	18 94	18 94	24 125	25 131	21 110	20 105	25 131
ARKANSAS	0 0	0 0	0 0	1 5	0 0	1 5	0 0	0 0	1 5	1 5
LOUISIANA	0 0	1 5	0 0	1 5	1 5	0 0	1 5	0 0	1 5	1 5
OKLAHOMA	9 47	8 42	7 36	7 36	7 36	8 42	7 36	7 36	6 31	8 42
TEXAS	16 84	12 63	10 52	9 47	10 52	15 76	17 89	14 73	12 63	15 78

TABLE 6.3E -- FEDERAL EUS GASOLINE AND ENERGY CONSUMPTION, BY STATE, 1967-76
(LAST IN A SERIES OF 5 TABLES)

GASOLINE CONSUMPTION IN THOUSANDS OF BARRELS
FOLLOWED BY ENERGY CONSUMPTION IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
MOUNTAIN	129 677	131 687	123 645	112 588	111 582	116 609	116 609	86 451	93 488	94 493
ARIZONA	42 220	38 199	35 183	33 173	34 178	34 178	32 168	28 147	28 147	28 147
COLORADO	3 15	3 15	3 15	3 15	3 15	3 15	2 10	3 15	3 15	3 15
IDAHO	28 147	30 157	29 152	25 131	20 105	19 99	18 94	4 21	15 78	15 78
MONTANA	4 21	5 26	6 31	7 36	5 26	5 26	6 31	0 0	4 21	4 21
NEVADA	17 89	18 94	18 94	15 78	9 47	7 36	5 26	5 26	4 21	5 26
NEW MEXICO	29 152	31 162	29 152	25 131	34 178	43 225	47 246	42 220	35 183	35 183
UTAH	5 26	5 26	3 15	4 21	6 31	5 26	6 31	4 21	4 21	4 21
WYOMING	1 5	1 5	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
PACIFIC	50 262	55 288	66 346	62 325	49 257	34 178	31 162	46 241	32 168	37 194
ALASKA	1 5	1 5	0 0	2 10	2 10	2 10	2 10	2 10	2 10	3 15
CALIFORNIA	12 63	17 89	34 178	33 173	25 131	12 63	11 57	11 57	14 73	16 84
HAWAII	0 0	0 0	0 0	1 5	1 5	1 5	1 5	17 89	0 0	1 5
OREGON	8 42	7 36	3 15	3 15	3 15	2 10	3 15	3 15	4 21	4 21
WASHINGTON	25 152	30 157	29 152	23 120	18 94	17 89	14 73	13 68	12 63	13 68

TABLE 6.4 -- INTERCITY BUS DIESEL FUEL AND ENERGY USE,
BY INCOME OF TRAVELER'S FAMILY, 1967, 72, 76

PERCENTAGE FUEL CONSUMPTION IN EACH INCOME CLASS IS GIVEN.

1967	INCOME CATEGORIES		1976	1967	1972	1976
	1972					
TOTAL FUEL USE, IN THOUSANDS OF BARRELS				5216	4635	4340
TOTAL ENERGY USE, IN BILLIONS OF BTU				30385	27000	25282
\$0-3999	\$0-4999	\$0 999		40	28	4
\$4000-5999	\$5000-7499	\$2000-2999		24	17	5
\$6000-7499	\$7500-9999	\$3000-3999		7	15	7
\$7500-9999	\$10,000 4,999	\$4000-4999		13	23	4
\$10,000 4,999	\$15,000-UP	\$5000-5999		8	13	5
\$15,000-UP	UNCLASSIFIED	\$6000-7499		3		7
UNCLASSIFIED		\$7500-9999		2		9
		\$10,000 1,999				6
		\$12,000 4,999				13
		\$15,000 9,999				12
		\$20,000-24,999				9
		\$25,000-34,999				8
		\$35,000-49,999				2
		\$50,000-UP				0
		UNCLASSIFIED				2

SOURCE: METHOD 324

DATA QUALITY: 1

TABLE 6.5 -- TRANSIT BUS FUEL AND ENERGY USE, BY FUEL, 1967-77
(APTA ESTIMATES)

FUEL TYPE	1967	1968	1969	1970	1971	1972	1973	1974	1985	1976	1977
TOTAL ENERGY, BILLIONS OF BTU	56158	55307	54599	53554	50269	47933	49979	54043	60494	63490	64826
GASOLINE USE, THOUSANDS OF BBL	1376	1088	952	885	700	467	293	177	119	123	192
BILLIONS OF BTU	7224	5712	4998	4646	3675	2451	1538	929	624	645	1008
DIESEL FUEL USE, THOUSANDS OF BBL	6435	6528	6519	6442	6114	6029	6729	7532	8691	9266	9591
BILLIONS OF BTU	37486	38028	37975	37527	35616	35121	39199	43876	50628	53978	55871
ELECTRICITY USE, MILLIONS OF KWH	2531	2586	2618	2561	2556	2428	2331	2630	2646	2576	2303
BILLIONS OF BTU	8636	8823	8932	8738	8721	8284	7953	8973	9028	8789	7858
LPG USE, THOUSANDS OF BBL	785	766	752	738	630	580	360	74	60	22	25
BILLIONS OF BTU	2812	2744	2694	2643	2257	2077	1289	265	214	78	89

SOURCE: AMERICAL PUBLIC TRANSIT ASSOCIATION (SEE METHOD 323)

DATA QUALITY: 2

NOTE: ORNL HAS INDEPENDENTLY ESTIMATED 1976 TRANSIT CONSUMPTION OF DIESEL FUEL.
NOTE THAT THE RESULT, IN TABLE 6.6, DOES NOT AGREE EXACTLY WITH THE APTA ESTIMATE

TABLE 6.6A -- TRANSIT BUS DIESEL FUEL USE, BY STATE, 1976
(FIRST IN A SERIES OF FIVE TABLES)

REGION, STATE	DIESEL FUEL USE THOUSANDS OF BBL	ENERGY USE BILLIONS OF BTU
UNITED STATES	8990	52370
NEW ENGLAND	496	2889
CONNECTICUT	103	600
MAINE	17	99
MASSACHUSETTS	337	1963
NEW HAMPSHIRE	5	29
RHODE ISLAND	27	157
VERMONT	7	40
MID-ATLANTIC	2233	13008
NEW JERSEY	608	3541
NEW YORK	1207	7031
PENNSYLVANIA	418	2435

SOURCE: METHOD 323

DATA QUALITY: 3

TABLE 6.6B -- TRANSIT BUS DIESEL FUEL USE, BY STATE, 1976
(SECOND IN A SERIES OF FIVE TABLES)

REGION, STATE	DIESEL FUEL USE THOUSANDS OF BBL	ENERGY USE BILLIONS OF BTU
SOUTH ATLANTIC	1363	7940
DELAWARE	17	99
D.C.	428	2493
FLORIDA	271	1578
GEORGIA	207	1205
MARYLAND	198	1153
NORTH CAROLINA	86	500
SOUTH CAROLINA	21	122
VIRGINIA	106	617
WEST VIRGINIA	29	168

SOURCE: METHOD 323

DATA QUALITY: 3

TABLE 6.6C -- TRANSIT BUS DIESEL FUEL USE, BY STATE, 1976
(THIRD IN A SERIES OF FIVE TABLES)

REGION, STATE	DIESEL FUEL USE THOUSANDS OF BBL	ENERGY USE BILLIONS OF BTU
EAST NORTH CENTRAL	1780	10369
ILLINOIS	834	4858
INDIANA	100	582
MICHIGAN	295	1718
OHIO	407	2370
WISCONSIN	144	838
EAST SOUTH CENTRAL	180	1048
ALABAMA	46	267
KENTUCKY	66	384
MISSISSIPPI	11	64
TENNESSEE	57	332

SOURCE: METHOD 323

DATA QUALITY: 3

TABLE 6.6D -- TRANSIT BUS DIESEL FUEL USE, BY STATE, 1976
(FOURTH IN A SERIES OF FIVE TABLES)

REGION, STATE	DIESEL FUEL USE THOUSANDS OF BBL	ENERGY USE BILLIONS OF BTU
WEST NORTH CENTRAL	553	3221
IOWA	45	262
KANSAS	18	104
MINNESOTA	218	1269
MISSOURI	229	1334
NEBRASKA	39	227
NORTE DAKOTA	3	17
SOUTH DAKOTA	1	5
WEST SOUTH CENTRAL	490	2854
ARKANSAS	12	69
LOUISIANA	133	774
OKLAHOMA	28	163
TEXAS	317	1846

SOURCE: METHOD 323

DATA QUALITY: 3

TABLE 6.6E -- TRANSIT BUS DIESEL FUEL USE, BY STATE, 1976
(LAST IN A SERIES OF FIVE TABLES)

REGION, STATE	DIESEL FUEL USE THOUSANDS OF BBL	ENERGY USE BILLIONS OF BTU
MOUNTAIN	245	1427
ARIZONA	49	285
COLORADO	115	669
IDAHO	0	0
MONTANA	5	29
NEVADA	5	29
NEW MEXICO	12	69
UTAH	59	343
WYOMING	0	0
PACIFIC	1650	9611
ALASKA	6	34
CALIFORNIA	1249	7275
HAWAII	91	530
OREGON	118	687
WASHINGTON	186	1083

SOURCE: METHOD 323

DATA QUALITY: 3

TABLE 7.1 -- TOTAL TRUCK FUEL AND ENERGY USE, BY SECTOR BY FUEL, 1967-76

FUEL USE IN THOUSANDS OF BBL, ENERGY USE IN BILLIONS OF BTU

SECTOR, FUEL	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
TOTAL ENERGY	2631341	2809213	2985356	3096947	3291362	3547042	3783193	3629022	3624957	3822760
HOUSEHOLD SECTOR										
GASOLINE	90132	100296	110949	121065	132492	147754	159865	158903	169364	185048
DIESEL FUEL	13	21	32	44	61	80	108	122	135	162
LPG	0	22	55	98	158	239	356	443	526	678
TOTAL ENERGY	473295	526790	582899	636218	696538	777076	841221	836564	891856	974914
COMMERCIAL SECTOR										
GASOLINE	288114	295110	300668	302257	304757	313034	311779	285051	279126	279777
DIESEL FUEL	104708	119424	134668	143868	163803	185578	215549	214215	209642	228548
LPG	3068	3607	4135	4480	5077	5689	6473	6280	5936	6118
TOTAL ENERGY	2133592	2257991	2377862	2441032	2572429	2744915	2915742	2766932	2707958	2822152
FEDERAL GOVERNMENT										
ALL FUELS	4529	4527	4558	3679	4136	4637	4858	4720	4652	4745
TOTAL ENERGY	24454	24432	24595	19697	22395	25051	26230	25526	25143	25694

SOURCE: METHOD 330

DATA QUALITY: SEE TABLES 7.2-7.12

IMPORTANT NOTE: IN THIS AND SUBSEQUENT TABLES (EXCEPT 7.11, 7.12), THE SHARES OF THE NATION'S HIGHWAY GASOLINE AND DIESEL/LPG USE ALLOTTED TO EACH CATEGORY OF TRUCK FUEL USE ARE BASED ON DATA FOR THE YEARS 1967 AND 1972 ONLY. EACH STATE'S REPORTED TOTAL HIGHWAY GASOLINE USE AND TOTAL TRUCK DIESEL FUEL USE FOR THE YEARS 1967-76 ARE BASED ON ANNUAL DATA, BUT THE DISAGGREGATED TRUCK FUEL USE ESTIMATES FOR YEARS OTHER THAN 1967 AND 1972 ARE BASED ON INTERPOLATION OR EXTRAPOLATION AND SHOULD BE USED WITH CAUTION.

NOTE: HOUSEHOLD TRUCK FUEL CONSUMPTION IS HERE DEFINED TO BE THE TOTAL FUEL CONSUMPTION OF TRUCKS WHOSE PRIMARY USE IS INDICATED BY THEIR OWNERS TO BE PERSONAL TRANSPORTATION. CONSEQUENTLY IF A PICKUP TRUCK IS USED PARTLY FOR HAULING FREIGHT BUT MOSTLY FOR PERSONAL TRANSPORTATION, ALL THE FUEL IT USES IS COUNTED AS CONSUMPTION IN THE HOUSEHOLD SECTOR.

NOTE: THE SMALL AMOUNT OF FUEL USED BY STATE AND LOCAL GOVERNMENT TRUCKS IS OMITTED ABOVE. IT COMPRISES A NEGLIGIBLE FRACTION OF THE HOUSEHOLD AUTO FUEL USE REPORTED IN TABLE 5.5.

TABLE 7.2A — TRUCK FUEL AND ENERGY USE, BY FUEL BY SECTOR BY WEIGHT, 1967-76
(FIRST IN A SERIES OF 3 TABLES)

ENERGY USE IN BILLIONS OF BTU

SECTOR, FUEL, WEIGHT	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
** ALL FUELS **										
* HOUSEHOLD SECTOR *										
ALL WEIGHT CLASSES	473295	526790	582899	636218	696538	777076	841221	836564	891856	974914
UNDER 12,000 LB	467252	513136	560737	604969	655192	723599	775936	764834	808663	877080
12,000-16,000 LB	3747	10478	17973	26002	34900	45565	55962	61780	71958	84861
16,000-25,000 LB	1412	1542	1674	1797	1939	2133	2278	2237	2357	2548
OVER 25,000 LB	844	1634	2515	3450	4507	5779	7045	7713	8878	0425
* COMMERCIAL SECTOR *										
ALL WEIGHT CLASSES	2133592	2257991	2377862	2441032	2572429	2744915	2915742	2766932	2707958	2822152
UNDER 12,000 LB	690386	709664	725943	732994	743011	767772	770529	710142	700680	709395
12,000-16,000 LB	263612	283977	304670	322520	343846	373777	396059	384624	398772	426336
16,000-25,000 LB	202532	201154	197710	190140	182815	177144	165115	138313	120806	105143
OVER 25,000 LB	977062	1063196	1149539	1195378	1302757	1426222	1584039	1533853	1487700	1581278

SOURCE: METHOD 331

DATA QUALITY (DISAGGREGATE DATA): 2 (1967,72), 3 (OTHER YEARS)
(AGGREGATE DATA): 1 (1967,72), 2 (OTHER YEARS)

TABLE 7.2B -- TRUCK FUEL AND ENERGY USE, BY FUEL BY SECTOR BY WEIGHT, 1967-76
(SECOND IN A SERIES OF 4 TABLES)

FUEL USE IN THOUSANDS OF BARRELS, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

FUEL, SECTOR, WEIGHT CLASS	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
** GASOLINE **										
* HOUSEHOLD SECTOR *										
ALL WEIGHT CLASSES	90132 4732.14	100296 526573	110949 582497	121065 635602	132492 695604	147754 775731	159865 839300	158903 834260	169364 889178	185048 971519
UNDER 12,000 LB	89007 467292	97722 513046	106764 560518	115160 604592	124682 654583	137653 722683	147540 774585	145365 763170	153654 806690	166577 874536
12,000-16,000 LB	712 3744	1994 10474	3422 17966	4950 25993	6644 34888	8674 45546	10654 55935	11761 61749	13699 71923	16155 84818
16,000-25,000 LB	268 1412	293 1547	318 1672	341 1793	367 1931	403 2121	430 2261	421 2217	444 2333	479 2518
OVER 25,000 LB	145 766	287 1512	445 2341	614 3224	799 4202	1024 5381	1241 6519	1356 7124	1567 8232	1837 9647
* COMMERCIAL SECTOR *										
ALL WEIGHT CLASSES	288114 1512617	295110 1549346	300668 1578527	302257 1586860	304757 1599991	313034 1643440	311779 1636864	285051 1496534	279126 1465429	279777 1468842
UNDER 12,000 LB	131216 688890	134770 707547	137712 722994	138878 729115	140507 737671	144861 760524	144866 760554	133034 698433	130903 687246	131913 692545
12,000-16,000 LB	48608 255197	52132 273694	55687 292364	58782 308606	62332 327243	67451 354120	70911 372291	68577 360033	71195 373779	75853 398231
16,000-25,000 LB	36141 189744	35737 187623	35002 183764	33656 176694	32258 169359	31260 164118	29093 152746	24552 128898	21829 114607	19423 101975
OVER 25,000 LB	72149 378786	72471 380482	72267 379405	70941 372445	69660 365718	69462 364678	66909 351273	58888 309170	55199 289797	52588 276091

SOURCE: METHOD 331

DATA QUALITY (DISAGGREGATE DATA): 2 (1967,72), 3 (OTHER YEARS)
(AGGREGATE DATA): 1 (1967,72), 2 (OTHER YEARS)

TABLE 7.2C -- TRUCK FUEL AND ENERGY USE, BY FUEL BY SECTOR BY WEIGHT, 1967-76
(THIRD IN A SERIES OF 4 TABLES)

FUEL USE IN THOUSANDS OF BARRELS, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

FUEL, SECTOR, WEIGHT CLASS	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
** DIESEL FUEL **										
* HOUSEHOLD SECTOR *										
ALL WEIGHT CLASSES	1379	21133	32198	44264	61362	80480	108640	122720	135790	162956
UNDER 12,000 LB	00	214	533	954	1484	21123	30176	35209	41239	51302
12,000-16,000 LB	01	01	01	01	01	02	02	02	01	01
16,000-25,000 LB	01	01	02	04	17	110	214	317	320	425
OVER 25,000 LB	1373	19117	27162	35205	46270	58345	76448	84492	91530	107628
* COMMERCIAL SECTOR *										
ALL WEIGHT CLASSES	104708 609978	119424 695709	134668 784504	143868 338111	163803 954236	185578 1081079	215549 1255677	214215 1247896	209642 1221255	228548 1331389
UNDER 12,000 LB	214 1252	206 1204	187 1092	148 870	108 635	51 296	0 0	0 0	0 0	0 0
12,000-16,000 LB	1035 6030	1297 7561	1595 9292	1850 10782	2269 13225	2762 16095	3434 20313	3654 21290	3821 22262	4426 25785
16,000-25,000 LB	1679 9781	1745 10166	1770 10311	1679 9784	1658 9661	1584 9235	1488 8572	1121 6537	736 4286	381 2220
OVER 25,000 LB	101780 592915	116176 676778	131116 763809	140191 816675	159768 930715	181181 1055453	210657 1227164	209561 1220777	205299 1195953	224085 1305386

SOURCE: METHOD 331

DATA QUALITY (DISAGGREGATE DATA): 2 (1967,72), 3 (OTHER YEARS)
(AGGREGATE DATA): 1 (1967,72), 2 (OTHER YEARS)

TABLE 7.3A -- NONGOVERNMENT TRUCK ENERGY USE, BY FUEL TYPE BY RANGE
BY BODY TYPE, 1967-76
(FIRST IN A SERIES OF 6 TABLES)

ENERGY USE IN BILLIONS OF BTU

FUEL, RANGE, BODY TYPE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
* ALL FUELS & RANGES **										
ALL BODY TYPES	2606698	2784556	2960542	3077020	3268747	3521794	3756821	3603394	3599716	3796979
PICKUP OR PANEL TRUCK	1118546	1201069	1284560	1357328	1441305	1561743	1644743	1592346	1655152	1765990
PLATFORM TRUCK	361241	382317	403562	415961	441577	475764	513646	494948	488895	519420
CATTLE RACK	53153	58248	63460	67378	73306	80726	88072	86104	87566	94169
INSULATED VAN	57110	61834	66684	69387	75662	83115	92817	90575	88541	95175
REFRIGERATED VAN	105381	115239	125548	131954	145411	161422	182038	179479	177614	193100
FURNITURE VAN	55193	60594	66290	70637	77624	86388	96088	95249	97132	106132
OPEN TOP VAN	34346	35457	36135	35155	35461	35512	35503	30356	25256	22073
OTHER ENCLOSED VAN	312993	340655	368260	382856	416544	455147	503248	485759	471160	499127
BEVERAGE TRUCK	21417	22166	22897	23298	24091	25426	26568	25220	25036	26271
UTILITY TRUCK	27869	31775	35950	40032	44718	50831	56131	56784	61313	68064
GARPAGE TRUCK	9675	10841	12115	13304	14859	16887	19004	19319	20420	22746
WINCH OR CRANE	7241	8903	10746	12582	14842	17661	20591	21600	23633	27021
WEECKER	6051	6964	7943	8895	10001	11429	12705	12898	13924	15491
POLE OR LOGGING TRUCK	20908	22536	24234	25355	27572	30372	33848	33355	33285	36161
AUTO TRANSPORT TRUCK	20265	21502	22903	23894	25965	28770	32479	32503	32801	36432
DUMP TRUCK	129027	135334	141459	144616	151871	161974	173127	165502	162000	170155
TANK TRUCK (LIQUIDS)	145595	152871	159082	159311	165670	172695	181200	165512	150591	148170
TANK TRUCK (DRY BULK)	19371	21227	23194	24334	27034	30185	34597	34317	33687	36840
CONCRETE MIXER	17780	18485	19124	19263	20059	21148	22615	21360	20167	20747
OTHER	83536	76539	66396	51480	35175	14599	0	0	0	0

SOURCE: METHOD 331

DATA QUALITY: SAME AS TABLES 7.2A-7.2C

TABLE 7.3E -- NONGOVERNMENT TRUCK ENERGY USE, BY FUEL TYPE BY RANGE
BY BODY TYPE, 1967-76
(SECOND IN A SERIES OF 6 TABLES)

ENERGY USE IN BILLIONS OF BTU

FUEL, RANGE, BODY TYPE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
* GASOLINE & ALL RANGES *										
ALL BODY TYPES	1385724	2075796	2160909	2222339	2295474	2419066	2476083	2330728	2354542	2440305
PICKUP OR PANEL TRUCK	1112320	1194339	1277287	1349772	1432871	1552248	1633647	1581521	1643594	1752899
PLATFORM TRUCK	264768	267085	267606	264107	260923	262003	254411	226035	214251	206874
CATTLE RACK	36983	39906	42880	45524	48545	52824	55837	54283	56647	60657
INSULATED VAN	26265	25939	25364	24347	23285	22505	20881	17547	15515	13702
REFRIGERATED VAN	47330	47461	47238	46271	45324	45068	43268	37933	35386	33520
FURNITURE VAN	37039	39149	41219	42887	44829	47820	49558	47251	48358	50795
OPEN TOP VAN	13853	13322	12625	11661	10629	9655	8239	6155	4539	2895
OTHER ENCLOSED VAN	124091	126450	128112	128007	128208	130733	129169	117049	113486	112495
BEVERAGE TRUCK	19892	20091	20172	19953	19762	19901	19391	17295	16465	15982
UTILITY TRUCK	27541	31299	35281	39156	43521	49223	53945	54256	58459	64518
GARBAGE TRUCK	8729	9360	10000	10555	11192	12114	12737	12318	12788	13624
WINCH OR CRANE	6259	7484	8805	10132	11621	13508	15163	15579	17109	19206
WRECKER	5847	6684	7572	8439	9415	10686	11748	11849	12797	14158
POLE OR LOGGING TRUCK	12515	12556	12505	12257	12015	11959	11494	10089	9429	8948
AUTO TRANSPORT TRUCK	15439	14973	14334	13407	12422	11534	10154	7941	6329	4735
DUMP TRUCK	96790	96594	95616	93077	90519	89252	84839	73496	67574	62848
TANK TRUCK (LIQUIDS)	69966	68283	65854	62162	58256	54894	49292	39661	33003	26598
TANK TRUCK (DRY BULK)	6383	5977	5479	4838	4149	3445	2544	1432	441	0
CONCRETE MIXER	11685	11128	10413	9458	8435	7433	5064	4198	2656	1047
OTHER	42039	37716	32547	26329	19553	12261	3702	0	0	0

SOURCE: METHOD 331

DATA QUALITY: SAME AS TABLES 7.2A-7.2C

TABLE 7.3C -- NONGOVERNMENT TRUCK ENERGY USE, BY FUEL TYPE BY RANGE
BY BODY TYPE, 1967-76
(THIRD IN A SERIES OF 6 TABLES)

ENERGY USE IN BILLIONS OF BTU

FUEL, RANGE, BODY TYPE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
* GASOLINE & LOCAL *										
ALL BODY TYPES	1703241	1763201	1816848	1848665	1888282	1966765	1988514	1847764	1841461	1881408
PICKUP OR PANEL TRUCK	1104839	1155842	1204180	1239430	1281296	1351456	1384551	1304496	1319110	1368537
PLATFORM TRUCK	190508	193265	194858	193655	192819	195328	191575	172169	165371	162180
CATTLE RACK	24963	27574	30292	32844	35733	39633	42664	42206	44785	48728
INSULATED VAN	13385	13210	12905	12375	11821	11408	10565	8855	7804	6861
REFRIGERATED VAN	26441	26679	26738	26396	26085	26202	25454	22626	21457	20733
FURNITURE VAN	18125	18940	19711	20267	20927	22047	22558	21229	21436	22209
OPEN TOP VAN	7530	7267	6917	6424	5898	5410	4680	3571	2732	1889
OTHER ENCLOSED VAN	72702	74933	76857	77821	79072	81904	82320	76007	75233	76302
BEVERAGE TRUCK	16003	16122	16132	15895	15676	15709	15219	13487	12742	12257
UTILITY TRUCK	23133	25893	28795	31572	34708	38865	42209	42102	45020	49338
GARAGE TRUCK	8591	9198	9813	10341	10950	11835	12426	12000	12441	13237
WINCH OR CRANE	3605	4555	5587	6645	7828	9301	10636	11102	12358	14039
WRECKER	5566	6315	7106	7873	8737	9869	10804	10856	11683	12885
POLE OR LOGGING TRUCK	9140	9215	9227	9100	8983	9012	8743	7758	7345	7081
AUTO TRANSPORT TRUCK	1075	1323	1593	1868	2176	2562	2908	3014	3337	3772
DUMP TRUCK	86466	86344	85530	83326	81110	80065	76204	66120	60912	56794
TANK TRUCK (LIQUIDS)	52149	51477	50317	48267	46132	44551	41287	34649	30584	26939
TANK TRUCK (DRY BULK)	3931	3674	3359	2955	2520	2075	1508	816	194	0
CONCRETE MIXER	11398	10876	10204	9302	8335	7392	6091	4292	2824	1299
OTHER	23634	20434	16668	12245	7406	2084	0	0	0	0

SOURCE: METHOD 331

DATA QUALITY: SAME AS TABLES 7.2A-7.2C

TABLE 7.3D -- NONGOVERNMENT TRUCK ENERGY USE, BY FUEL TYPE BY RANGE
BY BODY TYPE, 1967-76
(FOURTH IN A SERIES OF 6 TABLES)
ENERGY USE IN BILLIONS OF BTU

FUEL, RANGE, BODY TYPE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
* GASOLINE & INTERCITY **										
ALL BODY TYPES	282590	312718	344176	373797	407313	452406	487650	483030	513146	558953
PICKUP OR PANEL TRUCK	7481	38497	73107	110342	151575	200792	249096	277025	324484	384362
PLATFORM TRUCK	74260	73820	72748	70452	68104	66675	62836	53866	48880	44694
CATTLE RACK	12020	12332	12588	12680	12812	13191	13173	12077	11862	11929
INSULATED VAN	12880	12729	12459	11972	11464	11097	10316	8692	7711	6841
REFRIGERATED VAN	20859	20782	20500	19875	19239	18866	17814	15307	13929	12787
FURNITURE VAN	18914	20209	21508	22620	23902	25773	27000	26022	26922	28586
OPEN TOP VAN	6323	6055	5708	5237	4731	4245	3559	2584	1807	1006
OTHER ENCLOSED VAN	51359	51517	51255	50186	49136	48829	46849	41042	38253	36193
BEVERAGE TRUCK	3879	3969	4040	4058	4086	4192	4172	3808	3723	3725
UTILITY TRUCK	4438	5406	6486	7584	8813	10358	11736	12154	13439	15180
GARAGE TRUCK	138	162	187	214	242	279	311	318	347	387
WINCH OR CRANE	2654	2929	3218	3487	3793	4207	4527	4477	4751	5167
WRECKER	231	369	466	566	678	817	944	993	1114	1273
POLE OR LOGGING TRUCK	3375	3341	3278	3157	3032	2947	2751	2331	2084	1867
AUTO TRANSPORT TRUCK	14354	13650	12741	11539	10246	8972	7246	4927	2992	963
DUMP TRUCK	10324	10250	10086	9751	9409	9187	8535	7376	6662	6054
TANK TRUCK (LIQUIDS)	17817	16806	15537	13895	12124	10343	8005	5012	2419	0
TANK TRUCK (DRY BULK)	2452	2303	2120	1883	1629	1370	1036	616	247	0
CONCRETE MIXER	237	252	209	156	100	41	0	0	0	0
OTHER	18405	17282	15879	14084	12147	10177	7535	4469	1664	0

SOURCE: ETHOD 331

DATA QUALITY: SAME AS TABLES 7.2A-7.2C

TABLE 7.3E -- NONGOVERNMENT TRUCK ENERGY USE, BY FUEL TYPE BY RANGE
BY BODY TYPE, 1967-76
(SECOND IN A SERIES OF 6 TABLES)

ENERGY USE IN BILLIONS OF BTU

FUEL, RANGE, BODY TYPE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
* DIESEL & ALL RANGES **										
ALL BODY TYPES	610006	695774	784637	838305	954535	1081497	1256266	1248580	1222015	1332313
PICKUP OR PANEL TRUCK	6099	5838	5287	4218	3109	1531	0	0	0	0
PLATFORM TRUCK	94845	113427	134032	149946	178726	211901	257519	267705	274030	312580
CATTLE RACK	16138	18310	20550	21830	24745	27898	32249	31857	30979	33608
INSULATED VAN	30663	35683	41080	44784	52092	60295	71585	72697	72724	81175
REFRIGERATED VAN	57784	67502	78043	85455	99908	116258	138798	141730	142584	160177
FURNITURE VAN	18138	21427	25051	27731	32775	38548	46510	47984	48766	55336
OPEN TOP VAN	20478	22110	23474	23441	24756	25749	27112	24022	20512	18921
OTHER ENCLOSED VAN	188815	214065	239937	254559	287926	323851	373300	367794	356626	385319
BEVERAGE TRUCK	1510	2043	2682	3293	4260	5435	7057	7792	8427	10115
UTILITY TRUCK	320	399	492	576	715	885	1120	1214	1290	1530
GARPAGE TRUCK	933	1446	2048	2644	3505	4538	5926	6586	7145	8500
WINCH OR CRANE	938	1370	1889	2397	3165	4096	5369	5973	6492	7795
WRECKER	204	279	367	449	574	724	929	1013	1084	1278
POLE OR LOGGING TRUCK	8297	9870	11608	12972	15420	18268	22199	23130	23743	27116
AUTO TRANSPORT TRUCK	4815	6518	8559	10480	13539	17236	22332	24577	26495	31733
DUMP TRUCK	31897	38369	45458	51174	61001	72413	88045	91901	94473	107541
TANK TRUCK (LIQUIDS)	68266	76521	84751	88917	99319	110326	125536	122122	116858	124368
TANK TRUCK (DRY BULK)	12781	14933	17256	18883	22040	25597	30491	31071	31189	34916
CONCRETE MIXER	5689	6943	8319	9481	11389	13622	16671	17539	18166	20753
OTHER	41396	38721	33754	25075	15571	2326	0	0	0	0

SOURCE: METHOD 331

DATA QUALITY: SAME AS TABLES 7.2A-7.2C

TABLE 7.3F -- NONGOVERNMENT TRUCK ENERGY USE, BY FUEL TYPE BY RANGE
BY BODY TYPE, 1967-76
(FIFTH IN A SERIES OF 6 TABLES)

ENERGY USE IN BILLIONS OF BTU

FUEL, RANGE, BODY TYPE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
* DIESEL & LOCAL **										
ALL BODY TYPES	85121	99734	115176	126970	147945	172116	205310	211023	213901	239409
PICKUP OR PANEL TRUCK	1375	1380	1348	1232	1162	1053	924	630	333	50
PLATFORM TRUCK	11116	14013	17242	20094	24590	29887	37077	39486	41336	47648
CATTLE RACK	739	789	828	828	873	915	981	900	810	798
INSULATED VAN	1472	1882	2343	2757	3400	4159	5190	5555	5839	6757
REFRIGERATED VAN	2207	2458	2700	2835	3150	3499	3988	3920	3803	4077
FURNITURE VAN	671	735	796	821	897	979	1095	1055	1002	1050
OPEN TOP VAN	1735	1978	2223	2389	2717	3088	3603	3624	3600	3950
OTHER ENCLOSED VAN	13911	16340	18915	20896	24396	28435	33977	34979	35510	39801
BEVERAGE TRUCK	586	659	732	778	876	985	1136	1131	1111	1208
UTILITY TRUCK	180	183	182	171	165	157	147	113	76	48
GARBAGE TRUCK	847	1336	1910	2483	3303	4288	5609	6244	6785	8075
WINCH OR CRANE	261	430	630	831	1116	1458	1920	2147	2341	2794
WRECKER	75	121	175	228	306	399	523	583	635	757
POLE OR LOGGING TRUCK	3830	4368	4916	5289	6021	6851	8000	8057	8008	8797
AUTO TRANSPORT TRUCK	16	73	142	215	316	437	600	692	773	941
DUMP TRUCK	21151	25537	30300	34231	40787	48427	58359	61548	63390	72004
TANK TRUCK (LIQUIDS)	13376	14876	16327	17125	19009	21086	24004	23564	22832	24443
TANK TRUCK (DRY BULK)	868	1116	1396	1648	2038	2500	3126	3351	3528	4086
CONCRETE MIXER	5646	6861	8187	9296	11125	13260	16175	16967	17525	19960
OTHER	5031	4566	3850	2786	1666	221	0	0	0	0

TABLE 7.3G -- NONGOVERNMENT TRUCK ENERGY USE, BY FUEL TYPE BY RANGE
BY BODY TYPE, 1967-76
(LAST IN A SERIES OF 6 TABLES)

ENERGY USE IN BILLIONS OF BTU

FUEL, RANGE, BODY TYPE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
* DIESEL & INTERCITY **										
ALL BODY TYPES	524936	596108	669526	711405	806653	909443	1051007	1037593	1008144	1092936
PICKUP OR PANEL TRUCK	4723	4458	3939	2986	1947	478	0	0	0	0
PLATFORM TRUCK	83729	99414	116790	129852	154136	182014	220442	228219	232694	264932
CATTLE RACK	15399	17521	19722	21002	23872	26983	31268	30957	30169	32810
INSULATED VAN	29191	33801	38737	42027	48692	56136	66395	67142	66885	74418
REFRIGERATED VAN	55577	65044	75343	82620	96758	112759	134810	137810	138781	156100
FURNITURE VAN	17467	20692	24255	26910	31878	37569	45415	46929	47764	54286
OPEN TOP VAN	18743	20132	21251	21052	22039	22661	23509	20398	16912	14971
OTHER ENCLOSED VAN	174904	197725	221022	233663	263530	295416	339323	332815	321116	345518
BEVERAGE TRUCK	924	1384	1950	2515	3384	4450	5921	6661	7316	8907
UTILITY TRUCK	140	216	310	405	550	728	973	1101	1214	1482
GARBAGE TRUCK	86	110	138	161	202	250	317	342	360	425
WINCH OR CRANE	677	940	1259	1566	2049	2638	3449	3826	4151	5001
WRECKER	129	158	192	221	268	325	406	430	449	521
POLE OR LOGGING TRUCK	4467	5502	6692	7683	9399	11417	14199	15073	15735	18319
AUTO TRANSPORT TRUCK	4799	6445	8417	10265	13223	16799	21732	23885	25722	30792
DUMP TRUCK	10746	12832	15158	16943	20214	23986	29186	30353	31083	35537
TANK TRUCK (LIQUIDS)	54890	61645	68424	71792	80310	89240	101532	98558	94026	99925
TANK TRUCK (DRY BULK)	11913	13817	15860	17235	20002	23097	27365	27720	27661	30830
CONCRETE MIXER	43	82	132	185	264	362	496	572	641	793
OTHER	36365	34155	29904	22289	13905	2105	0	0	0	0

SOURCE: METHOD 331

DATA QUALITY: SAME AS TABLES 7.2A-7.2C

TABLE 7.4A -- LOCAL HOUSEHOLD TRUCK ENERGY USE, BY STATE, 1967-76
(FIRST IN A SERIES OF 5 TABLES)

ENERGY CONSUMPTION IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
UNITED STATES	471593	508383	545817	579006	617004	670931	708819	688752	718283	768813
NEW ENGLAND	11822	12817	13835	14748	15795	17255	18312	17872	18722	20123
CONNECTICUT	3221	3364	3498	3592	3706	3899	3989	3752	3789	3924
MAINE	2606	2750	2890	3002	3132	3335	3450	3283	3354	3517
MASSACHUSETTS	3067	3544	4052	4553	5116	5643	6460	6548	7105	7892
NEW HAMPSHIRE	1318	1391	1464	1519	1587	1690	1748	1663	1699	1782
RHODE ISLAND	835	901	958	1027	1095	1191	1258	1223	1276	1366
VERMONT	775	867	963	1055	1159	1297	1407	1403	1499	1642
MID-ATLANTIC	26863	30585	34535	38388	42721	48377	53080	53443	57636	63666
NEW JERSEY	6133	6483	6926	7102	7423	7919	8207	7824	8008	8412
NEW YORK	7347	8886	10549	12231	14111	16484	18585	19167	21117	23775
PENNSYLVANIA	13383	15216	17160	19055	21187	23974	26288	26452	28511	31479

SOURCE: METHOD 332

DATA QUALITY: 2 (1967-68,71-73), 3 (OTHER YEARS)

TABLE 7.4E -- LOCAL HOUSEHOLD TRUCK ENERGY USE, BY STATE, 1967-76
(SECOND IN A SERIES OF 5 TABLES)

ENERGY CONSUMPTION IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
SOUTH ATLANTIC	62719	70441	78581	86403	95225	106883	116337	116279	124562	136743
DELAWARE	913	985	1059	1124	1198	1304	1378	1340	1398	1497
D.C.	171	169	166	160	153	149	139	118	105	94
FLORIDA	13432	15324	17333	19295	21501	24374	26770	26976	29117	32186
GEORGIA	12318	13637	15016	16315	17787	19766	21321	21131	22452	24468
MARYLAND	3939	4715	5550	6392	7334	8528	9576	9842	10811	12139
NORTH CAROLINA	12498	13898	15365	16756	18329	20430	22095	21953	23390	25546
SOUTH CAROLINA	5690	6465	7287	8087	8986	10162	11136	11200	12067	13316
VIRGINIA	8091	9115	10196	11238	12413	13960	15221	15239	16350	17974
WEST VIRGINIA	5667	6133	6609	7036	7524	8210	8701	8480	8872	9523

SOURCE: METHOD 332

DATA QUALITY: 2 (1967-68,71-73), 3 (OTHER YEARS)

TABLE 7.4C — LOCAL HOUSEHOLD TRUCK ENERGY USE, BY STATE, 1967-76
(THIRD IN A SERIES OF 5 TABLES)

ENERGY CONSUMPTION IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
EAST NORTH CENTRAL	53566	60121	67029	73663	81149	91047	99070	98988	105998	116336
ILLINOIS	12025	13147	14306	15373	16585	18249	19497	19151	20185	21823
INDIANA	13405	13733	13996	14076	14203	14601	14567	13338	13066	13118
MICHIGAN	15408	17921	20509	23273	26262	30104	33389	33945	36930	41117
OHIO	9889	11720	13690	15663	17873	20686	23137	23696	25949	29060
WISCONSIN	2939	3600	4428	5278	6226	7407	8490	8858	9868	11218
EAST SOUTH CENTRAL	35260	39222	43378	47326	51790	57757	62504	62140	66230	72381
ALABAMA	13961	14649	15309	15808	16395	17352	17839	16868	17121	17830
KENTUCKY	5659	6959	8368	9801	11402	13412	15210	15764	17442	19712
MISSISSIPPI	8718	9162	9592	9927	10324	10960	11317	10747	10945	11457
TENNESSEE	6922	8452	10109	11790	13669	16033	18138	18761	20722	23382

SOURCE: METHOD 332

DATA QUALITY: 2 (1967-68,71-73), 3 (OTHER YEARS)

TABLE 7.4D -- LOCAL HOUSEHOLD TRUCK ENERGY USE, BY STATE, 1967-76
(FOURTH IN A SERIES OF 5 TABLES)

ENERGY CONSUMPTION IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
WEST NORTH CENTRAL	34359	37823	41425	44785	48592	53759	57730	56985	60339	65522
IOWA	4684	5223	5788	6326	6933	7743	8388	8348	8907	9742
KANSAS	7694	8105	8504	8817	9183	9760	10078	9572	9760	10213
MINNESOTA	6262	6922	7610	8257	8989	9976	10744	10634	11289	12289
MISSOURI	10043	11317	12662	13960	15422	17348	18919	18943	20327	22350
NEBRASKA	2626	3015	3430	3836	4294	4887	5386	5445	5894	6531
NORTH DAKOTA	1246	1344	1443	1531	1631	1774	1874	1822	1901	2035
SOUTH DAKOTA	1804	1897	1988	2058	2140	2271	2341	2221	2261	2362
WEST SOUTH CENTRAL	92067	96877	101545	105183	109473	116290	120072	114036	116206	121610
ARKANSAS	14088	13624	12995	12100	11146	10270	8945	6890	5356	3823
LOUISIANA	11943	12622	13288	13823	14446	15407	15965	15218	15574	16356
OKLAHOMA	13845	14552	15233	15757	16373	17361	17885	16946	17234	17988
TEXAS	52191	56079	60029	63503	67508	73252	77277	74982	78042	83443

SOURCE: METHOD 332

DATA QUALITY: 2 (1967-68,71-73), 3 (OTHER YEARS)

TABLE 7.4E -- LOCAL HOUSEHOLD TRUCK ENERGY USE, BY STATE, 1967-76
(LAST IN A SERIES OF 5 TABLES)

ENERGY CONSUMPTION IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
MOUNTAIN	49201	51918	54571	56679	59143	62983	65166	62024	63372	66456
ARIZONA	11162	11989	12627	13559	14399	15605	16428	15910	16539	17646
COLORADO	10619	11294	11965	12526	13175	14143	14750	14152	14578	15411
IDAHO	5026	5002	4936	4787	4636	4548	4297	3695	3367	3094
MONTANA	3614	3716	3901	3838	3888	4014	4020	3697	3645	3680
NEVADA	3460	3542	3607	3626	3657	3759	3753	3439	3372	3392
NEW MEXICO	7632	7944	8234	8429	8665	9086	9252	8662	8702	8967
UTAH	5474	6085	6725	7331	8016	8933	9658	9594	10219	11159
WYOMING	2214	2346	2476	2583	2707	2895	3003	2875	2950	3107
PACIFIC	105713	108550	110852	111801	113080	116548	116518	106963	105206	105973
ALASKA	1458	1624	1798	1963	2149	2398	2596	2581	2752	3008
CALIFORNIA	79565	80791	81538	81127	80877	82043	80597	72563	69838	68652
HAWAII	718	808	903	995	1098	1235	1346	1347	1444	1587
OREGON	7467	7732	7969	8110	8286	8633	8731	8116	8091	8269
WASHINGTON	16505	17595	18684	19606	20670	22239	23248	22356	23081	24457

SOURCE: METHOD 332

DATA QUALITY: 2 (1967-68,71-73), 3 (OTHER YEARS)

TABLE 7.5A -- LOCAL COMMERCIAL TRUCK ENERGY USE, BY STATE, 1967-76
(FIRST IN A SERIES OF 5 TABLES)

ENERGY CONSUMPTION IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
UNITED STATES	1324531	1363979	1397393	1409209	1434082	1485387	1505888	1391491	1358739	1376067
NEW ENGLAND	56062	57452	58516	58513	59181	60801	61307	56061	53786	53726
CONNECTICUT	13307	13502	13595	13412	13374	13512	13379	11965	11178	10836
MAINE	5979	6218	6441	6578	6769	7099	7267	6819	6808	7025
MASSACHUSETTS	25679	26282	26724	26643	26918	27602	27854	25406	24184	24055
NEW HAMPSHIRE	3999	3952	3879	3737	3614	3544	3403	2956	2645	2455
RHODE ISLAND	4357	4624	4880	5065	5315	5676	5929	5643	5701	5968
VERMONT	2741	2874	2997	3078	3191	3368	3475	3272	3270	3387
MID-ATLANTIC	139256	142238	144352	143800	144828	148114	148609	135144	128845	127791
NEW JERSEY	31955	32812	33478	33468	33977	35001	35584	32642	31158	31197
NEW YORK	58014	58635	58809	57852	57357	57643	56563	50253	46804	44991
PENNSYLVANIA	49287	50791	52065	52480	53494	55470	56462	52249	50883	51603

SOURCE: METHOD 332

DATA QUALITY: 2 (1967-68,71-73), 3 (OTHER YEARS)

TABLE 7.5B -- LOCAL COMMERCIAL TRUCK ENERGY USE, BY STATE, 1967-76
(SECOND IN A SERIES OF 5 TABLES)

ENERGY CONSUMPTION IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
SOUTH ATLANTIC	20586.2	21309.3	21956.2	22281.9	22830.3	23824.6	24357.0	22713.9	22392.2	22923.8
DELAWARE	3216	3325	3423	3465	3551	3704	3801	3542	3465	3542
D.C.	2877	2767	2621	2410	2201	1997	1728	1295	923	576
FLORIDA	45324	47646	49916	51514	53842	57355	60152	57406	57600	60408
GEORGIA	36940	38747	40456	41611	43220	45725	47334	44738	44871	46634
MARYLAND	20068	21007	21902	22487	23371	24746	25758	24415	24384	25405
NORTH CAROLINA	42899	43897	44574	44788	45186	46407	45469	42519	41302	41389
SOUTH CAROLINA	18842	19056	19145	18919	18802	18990	18695	16765	15879	15507
VIRGINIA	27418	28087	28506	28673	28950	29728	29789	27249	26413	26442
WEST VIRGINIA	8278	8561	8319	8952	9180	9594	9844	9210	9085	9335

SOURCE: METHOD 332

DATA QUALITY: 2 (1967-68, 71-73), 3 (OTHER YEARS)

TABLE 7.5C -- LOCAL COMMERCIAL TRUCK ENERGY USE, BY STATE, 1967-76
(THIRD IN A SERIES OF 5 TABLES)

ENERGY CONSUMPTION IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
EAST NORTH CENTRAL	212288	216909	220257	219891	221251	226234	226008	205705	197741	196581
ILLINOIS	55424	56776	57810	57833	58432	59984	60354	55311	53309	53423
INDIANA	31631	33364	35030	36241	37822	40207	41832	39843	40355	42300
MICHIGAN	48417	48774	48738	47784	47096	47031	45665	40190	37213	35315
OHIO	50233	51273	52008	51872	52125	53232	53057	48145	46180	45737
WISCONSIN	26583	26722	26671	26161	25776	25780	25100	22216	20684	19806
EAST SOUTH CENTRAL	103318	105819	107825	108204	109397	112587	113291	104171	101430	102349
ALABAMA	25591	27053	28518	29666	31198	33482	35276	33963	34605	36706
KENTUCKY	24069	24888	25627	26011	26634	27794	28399	26502	26177	26833
MISSISSIPPI	21044	21725	22303	22551	22928	23715	23858	22030	21780	22194
TENNESSEE	32614	32153	31377	29976	28637	27596	25758	21676	18868	16616

SOURCE: METHOD 332

DATA QUALITY: 2 (1967-68,71-73), 3 (OTHER YEARS)

TABLE 7.5E -- LOCAL COMMERCIAL TRUCK ENERGY USE, BY STATE, 1967-76
(FOURTH IN A SERIES OF 5 TABLES)

ENERGY CONSUMPTION IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
WEST NORTH CENTRAL	156971	159924	161930	161434	161652	164590	163227	148071	142744	141579
IOWA	28790	29079	29177	28823	28556	28755	28103	25102	23819	23172
KANSAS	25986	26414	26687	26564	26534	26962	26606	24006	23059	22769
MINNESOTA	30637	31269	31728	31700	31860	32576	32461	29526	28475	28307
MISSOURI	30497	32072	33588	34696	36124	38343	39735	37689	38054	39701
NEBRASKA	22363	22138	21670	20742	19788	18981	17752	15118	13468	12150
NORTH DAKOTA	9970	9953	9848	9565	9290	9131	8664	7483	6838	6325
SOUTH DAKOTA	8728	8999	9232	9344	9500	9842	9906	9147	9031	9155
WEST SOUTH CENTRAL	199334	205127	210065	211963	215547	223252	225010	208965	204686	207566
ARKANSAS	22472	22830	23031	22843	22754	23012	22585	20197	19176	18628
LOUISIANA	28958	29778	30467	30713	31187	32249	32571	30043	29365	29683
OKLAHOMA	31421	33034	34639	35821	37521	40104	42238	40539	40924	43238
TEXAS	116483	119485	121928	122586	124085	127887	128616	118186	115221	116017

SOURCE: METHOD 332

DATA QUALITY: 2 (1967-68,71-73), 3 (OTHER YEARS)

TABLE 7.5E -- LOCAL COMMERCIAL TRUCK ENERGY USE, BY STATE, 1967-76
(LAST IN A SERIES OF 5 TABLES)

ENERGY CONSUMPTION IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
MOUNTAIN	73562	76475	79143	80705	83025	87015	89172	83490	83149	85898
ARIZONA	13147	13880	14597	15123	15836	16898	17672	16867	17048	17896
COLORADO	18406	19735	21084	22219	23635	25636	27210	26410	27230	29110
IDAHO	8648	8601	8460	8140	7837	7604	7095	5955	5393	5021
MONTANA	9200	9317	9372	9273	9217	9309	9139	8181	7758	7553
NEVADA	3374	3588	3798	3960	4173	4479	4708	4515	4592	4853
NEW MEXICO	9578	9702	9761	9658	9591	9670	9462	8436	8018	7817
UTAH	6618	7009	7405	7722	8150	8783	9308	9012	9222	9847
WYOMING	4591	4643	4666	4610	4586	4636	4578	4114	3888	3801
PACIFIC	177802	186865	195667	201805	210822	224469	235113	224307	225589	236879
ALASKA	1150	1319	1498	1669	1876	2140	2390	2426	2596	2885
CALIFORNIA	142330	149814	157144	162408	170001	181416	190448	182186	183782	193558
HAWAII	3285	3379	3454	3461	3516	3625	3680	3375	3236	3242
OREGON	10519	10927	11301	11484	11857	12457	12940	12172	11952	12345
WASHINGTON	20518	21426	22270	22783	23572	24831	25655	24148	24023	24849

SOURCE: METHOD 332

DATA QUALITY: 2 (1967-68, 71-73), 3 (OTHER YEARS)

TABLE 7.6A -- LOCAL NONGOVERNMENT TRUCK GASOLINE & ENERGY USE, BY STATE, 1967-76.
(FIRST IN A SERIES OF 5 TABLES)

GASOLINE USE IN THOUSANDS OF BARRELS, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
UNITED STATES	324427 1703246	335848 1763204	346066 1816851	352127 1848669	359672 1888284	374622 1966768	378765 1988519	351955 1847768	350754 1841463	358364 1881412
NEW ENGLAND	11589 60854	11879 62392	12114 63623	12190 64016	12302 64611	12551 66439	12615 66249	11547 60649	11323 59475	11367 59707
CONNECTICUT	2771 14549	2801 14711	2814 14779	2786 14629	2762 14502	2783 14617	2714 14255	2423 12728	2310 12136	2246 11798
MAINE	1594 8372	1657 8705	1715 9011	1754 9213	1801 9458	1885 9904	1918 10070	1792 9413	1798 9441	1848 9711
MASSACHUSETTS	4720 24783	4834 25382	4924 25856	4950 25988	4989 26199	5125 26907	5103 26794	4664 24492	4566 23977	4576 24027
NEW HAMPSHIRE	1007 5295	998 5244	980 5147	944 4959	907 4766	882 4633	824 4328	698 3671	625 3285	561 2949
RHODE ISLAND	879 4615	933 4903	988 5189	1032 5426	1085 5700	1163 6112	1212 6367	1162 6102	1195 6278	1262 6629
VERMONT	618 3250	656 3447	693 3641	724 3801	758 3986	812 4256	844 4435	808 4243	829 4358	874 4593
MID-ATLANTIC	28438 149310	29317 153934	30079 157932	30465 159958	30967 162586	32086 168463	32260 169380	29798 156455	29507 154927	29941 157202
NEW JERSEY	6166 32373	6260 32873	6319 33177	6286 33009	6268 32907	6358 33382	6245 32792	5623 29522	5411 28414	5319 27930
NEW YORK	11288 59268	11584 60821	11826 62093	11915 62557	12041 63224	12400 65108	12386 65030	11358 59638	11160 58596	11228 58951
PENNSYLVANIA	10984 57669	11473 60240	11934 62662	12264 64392	12658 66455	13328 69973	13629 71558	12817 67295	12936 67917	13394 70321

SOURCE: METHOD 332 DATA QUALITY: 2 (1967,72), 3 (OTHER YEARS)**

TABLE 7.6B -- LOCAL NONGOVERNMENT TRUCK GASOLINE & ENERGY USE, BY STATE, 1967-76
(FIRST IN A SERIES OF 5 TABLES)

GASOLINE USE IN THOUSANDS OF BARRELS, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
SOUTH ATLANTIC	48597 255183	50915 267341	53123 278930	54758 287527	56698 297702	59899 314504	61468 322742	58013 304603	58769 308563	61081 320711
DELAWARE	723 3800	745 3918	765 4022	776 4075	789 4143	817 4295	822 4320	760 3993	753 3955	764 4016
D.C.	539 2837	513 2697	479 2520	434 2285	386 2032	339 1783	274 1445	187 989	116 609	40 212
FLORIDA	10536 55321	11132 58450	11716 61513	12184 63970	12729 66833	13572 71258	14060 73816	13397 70340	13706 71959	14389 75548
GEORGIA	8822 46319	9339 49031	9847 51700	10260 53870	10741 56391	11475 60244	11910 62532	11373 59709	11657 61207	12265 64394
MARYLAND	4244 22284	4497 23610	4745 24915	4948 25984	5185 27225	5544 29112	5760 30243	5505 28904	5648 29657	5948 31229
NORTH CAROLINA	10223 53678	10623 55775	10989 57697	11227 58950	11519 60476	12052 63278	12245 64289	11436 60045	11460 60168	11776 61828
SOUTH CAROLINA	4495 23607	4656 24450	4801 25207	4887 25662	4994 26226	5205 27332	5266 27652	4897 25712	4884 25643	4993 26219
VIRGINIA	6445 33840	6724 35305	6986 36677	7168 37639	7388 38792	7768 40786	7932 41647	7448 39105	7505 39403	7757 40728
WEST VIRGINIA	2570 13497	2686 14105	2795 14679	2874 15092	2967 15584	3127 16416	3199 16798	3010 15806	3040 15962	3149 16537

SOURCE: METHOD 332 DATA QUALITY: 2 (1967,72), 3 (OTHER YEARS)***

TABLE 7.6C -- LOCAL NONGOVERNMENT TRUCK GASOLINE & ENERGY USE, BY STATE, 1967-76
(FIRST IN A SERIES OF 5 TABLES)

GASOLINE USE IN THOUSANDS OF BARRELS, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
EAST NORTH CENTRAL	47499 249398	49224 258446	50777 266600	51726 271580	52899 277737	55170 289654	55854 293257	51975 272894	51877 272382	53090 278752
ILLINOIS	11818 62049	12135 63710	12396 65078	12496 65606	12638 66350	13024 66377	13018 68348	11948 62734	11750 61696	11834 62135
INDIANA	8167 42878	8497 44613	8801 46214	9006 47286	9253 48583	9698 50915	9868 51814	9233 48480	9269 48667	9544 50109
MICHIGAN	11378 59742	11865 62297	12320 64684	12637 66345	13016 68338	13677 71805	13957 73280	13097 68763	13188 69239	13621 71519
OHIO	10737 56376	11201 58809	11635 61087	11938 62680	12302 64590	12933 67901	13204 69324	12395 65080	12487 65564	12905 67756
WISCONSIN	5399 28353	5526 29017	5625 29537	5649 29663	5690 29876	5838 30652	5807 30491	5302 27837	5183 27216	5186 27233
EAST SOUTH CENTRAL	25553 134170	26559 139452	27483 144305	28090 147487	28826 151356	30174 156430	30668 161023	28656 150456	28727 150824	29531 155059
ALABAMA	7299 38322	7626 40041	7935 41663	8157 42826	8421 44212	8870 46568	9073 47639	8536 44816	8618 45247	8926 46865
KENTUCKY	5462 28678	5806 30486	6148 32283	6433 33782	6764 35516	7257 38107	7566 39726	7256 38098	7471 39225	7894 41449
MISSISSIPPI	5517 28969	5703 29945	5867 30807	5961 31295	6077 31910	6319 33174	6375 33475	5912 31040	5879 30864	5991 31458
TENNESSEE	7275 38201	7424 38980	7533 39552	7539 39584	7564 39718	7728 40581	7654 40183	6952 36502	6759 35488	6720 35287

SOURCE: METHOD 332 DATA QUALITY: 2 (1967,72), 3 (OTHER YEARS)**

TABLE 7.6D -- LOCAL NONGOVERNMENT TRUCK GASOLINE & ENERGY USE, BY STATE, 1967-76
(FIRST IN A SERIES OF 5 TABLES)

GASOLINE USE IN THOUSANDS OF BARRELS, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
WEST NORTH CENTRAL	35548 186653	36594 192160	37487 196847	37910 199050	38464 201966	39780 208877	39916 209588	36790 193173	36346 190836	36784 193148
IOWA	6304 33100	6435 33792	6533 34304	6543 34350	6568 34486	6715 35259	6654 34938	6049 31762	5886 30907	5859 30763
KANSAS	6341 33297	6480 34027	6586 34581	6603 34669	6638 34852	6796 35682	6744 35413	6142 32250	5989 31443	5974 31365
MINNESOTA	6786 35633	6989 36698	7162 37607	7245 38044	7355 38618	7611 39958	7640 40115	7045 36993	6965 36567	7053 37034
MISSOURI	7473 39234	7962 41806	8451 44373	8865 46543	9341 49045	10046 52747	10497 55115	10090 52978	10413 54672	11029 57905
NEBRASKA	4586 24078	4591 24109	4562 23955	4460 23420	4359 22890	4323 22702	4138 21729	3615 18982	3358 17632	3163 16612
NORTH DAKOTA	2077 10906	2090 10976	2088 10968	2055 10793	2023 10627	2024 10631	1957 10277	1730 9084	1630 8559	1562 8205
SOUTH DAKOTA	1981 10405	2047 10752	2105 11059	2139 11231	2180 11448	2265 11898	2286 12001	2119 11124	2105 11056	2144 11264
WEST SOUTH CENTRAL	53804 282488	55415 290948	56795 298186	57457 301672	58332 306258	60360 316915	60605 318195	55897 293471	55261 290134	55974 293876
ARKANSAS	6727 35320	6692 35135	6600 34652	6397 33588	6191 32503	6068 31861	5727 30073	4919 25828	4474 23493	4104 21548
LOUISIANA	7558 39687	7788 40892	7986 41928	8082 42438	8209 43104	8499 44628	8539 44834	7880 41376	7796 40933	7902 41491
OKLAHOMA	8272 43429	8569 44993	8837 46398	8999 47252	9201 48307	9592 50363	9708 50972	9031 47414	9010 47307	9217 48392
TEXAS	31247 164052	32366 169928	33372 175208	33979 178394	34731 182344	36201 190063	36631 192316	34067 178853	33981 178401	34751 182445

SOURCE: METHOD 332 DATA QUALITY: 2 (1967,72), 3 (OTHER YEARS)***

TABLE 7.6E -- LOCAL NONGOVERNMENT TRUCK GASOLINE & ENERGY USE, BY STATE, 1967-76
(FIRST IN A SERIES OF 5 TABLES)

GASOLINE USE IN THOUSANDS OF BARRELS, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
MOUNTAIN	22533 118341	23462 123212	24322 127731	24907 130787	25609 134482	26862 141055	27359 143670	25620 134544	25746 135195	26532 139336
ARIZONA	4442 23324	4701 24687	4957 26029	5164 27118	5405 28384	5775 30321	5994 31468	5722 30044	5865 30794	6169 32394
COLORADO	5363 28160	5696 29905	6025 31635	6299 33069	6614 34731	7069 37226	7383 38767	7073 37140	7275 38200	7680 40323
IDAHO	2432 12773	2421 12717	2391 12555	2319 12183	2248 11806	2207 11591	2087 10962	1796 9437	1639 8610	1509 7928
MONTANA	2357 12380	2390 12552	2408 12647	2392 12559	2379 12494	2408 12645	2359 12388	2117 11119	2031 10666	1988 10443
NEVADA	1245 6540	1292 6786	1334 7009	1361 7149	1394 7321	1455 7645	1476 7754	1376 7227	1376 7226	1410 7408
NEW MEXICO	3207 16844	3282 17234	3340 17540	3354 17611	3377 17734	3464 18189	3445 18088	3144 16509	3073 16136	3073 16139
UTAH	2231 11720	2400 12602	2569 13495	2719 14279	2891 15177	3135 16463	3303 17347	3202 16814	3331 17494	3557 18679
WYOMING	1256 6600	1280 6729	1298 6821	1299 6819	1301 6835	1328 6974	1312 6896	1190 6254	1156 6069	1146 6022
PACIFIC	50812 266786	52427 275269	53834 282656	54574 286543	55525 291532	57591 302380	57971 304364	53608 281470	53155 279078	54010 283570
ALASKA	473 2491	531 2793	591 3110	649 3413	714 3755	800 4208	870 4574	869 4566	930 4885	1020 5357
CALIFORNIA	39879 209366	41012 215318	41966 220328	42386 222530	42953 225507	44361 232902	44448 233355	40901 214737	40337 211774	40748 213932
HAWAII	653 3436	677 3561	699 3674	712 3743	728 3827	759 3992	769 4042	715 3761	715 3754	731 3842
OREGON	3143 16502	3218 16900	3278 17215	3294 17302	3321 17441	3411 17911	3397 17835	3104 16301	3039 15957	3045 15989
WASHINGTON	6664 34991	6989 36697	7300 38329	7533 39555	7809 41002	8260 43367	8487 44558	8019 42105	8134 42708	8466 44450

TABLE 7.7A -- LOCAL NONGOVERNMENT TRUCK DIESEL & ENERGY USE, BY STATE, 1967-76
(FIRST IN A SERIES OF 5 TABLES)

FUEL USE IN THOUSANDS OF BARRELS, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
UNITED STATES	14611 85124	17120 99736	19771 115178	21795 126972	25396 147947	29546 172118	35243 205312	36224 211025	36718 213904	41098 239413
NEW ENGLAND	1193 6972	1338 7813	1479 8644	1567 9140	1751 10228	1961 11441	2253 13139	2232 13016	2182 12729	2358 13757
CONNECTICUT	338 1974	367 2142	392 2291	401 2339	432 2523	466 2714	514 2997	489 2848	457 2666	472 2751
MAINE	33 195	42 245	51 302	60 351	73 430	89 522	111 647	118 689	123 721	142 831
MASSACHUSETTS	680 3963	762 4439	842 4907	890 5186	995 5799	1112 6483	1276 7438	1263 7361	1234 7191	1332 7763
NEW HAMPSHIRE	2 16	15 93	31 189	49 289	72 426	101 592	139 813	160 939	180 1051	219 1280
RHODE ISLAND	97 568	104 611	111 647	112 654	119 697	127 741	138 805	129 751	118 689	119 696
VERMONT	43 256	48 283	52 308	55 321	60 353	66 389	75 439	73 428	70 411	74 436
MID-ATLANTIC	2869 16718	3217 18749	3562 20755	3769 21962	4220 24593	4724 27528	5427 31627	5378 31340	5261 30657	5687 33143
NEW JERSEY	977 5692	1095 6383	1213 7066	1283 7476	1437 8371	1608 5369	1847 10763	1830 10665	1790 10432	1935 11277
NEW YORK	1040 6062	1144 6664	1240 7226	1285 7485	1407 8200	1540 8973	1728 10070	1672 9740	1595 9291	1680 9787
PENNSYLVANIA	852 4964	978 5702	1109 6463	1201 7001	1376 8022	1576 9186	1852 10794	1876 10935	1876 10934	2072 12079

SOURCE: METHOD 332 DATA QUALITY: 2 (1967,72), 3 (OTHER YEARS)***

TABLE 7.7B -- LOCAL NONGOVERNMENT TRUCK DIESEL & ENERGY USE, BY STATE, 1967-76
(FIRST IN A SERIES OF 5 TABLES)

FUEL USE IN THOUSANDS OF BARRELS, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
SOUTH ATLANTIC	2134 12453	2582 15066	3070 17903	3473 20255	4143 24164	4928 28725	5994 34949	6275 36578	6468 37704	7352 42860
DELAWARE	54 319	65 381	76 448	86 502	101 593	120 700	145 846	151 879	154 901	174 1019
D.C.	35 298	40 236	45 264	48 283	55 321	62 363	72 422	72 424	72 419	78 458
FLORIDA	500 2975	675 3936	876 5103	1063 6197	1345 7840	1681 9794	2134 12435	2318 13505	2468 14380	2887 16822
GEORGIA	464 2767	526 3066	587 3426	628 3660	710 4139	803 4677	931 5426	931 5429	920 5362	1003 5852
MARYLAND	239 1637	355 2072	428 2494	489 2852	589 3436	707 4115	866 5050	913 5322	947 5520	1083 6310
NORTH CAROLINA	295 1719	344 2006	396 2308	435 2535	505 2943	586 3414	696 4060	714 4161	722 4206	806 4696
SOUTH CAROLINA	143 835	161 940	179 1043	190 1108	213 1244	240 1398	276 1611	275 1602	269 1572	292 1705
VIRGINIA	273 1619	316 1845	356 2074	382 2229	435 2536	494 2882	577 3363	580 3383	576 3360	633 3688
WEST VIRGINIA	76 444	100 584	127 743	152 889	190 1112	235 1378	297 1736	321 1873	340 1984	396 2310

SOURCE: METHOD 332

DATA QUALITY: 2 (1967,72), 3 (OTHER YEARS)**

TABLE 7.7C -- LOCAL NONGOVERNMENT TRUCK DIESEL & ENERGY USE, BY STATE, 1967-76
(FIRST IN A SERIES OF 5 TABLES)

FUEL USE IN THOUSANDS OF BARRELS, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
EAST NORTH CENTRAL	2669 15563	3023 17622	3379 19697	3610 21045	4082 23794	4614 26892	5352 31198	5356 31216	5290 30831	5775 33655
ILLINOIS	868 5061	1006 5862	1149 6697	1254 7308	1448 8435	1669 9725	1974 11503	2013 11728	2025 11798	2250 13111
INDIANA	332 1937	387 2260	446 2601	490 2859	569 3321	661 3853	786 4585	806 4701	815 4754	911 5309
MICHIGAN	682 3975	734 4277	778 4533	786 4582	838 4887	891 5195	969 5649	906 5278	832 4847	840 4895
OHIO	626 3647	698 4069	769 4481	809 4716	901 5252	1003 5846	1146 6679	1129 6581	1098 6400	1180 6878
WISCONSIN	161 943	198 1154	237 1385	271 1580	326 1899	390 2273	477 2782	502 2928	520 3032	594 3462
EAST SOUTH CENTRAL	597 3484	773 4505	969 5658	1149 6702	1425 8315	1752 10221	2196 12805	2358 13750	2488 14499	2885 16822
ALABAMA	196 1142	259 1508	330 1924	396 2308	496 2893	615 3585	776 4523	838 4886	889 5178	1035 6034
KENTUCKY	136 797	180 1048	228 1333	273 1595	342 1994	423 2468	533 3109	575 3354	609 3551	709 4134
MISSISSIPPI	64 373	84 491	107 625	128 748	160 936	198 1159	250 1460	270 1575	286 1668	333 1943
TENNESSEE	201 1172	250 1458	304 1776	352 2051	427 2492	516 3009	637 3713	675 3935	704 4102	808 4711

SOURCE: METHOD 332 DATA QUALITY: 2 (1967,72), 3 (OTHER YEARS)***

TABLE 7.7D -- LOCAL NONGOVERNMENT TRUCK DIESEL & ENERGY USE, BY STATE, 1967-76
(FIRST IN A SERIES OF 5 TABLES)

FUEL USE IN THOUSANDS OF BARRELS, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
WEST NORTH CENTRAL	518 3036	651 3812	798 4673	930 5430	1136 6630	1378 8041	1706 9960	1815 10591	1898 11071	2184 12747
IOWA	48 282	70 413	96 564	122 712	159 927	203 1184	262 1531	289 1688	312 1819	369 2151
KANSAS	43 252	60 350	79 463	98 571	125 730	158 920	202 1177	220 1286	236 1376	277 1617
MINNESOTA	173 1012	203 1188	235 1374	260 1517	304 1771	354 2063	423 2465	435 2537	442 2574	495 2885
MISSOURI	168 982	207 1210	250 1460	287 1674	347 2021	415 2423	511 2981	540 3146	560 3267	641 3739
NEBRASKA	29 172	51 297	76 446	102 596	138 809	182 1065	241 1409	271 1581	296 1730	354 2069
NORTH DAKOTA	43 252	45 262	45 266	44 257	44 260	44 259	44 261	38 221	31 180	26 155
SOUTH DAKOTA	14 84	15 92	17 100	17 103	19 112	21 122	23 136	22 132	21 125	22 131
WEST SOUTH CENTRAL	1145 6677	1416 8259	1713 10003	1972 11505	2388 13923	2875 16751	3538 20622	3740 21803	3890 22677	4459 25989
ARKANSAS	169 984	176 1028	180 1053	175 1024	179 1044	130 1053	184 1076	160 932	133 779	119 697
LOUISIANA	174 1017	220 1283	270 1578	315 1839	386 2250	469 2735	582 3393	620 3614	649 3783	748 4360
OKLAHOMA	221 1291	323 1885	441 2576	557 3248	725 4229	927 5402	1198 6981	1320 7694	1423 8293	1682 9804
TEXAS	581 3385	697 4063	822 4796	925 5394	1098 6400	1299 7571	1574 9172	1640 9563	1685 9822	1910 11128

SOURCE: METHOD 332 DATA QUALITY: 2 (1967,72), 3 (OTHER YEARS)***

TABLE 7.7E -- LOCAL NONGOVERNMENT TRUCK DIESEL & ENERGY USE, BY STATE, 1967-76
(FIRST IN A SERIES OF 5 TABLES)

FUEL USE IN THOUSANDS OF BARRELS, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
MOUNTAIN	700 4093	814 4767	938 5475	1025 6002	1192 6959	1380 8059	1640 9570	1678 9797	1720 10042	1960 11446
ARIZONA	152 890	183 1070	217 1266	244 1425	290 1693	344 2005	417 2431	435 2537	447 2608	507 2957
COLORADO	141 822	184 1077	234 1366	279 1630	349 2035	431 2515	543 3164	585 3411	619 3608	720 4198
IDAHO	152 887	148 864	139 809	120 700	104 606	82 478	54 317	13 81	0 0	0 0
MONTANA	69 406	76 444	82 479	84 494	92 538	100 585	112 652	107 627	101 594	106 620
NEVADA	47 275	54 320	63 367	68 401	79 465	92 538	109 638	112 652	112 658	125 733
NEW MEXICO	46 270	53 309	60 350	64 378	74 432	84 494	99 579	100 585	100 584	110 645
UTAH	63 367	78 459	96 561	111 650	136 792	164 959	203 1186	216 1260	225 1315	259 1513
WYOMING	30 176	38 224	47 277	55 324	68 398	83 485	103 603	110 644	116 675	133 780
PACIFIC	2762 16102	3279 19113	3832 22339	4272 24899	5028 29309	5906 34419	7106 41416	7363 42915	7521 43828	8478 49403
ALASKA	20 117	25 149	31 185	37 217	45 267	56 326	69 406	74 434	78 455	90 526
CALIFORNIA	2051 11952	2460 14334	2902 16907	3261 19001	3868 22533	4573 26641	5537 32256	5770 33614	5924 34510	6709 39088
HAWAII	96 563	106 620	115 674	120 700	131 770	144 845	162 952	157 924	150 884	160 935
OREGON	253 1477	299 1741	347 2022	384 2241	450 2624	526 3067	630 3674	650 3791	662 3857	743 4332
WASHINGTON	342 1993	389 2269	437 2551	470 2740	534 3115	607 3540	708 4128	712 4152	707 4122	776 4522

TABLE 7.8A -- INTERCITY NONGOVERNMENT TRUCK DIESEL FUEL AND ENERGY USE,
 BY STATE, 1967-76
 (FIRST IN A SERIES OF FIVE TABLES)
 FUEL USE IN THOUSANDS OF BARRELS, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
UNITED STATES	90112 524939	102329 596111	114932 669529	122121 711408	138472 806657	156117 909445	180418 1051008	178115 1037595	173060 1008145	187615 1092938
NEW ENGLAND	2718 15847	3077 17943	3442 20059	3601 20990	3950 23019	4158 24243	4648 27087	4736 27606	4416 25740	3829 22308
CONNECTICUT	931 5427	1025 5975	1181 6882	1196 6968	1231 7171	1278 7446	1395 8128	1390 8098	1237 7208	1330 7748
MAINE	396 2308	437 2548	481 2802	562 3277	623 3629	739 4309	843 4916	870 5073	868 5059	903 5261
MASSACHUSETTS	955 5567	1078 6282	1217 7094	1143 6662	1258 7332	1228 7159	1394 8122	1441 8399	1370 7980	1131 6591
NEW HAMPSHIRE	175 1020	197 1152	215 1252	219 1281	254 1484	257 1500	259 1509	255 1488	207 1209	227 1326
RHODE ISLAND	200 1167	267 1559	270 1575	268 1561	320 1865	380 2217	401 2337	389 2269	314 1833	321 1870
VERMONT	61 358	73 427	78 454	213 1241	264 1538	276 1612	356 2075	391 2279	420 2451	0 0
MID-ATLANTIC	9624 56072	10910 63561	12775 74428	14129 82311	15121 88092	17302 100800	19237 112066	19500 113602	17278 100658	19179 111732
NEW JERSEY	2754 16047	3090 18003	3304 19250	3573 20816	3787 22062	4106 23919	4497 26197	4458 25971	3945 22981	4434 25830
NEW YORK	1153 5719	1321 7698	2131 12415	2712 15798	2809 16366	3022 17608	3579 20850	3213 18720	2764 16106	3005 17508
PENNSYLVANIA	5717 33306	6499 37860	7340 42763	7844 45697	8525 49664	10174 59273	11161 65019	11829 68911	10569 61571	11740 68394

SOURCE: METHOD 333

DATA QUALITY: 3

TABLE 7.8B -- INTERCITY NONGOVERNMENT TRUCK DIESEL FUEL AND ENERGY USE,
 BY STATE, 1967-76
 (SECOND IN A SERIES OF FIVE TABLES)
 FUEL USE IN THOUSANDS OF BARRELS, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
SOUTH ATLANTIC	14350 83621	16078 93681	18091 105407	19822 115487	22869 133236	25714 149812	29971 174618	28726 167365	27146 158154	28339 165104
DELAWARE	145 849	171 999	177 1032	172 1002	215 1256	204 1189	208 1216	232 1355	249 1455	264 1543
D.C.	78 458	75 438	80 467	97 565	142 832	109 637	91 532	76 445	43 250	0 0
FLORIDA	1977 11521	2207 12857	2618 15255	2804 16336	3422 19934	4138 24109	5037 29347	4639 27029	4274 24900	4150 24175
GEORGIA	3177 18509	3638 21196	4097 23869	4548 26495	5388 31387	5961 34725	7117 41464	7048 41058	6289 36640	6568 38264
MARYLAND	1065 6208	1146 6678	1276 7433	1328 7741	1367 7968	1481 8631	1604 9346	1767 10298	1637 9540	1466 8542
NORTH CAROLINA	2581 15037	2910 16954	3274 19073	3492 20342	4061 23658	4630 26972	5589 32562	5351 31177	5142 29954	6044 35210
SOUTH CAROLINA	1277 7444	1475 8595	1634 9523	1869 10888	2111 12297	2495 14537	2950 17185	2926 17048	2886 16816	3262 19007
VIRGINIA	2953 17204	3286 19147	3649 21261	3889 22658	4371 25465	4846 28233	5270 30703	5092 29664	4887 28469	5460 31807
WEST VIRGINIA	1097 6391	1170 6817	1286 7494	1623 9460	1792 10439	1850 10779	2105 12263	1595 9291	1739 10130	1347 7852

SOURCE: METHOD 333

DATA QUALITY: 3

TABLE 7.8C -- INTERCITY NONGOVERNMENT TRUCK DIESEL & ENERGY USE,
BY STATE, 1967-76
(THIRD IN A SERIES OF FIVE TABLES)
FUEL USE IN THOUSANDS OF BARRELS, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
EAST NORTH CENTRAL	17762 103485	20900 121760	23569 137310	24332 141754	28468 165846	32354 188492	37734 219832	38197 222520	36268 211286	40862 238046
ILLINOIS	4231 24651	4998 29115	5524 32180	5555 32364	6781 39505	7520 43808	8965 52228	9543 55595	8813 51341	9024 52569
INDIANA	3609 21029	4139 24113	4552 26517	5211 30357	5958 34684	6956 40526	7977 46474	7785 45352	7636 44487	8882 51743
MICHIGAN	2322 13532	2733 15923	3311 19292	3325 19369	3983 23203	4652 27103	5525 32188	5343 31126	5132 29896	6030 35127
OHIO	5936 34579	7159 41705	7954 46340	7814 45522	8948 52126	10017 58358	11543 67248	11548 67273	10640 61985	12118 70595
WISCONSIN	1664 9694	1871 10904	2228 12981	2427 14142	2802 16328	3209 18697	3724 21694	3978 23174	4047 23577	4808 28012
EAST SOUTH CENTRAL	6955 40521	8104 47219	5293 54145	9318 54295	11054 64400	12885 75070	14894 86776	14426 84051	14068 81959	16097 93782
ALABAMA	1833 10680	2064 12028	2290 13345	2373 13828	2669 15549	2968 17290	3336 19437	3283 19127	3186 18563	3540 20624
KENTUCKY	1491 8687	1736 10113	1931 11253	2137 12452	2448 14261	2827 16473	3382 19704	2812 16386	2741 15968	3087 17988
MISSISSIPPI	1561 9094	1791 10434	2157 12566	1575 9179	2032 11837	2424 14121	2786 15231	2862 16676	2727 15889	3148 18340
TENNESSEE	2970 12260	2513 14644	2915 16981	3233 18836	3905 22753	4666 27186	5390 31404	5469 31862	5414 31539	6322 36830

SOURCE: METHOD 333

DATA QUALITY: 3

TABLE 7.8D -- INTERCITY NONGOVERNMENT TRUCK DIESEL & ENERGY USE,
BY STATE, 1967-76
(FOURTH IN A SERIES OF FIVE TABLES)
FUEL USE IN THOUSANDS OF BARRELS, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
WEST NORTH CENTRAL	10232 59613	11730 68344	12884 75081	14102 82171	16188 94312	18294 106594	22028 128341	21526 125412	21349 124380	23798 138661
IOWA	2176 12678	2328 13561	2580 15034	2866 16697	3349 19509	3898 22711	4641 27039	4636 27007	4561 26570	5029 29301
KANSAS	1494 8703	1737 10121	1897 11055	2048 11935	2348 13683	2785 16228	3195 18613	3130 18238	3105 18092	3293 19187
MINNESOTA	1742 10147	1971 11486	2165 12617	2352 13704	2768 16124	2913 16573	3662 21337	3519 20502	3554 20705	3935 22927
MISSOURI	2875 16750	3542 20633	3847 22410	4013 23380	4527 26374	4942 28794	5834 33989	5620 32741	5327 31035	5999 34951
NEBRASKA	957 5578	1063 6194	1197 6978	1377 8026	1668 9718	2085 12147	2538 14789	2649 15436	2664 15521	3076 17923
NORTH DAKOTA	527 3070	588 3429	607 3540	786 4583	787 4587	853 4972	1081 6300	943 5494	1128 6572	1352 7879
SOUTH DAKOTA	461 2687	501 2920	591 3447	660 3846	741 4317	818 4769	1077 6274	1029 5994	1010 5885	1114 6493
WEST SOUTH CENTRAL	11393 66384	12693 73956	13372 77911	14342 83556	16530 96300	18911 110174	22096 128724	21989 128095	22638 131885	25162 146588
ARKANSAS	1295 7548	1516 8835	1759 10251	1915 11157	2337 13614	2787 16236	3349 19512	3292 19177	3207 18682	3811 22205
LOUISIANA	1433 8352	1616 9418	1698 9895	1823 10623	2099 12231	2463 14353	2815 16399	3068 17872	3125 18207	3633 21164
OKLAHOMA	1719 10017	1809 10541	1846 10756	1893 11031	1977 11519	2169 12637	2255 13137	2178 12689	2084 12143	2263 13184
TEXAS	6946 40467	7752 45162	8069 47009	8711 50745	10117 58936	11492 66948	13677 79676	13451 78357	14222 82853	15455 90035

TABLE 7.3E -- INTERCITY NONGOVERNMENT TRUCK DIESEL & ENERGY USE,
BY STATE, 1967-76
(LAST IN A SERIES OF FIVE TABLES)
FUEL USE IN THOUSANDS OF BARRELS, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
MOUNTAIN	7041 41040	7911 46100	8745 50962	9230 53784	10220 59549	11454 66739	13269 77322	13503 78678	13701 79828	15010 87456
ARIZONA	1466 8544	1611 9387	1995 11624	1933 11264	2335 13603	2547 14837	3031 17657	3059 17823	3131 18240	3354 19541
COLORADO	1088 6341	1147 6682	1200 6994	1288 7505	1471 8572	1642 9565	1914 11154	1843 10737	1760 10255	1944 11328
IDAHO	365 2131	455 2651	487 2840	450 2621	630 3674	667 3891	1026 5980	910 5306	1135 6615	993 5784
MONTANA	817 4764	979 5705	1072 6249	1263 7360	1330 7748	1503 8759	1567 9712	1574 9169	1565 9118	1879 10948
NEVADA	560 3263	696 4057	747 4351	797 4644	851 4959	926 5394	1002 5341	1148 6692	1109 6465	1035 6030
NEW MEXICO	1326 7726	1447 8431	1603 9341	1740 10140	1872 10908	2114 12316	2270 13228	2368 13799	2449 14266	2862 16677
UTAH	826 4815	903 5264	946 5515	980 5712	959 5588	1154 6724	1341 7815	1322 7701	1303 7593	1353 7886
WYOMING	593 3456	673 3923	695 4048	779 4538	772 4497	901 5253	1018 5535	1279 7451	1249 7276	1590 9262
PACIFIC	10011 58329	10902 63521	12734 74195	13222 77033	14052 81875	15018 87497	16516 96222	15489 90242	16175 94228	15318 89238
ALASKA	30 175	175 1019	71 418	199 1160	11 67	197 1151	111 648	595 3468	690 4019	867 5053
CALIFORNIA	7188 41875	7496 43672	9013 52509	9249 53879	9868 57489	10064 58627	10347 60280	9458 55101	9552 55646	8290 48296
HAWAII	1 10	17 103	6 37	26 156	44 260	31 184	0 0	2 15	0 0	0 0
OREGON	1490 8580	1688 9837	1987 11576	2009 11703	2256 13145	2586 15065	3420 19925	2836 16524	3305 19254	3180 18527
WASHINGTON	1302 7589	1526 8890	1657 9655	1739 10135	1873 10914	2140 12470	2638 15371	2598 15134	2641 15386	3024 17617

TABLE 7.9A -- INTERCITY NONGOVERNMENT TRUCK GASOLINE & ENERGY USE,
BY STATE, 1967-76
(FIRST IN A SERIES OF 5 TABLES)
GASOLINE USE IN THOUSANDS OF BBL, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
UNITED STATES	53823 282590	59562 312718	65554 344176	71197 373797	77579 407313	86170 452406	92882 487650	92002 483030	97739 513146	106463 558953
NEW ENGLAND	1622 8530	1747 9183	1873 9846	1984 10434	2113 11103	2294 12058	2419 12720	2347 12343	2446 12857	2615 13744
CONNECTICUT	553 2918	582 3073	611 3225	633 3344	659 3482	701 3701	724 3820	687 3629	701 3700	735 3871
MAINE	233 1238	264 1397	295 1563	326 1721	359 1902	403 2142	442 2333	441 2335	475 2507	521 2755
MASSACHUSETTS	566 2993	591 3116	612 3227	625 3302	643 3393	675 3557	687 3621	642 3388	645 3401	665 3503
NEW HAMPSHIRE	103 545	108 581	116 620	122 651	127 689	138 742	143 779	140 749	145 774	154 822
RHODE ISLAND	116 624	132 707	149 794	164 879	183 975	207 1100	226 1201	226 1207	244 1297	268 1428
VERMONT	34 191	53 288	74 398	96 514	119 643	149 797	178 946	191 1017	218 1159	252 1343
MID-ATLANTIC	5745 30181	6414 33690	7117 37377	7786 40891	8542 44861	9548 50139	10352 54360	10309 54137	11005 57803	12047 63260
NEW JERSEY	1640 8635	1757 9247	1876 9862	1976 10395	2093 11008	2262 11893	2376 12487	2294 12060	2379 12503	2531 13302
NEW YORK	686 3613	849 4472	1028 5409	1208 6361	1410 7422	1665 8755	1892 9951	1963 10333	2178 11451	2466 12959
PENNSYLVANIA	3412 17926	3799 19962	4205 22098	4593 24128	5030 26423	5612 29482	6074 31915	6041 31737	6442 33842	7043 36991

SOURCE: METHOD 334

DATA QUALITY (STATES): 2 (1967,72), 3 (OTHER YEARS)

TABLE 7.9B -- INTERCITY NONGOVERNMENT TRUCK GASOLINE & ENERGY USE,
BY STATE, 1967-76
(SECOND IN A SERIES OF 5 TABLES)
GASOLINE USE IN THOUSANDS OF BBL, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
SOUTH ATLANTIC	8570 45015	9559 50208	10598 55659	11587 60850	12704 66715	14190 74525	15378 80755	15307 80381	16338 85786	17872 93848
DELAWARE	84 454	89 480	93 505	97 526	102 550	109 586	113 609	108 580	111 595	117 625
D.C.	45 244	46 257	49 270	51 281	54 294	58 313	60 324	55 309	57 317	60 332
FLORIDA	1177 5198	1366 7190	1567 8250	1767 9297	1992 10476	2281 11990	2527 13282	2564 13486	2790 14656	3101 16304
GEORGIA	1892 9960	2137 11235	2392 12579	2640 13879	2919 15344	3286 17271	3587 18845	3595 18878	3858 20268	4245 22295
MARYLAND	631 3339	668 3526	703 3708	731 3854	764 4025	814 4290	841 4442	803 4229	821 4324	861 4537
NORTH CAROLINA	1538 8091	1717 9026	1904 10011	2081 10949	2283 12006	2552 13413	2768 14539	2754 14474	2939 15451	3215 16904
SOUTH CAROLINA	760 4003	865 4560	979 5153	1089 5731	1211 6380	1374 7227	1509 7933	1520 7989	1638 8617	1809 9518
VIRGINIA	1760 9259	1923 10119	2093 11012	2251 11832	2427 12763	2671 14041	2854 15000	2804 14732	2954 15525	3195 16785
WEST VIRGINIA	652 3438	716 3780	786 4137	849 4468	920 4847	1017 5357	1094 5752	1078 5673	1140 6004	1238 6516

SOURCE: METHOD 334

DATA QUALITY (STATES): 2 (1967,72), 3 (OTHER YEARS)

TABLE 7.9C -- INTERCITY NONGOVERNMENT TRUCK GASOLINE & ENERGY USE,
BY STATE, 1967-76
(THIRD IN A SERIES OF 5 TABLES)
GASOLINE USE IN THOUSANDS OF BBL, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
EAST NORTH CENTRAL	10608 55708	11879 62380	13215 69401	14497 76124	15940 83709	17857 93762	19399 101861	19355 101631	20701 108701	22694 119153
ILLINOIS	2524 13268	2810 14769	3110 16344	3394 17840	3716 19531	4147 21790	4488 23581	4464 23445	4757 24997	5200 27316
INDIANA	2153 11317	2444 12850	2754 14475	3055 16054	3393 17832	3837 20157	4202 22079	4225 22197	4550 23906	5021 26376
MICHIGAN	1384 7280	1587 8350	1802 9486	2016 10600	2255 11853	2565 13478	2824 14844	2852 14994	3086 16221	3419 17968
OHIO	3542 18611	3897 20473	4263 22406	4608 24208	4997 26252	5527 29026	5931 31155	5851 30737	6193 32529	6722 35308
WISCONSIN	991 5215	1126 5923	1268 6673	1408 7404	1564 8224	1768 9297	1938 10185	1947 10241	2097 11031	2316 12172
EAST SOUTH CENTRAL	4151 21813	4667 24524	5213 27387	5737 30140	6329 33245	7109 37340	7745 40668	7744 40672	8300 43595	9118 47883
ALABAMA	1091 5745	1189 6263	1289 6794	1385 7279	1489 7833	1633 8596	1741 9162	1708 8981	1796 9443	1937 10188
KENTUCKY	889 4672	1004 5286	1127 5932	1247 6558	1381 7265	1557 8191	1702 8952	1708 8980	1835 9654	2023 10633
MISSISSIPPI	929 4892	1004 5283	1080 5684	1146 6040	1224 6446	1333 7021	1411 7426	1373 7227	1434 7547	1538 8088
TENNESSEE	1232 6487	1461 7680	1704 8966	1948 10249	2223 11689	2572 13519	2875 15114	2945 15475	3223 16939	3610 18964

SOURCE: METHOD 334

DATA QUALITY (STATES): 2 (1967,72), 3 (OTHER YEARS)

TABLE 7.9D -- INTERCITY NONGOVERNMENT TRUCK GASOLINE & ENERGY USE,
BY STATE, 1967-76
(FOURTH IN A SERIES OF 5 TABLES)
GASOLINE USE IN THOUSANDS OF BBL, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
WEST NORTH CENTRAL	6110 32090	6811 35774	7546 39644	8249 43324	9042 47484	10096 53022	10938 57438	10884 57160	11613 60987	12702 66699
IOWA	1295 6822	1447 7607	1603 3434	1752 9220	1923 10111	2150 11294	2328 12237	2318 12182	2473 13001	2705 14223
KANSAS	890 4681	1000 5272	1120 5897	1234 6498	1364 7176	1534 8069	1672 8796	1673 8804	1795 9445	1974 10382
MINNESOTA	1036 5461	1138 5994	1243 6547	1342 7061	1453 7644	1605 8440	1720 9044	1694 8910	1790 9419	1940 10210
MISSOURI	1714 9013	1892 9958	2081 10940	2257 11863	2455 12910	2724 14322	2934 15416	2902 15254	3080 16188	3351 17613
NEBRASKA	568 3000	667 3517	774 4072	878 4623	998 5244	1147 6038	1276 6723	1303 6857	1422 7482	1588 8352
NORTH DAKOTA	312 1649	339 1797	367 1949	395 2091	424 2249	467 2469	499 2632	489 2580	514 2712	554 2927
SOUTH DAKOTA	271 1444	302 1606	334 1778	366 1941	400 2123	449 2369	485 2563	481 2547	513 2716	562 2968
WEST SOUTH CENTRAL	6804 35734	7456 39159	8132 42707	8757 45989	9467 49713	10436 54804	11170 58659	10991 57718	11602 60929	12565 65977
ARKANSAS	771 4060	901 4745	1041 5479	1180 6208	1334 7025	1535 8073	1706 8976	1739 9142	1895 9963	2113 11112
LOUISIANA	853 4490	941 4962	1035 5452	1123 5913	1221 6433	1357 7136	1460 7682	1445 7601	1533 8064	1670 8775
OKLAHOMA	1024 5389	1062 5587	1096 5769	1117 5881	1143 6018	1193 6284	1210 6366	1126 5928	1127 5924	1152 6070
TEXAS	4145 21782	4540 23852	4949 25997	5324 27976	5753 30223	6340 33300	6733 35623	6670 35033	7038 36967	7618 40008

SOURCE: HOD 334

DATA QUALITY (STATES): 2 (1967,72), 3 (OTHER YEARS)

TABLE 7.9E -- INTERCITY NONGOVERNMENT TRUCK GASOLINE & ENERGY USE,
BY STATE, 1967-76
(LAST IN A SERIES OF 5 TABLES)
GASOLINE USE IN THOUSANDS OF BBL, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
MOUNTAIN	4206 22090	4587 24099	4982 26172	5342 28067	5753 30224	6320 33198	6742 35409	6612 34726	6957 36543	7510 39450
ARIZONA	873 4595	966 5088	1064 5603	1156 6089	1261 6638	1403 7377	1513 7954	1499 7883	1592 8378	1735 9128
COLORADO	645 3411	694 3661	743 3913	785 4137	834 4390	903 4754	950 5003	918 4841	955 5031	1019 5364
IDAHO	215 1143	242 1281	269 1427	294 1567	325 1722	364 1933	398 2100	395 2096	424 2242	465 2459
MONTANA	484 2561	545 2875	606 3204	668 3522	735 3879	826 4353	899 4735	898 4732	962 5068	1056 5561
NEVADA	330 1754	362 1918	396 2093	426 2251	460 2433	507 2679	542 2867	535 2818	562 2974	609 3218
NEW MEXICO	788 4155	857 4513	927 4881	991 5214	1061 5595	1164 6124	1236 6508	1207 6360	1267 6672	1364 7182
UTAH	490 2588	517 2736	545 2881	567 2996	593 3131	632 3340	655 3463	626 3301	638 3377	672 3550
WYOMING	350 1855	377 1998	404 2138	428 2263	455 2406	494 2609	520 2751	505 2665	525 2772	560 2962
PACIFIC	5978 31397	6409 33668	6845 35957	7225 37944	7659 40228	8287 43524	8710 45747	8421 44233	8741 45911	9312 48905
ALASKA	16 93	30 168	47 255	64 346	83 447	105 568	128 687	140 748	161 862	189 1007
CALIFORNIA	4290 22538	4537 23835	4780 25105	4973 26131	5201 27325	5551 29161	5756 30236	5491 28837	5622 29530	5907 31033
HAWAII	0 4	1 16	5 32	6 48	11 66	14 88	18 111	20 122	24 144	30 169
OREGON	887 4669	980 5169	1080 5692	1174 6186	1280 6740	1424 7490	1535 8077	1522 8002	1616 8504	1760 9266
WASHINGTON	774 4083	847 4463	922 4858	990 5221	1070 5634	1177 6200	1257 6624	1236 6508	1303 6859	1410 7416

TABLE 7.10A -- INTERCITY NONGOVERNMENT TRUCK ENERGY CONSUMPTION,
BY WEIGHT CLASS BY SECTOR BY USE, 1967-76

ENERGY CONSUMPTION IN BILLIONS OF BTU

WEIGHT CLASS, SECTOR, USE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
*** ALL WEIGHTS ***										
TOTAL ENERGY	810765	912422	1017556	1089041	1217883	1365676	1542260	1523258	1522792	1652190
HOUSEHOLD SECTOR (TOTAL)	1700	18408	37085	57217	79537	106146	132406	147816	173575	206105
COMMERCIAL SECTOR (TOTAL)	809065	894014	980471	1031824	1138346	1259530	1409854	1375442	1349217	1446085
SERVICES	7544	11419	15714	20184	25301	31513	37634	40506	45929	53369
FREIGHT (TOTAL)	801521	882595	964757	1011640	1113045	1228017	1372220	1334936	1303288	1392716
AGRICULTURE	39133	45259	52060	58017	66936	77919	90967	93855	98701	111932
CONSTRUCTION	26742	34278	42823	51251	62357	76013	91589	97793	107142	124626
MANUFACTURING	86046	95717	106002	112926	126507	142487	163205	162878	162839	179164
WHOLESALE & RETAIL TRADE	160634	175402	190315	199624	217261	238181	261947	254020	250949	267355
UTILITIES	5752	6818	7973	9086	10460	12179	13892	14302	15437	17386
FOR HIRE	430134	467895	504189	517078	560771	606393	668439	632748	590737	609946
FORESTRY & LUMBER	17612	19856	22338	24298	27693	31835	37159	37957	38966	43888
MINING	7356	7582	7714	7493	7529	7511	7449	6319	5223	4498
OTHER	28070	29750	31300	31831	33490	35459	37548	35043	33278	33906

SOURCE: METHOD 335

DATA QUALITY: 2 (1967, 72), 3 (OTHER YEARS)

NOTE: ENERGY USE IN EACH USE CATEGORY REPRESENTS THE TOTAL ENERGY USED BY TRUCKS WHOSE OWNERS JUDGE THEM TO SERVE PRIMARILY THAT USE. IF A PICKUP, FOR INSTANCE, IS USED MOSTLY FOR PERSONAL TRANSPORT AND PARTLY FOR OTHER PURPOSES, ITS FUEL USE IS COUNTED ENTIRELY AS USE IN THE HOUSEHOLD SECTOR.

TABLE 7.10B -- INTERCITY NONGOVERNMENT TRUCK ENERGY CONSUMPTION,
BY WEIGHT CLASS BY SECTOR BY USE, 1967-76

ENERGY CONSUMPTION IN BILLIONS OF BTU

WEIGHT CLASS, SECTOR, USE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
*** UNDER 10,000 LB ***										
TOTAL ENERGY	10798	38942	70320	103973	103973	186017	229860	254813	297600	351879
HOUSEHOLD SECTOR (TOTAL)	418	14920	31139	48641	48641	91148	113986	127492	149926	178220
COMMERCIAL SECTOR (TOTAL)	10380	24022	39181	55332	55332	94869	115874	127321	147674	173659
SERVICES	1499	3660	6071	8652	8652	14973	18353	20229	23514	27717
FREIGHT (TOTAL)	8881	20362	33110	46680	46680	79896	97521	107092	124160	145942
AGRICULTURE	1364	3493	5859	8382	8382	14522	17764	19546	22716	26724
CONSTRUCTION	1568	5192	9252	13624	13624	24376	30211	33569	39210	46476
MANUFACTURING	295	1055	1902	2812	2812	5027	6209	6882	8039	9505
WHOLESALE & RETAIL TRADE	3119	5551	8230	11050	11050	17933	21500	23289	26750	31142
UTILITIES	545	1366	2278	3255	3255	5635	6898	7597	8832	10400
FOR HIRE	894	1462	2065	2664	2664	4090	4756	5000	5639	6389
FORESTRY & LUMBER	389	835	1330	1859	1859	3150	3832	4201	4867	5715
MINING	114	315	534	763	763	1310	1587	1727	1996	2324
OTHER	588	1086	1652	2265	2265	3847	4759	5277	6108	7262

SOURCE: METHOD 335

DATA QUALITY: 2 (1967, 72), 3 (OTHER YEARS)

NOTE: ENERGY USE IN EACH USE CATEGORY REPRESENTS THE TOTAL ENERGY USED BY TRUCKS WHOSE OWNERS JUDGE THEM TO SERVE PRIMARILY THAT USE. IF A PICKUP, FOR INSTANCE, IS USED MOSTLY FOR PERSONAL TRANSPORT AND PARTLY FOR OTHER PURPOSES, ITS FUEL USE IS COUNTED ENTIRELY AS USE IN THE HOUSEHOLD SECTOR.

TABLE 7.10C -- INTERCITY NONGOVERNMENT TRUCK ENERGY CONSUMPTION,
BY WEIGHT CLASS BY SECTOR BY USE, 1967-76

ENERGY CONSUMPTION IN BILLIONS OF BTU

WEIGHT CLASS, SECTOR, USE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
*** 10,000-20,000 LB ***										
TOTAL ENERGY	55964	61906	68124	73767	80584	89597	97259	96376	101517	110644
HOUSEHOLD SECTOR (TOTAL)	674	2501	4540	6730	9156	12058	14901	16524	19311	22837
COMMERCIAL SECTOR (TOTAL)	55290	59405	63584	67037	71428	77539	82358	79852	82206	87807
SERVICES	3177	4199	5317	6474	7768	9366	10845	11435	12827	14680
FREIGHT (TOTAL)	52113	55206	58267	60563	63660	68173	71513	68417	69379	73127
AGRICULTURE	6246	6342	6421	6386	6471	6684	6879	6389	6121	6278
CONSTRUCTION	3112	3703	4347	4992	5741	6690	7576	7816	8557	9655
MANUFACTURING	6136	6046	5888	5598	5306	5048	4585	3714	3111	2522
WHOLESALE & RETAIL TRADE	18593	19678	20721	21509	22466	23896	24717	23412	23720	24691
UTILITIES	1608	1633	1643	1624	1606	1609	1552	1361	1269	1192
FOR HIRE	11909	12555	13164	13548	14112	14934	15458	14534	14467	14931
FORESTRY & LUMBER	691	823	966	1103	1270	1477	1680	1727	1867	2099
MINING	309	429	589	763	1030	1376	1867	2145	2390	2963
OTHER	3497	3988	4517	5031	5648	6448	7193	7314	7875	8791

SOURCE: METHOD 335

DATA QUALITY: 2 (1967, 72), 3 (OTHER YEARS)

NOTE: ENERGY USE IN EACH USE CATEGORY REPRESENTS THE TOTAL ENERGY USED BY TRUCKS WHOSE OWNERS JUDGE THEM TO SERVE PRIMARILY THAT USE. IF A PICKUP, FOR INSTANCE, IS USED MOSTLY FOR PERSONAL TRANSPORT AND PARTLY FOR OTHER PURPOSES, ITS FUEL USE IS COUNTED ENTIRELY USE IN THE HOUSEHOLD SECTOR.

TABLE 7.10D -- INTERCITY NONGOVERNMENT TRUCK ENERGY CONSUMPTION,
BY WEIGHT CLASS BY SECTOR BY USE, 1967-76

ENERGY CONSUMPTION IN BILLIONS OF BTU

WEIGHT CLASS, SECTOR, USE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
*** 20,000-26,000 LB ***										
TOTAL ENERGY	52564	51827	50420	47704	45035	42466	38097	30074	24115	18115
HOUSEHOLD SECTOR (TOTAL)	432	475	519	561	610	675	726	718	760	827
COMMERCIAL SECTOR (TOTAL)	52132	51352	49901	47143	44425	41791	37371	29356	23355	17288
SERVICES	690	1079	1513	1971	2495	3134	3771	4089	4662	5449
FREIGHT (TOTAL)	51442	50273	48388	45172	41930	38657	33600	25267	18693	11839
AGRICULTURE	5463	5326	5104	4733	4343	3934	3300	2349	1601	754
CONSTRUCTION	3516	3442	3328	3142	2945	2768	2469	1959	1597	1231
MANUFACTURING	6719	6573	6316	5859	5385	4871	4070	2855	1889	779
WHOLESALE & RETAIL TRADE	19407	19266	18918	18140	17404	16792	15574	12911	11090	9433
UTILITIES	709	754	795	823	856	902	921	855	845	851
FOR HIRE	10772	10267	9556	8496	7403	6179	4551	2391	408	0
FORESTRY & LUMBER	1257	1232	1188	1111	1031	949	817	606	447	270
MINING	443	398	343	273	197	110	6	0	0	0
OTHER	3146	3005	2829	2583	2354	2139	1884	1438	1023	693

SOURCE: METHOD 335

DATA QUALITY: 2 (1967, 72), 3 (OTHER YEARS)

NOTE: ENERGY USE IN EACH USE CATEGORY REPRESENTS THE TOTAL ENERGY USED
BY TRUCKS WHOSE OWNERS JUDGE THEM TO SERVE PRIMARILY THAT USE.
IF A PICKUP, FOR INSTANCE, IS USED MOSTLY FOR PERSONAL TRANSPORT
AND PARTLY FOR OTHER PURPOSES, ITS FUEL USE IS COUNTED ENTIRELY
AS USE IN THE HOUSEHOLD SECTOR.

TABLE 7.10E -- INTERCITY NONGOVERNMENT TRUCK ENERGY CONSUMPTION,
BY WEIGHT CLASS BY SECTOR BY USE, 1967-76

ENERGY CONSUMPTION IN BILLIONS OF BTU

WEIGHT CLASS, SECTOR, USE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
*** OVER 26,000 LB ***										
TOTAL ENERGY	691439	759747	828692	863597	950914	1047596	1177044	1141995	1099560	1171552
HOUSEHOLD SECTOR (TOTAL)	176	512	887	1285	1732	2265	2793	3082	3578	4221
COMMERCIAL SECTOR (TOTAL)	691263	759235	827805	862312	949182	1045331	1174251	1138913	1095982	1167331
SERVICES	2178	2481	2813	3087	3515	4040	4665	4753	4926	5523
FREIGHT (TOTAL)	689085	756754	824992	859225	945667	1041291	1169586	1134160	1091056	1161808
AGRICULTURE	26060	30098	34676	38516	44944	52779	63024	65571	68263	78176
CONSTRUCTION	18546	21941	25896	29493	35162	42179	51333	54449	57778	67264
MANUFACTURING	72896	82043	91896	98657	111995	127541	148341	149427	149800	166358
WHOLESALE & RETAIL TRADE	119515	130907	142446	148925	163213	179560	200156	194408	189389	202089
UTILITIES	2890	3065	3257	3384	3661	4033	4521	4489	4491	4943
FOR HIRE	406559	443611	479404	492370	535931	581190	643674	610823	570223	590453
FORESTRY & LUMBER	15275	16966	18854	20225	22947	26259	30830	31423	31785	35804
MINING	6490	6440	6248	5694	5288	4715	3989	2549	1050	0
OTHER	20839	21671	22302	21952	22514	23025	23712	21014	18272	17160

SOURCE: METHOD 335

DATA QUALITY: 2 (1967, 72), 3 (OTHER YEARS)

NOTE: ENERGY USE IN EACH USE CATEGORY REPRESENTS THE TOTAL ENERGY USED BY TRUCKS WHOSE OWNERS JUDGE THEM TO SERVE PRIMARILY THAT USE. IF A PICKUP, FOR INSTANCE, IS USED MOSTLY FOR PERSONAL TRANSPORT AND PARTLY FOR OTHER PURPOSES, ITS FUEL USE IS COUNTED ENTIRELY AS USE IN THE HOUSEHOLD SECTOR.

TABLE 7.10 -- FEDERAL TRUCK FUEL AND ENERGY USE, BY WEIGHT CLASS, 1967-76

FUEL USE (ALL FUELS) IN THOUSANDS OF BARRELS
FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

WEIGHT CLASS	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
ALL TRUCKS	4529 24454	4527 24432	4558 24595	3679 19697	4136 22395	4637 25051	4858 26230	4720 25526	4652 25143	4745 25694
UNDER 12,500 LB	3524 18614	3542 18689	3606 19034	3280 17329	3282 17355	3800 20070	3946 20815	3832 20221	3795 20041	3757 19850
12,500 - 16,999 LB	498 2760	462 2575	435 2421	370 2067	321 1823	272 1568	244 1403	218 1282	241 1393	255 1460
17,000 LB AND UP	507 3080	523 3168	517 3140	29 301	533 3217	565 3413	668 4012	670 4023	616 3709	733 4384

SOURCE: METHOD 316

DATA QUALITY: 1 (FUEL FIGURES), 2 (ENERGY FIGURES)

TABLE 7.12A - FEDERAL TRUCK FUEL AND ENERGY USE, BY STATE, 1967-76
(FIRST IN A SERIES OF 5 TABLES)

FUEL USE IN THOUSANDS OF BARRELS, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
UNITED STATES	4529 24454	4527 24432	4558 24595	3679 19697	4136 22395	4637 25051	4858 26230	4720 25526	4652 25143	4745 25694
NEW ENGLAND	177 975	178 992	197 1086	155 847	182 1009	208 1138	223 1223	211 1175	217 1195	226 1245
CONNECTICUT	46 252	48 266	53 239	40 215	51 280	54 294	60 323	55 307	60 327	65 357
MAINE	17 92	16 94	17 95	13 71	12 73	17 93	18 100	17 103	18 101	19 103
MASSACHUSETTS	80 431	85 455	91 492	74 398	86 465	99 531	106 574	101 549	103 556	105 567
NEW HAMPSHIRE	13 75	10 58	11 62	10 56	10 60	12 74	14 79	13 73	12 72	13 75
RHODE ISLAND	13 80	13 79	18 102	13 76	16 92	18 98	17 98	16 97	17 96	17 100
VERMONT	8 45	6 40	7 46	5 31	7 39	8 48	8 49	8 47	7 43	7 43
MID-ATLANTIC	404 2176	420 2256	458 2461	410 2186	444 2392	508 2729	584 3143	573 3081	564 3026	589 3163
NEW JERSEY	74 402	85 454	91 490	86 456	96 517	105 568	125 681	126 676	126 677	128 686
NEW YORK	203 1086	203 1089	218 1168	196 1045	209 1124	239 1278	267 1433	259 1392	256 1374	268 1441
PENNSYLVANIA	127 688	132 713	149 803	128 685	139 751	164 883	192 1029	188 1013	182 975	193 1036

SOURCE: METHOD 336

DATA QUALITY: 1 (NATIONAL FUEL), 2 (NATIONAL ENERGY), 3 (EVERYTHING ELSE)

TABLE 7.12B - FEDERAL TRUCK FUEL AND ENERGY USE, BY STATE, 1967-76
(SECOND IN A SERIES OF 5 TABLES)

FUEL USE IN THOUSANDS OF BARRELS, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
SOUTH ATLANTIC	608 3303	582 3166	606 3282	503 2701	616 3338	693 3756	716 3877	709 3848	668 3632	674 3661
DELAWARE	5 39	11 63	9 52	7 42	8 52	9 58	10 60	9 57	9 57	9 60
D.C.	58 319	56 306	57 314	43 231	52 281	57 310	57 304	58 312	54 293	53 289
FLORIDA	152 819	148 797	151 811	131 701	171 920	184 989	189 1017	185 994	174 941	173 929
GEORGIA	82 442	78 419	83 447	68 360	85 454	90 491	92 494	93 506	86 470	89 480
MARYLAND	66 358	61 334	69 374	60 323	68 371	84 452	89 486	86 465	82 440	86 463
NORTH CAROLINA	73 392	70 381	72 387	54 296	67 362	73 398	74 398	76 414	71 385	72 388
SOUTH CAROLINA	54 290	53 289	51 276	39 209	46 253	50 274	50 273	52 285	49 271	50 275
VIRGINIA	92 501	81 443	91 488	78 414	93 502	114 613	122 660	118 635	112 604	111 603
WEST VIRGINIA	26 143	24 134	23 133	23 125	26 143	32 171	33 185	32 180	31 171	31 174

SOURCE: METHOD 336

DATA QUALITY: 1 (NATIONAL FUEL), 2 (NATIONAL ENERGY), 3 (EVERYTHING ELSE)

TABLE 7.12C - FEDERAL TRUCK FUEL AND ENERGY USE, BY STATE, 1967-76
(THIRD IN A SERIES OF 5 TABLES)

FUEL USE IN THOUSANDS OF BARRELS, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
EAST NORTH CENTRAL	458 2474	456 2460	445 2404	380 2040	412 2232	461 2504	505 2722	520 2806	541 2919	536 2896
ILLINOIS	133 715	138 745	129 696	110 587	115 621	132 712	147 791	152 816	155 835	152 819
INDIANA	54 295	54 295	54 296	45 246	50 276	55 300	57 306	58 313	57 311	58 315
MICHIGAN	98 528	94 501	97 524	91 489	96 519	107 577	116 623	121 653	127 684	125 678
OHIO	132 710	119 645	121 650	95 505	100 539	107 582	120 646	124 668	127 682	125 675
WISCONSIN	41 226	51 274	44 238	39 213	51 277	60 333	65 356	65 356	75 407	76 409
EAST SOUTH CENTRAL	341 1840	343 1850	342 1838	268 1437	301 1626	336 1811	337 1823	319 1725	307 1661	317 1720
ALABAMA	81 438	79 426	75 407	52 334	70 381	81 434	80 431	76 411	74 399	74 406
KENTUCKY	53 285	53 293	52 277	40 214	42 231	53 290	55 301	52 285	51 278	53 288
MISSISSIPPI	60 326	60 323	64 348	47 253	52 282	55 300	55 302	52 285	49 271	50 272
TENNESSEE	147 791	151 808	150 806	119 636	137 732	147 787	147 789	139 744	133 713	140 754

SOURCE: METHOD 336

DATA QUALITY: 1 (NATIONAL FUEL), 2 (NATIONAL ENERGY), 3 (EVERYTHING ELSE)

TABLE 7.12D - FEDERAL TRUCK FUEL AND ENERGY USE, BY STATE, 1967-76
(FOURTH IN A SERIES OF 5 TABLES)

FUEL USE IN THOUSANDS OF BARRELS, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
WEST NORTH CENTRAL	373 2026	362 1965	347 1889	279 1514	308 1695	354 1928	364 1983	348 1906	344 1879	346 1905
IOWA	49 274	47 255	46 254	40 219	45 245	52 281	53 291	54 297	51 276	52 281
KANSAS	42 230	50 270	40 219	33 184	40 221	45 249	47 258	48 260	44 240	45 247
MINNESOTA	76 413	72 393	71 385	57 306	63 341	72 388	79 425	75 407	82 446	83 452
MISSOURI	79 423	69 372	71 385	60 324	65 356	72 391	73 394	71 385	71 386	73 399
NEBRASKA	47 256	44 240	40 216	31 168	34 193	36 199	38 209	37 205	36 197	35 194
NORTH DAKOTA	35 189	38 208	36 198	28 150	30 166	35 191	35 191	32 180	30 168	29 165
SOUTH DAKOTA	45 241	42 227	43 232	30 163	31 173	42 229	39 215	31 172	30 166	29 167
WEST SOUTH CENTRAL	400 2154	437 2350	394 2127	336 1792	400 2158	482 2592	499 2690	499 2691	479 2583	483 2600
ARKANSAS	40 222	38 204	38 213	31 166	35 196	42 233	43 232	42 228	39 214	40 218
LOUISIANA	54 288	61 331	54 292	47 252	54 295	66 355	67 366	71 387	70 380	70 376
OKLAHOMA	67 366	77 415	63 339	51 275	62 334	68 370	71 386	73 399	70 380	71 386
TEXAS	239 1278	261 1400	239 1283	207 1099	249 1333	306 1634	318 1706	313 1677	300 1609	302 1620

SOURCE: METHOD 336

DATA QUALITY: 1 (NATIONAL FUEL), 2 (NATIONAL ENERGY), 3 (EVERYTHING ELSE)

TABLE 7.12E - FEDERAL TRUCK FUEL AND ENERGY USE, BY STATE, 1967-76
(LAST IN A SERIES OF 5 TABLES)

FUEL USE IN THOUSANDS OF BARRELS, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
MOUNTAIN	873 4704	855 4595	870 4686	628 3359	670 3628	722 3915	738 3976	698 3768	673 3635	687 3723
ARIZONA	117 628	115 623	124 667	95 504	106 575	119 642	123 662	119 640	112 602	114 616
COLORADO	129 691	127 680	124 670	98 521	103 559	117 636	122 655	113 613	112 598	115 620
IDAHO	99 531	95 508	94 508	69 367	71 387	76 417	78 420	75 404	72 388	72 392
MONTANA	118 639	113 604	115 620	72 387	77 413	85 460	83 452	79 426	75 404	74 403
NEVADA	138 744	136 730	146 781	106 567	105 565	99 533	93 499	85 457	78 427	82 444
NEW MEXICO	146 785	148 798	146 787	105 559	115 623	123 665	129 688	120 648	117 630	121 647
UTAH	79 426	77 411	77 415	53 290	60 323	67 362	68 372	62 332	61 330	61 334
WYOMING	47 260	44 241	44 233	30 164	33 183	36 200	42 228	45 248	46 256	48 267
PACIFIC	895 4802	894 4798	899 4822	720 3821	803 4317	873 4678	892 4793	843 4525	859 4613	887 4781
ALASKA	51 277	51 278	54 291	41 224	48 260	49 264	44 241	39 218	39 216	40 222
CALIFORNIA	452 2410	465 2482	467 2454	401 2118	456 2441	499 2667	512 2739	484 2590	513 2744	532 2855
HAWAII	38 213	31 177	30 167	20 106	20 118	21 122	23 130	24 132	23 125	22 126
OREGON	152 320	176 944	146 784	108 578	137 733	144 773	144 775	138 737	132 706	134 725
WASHINGTON	202 1082	171 917	202 1084	150 795	142 765	160 852	169 908	158 848	152 822	159 853

SOURCE: PHOD 336

DATA QUALITY: 1 (NATIONAL FUEL), 2 (NATIONAL ENERGY), 3 (EVERYTHING ELSE)

TABLE 8.1A -- MOTORCYCLE GASOLINE AND ENERGY CONSUMPTION, BY STATE, 1974-76
(FIRST IN A SERIES OF 5 PAGES)

GASOLINE CONSUMPTION IN THOUSANDS OF BARRELS
FOLLOWED BY ENERGY CONSUMPTION IN BILLIONS OF BTU

REGION, STATE	1974	1975	1976
UNITED STATES	7543 39704	7436 39153	7403 38961
NEW ENGLAND	301 1587	299 1582	296 1567
CONNECTICUT	89 468	89 468	95 501
MAINE	30 157	31 165	32 168
MASSACHUSETTS	82 432	80 424	72 379
NEW HAMPSHIRE	48 252	47 251	45 241
RHODE ISLAND	33 176	32 169	31 167
VERMONT	19 102	20 105	21 111
MID-ATLANTIC	594 3126	670 3524	711 3739
NEW JERSEY	148 778	146 768	151 797
NEW YORK	223 1173	254 1337	272 1430
PENNSYLVANIA	223 1175	270 1419	288 1512

SOURCE: METHOD 314 DATA QUALITY: 2 (NAT'L & REGIONAL), 3 (STATES)

TABLE 3.1B --

MOTORCYCLE GASOLINE AND ENERGY CONSUMPTION, BY STATE, 1974-76
(SECOND IN A SERIES OF 5 PAGES)GASOLINE CONSUMPTION IN THOUSANDS OF BARRELS
FOLLOWED BY ENERGY CONSUMPTION IN BILLIONS OF BTU

REGION, STATE	1974	1975	1976
SOUTH ATLANTIC	1466 7718	1359 7160	1328 6980
DELAWARE	21 111	21 114	20 106
D.C.	7 41	6 36	7 37
FLORIDA	431 2264	379 1991	416 2185
GEORGIA	169 892	159 836	152 798
MARYLAND	141 743	140 739	144 757
NORTH CAROLINA	252 1326	239 1259	227 1192
SOUTH CAROLINA	113 594	81 428	91 479
VIRGINIA	270 1417	273 1436	217 1139
WEST VIRGINIA	62 330	61 321	54 287

SOURCE: METHOD 341
P.

DATA QUALITY: 2 (REGIONAL), 3 (STATES)

TABLE 8.1C -- MOTORCYCLE GASOLINE AND ENERGY CONSUMPTION, BY STATE, 1974-76
(THIRD IN A SERIES OF 5 PAGES)

GASOLINE CONSUMPTION IN THOUSANDS OF BARRELS
FOLLOWED BY ENERGY CONSUMPTION IN BILLIONS OF BTU

REGION, STATE	1974	1975	1976
EAST NORTH CENTRAL	1432 7527	1438 7559	1458 7659
ILLINOIS	260 1367	273 1436	285 1497
INDIANA	276 1451	271 1425	268 1408
MICHIGAN	414 2174	403 2116	369 1938
OHIO	320 1681	312 1641	342 1797
WISCONSIN	162 854	179 941	194 1019
EAST SOUTH CENTRAL	592 3111	570 2997	507 2671
ALABAMA	194 1020	185 974	157 824
KENTUCKY	59 310	62 326	60 317
MISSISSIPPI	90 473	80 422	73 388
TENNESSEE	249 1308	243 1275	217 1142

SOURCE: METHOD 341 DATA QUALITY: 2 (REGIONAL), 3 (STATES)

TABLE 8.D -- MOTORCYCLE GASOLINE AND ENERGY CONSUMPTION, BY STATE, 1974-76
(FOURTH IN A SERIES OF 5 PAGES)

GASOLINE CONSUMPTION IN THOUSANDS OF BARRELS
FOLLOWED BY ENERGY CONSUMPTION IN BILLIONS OF BTU

REGION, STATE	1974	1975	1976
WEST NORTH CENTRAL	634 3347	633 3342	637 3363
IOWA	117 615	126 665	128 676
KANSAS	104 546	101 534	97 513
MINNESOTA	126 664	125 658	137 721
MISSOURI	197 1039	185 973	174 918
NEBRASKA	36 193	37 197	41 217
NORTH DAKOTA	35 188	39 208	39 207
SOUTH DAKOTA	19 102	20 107	21 111
WEST SOUTH CENTRAL	877 4613	819 4307	807 4244
ARKANSAS	219 1152	180 947	161 848
LOUISIANA	144 757	129 679	139 733
OKLAHOMA	113 595	117 614	119 625
TEXAS	401 2109	393 2067	388 2038

TABLE 8.1E - MOTORCYCLE GASOLINE AND ENERGY CONSUMPTION, BY STATE, 1974-76
(FIFTH IN A SERIES OF 5 PAGES)

GASOLINE CONSUMPTION IN THOUSANDS OF BARRELS
FOLLOWED BY ENERGY CONSUMPTION IN BILLIONS OF BTU

REGION, STATE	1974	1975	1976
MOUNTAIN	349 1851	354 1880	348 1845
ARIZONA	67 355	70 371	62 329
COLORADO	84 442	86 455	87 457
IDAHO	38 201	36 193	35 188
MONTANA	14 76	15 80	14 74
NEVADA	25 135	26 140	27 144
NEW MEXICO	32 171	34 179	36 192
UTAH	79 417	77 409	76 403
WYOMING	10 54	10 53	11 58
PACIFIC	1298 6824	1294 6802	1311 6893
ALASKA	13 71	13 69	13 73
CALIFORNIA	1070 5618	1064 5588	1062 5578
HAWAII	0 0	0 0	0 0
OREGON	95 502	97 512	114 600
WASHINGTON	120 633	120 633	122 642

SOURCE: METHOD 341

DATA QUALITY: 2 (REGIONAL), 3 (STATES)

TABLE 8.2 -- MOTORCYCLE FUEL AND ENERGY CONSUMPTION NATIONWIDE, 1967-73
REGISTERED MOTORCYCLES ONLY

	1967	1968	1969	1970	1971	1972	1973
FUEL USE, 1000'S OF BBL	1942	2088	2302	2798	3325	3781	4332
ENERGY USE, BILLIONS OF BTU	10195	10965	12090	14694	17456	19854	22743

SOURCE: METHOD 341

DATA QUALITY: 2 (WHERE IT IS UNDERSTOOD THAT REGISTERED CYCLES ONLY ARE
ACCOUNTED FOR)

TABLE 8.3 -- MOTORCYCLE FUEL AND ENERGY CONSUMPTION, BY USE, 1974-76

GASOLINE CONSUMPTION IN THOUSANDS OF BARRELS
FOLLOWED BY ENERGY CONSUMPTION IN BILLIONS OF BTU

USE	1974	1975	1976
ALL USES	7564 39725	7457 39171	7422 38983
COMMUTING TO WORK OR SCHOOL	1278 6714	1261 6625	1255 6591
FAMILY BUSINESS	319 1676	315 1654	313 1645
OUTDOOR RECREATION	3127 16420	3080 16181	3067 16109
PLEASURE RIDING	1014 5326	997 5239	994 5221
ORGANIZED COMPETITION	437 2295	430 2261	428 2251
OFF-ROAD RIDING	1676 8799	1653 8681	1645 8637
GENERAL TRANSPORTATION	1661 8724	1638 8601	1630 8560
VACATION & SIGHTSEEING	1179 6191	1163 6110	1157 6078

SOURCE: METHOD 341 DATA QUALITY: 2

NOTE: TOTALS FOR ALL USES DO NOT AGREE PRECISELY WITH NATIONAL TOTALS
IN TABLE 8.2A BECAUSE OF ACCUMULATED ROUND OFF ERROR THAT OCCURS
WHEN STATE FIGURES ARE ADDED TO PRODUCE THOSE NATIONAL TOTALS.

TABLE 9.1 -- TOTAL CIVILIAN MARINE FUEL & ENERGY USE, BY FUEL BY SECTOR, 1967-78

GASOLINE USE IN THOUSANDS OF BARRELS
 FOLLOWED BY DISTILLATE (DIESEL) OIL USE IN THOUSANDS OF BARRELS
 FOLLOWED BY RESIDUAL OIL USE IN THOUSANDS OF BARRELS
 FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

SECTOR	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
TOTAL MARINE	41883	42887	44468	46797	50112	50721	52891	57213	67406	71747	76376	79391
	18202	18976	19646	20312	21825	23002	27700	25746	27303	29570	34832	38963
	80657	87570	83480	89849	78726	77928	92412	91050	96666	117457	128965	157515
	833044	886292	872774	928929	885214	890249	1020080	1022820	1120715	1287436	1414746	1634144
RECREATIONAL BOATS	41883	42887	44468	46797	50112	50721	52891	57213	67406	71747	76376	79391
	724	741	769	809	866	877	914	989	1165	1240	1320	1372
	0	0	0	0	0	0	0	0	0	0	0	0
	224105	229479	237936	250400	268138	271398	283010	306133	360573	383904	408671	424802
COMMERCIAL SHIPS	0	0	0	0	0	0	0	0	0	0	0	0
	17478	18235	18877	19503	20959	22125	26786	24757	26138	28330	33512	37591
	80657	87570	83480	89849	78726	77928	92412	91050	96666	117457	128965	157515
	608939	656813	634838	678529	617076	618851	737070	716687	760042	903532	1006075	1209342

SOURCE: METHOD 400 DATA QUALITY: GENERALLY 2

TABLE 9.2A -- RECREATIONAL BOAT GASOLINE AND ENERGY USE, BY STATE, 1967-78
(FIRST IN A SERIES OF 5 TABLES)

GASOLINE USE IN THOUSANDS OF BBL, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
UNITED STATES	41883 219886	42887 225159	44468 233457	46797 245686	50112 263090	50721 266289	52891 277682	57213 300370	67406 353883	71747 376676	76376 400977	79391 416804
NEW ENGLAND	7860 41269	8037 42196	8059 42312	8215 43132	9027 47395	7862 41278	9027 47394	9303 48842	12319 64675	12061 63323	13299 69823	13489 70817
CONNECTICUT	4275 22444	4271 22423	4051 21272	3806 19983	4186 21977	3145 16515	4009 21048	4272 22429	6112 32092	5450 28616	5555 29168	5726 30064
MAINE	638 3351	629 3305	632 3319	691 3628	779 4091	823 4322	857 4502	936 4914	980 5146	1188 6239	1216 6386	1350 7090
MASSACHUSETTS	419 2200	477 2506	525 2761	612 3214	710 3730	671 3523	735 3859	698 3664	738 3875	483 2538	877 4606	934 4905
NEW HAMPSHIRE	720 3780	809 4250	893 4691	1042 5473	993 5215	931 4892	1068 5612	908 4769	1426 7489	1723 9050	2278 11959	1906 10007
RHODE ISLAND	1253 6582	1242 6522	1298 6817	1379 7241	1604 8423	1451 7617	1435 7535	1475 7745	1878 9859	1922 10090	1998 10492	2086 10955
VERMONT	554 2910	607 3187	657 3449	684 3591	753 3957	839 4406	921 4836	1013 5318	1183 6213	1293 6788	1373 7209	1484 7793
MID-ATLANTIC	336 1765	340 1786	350 1839	401 2109	408 2146	440 2313	492 2587	535 2812	657 3449	703 3694	728 3824	744 3907
NEW JERSEY	140 739	120 632	120 633	142 748	132 696	146 766	150 789	170 896	243 1277	235 1235	214 1124	248 1304
NEW YORK	107 566	122 643	143 754	158 832	175 921	188 991	206 1086	216 1136	261 1374	271 1425	279 1465	290 1524
PENNSYLVANIA	87 459	97 510	86 452	100 528	100 528	105 555	135 711	148 779	152 798	196 1033	235 1233	205 1078

TABLE 9.2B -- RECREATIONAL BOAT GASOLINE AND ENERGY USE, BY STATE, 1967-78
(SECOND IN A SERIES OF 5 TABLES)

GASOLINE GASOLINE USE IN THOUSANDS OF BBL, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
SOUTH ATLANTIC	3920 20584	4003 21018	4459 23454	4741 24893	5183 27211	5606 29432	6286 33006	6807 35737	7694 40396	8079 42419	8542 44846	8871 46573
DELAWARE	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
D.C.	132 695	137 722	181 951	180 950	208 1092	236 1242	250 1317	278 1460	323 1700	360 1890	387 2033	402 2114
FLORIDA	717 3769	836 4389	581 3051	729 3829	804 4226	698 3668	748 3930	725 3809	800 4203	707 3712	780 4099	769 4040
GEORGIA	135 712	151 795	163 857	207 1091	260 1366	281 1476	323 1699	367 1927	402 2110	416 2187	453 2378	498 2619
MARYLAND	268 1412	294 1546	316 1663	346 1819	402 2114	448 2354	484 2545	502 2636	552 2898	579 3042	594 3122	612 3215
NORTH CAROLINA	75 395	81 425	91 481	103 544	116 610	114 602	116 610	139 732	117 617	179 944	225 1181	253 1331
SOUTH CAROLINA	511 2685	550 2888	606 3185	525 2761	760 3991	890 4673	986 5179	1093 5743	1189 6244	1233 6478	1268 6659	1127 5921
VIRGINIA	78 413	87 460	99 521	102 540	93 491	97 510	134 704	134 705	174 915	158 832	175 921	189 995
WEST VIRGINIA	2000 10500	1864 9788	2428 12751	2544 13357	2537 13319	2838 14902	3241 17019	3566 18722	4134 21705	4444 23331	4657 24449	5016 26335

SOURCE: METHOD 401

DATA QUALITY: 2

TABLE 9.2C -- RECREATIONAL BOAT GASOLINE AND ENERGY USE, BY STATE, 1967-78
(THIRD IN A SERIES OF 5 TABLES)

GASOLINE GASOLINE USE IN THOUSANDS OF BBL, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
EAST NORTH CENTRAL	2077 10907	2169 11391	2413 12672	2516 13211	2799 14695	2877 15108	2383 12515	2995 15726	3501 18385	4180 21948	4562 23955	4821 25310
ILLINOIS	800 4200	819 4303	963 5055	1003 5269	1122 5893	1137 5973	605 3177	942 4947	1273 6688	1244 6532	1354 7110	1437 7549
INDIANA	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
MICHIGAN	1028 5398	1089 5720	1156 6073	1218 6397	1343 7054	1360 7142	1379 7241	1611 8462	1734 9105	2264 11886	2492 13085	2591 13606
OHIO	94 493	102 536	117 616	134 708	151 794	172 903	190 998	207 1090	244 1283	276 1451	295 1552	313 1647
WISCONSIN	155 814	158 831	176 926	159 837	181 952	207 1088	209 1097	233 1226	249 1309	395 2078	420 2207	477 2507
EAST SOUTH CENTRAL	4015 21080	4251 22319	4434 23280	4393 23064	4609 24197	4847 25446	5261 27623	5757 30229	6406 33636	6709 35222	7263 38135	7390 38801
ALABAMA	844 4433	957 5028	1008 5294	1062 5579	1015 5329	1034 5432	1229 6453	1368 7182	1508 7917	1508 7921	1568 8232	1608 8445
KENTUCKY	1202 6312	1440 7563	1516 7961	1339 7030	1442 7572	1549 8135	1674 8788	1776 9326	2007 10538	2133 11201	2247 11800	2356 12370
MISSISSIPPI	1208 6346	1210 6356	1199 6296	1252 6575	1329 6980	1397 7335	1427 7494	1641 8617	1781 9353	1869 9816	2195 11526	2173 11413
TENNESSEE	759 3988	641 3370	710 3727	738 3879	821 4314	865 4542	930 4886	972 5103	1110 5828	1196 6283	1252 6575	1251 6571

TABLE 9.2D -- RECREATIONAL BOAT GASOLINE AND ENERGY USE, BY STATE, 1967-78
(FOURTH IN A SERIES OF 5 TABLES)

GASOLINE GASOLINE USE IN THOUSANDS OF BBL, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
WEST NORTH CENTRAL	6420 33706	6425 33731	6678 35062	7153 37556	6882 36134	7343 38553	7602 39914	8391 44054	9077 47658	10084 52945	10717 56265	11083 58190
IOWA	85 448	77 406	85 448	93 488	102 538	117 615	135 710	134 704	176 925	206 1082	188 989	207 1088
KANSAS	301 1580	325 1711	358 1894	380 1999	380 1999	369 1941	351 1845	391 2056	419 2202	279 1467	613 3219	671 3522
MINNESOTA	578 3037	513 2697	555 2922	580 3048	641 3366	659 3460	516 2713	825 4335	1185 6222	1145 6011	1080 5674	1112 5840
MISSOURI	1090 5725	1096 5756	1174 6167	1250 6565	1158 6082	1283 6740	1672 8778	1657 8704	1767 9278	2013 10568	2247 11801	2279 11966
NEBRASKA	1991 10453	2008 10543	2054 10995	2522 13244	2337 12271	2721 14285	2662 13977	2715 14258	3022 15866	3553 18656	3737 19624	3867 20305
NORTH DAKOTA	1778 9138	1776 9324	1750 9188	1608 8446	1539 8082	1416 7435	1420 7460	1792 9412	1477 7758	1782 9359	1745 9163	1732 9096
SOUTH DAKOTA	595 3124	626 3291	658 3456	717 3765	722 3794	776 4074	843 4427	872 4592	1029 5404	1104 5800	1103 5792	1213 6368
WEST SOUTH CENTRAL	6814 35778	6667 35004	6713 35244	7042 36974	7026 36891	7258 38105	6801 35710	7329 38481	8017 42094	8471 44474	8973 47110	9014 47327
ARKANSAS	1648 8653	1775 9322	1653 8680	1860 9769	2048 10753	1916 10061	2184 11467	2388 12538	2287 12011	2487 13058	2706 14210	2571 13501
LOUISIANA	916 4809	777 4081	825 4332	884 4642	672 3532	746 3920	754 3959	1139 5382	1579 8289	1932 10146	2234 11731	2489 13067
OKLAHOMA	4250 22376	4114 21601	4234 22230	4297 22562	4305 22605	4594 24123	3863 20283	3301 19960	4151 21793	4051 21270	4032 21169	3953 20758
TEXAS	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0

SOURCE: METHOD 401

DATA QUALITY: 2

TABLE 9.2E -- RECREATIONAL BOAT GASOLINE AND ENERGY USE, BY STATE, 1967-78
(LAST IN A SERIES OF 5 TABLES)

GASOLINE GASOLINE USE IN THOUSANDS OF BBL, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
MOUNTAIN	6085 31946	6550 34392	6496 34107	7296 38305	9076 47651	9120 47880	9073 47636	9598 50391	12029 63157	13445 70586	13706 71960	13678 71812
ARIZONA	103 541	101 533	107 566	112 588	113 597	116 611	119 628	144 760	169 887	173 908	220 1156	241 1266
COLORADO	288 1516	316 1662	373 1959	442 2322	532 2794	636 3340	631 3315	775 4073	1049 5508	1238 6500	1372 7203	1511 7934
IDAHO	2305 12105	2465 12942	2693 14138	2883 15137	3141 16494	3456 18147	3158 16581	3565 18718	4770 25047	5594 29369	5884 30891	6234 32729
MONTANA	2788 14637	2959 15537	2536 13318	3062 16079	4348 22831	3785 19873	4219 22153	3954 20761	4669 24513	4930 25883	4757 24978	3899 20474
NEVADA	197 1035	265 1392	319 1679	320 1680	424 2228	530 2783	418 2196	532 2798	639 3358	680 3570	586 3077	789 4146
NEW MEXICO	142 746	146 771	161 847	166 873	186 980	207 1088	231 1213	255 1343	292 1536	326 1711	343 1802	404 2121
UTAH	142 747	174 918	176 926	178 937	194 1020	247 1299	155 816	216 1134	272 1432	326 1716	363 1907	409 2151
WYOMING	117 616	120 633	127 671	130 684	134 703	140 735	139 730	152 800	166 873	176 926	179 943	188 988
PACIFIC	2475 12994	2651 13917	2868 15061	2918 15321	2995 15727	3247 17051	3597 18885	3843 20179	4424 23226	4651 24421	4808 25243	5442 28573
ALASKA	598 3139	645 3391	697 3661	752 3951	829 4355	887 4659	955 5017	984 5166	1131 5938	1206 6335	1303 6845	1362 7151
CALIFORNIA	61 321	62 325	62 329	64 340	65 345	74 391	81 428	88 466	105 553	125 661	137 722	164 863
HAWAII	68 358	64 341	73 386	76 401	84 442	76 402	85 449	95 502	128 676	134 708	59 310	95 498
OREGON	867 4552	931 4888	1047 5500	1100 5779	921 4838	1039 5455	1188 6240	1299 6821	1332 6996	1598 8390	1768 9287	1926 10114
WASHINGTON	880 4622	946 4970	987 5183	923 4848	1094 5744	1170 6143	1285 6749	1375 7222	1726 9061	1585 8326	1538 8077	1894 9944

TABLE 9.3A -- COMMERCIAL MARINE FUEL AND ENERGY USE, BY FUEL BY STATE, 1967-78
(FIRST IN A SERIES OF NINE TABLES)

DIESEL FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY RESIDUAL OIL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
UNITED STATES	17478 80657 608939	18235 87570 656813	18377 83480 634838	19503 89849 678529	20959 78726 617076	22125 77928 618851	26786 92412 737070	24757 91050 716687	26138 96666 760042	28330 117457 903532	33512 128965 1006075	37591 157515 1209342
NEW ENGLAND	643 1728 14610	616 2076 16641	591 1517 12580	501 3388 24220	457 3184 22681	354 4965 33279	497 5758 39098	550 3002 22078	701 2034 16872	945 2670 22292	708 2063 17095	723 1559 14013
CONNECTICUT	49 360 2548	61 297 2222	55 120 1074	43 102 891	53 102 950	41 191 1439	58 714 4327	45 592 3984	54 528 3634	48 637 4284	39 422 2880	38 425 2893
MAINE	60 701 4756	64 861 5786	61 679 4624	58 1357 8869	50 1536 9948	55 3399 21691	69 3459 22150	58 1557 10127	81 885 6036	86 936 6385	55 541 3721	79 337 2579
MASSACHUSETTS	475 581 6420	455 768 7479	432 592 6233	339 1733 12870	317 1404 10674	212 1262 9169	318 1483 11176	408 795 7375	515 621 6904	718 1095 11067	533 1089 9951	558 777 8135
NEW HAMPSHIRE	1 20 131	0 11 69	2 5 43	2 2 24	0 0 0	0 0 0	0 0 0	0 11 69	2 0 11	3 0 17	3 0 17	3 0 17
RHODE ISLAND	51 63 693	29 139 1042	34 121 958	51 194 1516	30 142 1067	37 113 926	42 132 835	32 47 481	41 0 238	83 2 496	70 11 476	38 20 347
VERMONT	7 3 59	7 0 40	7 0 46	8 0 46	7 0 40	9 0 52	10 0 58	7 0 40	8 0 46	7 0 40	8 0 46	7 0 40

SOURCE: METHOD 402

DATA QUALITY: 2

TABLE 9.3B — COMMERCIAL MARINE FUEL AND ENERGY USE, BY FUEL BY STATE, 1967-78
(SECOND IN A SERIES OF NINE TABLES)

DIESEL FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY RESIDUAL OIL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
MID-ATLANTIC	2225	3078	3362	3006	2930	2683	3142	3103	2998	3197	2995	3340
	24428	26043	23509	26698	27117	25409	25390	18741	14429	17701	17916	17153
	166550	181673	167395	185372	187563	175386	177940	135908	108185	129917	130092	127304
NEW JERSEY	994	1429	1627	1691	1762	1722	1633	1754	1752	1748	1686	2145
	4696	5000	4865	6051	6627	8603	6789	4044	3058	5818	6480	7089
	35316	39761	40066	47895	51930	64121	52198	35643	29432	46762	50563	57066
NEW YORK	995	1370	1413	1066	966	636	1137	1005	917	1048	933	817
	15495	16478	15071	16632	16796	13687	14999	11176	7772	7889	6631	6024
	103219	111584	102988	110781	111230	89760	100928	76122	54207	55706	47126	42634
PENNSYLVANIA	236	279	322	249	202	325	372	344	329	401	376	378
	4237	4565	3573	4015	3694	3119	3602	3521	3599	3994	4805	4040
	28014	30327	24340	26694	24402	21503	24814	24141	24544	27447	32401	27603

SOURCE: METHOD 402

DATA QUALITY: 2

TABLE 9.3C -- COMMERCIAL MARINE FUEL AND ENERGY USE, BY FUEL BY STATE, 1967-78
(THIRD IN A SERIES OF NINE TABLES)

DIESEL FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY RESIDUAL OIL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
SOUTH ATLANTIC	1388	1595	1501	1461	1512	1552	2376	2692	2770	2580	4781	5468
	7276	10081	9680	11438	8772	8622	11190	10492	8412	10258	9299	10650
	53832	72674	69635	80426	63961	63250	84197	81649	69025	79525	86317	98814
DELAWARE	8	18	20	21	70	18	47	85	50	86	89	120
	185	740	852	536	327	793	801	1087	842	924	753	729
	1209	4757	5473	3492	2463	5090	5310	7329	5585	6310	5252	5282
D.C.	1	0	0	1	1	1	1	2	0	0	0	0
	0	0	5	2	0	0	32	113	0	0	0	0
	5	0	31	18	5	5	207	722	0	0	0	0
FLORIDA	482	517	371	371	375	305	628	808	1077	730	2583	3310
	1498	1895	2008	2067	1291	1521	2458	2223	2171	2839	3338	3934
	12226	14926	14786	15157	10301	11339	19112	18683	19923	22102	36034	44016
GEORGIA	80	94	61	78	73	50	67	86	57	55	94	100
	616	685	123	148	121	83	396	559	387	585	379	478
	4339	4854	1128	1384	1186	813	2880	4015	2765	3998	2930	3587
MARYLAND	276	377	422	384	365	408	461	498	406	534	565	559
	2313	3097	2643	3517	2638	2642	2588	3013	2250	2692	2546	3163
	16150	21668	19075	24349	18712	18988	21472	21844	16511	20036	19299	23143
NORTH CAROLINA	73	61	61	58	92	83	68	75	75	68	109	81
	38	76	122	201	76	78	143	114	177	156	94	87
	564	833	1122	1601	1013	973	1295	1153	1549	1376	1225	1018
SOUTH CAROLINA	46	81	73	76	59	51	131	129	102	108	149	148
	376	842	692	1386	1275	1009	1028	740	360	669	396	595
	2632	5765	4776	9157	8360	6641	7226	5404	2857	4835	3357	4603
VIRGINIA	415	445	450	429	433	399	508	537	483	540	607	630
	2250	2746	3235	3581	3044	2496	3344	2643	2225	2393	1793	1664
	16564	19857	22961	25014	21661	18017	23984	19745	16803	18191	14809	14132
WEST VIRGINIA	7	2	43	43	44	237	465	472	520	459	585	520
	0	0	0	0	0	0	0	0	0	0	0	0
	40	11	250	250	256	1380	2708	2749	3029	2673	3407	3029

SOURCE: METHOD 402

DATA QUALITY: 2

TABLE 9.3D -- COMMERCIAL MARINE FUEL AND ENERGY USE, BY FUEL BY STATE, 1967-78
(FOURTH IN A SERIES OF NINE TABLES)

DIESEL FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY RESIDUAL OIL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
EAST NORTH CENTRAL	1003	974	972	886	1032	1864	1908	1437	1194	1297	896	1055
	1331	1173	1407	1045	511	646	497	973	1492	1948	1510	1549
	14211	13049	14508	11731	9224	14920	14239	14488	16336	19803	14713	15884
ILLINOIS	482	624	669	571	731	1221	1265	868	606	626	438	515
	73	61	188	84	123	92	83	96	35	91	4	30
	3266	4018	5079	3854	5031	7691	7890	5660	3750	4218	2576	3188
INDIANA	130	89	69	97	115	197	224	218	140	118	73	68
	239	161	223	192	165	166	103	261	285	284	275	169
	2259	1530	1804	1772	1707	2191	1952	2910	2607	2473	2154	1458
MICHIGAN	68	105	97	78	78	112	78	71	107	155	58	49
	236	449	415	352	33	189	211	242	307	273	271	228
	1879	3434	3174	2667	661	1840	1781	1935	2553	2619	2041	1718
OHIO	252	132	85	89	93	319	320	266	289	330	242	240
	527	502	576	414	187	196	89	318	582	922	638	645
	4781	3925	4116	3121	1717	3090	2423	3548	5342	7719	5421	5453
WISCONSIN	71	24	52	51	15	15	21	14	52	68	85	183
	256	0	5	3	3	3	11	56	283	378	322	477
	2023	139	334	315	106	106	191	433	2082	2772	2519	4065

SOURCE: METHOD 402

DATA QUALITY: 2

TABLE 9.3E -- COMMERCIAL MARINE FUEL AND ENERGY USE, BY FUEL BY STATE, 1967-78
(FIFTH IN A SERIES OF NINE TABLES)

DIESEL FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY RESIDUAL OIL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
EAST SOUTH CENTRAL	2318	2084	2336	2807	3099	3669	4430	4209	4448	4543	4988	6203
	1261	1529	1384	1541	1369	1608	2869	5907	7793	8124	8271	9016
	21431	21753	22309	26040	26660	31483	43845	51658	74909	77543	81060	92822
ALABAMA	176	265	286	363	396	578	670	517	774	1099	1192	1276
	1106	1280	1358	1538	1369	1454	2438	5166	6613	6893	6968	6816
	7979	9591	10204	11784	10914	12508	19231	16074	46087	49741	50754	50288
KENTUCKY	531	469	859	919	873	886	983	788	795	510	582	1579
	0	0	0	0	0	0	0	0	0	0	0	0
	3093	2732	5062	5353	5085	5161	5726	4590	4631	2970	3390	9198
MISSISSIPPI	233	226	205	378	703	782	1223	1139	1242	1477	1654	1835
	52	249	26	3	0	154	431	741	1180	1231	1303	2200
	1684	2882	1357	2220	4095	5523	9834	11294	14654	16343	17827	24521
TENNESSEE	1378	1124	976	1147	1127	1423	1554	1665	1637	1457	1560	1513
	103	0	0	0	0	0	0	0	0	0	0	0
	8675	6547	5685	6681	6565	8289	9052	9699	9536	8487	9087	8813

SOURCE: METHOD 402

DATA QUALITY: 2

TABLE 9.3F -- COMMERCIAL MARINE FUEL AND ENERGY USE, BY FUEL BY STATE, 1967-78
(SIXTH IN A SERIES OF NINE TABLES)

DIESEL FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY RESIDUAL OIL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
EST NORTH CENTRAL	1008	966	931	1120	1030	493	440	381	565	705	350	397
	4	0	14	1	0	130	420	512	597	483	161	511
	5897	5627	5511	6530	6000	3689	5203	5438	7044	7143	3051	5525
IOWA	9	24	27	17	19	16	17	27	24	30	27	19
	0	0	0	0	0	0	0	0	0	0	0	0
	52	139	157	99	110	93	99	157	139	174	157	110
KANSAS	2	2	1	1	0	3	2	2	0	0	0	0
	0	0	0	0	0	0	0	12	0	0	0	21
	11	11	5	5	0	17	11	87	0	0	0	132
MINNESOTA	21	25	23	84	82	41	36	64	129	157	71	173
	4	0	14	1	0	110	401	487	593	479	159	488
	147	145	222	495	477	930	2730	3434	4479	3926	1413	4076
MISSOURI	976	911	864	993	921	433	385	288	412	518	247	196
	0	0	0	0	0	20	19	13	4	4	2	2
	5685	5306	5033	5784	5365	2648	2362	1759	2425	3042	1451	1154
NEBRASKA	0	4	16	25	8	0	0	0	0	0	5	9
	0	0	0	0	0	0	0	0	0	0	0	0
	0	23	93	145	46	0	0	0	0	0	29	52
NORTH DAKOTA	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
SOUTH DAKOTA	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0

SOURCE: METHOD 402

DATA QUALITY: 2

TABLE 9.3G -- COMMERCIAL MARINE FUEL AND ENERGY USE, BY FUEL BY STATE, 1967-78
(SEVENTH IN A SERIES OF NINE TABLES)

DIESEL FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY RESIDUAL OIL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
WEST SOUTH CENTRAL	5017	4813	5111	5688	6807	7349	9576	8793	9901	9721	11512	11753
	19942	20094	20423	19947	15165	15305	24154	33377	38260	42472	48650	56279
	154609	154376	158213	158549	135001	139039	207649	261077	298233	323667	372944	422314
ARKANSAS	203	20	30	28	82	182	282	243	306	276	370	269
	37	3	3	2	0	0	2	5	8	0	2	5
	1415	135	193	175	477	1060	1655	1453	1832	1607	2167	1598
LOUISIANA	2951	2749	2624	3289	4185	4401	5259	4922	5443	4679	5099	5446
	8755	8729	9135	8678	5687	5746	9109	12886	14756	16785	18646	18725
	72236	70896	72721	73721	60135	61764	87907	109692	124484	132791	146938	149456
OKLAHOMA	0	0	8	28	10	0	0	0	0	0	0	15
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	46	163	58	0	0	0	0	0	0	87
TEXAS	1863	2044	2449	2343	2530	2766	4035	3628	4152	4766	6043	6023
	11150	11362	11291	11267	9478	9559	15043	20485	23496	25687	30002	37549
	80957	83344	85257	84489	74330	76214	118086	149931	171915	189268	223837	271171

SOURCE: METHOD 402

DATA QUALITY: 2

TABLE 9.3H -- COMMERCIAL MARINE FUEL AND ENERGY USE, BY FUEL BY STATE, 1967-78
(EIGHTH IN A SERIES OF NINE TABLES)

DIESEL FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY RESIDUAL OIL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
MOUNTAIN	0	0	0	0	0	0	2	3	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	11	17	0	0	0	0
ARIZONA	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
COLORADO	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
IDAHO	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
MONTANA	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
NEVADA	0	0	0	0	0	0	2	3	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	11	17	0	0	0	0
NEW MEXICO	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
UTAH	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
WYOMING	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0

SOURCE: METHOD 402

DATA QUALITY: 2

TABLE 9.3I -- COMMERCIAL MARINE FUEL AND ENERGY USE, BY FUEL BY STATE, 1967-78
(LAST IN A SERIES OF NINE TABLES)

DIESEL FUEL USE IN THOUSANDS OF BARRELS
FOLLOWED BY RESIDUAL OIL USE IN THOUSANDS OF BARRELS
FOLLOWED BY TOTAL ENERGY USE IN BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
PACIFIC	3875 24687 177795	4109 26574 191017	4073 25540 184307	4034 25791 185657	4092 22608 165983	4161 21243 157802	4415 22134 164884	3589 18046 134369	3561 23649 169434	5342 33801 243639	7282 41095 300801	8652 60798 432662
ALASKA	274 24 1747	312 33 2025	313 112 2527	483 124 3593	533 220 4488	1244 226 8667	697 313 6028	679 326 6005	590 487 6498	762 850 9783	1048 1150 13335	1120 1963 18866
CALIFORNIA	2392 20928 155517	2432 21611 150044	2512 20777 145266	2323 21611 149409	2226 19708 136879	1457 18897 127300	2210 19356 134573	1355 15712 106914	1415 19851 133054	2364 29119 196854	3563 35893 246429	4543 50125 341620
HAWAII	314 1473 11090	348 2274 16324	252 2336 16155	334 1738 12873	394 1755 13329	336 1289 10061	315 1380 10511	317 786 6788	315 1040 8373	671 1191 11397	1018 1077 12701	1227 1323 15465
OREGON	353 813 7168	363 836 7370	326 791 6372	300 868 7205	309 229 3239	308 137 2655	347 166 3065	346 194 3235	360 316 4083	419 357 4685	444 399 5095	456 1833 14181
WASHINGTON	543 1449 12273	654 1820 15252	670 1524 13435	594 1450 12577	630 696 8046	816 694 9116	846 919 10706	852 1028 11425	881 1955 17424	1126 2284 20919	1209 2576 23239	1306 5554 42528

SOURCE: METHOD 402

DATA QUALITY: 2

TABLE 10.1 —

NATURAL GAS PIPELINE FUEL AND ENERGY CONSUMPTION, BY FUEL, 1967-77

FUEL	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
NATURAL GAS, MILLIONS OF CU. FT.	575752	590965	630962	722166	742592	766156	728177	668792	582963	548323	532669
BILLIONS OF BTU	594176	609284	650521	743830	763384	786842	743468	684843	595205	559289	543855
ELECTRICITY, MILLIONS OF KWH	2611	2678	2859	3269	3355	3458	3268	3010	2616	2458	2390
BILLIONS OF BTU	8912	9139	9757	11157	11450	11802	11152	10272	8928	8389	8157
ALL FUELS, BILLIONS OF BTU	607842	623297	665482	760938	780941	804939	760567	700594	608894	572152	556363

SOURCE: METHOD 510

DATA QUALITY: 1 (NATURAL GAS & ALL FUELS), 3 (ELECTRICITY)

TABLE 10.2A -- NATURAL GAS PIPELINE ENERGY CONSUMPTION, BY STATE, 1967-77
(FIRST IN A SERIES OF 5 PAGES)

BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
UNITED STATES	607842	623297	665482	760938	780941	804939	760567	700594	608894	572152	556363
NEW ENGLAND	2436	1775	1084	1202	749	738	646	764	587	687	530
CONNECTICUT	320	58	62	51	45	40	25	45	43	27	14
MAINE	0	0	0	0	0	0	0	0	0	0	0
MASSACHUSETTS	2052	1706	998	1118	677	679	599	695	519	645	500
NEW HAMPSHIRE	0	0	0	0	0	0	0	0	0	0	0
RHODE ISLAND	34	3	18	27	24	16	19	22	22	12	15
VERMONT	0	0	0	0	0	0	0	0	0	0	0
MID-ATLANTIC	32782	28761	30094	32410	33881	33321	27544	25643	21957	26196	27662
NEW JERSEY	757	487	659	996	917	764	714	571	409	530	593
NEW YORK	7040	3471	2817	3321	3568	3551	3187	3155	3028	3091	2761
PENNSYLVANIA	24975	24846	26673	28173	29481	29118	23723	21913	18556	22621	24364

SOURCE: METHOD 510

DATA QUALITY: 1

TABLE 10.2B -- NATURAL GAS PIPELINE ENERGY CONSUMPTION, BY STATE, 1967-77
(SECOND IN A SERIES OF 5 PAGES)

BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
SOUTH ATLANTIC	44902	46767	31874	40581	41862	50186	47545	38020	33591	31837	30240
DELAWARE	0	0	0	0	0	0	0	0	0	0	0
D.C.	0	0	0	0	0	0	0	0	0	0	0
FLORIDA	4067	4556	4893	4663	4516	4281	4144	3286	2474	1980	939
GEORGIA	6586	6910	7304	7308	7093	8391	6445	5099	4386	3628	3080
MARYLAND	1910	1498	2111	2125	2208	3764	2434	1839	2272	2350	2194
NORTH CAROLINA	4582	5067	6103	6448	6536	6358	6294	4713	3692	2899	2287
SOUTH CAROLINA	2572	2794	3022	3455	3369	3161	3698	2269	2766	3560	3348
VIRGINIA	7396	8078	8387	8188	7522	8684	6110	4413	3198	2819	2834
WEST VIRGINIA	17811	17839	0	8360	10624	15570	18472	16413	14892	14782	15696

SOURCE: METHOD 510

DATA QUALITY: 1

TABLE 10.2C -- NATURAL GAS PIPELINE ENERGY CONSUMPTION, BY STATE, 1967-77
(THIRD IN A SERIES OF 5 PAGES)

BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
EAST NORTH CENTRAL	58191	53213	59951	71219	72400	74647	66905	60329	49978	45142	47837
ILLINOIS	20502	18520	22923	29474	24452	24362	22364	19953	14930	17361	20121
INDIANA	11421	9985	11851	11444	12700	13609	12961	12759	9726	5109	4823
MICHIGAN	9178	8534	9085	10764	16058	16736	12422	11230	10584	12163	11997
OHIO	14101	13307	12805	12610	13301	13317	13418	10519	9445	8100	8437
WISCONSIN	2908	2813	3219	6872	5807	6498	5627	5614	5172	2402	2480
EAST SOUTH CENTRAL	121509	128708	143113	148705	148810	145763	146833	128591	102430	77870	77580
ALABAMA	16052	18368	21555	20975	21764	20109	20837	20324	17719	8633	10736
KENTUCKY	30357	31974	35759	37292	36698	38442	36148	30501	24273	21302	19764
MISSISSIPPI	51004	54237	58932	62156	62335	60694	60104	52750	40136	31943	32403
TENNESSEE	23736	23816	26531	27960	28025	26538	29750	25025	20199	15888	14592

SOURCE: METHOD 510
SOURCE: METHOD 510

DATA QUALITY: 1

DATA QUALITY: 1

TABLE 10.2D -- NATURAL GAS PIPELINE ENERGY CONSUMPTION, BY STATE, 1967-77
(FOURTH IN A SERIES OF 5 PAGES)

BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
WEST NORTH CENTRAL	97346	96739	106633	128654	129294	134522	120232	118681	109464	93311	85611
IOWA	14377	13169	16606	19038	20552	20921	17064	17770	16596	9143	7191
KANSAS	57951	59800	64343	74381	76034	81768	73713	75238	69720	63255	56633
MINNESOTA	2736	2850	3091	7674	8089	7654	5557	3692	3963	3994	3729
MISSOURI	10974	9761	9878	13243	10325	9908	9332	9190	7707	5389	4786
NEBRASKA	10448	10199	11710	13450	13606	13532	13978	11818	10602	10580	12451
NORTH DAKOTA	11	6	6	5	10	277	14	32	62	80	72
SOUTH DAKOTA	51	23	15	10	5	10	12	15	32	30	27
WEST SOUTH CENTRAL	164675	176528	193767	213885	223575	232878	237490	218167	187461	197606	194723
ARKANSAS	12346	12550	12640	13751	12021	13506	15761	13854	12460	9639	9221
LOUISIANA	60166	58989	74440	74297	79667	83722	84585	80329	64802	85444	88221
OKLAHOMA	14858	14518	14702	23907	27233	25966	27273	25405	24612	28139	28475
TEXAS	77273	93329	91641	101788	104511	109661	109880	98546	86193	75455	69818

SOURCE: METHOD 510

DATA QUALITY: 1

TABLE 0.2E -- NATURAL GAS PIPELINE ENERGY CONSUMPTION, BY STATE, 1967-77
(FIFTH IN A SERIES OF 5 PAGES)

BILLIONS OF BTU

REGION, STATE	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
MOUNTAIN	57357	60875	67220	70616	75457	82876	75803	75096	63880	63933	57596
ARIZONA	25847	28509	29604	26217	28459	28054	25909	24213	18393	16541	16046
COLORADO	1499	17040	1822	1873	1866	2983	2538	2436	4986	6208	6363
IDAHO	1506	2012	2467	4454	5484	5125	5031	4234	4565	4999	5032
MONTANA	791	573	619	731	792	1107	1755	1798	1842	1519	1529
NEVADA	25	0	0	0	0	0	0	0	0	0	0
NEW MEXICO	27426	29274	32005	33864	32383	40223	32217	35141	31585	30169	24048
UTAH	198	230	197	465	512	816	590	573	291	392	425
WYOMING	4203	2151	4223	5929	8174	6359	9081	7680	5033	6407	6085
PACIFIC	24936	26503	27813	50233	52812	48227	38730	34348	36745	33119	32293
ALASKA	0	0	0	17793	17693	9030	174	112	96	153	267
CALIFORNIA	20192	18437	18884	18453	20231	20174	21264	20517	21924	17119	16078
HAWAII	0	0	0	0	0	0	0	0	0	0	0
OREGON	2061	4241	3931	5921	7304	10608	9442	7797	8381	9343	9199
WASHINGTON	2680	3763	4932	6967	6642	7979	7915	5904	6240	6362	6592

SOURCE: METHOD 510

DATA QUALITY: 1

TABLE 10.3 -- LIQUIDS PIPELINE ELECTRICITY AND ENERGY CONSUMPTION, BY USE
(SAME ORDER-OF-MAGNITUDE ESTIMATES FOR EACH OF THE YEARS 1967-76)

	TOTAL	CRUDE OIL PIPELINES	OIL PRODUCT PIPELINES	WATER DISTRIBUTION	COAL SLURRY PIPELINE
. ELECTRICITY CONSUMPTION, . MILLIONS OF KWH . .	12708	4520	4350	3490	348
. ENERGY CONSUMPTION, . BILLIONS OF BTU . .	43360	15420	14840	11910	1190

NOTE: THE COAL SLURRY ESTIMATE IS FOR 1971-76 ONLY.

SOURCE: METHOD 520

DATA QUALITY: 4 (OIL & WATER PIPELINES), 3 (COAL SLURRY PIPELINE)

TABLE 11.1 -- MILITARY FUEL AND ENERGY USE BY HIGHWAY MODES, 1967-77

FUEL CONSUMPTION IN THOUSANDS OF BARRELS
 FOLLOWED BY APPROXIMATE ENERGY CONSUMPTION IN BILLIONS OF BTU

MODE OF TRANSPORT	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
HIGHWAY MODES, TOTAL	2613 14088	2665 14355	2542 13689	2271 12170	2226 11949	2169 11636	2134 11444	2094 11230	1931 10352	1844 9904	2065 11070
BUS	276 1450	270 1420	252 1325	231 1217	216 1137	208 1093	194 1018	181 953	159 838	164 861	161 847
TRUCK, TOTAL	1876 10213	1883 10244	1823 9909	1588 8578	1561 8454	1514 8196	1539 8320	1512 8170	1447 7803	1377 7451	1604 8647
1-TON TRUCKS	1250 6565	1271 6676	1248 6555	1184 6220	1121 5886	1096 5755	1133 5950	1121 5888	1111 5837	1002 5263	1228 6451
1-1/2 TO 2-1/2	290 1726	279 1625	265 1547	224 1306	192 1119	160 934	147 857	139 814	118 692	124 725	130 760
OVER 2-1/2 TON	330 1922	333 1943	310 1807	180 1052	248 1449	258 1507	259 1513	252 1468	218 1274	251 1463	246 1436
AUTO	461 2425	512 2691	467 2455	452 2375	449 2358	447 2350	401 2106	401 2107	325 1711	303 1592	300 1576

SOURCE: METHOD 600

DATA QUALITY: 2

TABLE 11.2A -- MILITARY FUEL AND ENERGY CONSUMPTION, BY FUEL BY STATE, 1975-77
(AIRCRAFT FUEL EXCLUDED) (FIRST IN A SERIES OF 5 TABLES)

FUEL USE IN THOUSANDS OF BARRELS, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION AND STATE	GASOLINE			DISTILLATE			RESIDUAL		
	1975	1976	1977	1975	1976	1977	1975	1976	1977
UNITED STATES	4724 24897	4724 22199	4196 22125	7930 46337	7523 43940	8498 49622	9668 60890	8884 55964	9935 62572
NEW ENGLAND	134 710	134 732	132 704	479 2810	383 2244	402 2352	1229 7743	1271 8011	1122 7073
CONNECTICUT	11 57	11 57	12 63	10 62	9 53	13 77	319 2011	320 2014	227 1431
MAINE	28 149	28 179	31 164	306 1787	244 1424	236 1379	51 324	49 314	42 269
MASSACHUSETTS	52 273	52 271	51 272	104 609	85 495	93 544	257 1618	390 2453	336 2116
NEW HAMPSHIRE	23 120	23 114	21 110	29 173	16 98	27 159	401 2526	321 2024	331 2081
RHODE ISLAND	15 80	15 81	12 66	24 140	20 117	24 140	196 1233	185 1168	181 1144
VERMONT	5 31	5 30	5 29	6 39	9 57	9 53	5 31	6 38	5 32
MID-ATLANTIC	320 1688	320 1603	380 2006	873 5093	833 4854	889 5189	2370 14914	2274 14305	2314 14555
NEW JERSEY	94 496	94 516	191 1007	286 1670	320 1866	335 1954	840 5285	811 5099	797 5014
NEW YORK	117 619	117 587	100 529	312 1820	252 1468	261 1524	630 3965	611 3844	582 3661
PENNSYLVANIA	109 573	109 500	89 470	275 1603	261 1520	293 1711	900 5664	852 5362	935 5880

TABLE 11.2B -- MILITARY FUEL AND ENERGY CONSUMPTION, BY FUEL BY STATE, 1975-77
(AIRCRAFT FUEL EXCLUDED) (SECOND IN A SERIES OF 5 TABLES)

FUEL USE IN THOUSANDS OF BARRELS, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION AND STATE	1975	GASOLINE 1976	1977	1975	DISTILLATE 1976	1977	1975	RESIDUAL 1976	1977
SOUTH ATLANTIC	1082 5703	1082 5509	1057 5565	2530 14764	2482 14473	2865 16712	3959 24907	3568 22453	4294 27025
DELAWARE	25 135	25 89	18 94	53 313	52 303	58 340	74 468	72 454	78 494
D.C.	79 415	79 537	83 437	224 1309	291 1699	302 1761	340 2139	255 1607	234 1474
FLORIDA	216 1136	216 1040	190 1001	200 1166	181 1058	208 1213	28 177	82 518	88 558
GEORGIA	155 815	155 812	172 904	219 1279	250 1458	422 2461	93 586	56 356	83 524
MARYLAND	103 543	103 468	109 575	813 4738	737 4295	837 4881	654 4112	511 3217	640 4026
NORTH CAROLINA	172 904	172 878	181 951	382 2231	353 2057	407 2375	641 4034	639 4019	790 4970
SOUTH CAROLINA	95 503	95 511	92 484	129 752	121 705	136 795	187 1178	185 1166	305 1922
VIRGINIA	227 1196	227 1127	204 1073	501 2923	490 2856	486 2831	1942 12213	1768 11116	2076 13057
WEST VIRGINIA	10 56	10 47	8 46	9 53	7 42	9 55	0 0	0 0	0 0

SOURCE: METHOD 600

DATA QUALITY: 2

TABLE 11.2C -- MILITARY FUEL AND ENERGY CONSUMPTION, BY FUEL BY STATE, 1975-77
(AIRCRAFT FUEL EXCLUDED) (THIRD IN A SERIES OF 5 TABLES)

FUEL USE IN THOUSANDS OF BARRELS, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION AND STATE	1975	GASOLINE 1976	1977	1975	DISTILLATE 1976	1977	1975	RESIDUAL 1976	1977
EAST NORTH CENTRAL	471 2487	471 2231	416 2190	925 5400	639 3734	604 3528	401 2529	310 1962	400 2532
ILLINOIS	222 1169	222 1131	214 1126	315 1837	228 1331	138 808	170 1071	124 783	202 1274
INDIANA	66 351	66 260	48 252	182 1065	144 842	174 1014	99 623	83 524	72 453
MICHIGAN	70 368	70 400	66 346	134 782	159 927	169 988	112 706	79 500	109 687
OHIO	74 390	74 285	57 299	43 251	36 214	44 257	10 63	8 53	8 56
WISCONSIN	39 209	39 155	31 167	251 1465	72 420	79 461	10 66	16 102	9 62
EAST SOUTH CENTRAL	310 1635	310 1618	294 1550	558 3260	587 3436	841 4910	430 2715	449 2831	531 3349
ALABAMA	95 504	96 516	92 487	92 540	80 470	109 635	182 1146	237 1493	280 1765
KENTUCKY	93 475	90 462	86 453	157 917	148 867	206 1204	15 96	21 132	29 188
MISSISSIPPI	64 340	64 357	62 326	85 495	81 477	86 504	168 1061	150 946	161 1012
TENNESSEE	60 317	60 283	54 284	224 1308	278 1622	440 2567	65 412	41 260	61 384

SOURCE: METHOD 600

DATA QUALITY: 2

TABLE 11.2D -- MILITARY FUEL AND ENERGY CONSUMPTION, BY FUEL BY STATE, 1975-77
(AIRCRAFT FUEL EXCLUDED) (FOURTH IN A SERIES OF 5 TABLES)

FUEL USE IN THOUSANDS OF BARRELS, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION AND STATE	1975	GASOLINE 1976	1977	1975	DISTILLATE 1976	1977	1975	RESIDUAL 1976	1977
WEST NORTH CENTRAL	364 1922	364 1602	288 1531	508 2972	482 2828	587 3433	455 2881	366 2324	613 3861
IOWA	16 84	16 76	14 76	15 92	33 195	88 514	13 83	25 161	138 869
KANSAS	97 510	97 359	64 337	84 490	51 301	81 473	41 260	2 17	30 189
MINNESOTA	30 160	30 132	22 118	91 530	56 330	38 223	101 639	89 564	104 657
MISSOURI	95 500	95 370	72 381	166 970	142 831	169 985	162 1023	156 986	258 1624
NEBRASKA	32 169	32 156	28 149	10 58	21 126	43 253	68 430	0 0	0 0
NORTH DAKOTA	63 332	63 336	56 299	130 762	167 975	142 831	70 446	94 596	83 522
SOUTH DAKOTA	31 167	31 173	32 171	12 70	12 70	26 154	0 0	0 0	0 0
WEST SOUTH CENTRAL	589 3098	589 3068	554 2918	391 2296	508 2971	565 3310	123 776	43 274	53 338
ARKANSAS	55 289	55 290	55 289	13 81	16 97	83 487	0 0	0 0	0 0
LOUISIANA	85 449	85 574	91 482	75 440	203 1185	94 553	102 642	42 266	48 304
OKLAHOMA	108 569	108 562	95 502	72 424	50 296	60 355	0 0	0 0	0 0
TEXAS	341 1791	341 1642	313 1645	231 1351	239 1393	328 1915	21 134	1 8	5 34

TABLE 11.2E — MILITARY FUEL AND ENERGY CONSUMPTION, BY FUEL BY STATE, 1975-77
(AIRCRAFT FUEL EXCLUDED) (LAST IN A SERIES OF 5 TABLES)

FUEL USE IN THOUSANDS OF BARRELS, FOLLOWED BY ENERGY USE IN BILLIONS OF BTU

REGION AND STATE	1975	GASOLINE 1976	1977	1975	DISTILLATE 1976	1977	1975	RESIDUAL 1976	1977
MOUNTAIN	421 2225	421 2101	388 2045	524 3082	492 2888	588 3438	14 96	30 194	58 370
ARIZONA	83 436	83 435	83 436	29 174	32 187	39 227	0 0	0 0	0 0
COLORADO	88 464	88 433	78 409	132 773	120 702	171 998	7 48	5 33	41 262
IDAHO	17 94	17 87	14 74	32 189	34 203	30 180	0 0	0 0	0 0
MONTANA	27 145	27 145	24 128	54 316	24 144	30 175	4 26	4 26	4 27
NEVADA	38 201	38 205	37 196	73 428	72 422	73 426	3 22	21 135	13 81
NEW MEXICO	76 400	76 393	76 399	23 138	21 124	30 176	0 0	0 0	0 0
UTAH	71 372	71 282	55 292	177 1036	183 1069	209 1217	0 0	0 0	0 0
WYOMING	21 113	21 121	21 111	4 28	6 37	6 39	0 0	0 0	0 0
PACIFIC	1033 5428	1033 3735	687 3616	1142 6660	1117 6512	1157 6750	687 4329	573 3610	550 3469
ALASKA	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
CALIFORNIA	839 4659	889 2995	549 2886	560 3266	522 3043	619 3609	136 856	140 880	132 833
HAWAII	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0
OREGON	18 96	18 83	19 101	74 434	30 175	42 248	80 508	11 72	96 607
WASHINGTON	126 663	126 657	119 629	508 2960	565 3294	496 2893	471 2965	422 2658	322 2029

TABLE 11.3 -- MILITARY CONSUMPTION OF JET FUEL, BY TYPE OF FUEL, 1975-77

FUEL CONSUMPTION IN THOUSANDS OF BARRELS
FOLLOWED BY ENERGY CONSUMPTION IN BILLIONS OF BTU

TYPE OF FUEL	1975	1976	1977
ALL JET FUEL	87007 478989	86043 473232	84712 466019
NAPHTHA TYPE	68286 372841	69671 380403	68080 371716
KEROSINE TYPE	18721 106148	16372 92829	16632 94303

SOURCE: METHOD 600

DATA QUALITY: 2