BROOKHAVEN NATIONAL LABORATORY DEVELOPING COUNTRIES ENERGY PROGRAM

MASTER

LESS DEVELOPED COUNTRIES ENERGY SYSTEM NETWORK SIMULATOR

LDC-ESNS

A Brief Description

Ann Reisman and Robert Malone

April 1978

POLICY ANALYSIS DIVISION
NATIONAL CENTER FOR ANALYSIS OF ENERGY SYSTEMS
BROOKHAVEN NATIONAL LABORATORY
UPTON, NEW YORK 11973

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ABSTRACT

Prepared for the Brookhaven National Laboratory Developing Countries Energy Program, this report describes the Less Developed Countries Energy System Network Simulator (LDC-ESNS), a tool which provides a quantitative representation of the energy system of an LDC. The network structure of the energy supply and demand system, the model inputs and outputs, and the possible uses of the model for analysis are described.

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INTRODUCTION

LDC-ESNS is a framework which describes quantitatively the flow of energy within a country from resources (including imports), through the processes which refine it, convert it from one form to another, transport it, and finally deliver it to the consumers of the final product. In addition, the monetary cost of each pathway, as well as its environmental impact as measured by the air and water residuals generated by the energy flows, can be specified and summed over all pathways to provide a total system view. The structure of the model is designed to apply to the energy system of developing countries.(1).

The framework is designed to be used in the following way: A projection is made of the energy services or fuels to be provided in some future reference year. By energy services are meant the levels of energy-using activities, such as vehicle-miles traveled or amount of irrigation pumping to be performed. Assumptions are then made about the fuels and technologies used to supply these energy services. (Alternatively one can start with estimates of fuel requirements.) Engineering economic assumptions are then made about the energy supply and conversion processes within the energy system so that a complete supply and conversion picture is assembled for the future year. The model then can be used to analyze the implications--in terms of resource consumption, costs, capital requirements, etc.--of alternative resource and technological assumptions. For example, one can examine the impact on resource consumption of a change in the level of energy services, or the impact on the environment of increases in process efficiencies at various points in the system, or the system-wide impacts of the introduction of solar energy technologies.

In one sense the framework should not be considered a "model"--in that there are no decisions made internal to the framework. Allocations of different energy forms or fuels would be specified exogenously. Nonetheless the term model may be applied to the framework in that it is a quantitative representation of a country's (or a region's) energy system.

I. GENERAL DESCRIPTION

A. Inputs

The input information required to operate LDC-ESNS includes the overall supply and demand structure of the energy system, the magnitude and type of energy demand, the efficiency of each technological process represented, the market allocation of each process and, if available, cost and environmental residual data. The model as currently constructed does not contain a projection component, but depends upon exogenously specified demands.

1. Reference Energy System

A diagram which represents graphically the flow of energy within a country for a specific year and fuel/technology mix is known as a Reference Energy System (RES). A schematic RES for developing countries is shown in Figure 1. An RES for India for the year 1972 is shown in Figure 2.

A Reference Energy System is structured with the resource categories displayed on the left-hand side, demand categories on the right, and along the top the activities needed to convert energy to the forms required to satisfy the country's energy demands. Included under each general activity category are the specific technological processes which perform the functions of that activity within the country.⁽²⁾

The supply side of the RES is divided into categories as displayed in Table I. All processes which are involved in supplying energy to the final demand can be assigned to a supply-activity category combination and displayed in an RES diagram.

LDC REFERENCE ENERGY SYSTEM (ILLUSTRATIVE)

Figure 1

REFERENCE ENERGY SYSTEM - COMMERCIAL AND NON-COMMERCIAL ENERGY
INDIA - 1972

UNIT: 10^{15} JOULE

Figure 2.

Table I
Energy Supply and Activity Categories

<u>Supply Categories (Energy sources)</u>	<u>Activity Categories (energy processing)</u>
I Commercial energy	I Extraction
A. Non-renewable resources	II Transportation
Fossil fuels	III Cleaning and Refining
Nuclear fuels	IV Conversion
B. Renewable resources	V Distribution and Transmission
Solar-derived energy	
C. Imports	
II Non-Commercial energy	
A. Wood	
B. Animal and Human wastes	
C. Crop Residues	
III Animate energy	
A. Animal and Human muscle power	

The demand sectors represented in an RES depend heavily on the quality and disaggregation of the available data. For the developing countries, the demand for energy is broken down into 4 sectors, each with several subsectors, (see Table II). Within each demand sector and subsector are included the individual end use processes which exist in that country and for which data are available or can be inferred.

Table II
Demand Sector Breakdown

I Urban Sector	III Industrial Sector
1. Household uses	IV Transport Sector
2. Commercial	1. Personal
II Rural Sector	2. Freight
1. Household uses	
2. Agriculture	
3. Small scale Industry	

The structure of the Reference Energy System for each country is the primary input to the LDC-ESNS model.

2. Energy Demand

Demand for energy drives the LDC-ESNS model. The model calculates the level of energy resources and imports required to satisfy a specified mix of demand types.

Demand for energy can be quantified for input into LDC-ESNS in three ways (see Figure 3).

- a. Direct Fuel Consumption (DFC)- the amount of fuel (x) in joules delivered to a particular end use category,
- b. Basic energy demand (BED) - the amount of energy in joules which represents the useful energy required by the particular demand category,
- c. Measure of demand activity (measure) - The level of demand requirement expressed in units of activity i.e., passenger-miles traveled for automobiles.

Demand expressed initially as basic energy demand or measure is converted within the model to direct fuel consumption by the use of numbers to represent the efficiency of end use (see Section IB-Calculations).

3. Efficiencies

Efficiency can be represented in LDC-ESNS in three different ways: primary efficiency, relative effectiveness and energy demand per measure.

Primary efficiency, used in all supply processes, is defined as the ratio of useful energy out of the process to primary energy delivered to the process. Fuel of a type other than the primary fuel which may also be required by the process, called ancillary fuel, is not included in the calculation of the primary efficiency (see Figure 4).

Figure 3

ENERGY FLOW CALCULATIONS IN LDC-ESNS

ALL ENERGY FLOWS NORMALIZED
TO 10^{15} JOULE = 1 PJ

CIRCLED VALUES REPRESENT USER'S INPUT TO MODEL
VALUES CIRCUMSCRIBED WITH SQUARES ARE CALCULATED BY THE MODEL

Figure 4

Energy Balance for Process

$$\text{Primary efficiency} = \frac{B}{A}$$

$$\text{Coefficient of ancillary energy} = \frac{C}{A}$$

$$\text{Overall efficiency} = \frac{B}{A+C}$$

The concept of Relative Effectiveness is used to describe the efficiency of end use devices. Relative effectiveness is distinguished from primary efficiency in that, in addition to reflecting the technical efficiency of the end use device (process), differences in utilization practices among fuels serving the same function are also incorporated.

For example, all electric houses tend to be more heavily insulated than houses that heat with oil. The relative effectiveness of electric and oil-heated houses reflects this difference.

The product of fuel delivered to the end use device (or process) and the relative effectiveness is the basic energy demand (see Section IB-Calculations).

Energy per measure is used to convert demand expressed in units of use to direct fuel consumption, or conversely to translate fuel consumed by an end use function into units of use.

The demand-efficiency type selected for input to LDC-ESNS depends on both the available data and the demand projection methodology (which operates external to the model).

4. Market Allocations

An RES diagram displays the choices that are available to a country to supply a particular fuel form to a specified use. When more than one option exists to supply a process with the energy it needs, the relative magnitude of each of the supply possibilities is known as the market allocation or market share of that technology. This number is expressed as the fraction of the total market for the product (see Section IB-Calculations).

5. Other Parameters

Using only the RES structure, demands, efficiencies, and allocations, LDC-ESNS can calculate energy flows through the system. However, additional optional inputs can greatly enhance the usefulness of the model.

Table III gives a list of optional parameters which can be included in LDC-ESNS. These include process efficiency components, residuals discharged to air and water, land use, occupational health, and fixed and operating costs. These data are inserted into the model in the form of units/ 10^{15} joules input to the process. When the energy flow through a process is calculated, the model will then calculate the total quantity of the parameter generated by the process (see Section IB-Calculations).

B. Calculations

Flows in the energy system of a country represented by the RES diagram are calculated from demand to supply (right to left). In Figure 3, sample calculations of the type performed in LDC-ESNS are shown. Circled values represent those input to the model, while values circumscribed with a square are calculated during a model run.

Very simply, on the supply side of the RES the energy supplied to any node is split according to the market share of each of the processes which deliver energy to that node, yielding the energy out of each process. The energy out is divided by the primary efficiency to give the energy into the process. This sequence is repeated until all energy flows in the supply side of the RES have been calculated.

On the demand side, three different calculations are made, depending upon which demand input type is entered into LDC-ESNS. If Direct Fuel Consumption (DFC) is provided (Type 1), no calculation needs to be made. Optionally, if either Basic Energy Demand or measure is desired, and the proper efficiency is supplied, these can be calculated from DFC.

Table III
OPTIONAL PARAMETERS FOR LDC-ESNS

Parameter	Units
Primary Fuel, Processing Loss	joule/ 10^{15} joule (in)
Primary Fuel, Physical Loss	"
Primary Fuel, Steam Raising	"
Ancillary Fuel, Coal	"
Ancillary Fuel, Oil	"
Ancillary Fuel, Gas	"
Ancillary Fuel, Electricity	"
Acids	tonnes/ 10^{15} joule (in)
Bases	"
Phosphates	"
Nitrates	"
Dissolved Solids, Misc.	"
Suspended Solids	"
Non-Degradable Organics	"
BOD	"
COD	"
Thermal Rejection	joule/ 10^{15} joule (in)
Particulates, Air	tonnes/ 10^{15} joule (in)
Oxides of Nitrogen	"
Sulfur Dioxide	"
Hydrocarbons	"
Carbon Monoxide	"
Carbon Dioxide	"
Aldehydes	"
Solid Waste	"
Land Use	Square meter-yr/ 10^{15} joule (in)
Occupational Deaths	Men/ 10^{15} joule (in)
Occupational Injuries	"
Occupational Man-Days Lost	"
Potential Disaster	number/ 10^{15} joule (in)
Annual Costs, Fixed	dollars/ 10^{15} joule (in)
Annual Costs, Operating	"
Totals Costs	"
Population Exposure, Radiation	man-rem/ 10^{15} joule (in)

Table III (cont'd)

Parameter	Units
High-Level Radioactive Waste	curies/ 10^{15} joule (in)
Tritium Emission	"
Krypton Emission	"
Energy Demand per Measure	joule/measure (varies)
Direct Fuel Consumption	joule
Basic Energy Demand	joule
Aqueous Ammonia	tonnes/ 10^{15} joule
Trace Elements	"
Hydrochloric Acid	"
Hydrogen Cyanide	"
Anti-biofouling agent	"
Hydrogen Sulfide	"
Carbonyl Sulfide	"
Ammonia	"
Photochemical Oxidants	"
Boron	"
Make-Up Water	meter $3/10^{15}$ joule
Plant Volume	meter $3/10^{15}$ joule
Radon-222	curie $/10^{15}$ joule
Thorium-230 (Air)	"
Transuranics	"
Radium-226 (Air)	"
Uranium (Air)	"
Iodine-131	"
Misc. Fission Products (Air)	"
Noble Gases	"
Radium-226 (Liquid)	"
Uranium + Daughters (Liquid)	"
Ruthenium-106	"
Thorium-234	"
Misc. Fission Products (Liquid)	"
Solid Low Level Waste	meter $3/10^{15}$ joule
Solid High Level Waste	curie $/10^{15}$ joule
Solid Low Level Waste	"

When Basic Energy Demand (Type 2) is entered, it is divided by the relative effectiveness to give Direct Fuel Consumption. Measure (Type 3) multiplied by energy demand per measure yields DFC.

As can be seen from the calculations, LDC-ESNS is primarily an accounting model. Given certain data inputs and demand assumptions, a snapshot of the energy system at one point in time is produced, with energy flows and associated parameters summed and the required resources and imports tabulated.

C. Outputs

The output of LDC-ESNS is available in two basic formats; an inverted listing and a production run listing.

The inverted listing format, a segment of which is shown in Figure 5, highlights an additional use of LDC-ESNS, that of a very simple data base. An inverted listing displays, in an easily readable style, all data associated with each process and conversely, all processes which contain a certain data type. This capability allows data to be organized in a useable fashion as they are gathered, as well as permitting rapid checks of specific items of data with corresponding numbers from other sources.

A sample of a base-case production run for India is given in Figure 6. For each process included in the run, the model displays the energy flow in and out of the process, the efficiency and market allocation assumed, and the total amounts of any environmental residual or other parameter for which a coefficient was previously entered.

A summary section follows the individual process listings. Displayed here are the total residuals generated by the system, the resources and imports of fuels required to satisfy the energy demand, and the breakdown of energy required by fuel and by sector. Commercial, noncommercial, and animate energy are summed separately.

D. Composite RES Diagram

An RES diagram which includes all present and potential processes from all LDCs, the Composite RES, is available as a master base file. This master file can be used for any LDC by setting the market allocation of technologies (processes) which are not present in that country's energy system to zero. The level of demand and technical coefficients used are country specific. This common format will allow summation of energy flows and other parameters over many LDCs. The composite RES is shown in Figure 7. Table IV lists processes specified in the current version of LDC-ESNS.

II. PERTURBATIONS

Given the inputs discussed above, LDC-ESNS will reproduce a base-case RES for a specific country and year. However, the greatest utility of the model lies in the ability to modify any or all of the inputs and observe the changes resulting from these new inputs.

Modifications to a base case model run can be made by

- a) substitution of a new value of any input variable for the original base case number,
- b) addition of a value for a parameter in a particular process for which no previous value was indicated,
- c) addition of new processes anywhere on the supply or demand side which were not present in the LDC composite RES diagram.

When any or all of these changes are made to a base or reference case, a perturbation case is calculated in which the effect of the modifications on the resources and imports are summed and the new flows through each process, as well as the residuals generated by these flows, are calculated. In addition, a comparison of any two cases, perturbation or base, can be printed if desired.

Three types of perturbation runs are especially useful to make with LDC-ESNS.

A trajectory is a single pathway which can be traced through the entire system. If all other demands and market allocations are set to zero, then only the residual effects and magnitude of flows of the trajectory of interest are calculated and displayed. This technique can be used for example, to examine alternate supply possibilities for a given demand.

Somewhere between a full system run and a single trajectory lies consideration of a subsystem of the full energy system. A subsystem can display the portion of an energy supply system which serves only one type of demand, e.g., all electric demand or a subset of energy demand. This can in turn be manipulated and then added to the rest of the supply system.

Finally, the impact of introducing a new technology or set of technologies on the existing or future reference energy system can be evaluated and compared to other possible energy supply strategies.

LISTING OF PARAMETERS BY PROCESS*

<u>Process Number</u>	<u>Process Name</u>	<u>Parameter Number</u>	<u>Parameter Value</u>
128	SOLAR, TO CENTRALIZED TRANSMISSION, NATIONAL		
	PRIMARY EFFICIENCY	2	1.000E+00 JOULES/10**15 JOULES
129	OIL, CRUDE IMPORTS, NATIONAL		
	MARKET ALLOCATION	1	6.240E-01 PERCENT/100
	PRIMARY EFFICIENCY	2	1.000E+00 JOULES/10**15 JOULES
130	OIL, EXTRACTION, ONSHORE WELLS, NATIONAL		
	MARKET ALLOCATION	1	3.760E-01 PERCENT/100
	PRIMARY EFFICIENCY	2	1.000E+00 JOULES/10**15 JOULES
131	OIL, EXTRACTION, OFFSHORE WELLS, NATIONAL		
	PRIMARY EFFICIENCY	2	1.000E+00 JOULES/10**15 JOULES
132	OIL, CRUDE IMPORTS, NATIONAL		
	MARKET ALLOCATION	1	1.000E+00 PERCENT/100
	PRIMARY EFFICIENCY	2	1.000E+00 JOULES/10**15 JOULES
133	OIL, TRANSPORTATION, PIPE LINE, NATIONAL		
	MARKET ALLOCATION	1	1.000E+00 PERCENT/100
	PRIMARY EFFICIENCY	2	1.000E+00 JOULES/10**15 JOULES
134	OIL, TRANSPORTATION, TANKER, NATIONAL		
	PRIMARY EFFICIENCY	2	1.000E+00 JOULES/10**15 JOULES
135	OIL, TRANSPORTATION, BARGE, NATIONAL		
	PRIMARY EFFICIENCY	2	1.000E+00 JOULES/10**15 JOULES
136	OIL, TRANSPORTATION, TANK TRUCK, NATIONAL		
	PRIMARY EFFICIENCY	2	1.000E+00 JOULES/10**15 JOULES
137	OIL, TRANSPORTATION, TANK CAR, NATIONAL		
	PRIMARY EFFICIENCY	2	1.000E+00 JOULES/10**15 JOULES
138	OIL, STORAGE, FIXED-ROOF STORAGE, NATIONAL		
	MARKET ALLOCATION	1	1.000E+00 PERCENT/100
	PRIMARY EFFICIENCY	2	1.000E+00 JOULES/10**15 JOULES
139	OIL, STORAGE, FLOATING-ROOF STORAGE, NATIONAL		
	PRIMARY EFFICIENCY	2	1.000E+00 JOULES/10**15 JOULES
140	OIL, REFINED IMPORTS, NATIONAL		
	MARKET ALLOCATION	1	1.440E-01 PERCENT/100
	PRIMARY EFFICIENCY	2	1.000E+00 JOULES/10**15 JOULES
141	OIL, REFINING, NATIONAL		
	MARKET ALLOCATION	1	8.560E-01 PERCENT/100
	PRIMARY EFFICIENCY	2	9.400E-01 JOULES/10**15 JOULES

* All parameters selected from the list in Table III for which a value has been entered will be listed for each process.

LISTING OF PROCESSES BY PARAMETER

<u>Process Numbers</u>	<u>Parameter Numbers</u>	<u>Process Name</u>	<u>Parameter Value</u> *
89	2	SPECIAL ESNS INTERNAL DEBUBBING LINK	1.000E+00
90	2	SOLID WASTE,ANIMAL,RESIDUALS COLLECTION,NATIONAL	1.000E+00
91	2	SOLID WASTE,ANIMAL,ANAEROBIC DIGESTION,NATIONAL	1.000E+00
92	2	SOLID WASTE,METHANE PIPELINE,NATIONAL	1.000E+00
93	2	SOLID WASTE,HUMAN,ANAEROBIC DIGESTION,NATIONAL	1.000E+00
94	2	SOLID WASTE,CO-COMBUSTION POWER PLANT,NATIONAL	1.000E+00
95	2	SOLID WASTE,HUMAN,COLLECTION AND TRANSPORT,NATIONAL	1.000E+00
96	2	SOLID WASTE,HUMAN,INTERMEDIATE RTU GAS PRODUCTION,NATIONAL	1.000E+00
97	2	SOLID WASTE,HUMAN,LOW BTU GAS PRODUCTION,NATIONAL	1.000E+00
98	2	WIND,WIND POWER,NATIONAL	1.000E+00
99	2	WIND,WIND GENERATOR,NATIONAL	1.000E+00
100	2	ELECTRIC,TO CENTRALIZED TRANSMISSION,NATIONAL	1.000E+00
101	2	ELECTRIC,TO DECENTRALIZED TRANSMISSION,NATIONAL	1.000E+00
102	2	HYDROELECTRIC,DAM,NATIONAL	1.000E+00
103	2	HYDROELECTRIC,POWER PLANT,NATIONAL	8.500E-01
104	2	NATURAL GAS,EXTRACTION,OFF SHORE,NATIONAL	1.000E+00
105	2	NATURAL GAS,EXTRACTION,ONSHORE,NATIONAL	1.000E+00
106	2	NATURAL GAS,GATHERING PIPELINE,NATIONAL	1.000E+00
107	2	NATURAL GAS,PROCESSING,NGL SEPARATION,NATIONAL	1.000E+00
108	2	NATURAL GAS,TRANS. & DISTRIB.,TRUCK,NATIONAL	1.000E+00
109	2	NATURAL GAS,PROCESSING,H2S REMOVAL,NATIONAL	7.600E-01
110	2	NATURAL GAS,EXPORTS,NATIONAL	1.000E+00
111	2	NATURAL GAS,TRANSPORTATION AND DISTRIBUTION,PIPELINE,NATIONAL	1.000E+00
112	2	NATURAL GAS,IMPORTS,NATIONAL	1.000E+00
113	2	NATURAL GAS,STORAGE,UNDERGROUND STORAGE,NATIONAL	1.000E+00
114	2	NATURAL GAS,STORAGE,HOLDER STORAGE,NATIONAL	1.000E+00
115	2	NATURAL GAS,STORAGE,LIQUEFACTION,NATIONAL	1.000E+00
116	2	NATURAL GAS,LNG IMPORTS,NATIONAL	1.000E+00
117	2	NATURAL GAS,LNG STORAGE,NATIONAL	1.000E+00
118	2	NATURAL GAS,LNG EXPORTS,NATIONAL	1.000E+00
119	2	NATURAL GAS,CONVERSION,LNG VAPORIZATION,NATIONAL	1.000E+00
120	2	NATURAL GAS,STEAM-ELECTRIC POWER PLANT,NATIONAL	2.600E-01
121	2	SOLAR,FLAT PLATE COLLECTION FOR WATER HEATING,NATIONAL	1.000E+00
122	2	SOLAR,FLAT PLATE COLLECTION FOR SPACE HEATING,NATIONAL	1.000E+00
123	2	SOLAR,PHOTOVOLTAIC COLLECTOR,NATIONAL	1.000E+00
124	2	SOLAR,BATTERY STORAGE,NATIONAL	1.000E+00
125	2	SOLAR,TO CENTRALIZED TRANSMISSION,NATIONAL	1.000E+00
126	2	SOLAR,DECENTRALIZED TRANSMISSION,NATIONAL	1.000E+00
127	2	SOLAR,CENTRAL RECEIVER/TURBO GENERATOR,NATIONAL	1.000E+00
128	2	SOLAR,TO CENTRALIZED TRANSMISSION,NATIONAL	1.000E+00
129	2	OIL,CRUDE IMPORTS,NATIONAL	1.000E+00
130	2	OIL,EXTRACTION,ONSHORE WELLS,NATIONAL	1.000E+00
131	2	OIL,EXTRACTION,OFFSHORE WELLS,NATIONAL	1.000E+00
132	2	OIL,CRUDE IMPORTS,NATIONAL	1.000E+00
133	2	OIL,TRANSPORTATION,PIPE LINE,NATIONAL	1.000E+00
134	2	OIL,TRANSPORTATION,TANKER,NATIONAL	1.000E+00
135	2	OIL,TRANSPORTATION,BARGE,NATIONAL	1.000E+00
136	2	OIL,TRANSPORTATION,TANK TRUCK,NATIONAL	1.000E+00
137	2	OIL,TRANSPORTATION,TANK CAR,NATIONAL	1.000E+00
138	2	OIL,STORAGE,FIXED-ROOF STORAGE,NATIONAL	1.000E+00
139	2	OIL,STORAGE,FLOATING-ROOF STORAGE,NATIONAL	1.000E+00
140	2	OIL,REFINED IMPORTS,NATIONAL	1.000E+00
141	2	OIL,REFINING,NATIONAL	9.400E-01
142	2	OIL,REFINED EXPORTS,NATIONAL	1.000E+00
143	2	OIL,STORAGE,FIXED ROOF STORAGE,NATIONAL	1.000E+00
144	2	OIL,STORAGE,FLOATING-ROOF STORAGE,NATIONAL	1.000E+00
145	2	OIL,OIL FIRED POWER PLANT,NATIONAL	2.600E-01
146	2	OIL,DISTRIBUTION,PROPANE ALLOCATION,NATIONAL	1.000E+00
147	2	OIL,SHALE,UNDERGROUND MINE,NATIONAL	1.000E+00
148	2	OIL,SHALE,SURFACE MINE,NATIONAL	1.000E+00
149	2	OIL,SHALE,TRANSPORTATION,CONVEYOR,NATIONAL	1.000E+00
150	2	OIL,SHALE,TRANSPORTATION,TRUCK,NATIONAL	1.000E+00
151	2	OIL,PREPROCESSING CRUSHING,NATIONAL	1.000E+00

* For efficiencies, a value of 1.000E+00 is inserted when a process is not included in the specific LDC RES.

FIGURE 6

PRODUCTION RUN LISTING - INDIA

TOTAL EFFECTS BY PROCESS FOR THE YEAR 1972

ELECTRICITY, TRANSMISSION, NATIONAL			1972
11	ENERGY FLOW IN=	2.2407E+17 JOULE	
	ENERGY FLOW OUT=	1.8598E+17 JOULE	
MARKET ALLOCATION 1.000000E+00			
PROCESS EFFICIENCY 8.300000E-01			
NUCLEAR, MINING, MINING, UNDERGROUND URANIUM MINE, NATIONAL			1972
15	ENERGY FLOW IN=	1.3444E+16 JOULE	
	ENERGY FLOW OUT=	1.3444E+16 JOULE	
MARKET ALLOCATION 1.000000E+00			
PROCESS EFFICIENCY 1.000000E+00			
NUCLEAR, MILLING, MILLING CONCENTRATION, NATIONAL			1972
16	ENERGY FLOW IN=	1.3444E+16 JOULE	
	ENERGY FLOW OUT=	1.3444E+16 JOULE	
MARKET ALLOCATION 1.000000E+00			
PROCESS EFFICIENCY 1.000000E+00			
NUCLEAR, PROCESSING, SOLVENT EXTRACTION, NATIONAL			1972
18	ENERGY FLOW IN=	1.3444E+16 JOULE	
	ENERGY FLOW OUT=	1.3444E+16 JOULE	
MARKET ALLOCATION 1.000000E+00			
PROCESS EFFICIENCY 1.000000E+00			
NUCLEAR, ENRICHMENT, ENRICHMENT BYPASS, NATIONAL			1972
21	ENERGY FLOW IN=	1.3444E+16 JOULE	
	ENERGY FLOW OUT=	1.3444E+16 JOULE	
MARKET ALLOCATION 1.000000E+00			
PROCESS EFFICIENCY 1.000000E+00			
NUCLEAR, FUEL FABRICATION, LWR FUEL FABRICATION, NATIONAL			1972
23	ENERGY FLOW IN=	1.3444E+16 JOULE	
	ENERGY FLOW OUT=	1.3444E+16 JOULE	
MARKET ALLOCATION 1.000000E+00			
PROCESS EFFICIENCY 1.000000E+00			
NUCLEAR, POWER PLANT, PWR POWER PLANT, NATIONAL			1972
25	ENERGY FLOW IN=	1.3444E+16 JOULE	
	ENERGY FLOW OUT=	4.0332E+15 JOULE	
MARKET ALLOCATION 1.800000E-02			
PROCESS EFFICIENCY 3.000000E-01			
COAL, MINE, LIGNITE UNDERGROUND MINE, NATIONAL			1972
44	ENERGY FLOW IN=	1.2057E+18 JOULE	
	ENERGY FLOW OUT=	1.2057E+18 JOULE	
MARKET ALLOCATION 8.000000E-01			
PROCESS EFFICIENCY 1.000000E+00			
COAL, MINE, LIGNITE STRIP MINE, NATIONAL			1972
45	ENERGY FLOW IN=	3.0144E+17 JOULE	

	ENERGY FLOW OUT=	3.0144E+17JOULE	
MARKET ALLOCATION	2.000000E-01		
PROCESS EFFICIENCY	1.000000E+00		
COAL,TRANSPORTATION,MINE,RAIL,NATIONAL			1972
48	ENERGY FLOW IN=	1.5072E+18JOULE	
	ENERGY FLOW OUT=	1.5072E+18JOULE	
MARKET ALLOCATION	1.000000E+00		
PROCESS EFFICIENCY	1.000000E+00		
COAL,PROCESSING,STEAM COAL CLEANING,NATIONAL			1972
51	ENERGY FLOW IN=	1.5072E+18JOULE	
	ENERGY FLOW OUT=	1.4620E+18JOULE	
MARKET ALLOCATION	1.000000E+00		
PROCESS EFFICIENCY	9.700000E-01		
COAL,STORAGE,ABOVE GROUND STORAGE,NATIONAL			1972
56	ENERGY FLOW IN=	1.4620E+18JOULE	
	ENERGY FLOW OUT=	1.4620E+18JOULE	
MARKET ALLOCATION	1.000000E+00		
PROCESS EFFICIENCY	1.000000E+00		
COAL,POWER PLANT,NATIONAL			1972
59	ENERGY FLOW IN=	3.9615E+17JOULE	
	ENERGY FLOW OUT=	9.9038E+16JOULE	
MARKET ALLOCATION	4.420000E-01		
PROCESS EFFICIENCY	2.500000E-01		
WOOD,EXTRACTION,NATIONAL			1972
81	ENERGY FLOW IN=	1.1900E+18JOULE	
	ENERGY FLOW OUT=	1.1900E+18JOULE	
MARKET ALLOCATION	1.000000E+00		
PROCESS EFFICIENCY	1.000000E+00		
ANIMAL,EXTRACTION,ANIMAL POWER,NATIONAL			1972
82	ENERGY FLOW IN=	2.8027E+17JOULE	
	ENERGY FLOW OUT=	2.8027E+17JOULE	
MARKET ALLOCATION	1.000000E+00		
PROCESS EFFICIENCY	1.000000E+00		
HUMAN,EXTRACTION,HUMAN POWER,NATIONAL			1972
83	ENERGY FLOW IN=	1.7692E+17JOULE	
	ENERGY FLOW OUT=	1.7692E+17JOULE	
MARKET ALLOCATION	1.000000E+00		
PROCESS EFFICIENCY	1.000000E+00		
SOLID WASTE,AGRICULTURAL,RESIDUALS COLLECTION,NATIONAL			1972
84	ENERGY FLOW IN=	3.1200E+17JOULE	
	ENERGY FLOW OUT=	3.1200E+17JOULE	
MARKET ALLOCATION	1.000000E+00		
PROCESS EFFICIENCY	1.000000E+00		
SOLID WASTE,ANIMAL,RESIDUALS COLLECTION,NATIONAL			1972
90	ENERGY FLOW IN=	5.6000E+17JOULE	

	ENERGY FLOW OUT=	5.6000E+17JOULE	
MARKET ALLOCATION	1.000000E+00		
PROCESS EFFICIENCY	1.000000E+00		
HYDROELECTRIC,DAM,NATIONAL			1972
102	ENERGY FLOW IN=	1.1652E+17JOULE	
	ENERGY FLOW OUT=	1.1652E+17JOULE	
MARKET ALLOCATION	1.000000E+00		
PROCESS EFFICIENCY	1.000000E+00		
HYDROELECTRIC,POWER PLANT,NATIONAL			1972
103	ENERGY FLOW IN=	1.1652E+17JOULE	
	ENERGY FLOW OUT=	9.9038E+16JOULE	
MARKET ALLOCATION	4.420000E-01		
PROCESS EFFICIENCY	8.500000E-01		
NATURAL GAS,EXTRACTION,ONSHORE,NATIONAL			1972
105	ENERGY FLOW IN=	3.9780E+16JOULE	
	ENERGY FLOW OUT=	3.9780E+16JOULE	
MARKET ALLOCATION	1.000000E+00		
PROCESS EFFICIENCY	1.000000E+00		
NATURAL GAS,GATHERING PIPELINE,NATIONAL			1972
106	ENERGY FLOW IN=	3.9780E+16JOULE	
	ENERGY FLOW OUT=	3.9780E+16JOULE	
MARKET ALLOCATION	1.000000E+00		
PROCESS EFFICIENCY	1.000000E+00		
NATURAL GAS,PROCESSING,H2S REMOVAL,NATIONAL			1972
109	ENERGY FLOW IN=	3.9780E+16JOULE	
	ENERGY FLOW OUT=	3.0233E+16JOULE	
MARKET ALLOCATION	1.000000E+00		
PROCESS EFFICIENCY	7.600000E-01		
NATURAL GAS,TRANSPORTATION AND DISTRIBUTION,PIPELINE,NATIONAL			1972
111	ENERGY FLOW IN=	3.0233E+16JOULE	
	ENERGY FLOW OUT=	3.0233E+16JOULE	
MARKET ALLOCATION	1.000000E+00		
PROCESS EFFICIENCY	1.000000E+00		
NATURAL GAS,STORAGE,HOLDER STORAGE,NATIONAL			1972
114	ENERGY FLOW IN=	3.0233E+16JOULE	
	ENERGY FLOW OUT=	3.0233E+16JOULE	
MARKET ALLOCATION	1.000000E+00		
PROCESS EFFICIENCY	1.000000E+00		
NATURAL GAS,STEAM-ELECTRIC POWER PLANT,NATIONAL			1972
120	ENERGY FLOW IN=	9.4798E+15JOULE	
	ENERGY FLOW OUT=	2.4647E+15JOULE	
MARKET ALLOCATION	1.100000E-02		
PROCESS EFFICIENCY	2.600000E-01		
OIL,CRUDE IMPORTS,NATIONAL			1972
129	ENERGY FLOW IN=	5.4112E+17JOULE	

	ENERGY FLOW OUT=	5.4112E+17JOULE	
MARKET ALLOCATION	6.240000E-01		
PROCESS EFFICIENCY	1.000000E+00		
OIL, EXTRACTION, ONSHORE WELLS, NATIONAL			1972
130	ENERGY FLOW IN=	3.2606E+17JOULE	
	ENERGY FLOW OUT=	3.2606E+17JOULE	
MARKET ALLOCATION	3.760000E-01		
PROCESS EFFICIENCY	1.000000E+00		
OIL, TRANSPORTATION, PIPE LINE, NATIONAL			1972
133	ENERGY FLOW IN=	8.6718E+17JOULE	
	ENERGY FLOW OUT=	8.6718E+17JOULE	
MARKET ALLOCATION	1.000000E+00		
PROCESS EFFICIENCY	1.000000E+00		
OIL, STORAGE, FIXED-ROOF STORAGE, NATIONAL			1972
138	ENERGY FLOW IN=	8.6718E+17JOULE	
	ENERGY FLOW OUT=	8.6718E+17JOULE	
MARKET ALLOCATION	1.000000E+00		
PROCESS EFFICIENCY	1.000000E+00		
OIL, REFINED IMPORTS, NATIONAL			1972
140	ENERGY FLOW IN=	1.3713E+17JOULE	
	ENERGY FLOW OUT=	1.3713E+17JOULE	
MARKET ALLOCATION	1.440000E-01		
PROCESS EFFICIENCY	1.000000E+00		
OIL, REFINING, NATIONAL			1972
141	ENERGY FLOW IN=	8.6718E+17JOULE	
	ENERGY FLOW OUT=	8.1515E+17JOULE	
MARKET ALLOCATION	8.560000E-01		
PROCESS EFFICIENCY	9.400000E-01		
OIL, STORAGE, FIXED ROOF STORAGE, NATIONAL			1972
143	ENERGY FLOW IN=	9.5228E+17JOULE	
	ENERGY FLOW OUT=	9.5228E+17JOULE	
MARKET ALLOCATION	1.000000E+00		
PROCESS EFFICIENCY	1.000000E+00		
OIL, OIL FIRED POWER PLANT, NATIONAL			1972
145	ENERGY FLOW IN=	7.4976E+16JOULE	
	ENERGY FLOW OUT=	1.9494E+16JOULE	
MARKET ALLOCATION	8.700000E-02		
PROCESS EFFICIENCY	2.600000E-01		
ELECTRIC, INTERMEDIATE, NATIONAL			1972
158	ENERGY FLOW IN=	1.8598E+17JOULE	
	ENERGY FLOW OUT=	1.8598E+17JOULE	
MARKET ALLOCATION	1.000000E+00		
PROCESS EFFICIENCY	1.000000E+00		
COAL, INTERMEDIATE, NATIONAL			1972
160	ENERGY FLOW IN=	1.0658E+18JOULE	

	ENERGY FLOW OUT=	1.0658E+18JOULE	
MARKET ALLOCATION	1.000000E+00		
PROCESS EFFICIENCY	1.000000E+00		
WOOD,INTERMEDIATE,NATIONAL			1972
161	ENERGY FLOW IN=	1.1900E+18JOULE	
	ENERGY FLOW OUT=	1.1900E+18JOULE	
MARKET ALLOCATION	1.000000E+00		
PROCESS EFFICIENCY	1.000000E+00		
ANIMAL POWER,INTERMEDIATE,NATIONAL			1972
162	ENERGY FLOW IN=	2.8027E+17JOULE	
	ENERGY FLOW OUT=	2.8027E+17JOULE	
MARKET ALLOCATION	1.000000E+00		
PROCESS EFFICIENCY	1.000000E+00		
HUMAN POWER,INTERMEDIATE,NATIONAL			1972
163	ENERGY FLOW IN=	1.7692E+17JOULE	
	ENERGY FLOW OUT=	1.7692E+17JOULE	
MARKET ALLOCATION	1.000000E+00		
PROCESS EFFICIENCY	1.000000E+00		
DRIED AGRICULTURE RESIDUALS,INTERMEDIATE,NATIONAL			1972
164	ENERGY FLOW IN=	3.1200E+17JOULE	
	ENERGY FLOW OUT=	3.1200E+17JOULE	
MARKET ALLOCATION	1.000000E+00		
PROCESS EFFICIENCY	1.000000E+00		
DRIED ANIMAL RESIDUALS,INTERMEDIATE,NATIONAL			1972
165	ENERGY FLOW IN=	5.6000E+17JOULE	
	ENERGY FLOW OUT=	5.6000E+17JOULE	
MARKET ALLOCATION	1.000000E+00		
PROCESS EFFICIENCY	1.000000E+00		
NATURAL GAS,INTERMEDIATE,NATIONAL			1972
169	ENERGY FLOW IN=	2.0753E+16JOULE	
	ENERGY FLOW OUT=	2.0753E+16JOULE	
MARKET ALLOCATION	1.000000E+00		
PROCESS EFFICIENCY	1.000000E+00		
OIL,INTERMEDIATE,NATIONAL			1972
173	ENERGY FLOW IN=	8.7730E+17JOULE	
	ENERGY FLOW OUT=	8.7730E+17JOULE	
MARKET ALLOCATION	1.000000E+00		
PROCESS EFFICIENCY	1.000000E+00		
RURAL HOUSEHOLD,WOOD,INTERMEDIATE,NATIONAL			1972
261	ENERGY FLOW IN=	1.1900E+18JOULE	
	ENERGY FLOW OUT=	1.1900E+18JOULE	
MARKET ALLOCATION	1.000000E+00		
PROCESS EFFICIENCY	1.000000E+00		
RURAL HOUSEHOLD,COAL,INTERMEDIATE,NATIONAL			1972
262	ENERGY FLOW IN=	8.4400E+16JOULE	

	ENERGY FLOW OUT=	8.4400E+16JOULE	
MARKET ALLOCATION	1.000000E+00		
PROCESS EFFICIENCY	1.000000E+00		
RURAL HOUSEHOLD.ELECTRIC.INTERMEDIATE.NATIONAL			1972
264	ENERGY FLOW IN=	3.3800E+16JOULE	
	ENERGY FLOW OUT=	3.3800E+16JOULE	
MARKET ALLOCATION	1.000000E+00		
PROCESS EFFICIENCY	1.000000E+00		
RURAL HOUSEHOLD.OIL.INTERMEDIATE.NATIONAL			1972
265	ENERGY FLOW IN=	1.6240E+17JOULE	
	ENERGY FLOW OUT=	1.6240E+17JOULE	
MARKET ALLOCATION	1.000000E+00		
PROCESS EFFICIENCY	1.000000E+00		
RURAL HOUSEHOLD.ANIMAL WASTE.INTERMEDIATE.NATIONAL			1972
266	ENERGY FLOW IN=	5.6000E+17JOULE	
	ENERGY FLOW OUT=	5.6000E+17JOULE	
MARKET ALLOCATION	1.000000E+00		
PROCESS EFFICIENCY	1.000000E+00		
RURAL HOUSEHOLD.AGRICULTURAL RESIDUALS.INTERMEDIATE.NATIONAL			1972
269	ENERGY FLOW IN=	3.1200E+17JOULE	
	ENERGY FLOW OUT=	3.1200E+17JOULE	
MARKET ALLOCATION	1.000000E+00		
PROCESS EFFICIENCY	1.000000E+00		
RURAL HOUSEHOLD.WOOD.COOKING.NATIONAL			1972
271	ENERGY FLOW IN=	1.1900E+18JOULE	
	BASIC ENERGY DEMAND=	1.1900E+17JOULE	
PROCESS EFFICIENCY	1.000000E-01		
RURAL HOUSEHOLD.COAL.COOKING.NATIONAL			1972
272	ENERGY FLOW IN=	8.4400E+16JOULE	
	BASIC ENERGY DEMAND=	8.4400E+15JOULE	
PROCESS EFFICIENCY	1.000000E-01		
RURAL HOUSEHOLD.OIL.COOKING.NATIONAL			1972
275	ENERGY FLOW IN=	1.6240E+17JOULE	
	BASIC ENERGY DEMAND=	8.1200E+16JOULE	
PROCESS EFFICIENCY	5.000000E-01		
RURAL HOUSEHOLD.ANIMAL WASTE.COOKING.NATIONAL			1972
276	ENERGY FLOW IN=	5.6000E+17JOULE	
	BASIC ENERGY DEMAND=	5.6000E+16JOULE	
PROCESS EFFICIENCY	1.000000E-01		
RURAL HOUSEHOLD.AGRICULTURAL RESIDUALS.COOKING.NATIONAL			1972
279	ENERGY FLOW IN=	3.1200E+17JOULE	
	BASIC ENERGY DEMAND=	3.1200E+16JOULE	
PROCESS EFFICIENCY	1.000000E-01		
RURAL HOUSEHOLD.ELECTRIC.LIGHTING.NATIONAL			1972

284	ENERGY FLOW IN=	3.3800E+16JOULE	
	BASIC ENERGY DEMAND=	3.3800E+16JOULE	
PROCESS EFFICIENCY 1.000000E+00			
RURAL AGRICULTURE,NATURAL GAS,INTERMEDIATE,NATIONAL			1972
315	ENERGY FLOW IN=	8.4700E+15JOULE	
	ENERGY FLOW OUT=	8.4700E+15JOULE	
MARKET ALLOCATION 1.000000E+00			
PROCESS EFFICIENCY 1.000000E+00			
RURAL AGRICULTURE,ELECTRIC,INTERMEDIATE,NATIONAL			1972
316	ENERGY FLOW IN=	1.7846E+16JOULE	
	ENERGY FLOW OUT=	1.7846E+16JOULE	
MARKET ALLOCATION 1.000000E+00			
PROCESS EFFICIENCY 1.000000E+00			
RURAL AGRICULTURE,OIL,INTERMEDIATE,NATIONAL			1972
317	ENERGY FLOW IN=	1.2680E+17JOULE	
	ENERGY FLOW OUT=	1.2680E+17JOULE	
MARKET ALLOCATION 1.000000E+00			
PROCESS EFFICIENCY 1.000000E+00			
RURAL AGRICULTURE,ANIMAL POWER,INTERMEDIATE,NATIONAL			1972
325	ENERGY FLOW IN=	2.8027E+17JOULE	
	ENERGY FLOW OUT=	2.8027E+17JOULE	
MARKET ALLOCATION 1.000000E+00			
PROCESS EFFICIENCY 1.000000E+00			
RURAL AGRICULTURE,HUMAN POWER,INTERMEDIATE,NATIONAL			1972
326	ENERGY FLOW IN=	1.7692E+17JOULE	
	ENERGY FLOW OUT=	1.7692E+17JOULE	
MARKET ALLOCATION 1.000000E+00			
PROCESS EFFICIENCY 1.000000E+00			
RURAL AGRICULTURE,NATURAL GAS,FEEDSTOCKS,NATIONAL			1972
333	ENERGY FLOW IN=	8.4700E+15JOULE	
	BASIC ENERGY DEMAND=	8.4700E+15JOULE	
PROCESS EFFICIENCY 1.000000E+00			
RURAL AGRICULTURE,OIL,FEEDSTOCKS,NATIONAL			1972
334	ENERGY FLOW IN=	7.3800E+16JOULE	
	BASIC ENERGY DEMAND=	7.3800E+16JOULE	
PROCESS EFFICIENCY 1.000000E+00			
RURAL,ELECTRIC,AGRICULTURE END USE 1,NATIONAL			1972
338	ENERGY FLOW IN=	1.7846E+16JOULE	
	BASIC ENERGY DEMAND=	1.1600E+16JOULE	
PROCESS EFFICIENCY 6.500000E-01			
RURAL,OIL,AGRICULTURE END USE 1,NATIONAL			1972
339	ENERGY FLOW IN=	5.3000E+16JOULE	
	BASIC ENERGY DEMAND=	1.0600E+16JOULE	

PROCESS EFFICIENCY	2.000000E-01	
RURAL,ANIMAL POWER,AGRICULTURE END USE 1,NATIONAL		1972
345	ENERGY FLOW IN= 3.0267E+16JOULE BASIC ENERGY DEMAND= 4.5400E+15JOULE	
PROCESS EFFICIENCY	1.500000E-01	
RURAL,HUMAN POWER,AGRICULTURE END USE 1,NATIONAL		1972
346	ENERGY FLOW IN= 4.9200E+15JOULE BASIC ENERGY DEMAND= 7.3800E+14JOULE	
PROCESS EFFICIENCY	1.500000E-01	
RURAL,ANIMAL POWER,AGRICULTURE END USE 2,NATIONAL		1972
357	ENERGY FLOW IN= 2.5000E+17JOULE BASIC ENERGY DEMAND= 2.5000E+16JOULE	
PROCESS EFFICIENCY	1.000000E-01	
RURAL,HUMAN POWER,AGRICULTURE END USE 2,NATIONAL		1972
358	ENERGY FLOW IN= 1.7200E+17JOULE BASIC ENERGY DEMAND= 1.7200E+16JOULE	
PROCESS EFFICIENCY	1.000000E-01	
INDUSTRY,ELECTRIC,INTERMEDIATE,NATIONAL		1972
509	ENERGY FLOW IN= 1.2800E+17JOULE ENERGY FLOW OUT= 1.2800E+17JOULE	
MARKET ALLOCATION	1.000000E+00	
PROCESS EFFICIENCY	1.000000E+00	
INDUSTRY,NATURAL GAS,INTERMEDIATE,NATIONAL		1972
510	ENERGY FLOW IN= 1.2283E+16JOULE ENERGY FLOW OUT= 1.2283E+16JOULE	
MARKET ALLOCATION	1.000000E+00	
PROCESS EFFICIENCY	1.000000E+00	
INDUSTRY,COAL,INTERMEDIATE,NATIONAL		1972
511	ENERGY FLOW IN= 6.6042E+17JOULE ENERGY FLOW OUT= 6.6042E+17JOULE	
MARKET ALLOCATION	1.000000E+00	
PROCESS EFFICIENCY	1.000000E+00	
INDUSTRY,OIL,INTERMEDIATE,NATIONAL		1972
512	ENERGY FLOW IN= 2.1167E+17JOULE ENERGY FLOW OUT= 2.1167E+17JOULE	
MARKET ALLOCATION	1.000000E+00	
PROCESS EFFICIENCY	1.000000E+00	
INDUSTRY,ELECTRIC,INDUSTRY 1,NATIONAL		1972
513	ENERGY FLOW IN= 1.2800E+17JOULE BASIC ENERGY DEMAND= 1.2800E+17JOULE	
PROCESS EFFICIENCY	1.000000E+00	
INDUSTRY,NATURAL GAS,INDUSTRY 1,NATIONAL		1972
514	ENERGY FLOW IN= 1.2283E+16JOULE BASIC ENERGY DEMAND= 7.3700E+15JOULE	

PROCESS EFFICIENCY	6.000000E-01	
INDUSTRY, COAL, INDUSTRY 1, NATIONAL		1972
515 ENERGY FLOW IN=	3.1333E+17 JOULE	
BASIC ENERGY DEMAND=	1.8800E+17 JOULE	
PROCESS EFFICIENCY	6.000000E-01	
INDUSTRY, OIL, INDUSTRY 1, NATIONAL		1972
516 ENERGY FLOW IN=	2.1167E+17 JOULE	
BASIC ENERGY DEMAND=	1.2700E+17 JOULE	
PROCESS EFFICIENCY	6.000000E-01	
INDUSTRY, COAL, IRON AND STEEL, NATIONAL		1972
551 ENERGY FLOW IN=	3.4708E+17 JOULE	
BASIC ENERGY DEMAND=	8.3300E+16 JOULE	
PROCESS EFFICIENCY	2.400000E-01	
TRANSPORTATION, COAL, INTERMEDIATE, NATIONAL		1972
556 ENERGY FLOW IN=	3.2100E+17 JOULE	
ENERGY FLOW OUT=	3.2100E+17 JOULE	
MARKET ALLOCATION	1.000000E+00	
PROCESS EFFICIENCY	1.000000E+00	
TRANSPORTATION, OIL, INTERMEDIATE, NATIONAL		1972
557 ENERGY FLOW IN=	3.7643E+17 JOULE	
ENERGY FLOW OUT=	3.7643E+17 JOULE	
MARKET ALLOCATION	1.000000E+00	
PROCESS EFFICIENCY	1.000000E+00	
TRANSPORTATION, ELECTRIC, INTERMEDIATE, NATIONAL		1972
558 ENERGY FLOW IN=	6.3300E+15 JOULE	
ENERGY FLOW OUT=	6.3300E+15 JOULE	
MARKET ALLOCATION	1.000000E+00	
PROCESS EFFICIENCY	1.000000E+00	
TRANSPORTATION, OIL, PERSONAL AUTO, NATIONAL		1972
560 ENERGY FLOW IN=	7.7333E+16 JOULE	
BASIC ENERGY DEMAND=	1.1600E+16 JOULE	
PROCESS EFFICIENCY	1.500000E-01	
TRANSPORTATION, OIL, SHIP, NATIONAL		1972
561 ENERGY FLOW IN=	4.7500E+16 JOULE	
BASIC ENERGY DEMAND=	9.5000E+15 JOULE	
PROCESS EFFICIENCY	2.000000E-01	
TRANSPORTATION, OIL, AIRPLANE, NATIONAL		1972
564 ENERGY FLOW IN=	4.2333E+16 JOULE	
BASIC ENERGY DEMAND=	1.2700E+16 JOULE	
PROCESS EFFICIENCY	3.000000E-01	
TRANSPORTATION, OIL, FREIGHT TRUCK, NATIONAL		1972
567 ENERGY FLOW IN=	1.8287E+17 JOULE	
BASIC ENERGY DEMAND=	2.7431E+16 JOULE	

PROCESS EFFICIENCY 1.500000E-01
TRANSPORTATION,ELECTRIC,PERSONAL TRAIN,NATIONAL 1972

573 ENERGY FLOW IN= 6.3300E+15JOULE
BASIC ENERGY DEMAND= 6.3300E+15JOULE

PROCESS EFFICIENCY 1.000000E+00
TRANSPORTATION,COAL,PERSONAL TRAIN,NATIONAL 1972

574 ENERGY FLOW IN= 3.2100E+17JOULE
BASIC ENERGY DEMAND= 3.2100E+16JOULE

PROCESS EFFICIENCY 1.000000E-01
TRANSPORTATION,OIL,PERSONAL TRAIN,NATIONAL 1972

575 ENERGY FLOW IN= 2.6393E+16JOULE
BASIC ENERGY DEMAND= 7.3900E+15JOULE

PROCESS EFFICIENCY 2.800000E-01

TOTAL EFFECTS BY QUANTITY FOR THE YEAR 1972*

PRIMARY FUEL,PROCESSING LOSS	0.	JOULES
PRIMARY FUEL,PHYSICAL LOSS	0.	JOULES
PRIMARY FUEL,STEAM RAISING	0.	JOULES
ANCILLARY FUEL,COAL	0.	JOULES
ANCILLARY FUEL,OIL	0.	JOULES
ANCILLARY FUEL,GAS	0.	JOULES
ANCILLARY FUEL,ELECTRICITY	0.	JOULES
ACIDS	0.	TONNES
BASES	0.	TONNES
PHOSPHATES	0.	TONNES
NITRATES	0.	TONNES
DISSOLVED SOLIDS,MISC.	0.	TONNES
SUSPENDED SOLIDS	0.	TONNES
NON-DEGRADABLE ORGANICS	0.	TONNES
BOD	0.	TONNES
COD	0.	TONNES
THERMAL REJECTION	0.	JOULES
PARTICULATES,AIR	0.	TONNES
OXIDES OF NITROGEN	0.	TONNES
SULFUR DIOXIDE	0.	TONNES
HYDROCARBONS	0.	TONNES
CARBON MONOXIDE	0.	TONNES
CARBON DIOXIDE	0.	TONNES
ALDEHYDES	0.	TONNES
SOLID WASTE	0.	TONNES
LAND USE	0.	METER**2
OCCUPATIONAL DEATHS	0.	MEN
OCCUPATIONAL INJURIES	0.	MEN
OCCUPATIONAL MAN-DAYS LOST	0.	MEN
POTENTIAL DISASTER	0.	NUMBER
ANNUAL COSTS,FIXED	0.	DOLLARS
ANNUAL COSTS,OPERATING	0.	DOLLARS
TOTAL COSTS	0.	DOLLARS
POPULATION EXPOSURE,RADIATION	0.	MAN-REMS
HIGH-LEVEL RADIOACTIVE WASTE	0.	CURIES
TRITIUM EMISSION	0.	CURIES
KRYPTON EMISSION	0.	CURIES

TOTAL RESOURCES CONSUMED IN JOULE FOR THE YEAR 1972 FOR THIS BASE CASE/TRAJECTORY RUN

PETROLEUM	1.0043E+18
COAL	1.5072E+18
HYDROELECTRIC	1.1652E+17
NUCLEAR	1.3444E+16
GAS	3.9780E+16
WOOD	1.1900E+18
WASTE	8.7200E+17
ANIMAL	2.8027E+17
HUMAN	1.7692E+17

TOTAL RESOURCES CONSUMED BY ENERGY TYPE

COMMERCIAL	2.6812E+18
NON-COMMERCIAL	2.5192E+18
ANIMATE	4.5719E+17

GRAND TOTAL RESOURCE CONSUMPTION= 5.2004E+18

* Environmental and Technological Parameters were not entered for this analysis.

ENERGY END USE INPUTS BY SECTOR AND FUEL TYPE FOR 1972

SECTOR: RURAL HOUSEHOLD

COAL	8.4400E+16	JOULE
OIL (GENERAL)	1.6240E+17	JOULE
GAS	0.	JOULE
ELECTRICITY	3.3800E+16	JOULE
HEAT	8.7200E+17	JOULE
WOOD	1.1900E+18	JOULE
WIND	0.	JOULE
SOLAR	0.	JOULE
ANIMAL	0.	JOULE
HUMAN	0.	JOULE

SECTOR: RURAL AGRIC.

COAL	0.	JOULE
OIL (GENERAL)	1.2680E+17	JOULE
GAS	8.4700E+15	JOULE
ELECTRICITY	1.7846E+16	JOULE
HEAT	0.	JOULE
WOOD	0.	JOULE
WIND	0.	JOULE
SOLAR	0.	JOULE
ANIMAL	2.8027E+17	JOULE
HUMAN	1.7692E+17	JOULE

SECTOR: INDUST..INDIV.

COAL	6.6042E+17	JOULE
OIL (GENERAL)	2.1167E+17	JOULE
GAS	1.2283E+16	JOULE
ELECTRICITY	1.2800E+17	JOULE
HEAT	0.	JOULE
WOOD	0.	JOULE
WIND	0.	JOULE
SOLAR	0.	JOULE
ANIMAL	0.	JOULE
HUMAN	0.	JOULE

SECTOR: TRANS..PERSONAL

COAL	3.2100E+17	JOULE
OIL (GENERAL)	1.9356E+17	JOULE
GAS	0.	JOULE
ELECTRICITY	6.3300E+15	JOULE
HEAT	0.	JOULE
WOOD	0.	JOULE
WIND	0.	JOULE
SOLAR	0.	JOULE
ANIMAL	0.	JOULE
HUMAN	0.	JOULE

SECTOR: TRANS..FREIGHT

COAL	0.	JOULE
OIL (GENERAL)	1.8287E+17	JOULE
GAS	0.	JOULE
ELECTRICITY	0.	JOULE
HEAT	0.	JOULE
WOOD	0.	JOULE
WIND	0.	JOULE
SOLAR	0.	JOULE
ANIMAL	0.	JOULE
HUMAN	0.	JOULE

ENERGY END USE INPUT TOTALS BY SECTOR AND FUEL TYPE FOR 1972

SECTOR TOTALS: *

RURAL HOUSEHOLD	2.3426E+18 JOULE
RURAL AGRIC.	6.1030E+17 JOULE
INDUST..INDIV.	1.0124E+18 JOULE
TRANS..PERSONAL	5.2089E+17 JOULE
TRANS..FREIGHT	1.8287E+17 JOULE
FUEL TYPE TOTALS:	

COAL	1.0658E+18 JOULE
OIL (GENERAL)	8.7730E+17 JOULE
GAS	2.0753E+16 JOULE
ELECTRICITY	1.8598E+17 JOULE
HEAT	8.7200E+17 JOULE
WOOD	1.1900E+18 JOULE
WIND	0. JOULE
SOLAR	0. JOULE
ANIMAL	2.8027E+17 JOULE
HUMAN	1.7692E+17 JOULE

BASIC ENERGY DEMANDS:

TOTALS BY END USE CATEGORY

RURAL:HOUSEHOLD--RURAL COOKING
2.958E+17 JOULE

RURAL:HOUSEHOLD--RURAL LIGHTING
3.380E+16 JOULE

RURAL:AGRICULTURE--FEEDSTOCKS
8.227E+16 JOULE

RURAL:AGRICULTURE--AGRICULTURE NO. 1
2.748E+16 JOULE

RURAL:AGRICULTURE--AGRICULTURE NO. 2
4.220E+16 JOULE

INDUSTRY,INDIVIDUAL--INDUSTRY 1
4.504E+17 JOULE

INDUSTRY,INDIVIDUAL--IRON AND STEEL
8.330E+16 JOULE

TRANSPORTATION:PERSONAL
7.962E+16 JOULE

TRANSPORTATION:FREIGHT
2.743E+16 JOULE

END OF OUTPUT

* The data available for this model run do not provide an Urban/Rural split for household energy use; therefore, all household energy consumption is summed under the ing "Rural Household."

LDC-ESNS ENERGY SYSTEM SUPPLY PROCESS NETWORK (NUCLEAR)

NUCLEAR SUBSYSTEM

THORIUM

URANIUM

COAL SUBSYSTEM

LDC-ESNS ENERGY SYSTEM SUPPLY PROCESS NETWORK (GEOTHERMAL, WOOD, ANIMAL, HUMAN)

GEOTHERMAL SUBSYSTEM

WOOD SUBSYSTEM

ANIMAL SUBSYSTEM

HUMAN SUBSYSTEM

LDC-ESNS ENERGY SYSTEM SUPPLY PROCESS NETWORK (SOLID WASTE, WIND)

SOLID WASTE SUBSYSTEM

WIND SUBSYSTEM

LDC - ESNS ENERGY SYSTEM SUPPLY PROCESS NETWORK
(HYDROELECTRIC, NATURAL GAS, SOLAR)

LDC-ESNS ENERGY SYSTEM SUPPLY PROCESS NETWORK (OIL)

OIL SUBSYSTEM

SHALE OIL:

INTERMEDIATE LINKS

LDC-ESNS UTILIZATION PROCESS NETWORK-URBAN HOUSEHOLD

LDC-ESNS UTILIZATION PROCESS NETWORK-URBAN: COMMERCIAL

LDC-ESNS UTILIZATION PROCESS
NETWORK - RURAL

LDC-ESNS UTILIZATION PROCESS NETWORK-RURAL

LDC-ESNS UTILIZATION PROCESS
NETWORK-RURAL: AGRICULTURAL

313
116 INTERMED. WOOD 269 --- TO A
RURAL

314
115 INTERMED. COAL 270 --- TO B
RURAL

315
125 INTERMED. NAT. GAS 271 --- TO C
RURAL

316
113 INTERMED. ELECT. (CENT.) 272 --- TO D

317
129 INTERMED. OIL 273 --- TO E
RURAL

318
121 INTERMED. ANIMAL WASTE 274 --- TO F
RURAL

319
123 INTERMED. WIND 275 --- TO G
RURAL

320
122 INTERMED. INT. BTU GAS FROM 276 --- TO H
SOLID WASTE
RURAL

321
120 INTERMED. AGRICULTURAL 277 --- TO I
RESIDUALS
RURAL

322
128 INTERMED. SOLAR FROM 278 --- TO J
DECENT.
RURAL

323
127 INTERMED. SOLAR SPACE 279 --- TO K
HEAT
RURAL

324
126 INTERMED. SOLAR WATER 280 --- TO L
HEAT
RURAL

325
117 INTERMED. ANIMAL POWER 281 --- TO M
RURAL

326
118 INTERMED. HUMAN POWER 282 --- TO N
RURAL

327
B --- 270 RURAL SOIL 283
PREPARATION
COAL

328
C --- 271 RURAL SOIL 284
PREPARATION
NAT. GAS

329
E --- 273 RURAL SOIL 285
PREPARATION
OIL

330
M --- 281 RURAL SOIL 286
PREPARATION
ANIMAL POWER

331
N --- 282 RURAL SOIL 287
PREPARATION
HUMAN POWER

332
B --- 270 FEED STOCKS 288
COAL

333
C --- 271 FEED STOCKS 289
NAT. GAS

334
E --- 273 FEED STOCKS 290
OIL

RURAL
SOIL
PREPARATION

FEEDSTOCKS

LDC-ESNS UTILIZATION PROCESS NETWORK - RURAL : AGRICULTURE

AGRICULTURE
1

AGRICULTURE
2

LDC - ESNS UTILIZATION PROCESS
NETWORK - RURAL = AGRICULTURE

AGRICULTURE
3

AGRICULTURE
4

LDC-ESNS UTILIZATION PROCESS
NETWORK - RURAL: AGRICULTURE

LDC-ESNS UTILIZATION PROCESS NETWORK - RURAL

(116) 395 (352) - - - - TO A
INTERMED.
WOOD RURAL

(115) 396 (353) - - - - TO B
INTERMED.
COAL RURAL

(125) 397 (354) - - - - TO C
INTERMED.
NAT. GAS RURAL

(113) 398 (355) - - - - TO D
INTERMED.
ELECT. (CENT)

(129) 399 (356) - - - - TO E
INTERMED.
OIL RURAL

(121) 400 (357) - - - - TO F
INTERMED.
ANIMAL WASTE
RURAL

(123) 401 (358) - - - - TO G
INTERMED.
WIND RURAL

(122) 402 (359) - - - - TO H
INTERMED.
INT. BTU GAS FROM
SOLID WASTE RURAL

(120) 403 (360) - - - - TO I
INTERMED.
ARICULTURAL
RESIDUALS RURAL

(128) 404 (361) - - - - TO J
INTERMED.
SOLAR FROM DECENT.
RURAL

(127) 405 (362) - - - - TO K
INTERMED.
SOLAR SPACE HEAT
RURAL

(126) 406 (363) - - - - TO L
INTERMED.
SOLAR WATER HEAT
RURAL

(117) 407 (364) - - - - TO M
INTERMED.
HUMAN POWER
RURAL

(118) 408 (365) - - - - TO N
INTERMED.
ANIMAL POWER
RURAL

A - - - - (352) 409 (366)
AGRIC. PROC.
WOOD
410
B - - - - (353) 410 (367)
AGRIC. PROC.
COAL
411
C - - - - (354) 411 (368)
AGRIC. PROC.
NAT. GAS

D - - - - (355) 412 (369)
AGRIC. PROC.
ELECT. (CENT.)
413
E - - - - (356) 413 (370)
AGRIC. PROC.
OIL
414
F - - - - (357) 414 (371)
AGRIC. PROC.
ANIMAL WASTE
415
G - - - - (358) 415 (372)
AGRIC. PROC.
WIND
416
H - - - - (359) 416 (373)
AGRIC. PROC.

I - - - - (360) 417 (374)
AGRIC. PROC.
AGRIC. RES.
418
J - - - - (361) 418 (375)
AGRIC. PROC.
SOLAR DECENT.

K - - - - (362) 419 (376)
AGRIC. PROC.
SOLAR HEAT
420
L - - - - (363) 420 (377)
AGRIC. PROC.
SOLAR WATER
HEAT

M - - - - (364) 421 (378)
AGRIC. PROC.
HUMAN POWER
422
N - - - - (365) 422 (379)
AGRIC. PROC.
ANIMAL POWER

A - - - - (352) 423 (380)
HAND. PROD.
WOOD

B - - - - (353) 424 (381)
HAND. PROD.
COAL
425
C - - - - (354) 425 (382)
HAND. PROD.
NAT. GAS
426
D - - - - (355) 426 (383)
HAND. PROD.
ELECT. CENT.

E - - - - (356) 427 (384)
HAND. PROD.
OIL
428
F - - - - (357) 428 (385)
HAND. PROD.
ANIMAL WASTE
429
G - - - - (358) 429 (386)
HAND. PROD.

H - - - - (359) 430 (387)
HAND. PROD.
WIND
430
I - - - - (360) 431 (388)
HAND. PROD.

J - - - - (361) 432 (389)
HAND. PROD.
SOLAR DECENT.
433
K - - - - (362) 433 (390)
HAND. PROD.
SOLAR SPACE
HEAT

L - - - - (363) 434 (391)
HAND. PROD.
SOLAR WATER
HEAT
435
M - - - - (364) 435 (392)
HAND. PROD.
HUMAN POWER

N - - - - (365) 436 (393)
HAND. PROD.
ANIMAL POWER

AGRICULTURAL
PROCESSING

HANDICRAFT
PRODUCTION

LDC-ESNS UTILIZATION PROCESS
NETWORK-RURAL

LDC - ESNS UTILIZATION PROCESS
NETWORK - RURAL

LDC-ESNS UTILIZATION PROCESS
NETWORK-RURAL

LDC-ESNS UTILIZATION PROCESS NETWORK - INDUSTRY

LDC-ESNS UTILIZATION PROCESS NETWORK - TRANSPORTATION

FUEL	ACTIVITY	LINK NO.	PROCESS NAME	NODE ORIG.	NODE DEST.	LINKS IN PARALLEL
NUCLEAR:	STORAGE	1	NUCLEAR,STORAGE,WASTE STORAGE	4	1	
	UTILIZATION	2	NUCLEAR,DISPOSAL,WASTE DISPOSAL	1	2	
	REFINING & CONV.	3	NUCLEAR,REPROCESSING,HTGR SPENT FUEL REPROCESSING	3	4	
	" "	4	NUCLEAR,RECYCLE,RECOVERED URANIUM-HTGR FUEL REPROCESSING	4	8	5 7 8
	" "	5	NUCLEAR,RECYCLE,RECOVERED THORIUM-HTGR FUEL REPROCESSING	4	8	4 7 8
	EXTRACTION	6	NUCLEAR,MINING,THORIUM MINE	5	6	
	REFINING & CONV.	7	NUCLEAR,MILLING,THORIUM MILL	6	8	4 5 8
	" "	8	NUCLEAR,ENRICHMENT,UFG PRODUCTION	7	8	4 5 7
	" "	9	NUCLEAR,FUEL FABRICATION,HTGR FUEL FABRICATION	8	9	
	CENTRAL STA. CONV.	10	NUCLEAR,POWER PLANT,HTGR POWER PLANT	9	10	12 13 24 25 26 39 59 60 61 67 74 80
	TRANS., DIST., STORAGE	11	ELECTRICITY,TRANSMISSION	10	11	87 94 100 103 120 125 128 145
	CENTRAL STA. CONV.	12	NUCLEAR,POWER PLANT,LMFBR POWER PLANT	16	10	10 13 24 25 26 39 59 60 61 67 74 80
	" "	13	NUCLEAR,(U+PU)PLUR POWER PLANT	16	10	87 94 100 103 120 125 128 145
	EXTRACTION	14	NUCLEAR,MINING,OPEN PIT URANIUM MINE	12	13	10 12 24 25 26 39 59 60 61 67 74
	"	15	NUCLEAR,MINING,MINING,UNDERGROUND URANIUM MINE	12	13	80 87 94 100 103 120 125 128 145
	REFINING & COV.	16	NUCLEAR,MILLING,MILLING CONCENTRATION	13	14	15
	" "	17	NUCLEAR,PROCESSING,HYDROFLUOR	14	15	14
	" "	18	NUCLEAR,PROCESSING,SOLVENT EXTRACTION	14	15	18 32
	" "	19	NUCLEAR,ENRICHMENT,GASEOUS DIFFUSION	15	7	17 32
	" "	20	NUCLEAR,ENRICHMENT,GAS CENTRIFUGE	15	7	20 21 33
	" "	21	NUCLEAR,ENRICHMENT,ENRICHMENT BYPASS	15	7	19 21 33
	" "	22	NUCLEAR,(U+PU)PWR FUEL FABRICATION	7	16	19 20 21
	" "	23	NUCLEAR,FUEL FABRICATION,LWR FUEL FABRICATION	7	17	
	CENTRAL STA. CONV	24	NUCLEAR,POWER PLANT,(U+PU) BWR POWER PLANT	16	10	10 12 13 25 26 39 59 60 61 67 74
	" "	25	NUCLEAR,POWER PLANT,PWR POWER PLANT	17	10	80 87 94 100 103 120 125 128 145
	" "	26	NUCLEAR,POWER PLANT,BWR POWER PLANT	17	10	10 12 13 24 26 39 59 60 61 67 74
	REFINING & CONV.	27	NUCLEAR,REPROCESSING,LWR SPENT FUEL REPROCESSING	18	21	80 87 94 100 103 120 125 128 145
	" "	28	NUCLEAR,REPROCESSING,(U+PU)LWR SPENT FUEL REPROCESSING	19	21	28 34
		29	NUCLEAR,STORAGE,TAILS STORAGE	20	22	27 34
	REFINING & CONV.	30	NUCLEAR,PARTITIONING BYPASS	21	23	31
	" "	31	NUCLEAR,PARTITIONING,PARTITIONING	21	23	30
	" "	32	NUCLEAR,RECYCLE,URANIUM RECYCLE	23	15	17 18

	"	"	33	NUCLEAR, RECYCLE, PLUTONIUM RECYCLE	23	7	19	20	21
	"	"	34	NUCLEAR, REPROCESSING, LMFBR SPENT FUEL REPROCESSING	22	21	27	28	
			35	NUCLEAR, STORAGE, WASTE STORAGE, DISPOSAL	23	24			
UTILIZATION			36	NUCLEAR, STORAGE, DISPOSAL	24	25			
COAL:	REFINING & CONV.		37	COAL, GASSIFICATION, HI BTU GASSIFICATION	29	31			
	"	"	38	COAL, GASSIFICATION, LOW BTU GASSIFICATION	29	32	97		
CENTRAL STA. CONV.			39	COAL, POWER PLANT, LOW BTU POWER PLANT	32	10	10	12	13
EXTRACTION			40	COAL, MINE, BITUMINOUS UNDERGROUND MINE	26	27	80	87	94
"			41	COAL, MINE, BITUMINOUS STRIP MINE	26	27	41	42	43
"	"		42	COAL, MINE, BITUMINOUS UNDERGROUND MINE	26	27	40	41	43
"			43	COAL, MINE, SUBBITUMINOUS STRIP MINE	26	27	40	41	42
"			44	COAL, MINE, LIGNITE UNDERGROUND MINE	26	27	40	41	42
"			45	COAL, MINE, LIGNITE STRIP MINE	26	27	40	41	42
TRANSPORT & STORAGE			46	COAL, TRANSPORTATION, TRUCK	27	28	47	48	
"	"		47	COAL, TRANSPORTATION, CONVEYOR	27	28	46	48	
"	"		48	COAL, TRANSPORTATION, MINE, RAIL	27	28	46	47	
UTILIZATION			49	COAL, EXPORTS	29	30	50	51	52
REFINING & CONV.			50	COAL, PROCESSING, BREAK AND SIZE	28	29	49	51	52
"	"		51	COAL, PROCESSING, STEAM COAL CLEANING	28	29	49	50	52
"	"		52	COAL, PROCESSING, METALLURGICAL CLEANING	28	29	49	50	51
EXTRACTION			53	COAL, EXPORTS	35	29	49	50	51
REFINING & CONV.			54	COAL, CONVERSION, SLOT OVEN	29	33	55		
"	"		55	COAL, CONVERSION, BEEHIVE OVEN	29	33	54		
TRANSPORT & STORAGE			56	COAL, STORAGE, ABOVE GROUND STORAGE	29	34	57	58	
"	"		57	COAL, STORAGE, UNDERGROUND STORAGE	29	34	56	58	
"	"		58	COAL, STORAGE, SILO STORAGE	29	34	56	57	
CENTRAL STA. CONV.			59	COAL, POWER PLANT	34	10	10	12	13
"	"		60	COAL, HERIC FLUIDIZED BED BOILER POWER PLANT	34	10	80	87	94
"	"		61	COAL, PRESSURIZED FLUIDIZED BED BOILER POWER PLANT	34	10	10	12	13
TRANSPORT & STORAGE			62	COAL, TRANSPORTATION, TRUCK	27	36	80	87	94
REFINING & CONV.			63	COAL, PROCESSING, SOLVENT REFINING	36	37	100	103	120

TRANSPORT & STORAGE	64	COAL,DISTRIBUTION,MIXED TRAIN	37	38	65 66
" "	65	COAL,DISTRIBUTION,UNIT TRAIN	37	38	64 66
" "	66	COAL,DISTRIBUTION,BARGE	37	38	64 65
CENIRAL STA. CONV.	67	COAL,POWER PLANT SOLVENT REFINED COAL	38	10	10 12 13 24 25 26 39 59 60 61 74
TRANSPORT & STORAGE	68	COAL,DISTRIBUTION,TRUCK	27	39	80 87 94 100 103 120 125 128 145
REFINING & CONV.	69	COAL,LIQUEFICATION,CSF PROCESS	39	40	70
" "	70	COAL,LIQUEFICATION,SRC PROCESS	39	40	69
<u>GEO THERMAL</u> : EXTRACTION	71	GEO THERMAL,REINJECTION,STEAM REINJECTION	41	42	
"	72	GEO THERMAL,EXTRACTION,STEAM DOMINATED HARD ROCK	42	43	
REFINING & CONV.	73	GEO THERMAL,TREATMENT,PARTICULATE FILTERING	43	44	76
CENIRAL STA. CONV.	74	GEO THERMAL,CONVERSION,STEAM CONVERSION	44	10	10 12 13 24 25 26 39 59 60 61 67
EXTRACTION	75	GEO THERMAL,REINJECTION,REINJ HOT DRY ROCK SYS	45	46	80 87 94 100 103 120 125 128 145
"	76	GEO THERMAL,EXTRACTION,HOT DRY ROCK,RESERVOIR	46	44	73
"	77	GEO THERMAL,REINJECTION,FLASH REINJECTION	47	49	78
"	78	GEO THERMAL,REINJECTION,BINARY REINJECTION	48	49	77
"	79	GEO THERMAL,EXTRACTION,LIQUID DOM RESERVOIR	49	50	
CENIRAL STA. CONV.	80	GEO THERMAL,CONVERSION,BINARY CONVERSION	50	10	10 12 13 24 25 26 39 59 60 61 67
<u>WOOD</u> : EXTRACTION	81	WOOD,EXTRACTION	51	52	74 87 94 100 103 120 125 128 145
<u>ANIMAL</u> : EXTRACTION	82	ANIMAL,EXTRACTION,ANIMAL POWER	53	54	
<u>HUMAN</u> : EXTRACTION	83	HUMAN,EXTRACTION,HUMAN POWER	55	56	
<u>SOLID WASTE</u> : EXTRACTION	84	SOLID WASTE,AGRICULTURAL,RESIDUALS COLLECTION	57	58	
TRANSPORT & STORAGE	85	SOLID WASTE,AGRICULTURAL,RESIDUALS TRANSPORT	58	59	
" "	86	SOLID WASTE,AGRICULTURAL,RESIDUALS STORAGE	59	60	
CENIRAL STA. CONV.	87	SOLID WASTE,AGRICULTURAL,CO-COMBUSTION	60	10	10 12 13 24 25 26 39 59 60 61 67
TEST & DEBUG	88	SPECIAL ESNS INTERNAL DEBUGGING LINK	291	541	74 80 94 100 103 120 125 128 145
TEST & DEBUG	89	SPECIAL ESNS INTERNAL DEBUGGING LINK	541	542	
<u>SOLID WASTE</u> : EXTRACTION	90	SOLID WASTE,ANIMAL,RESIDUALS COLLECTION	61	62	
REFINING & CONV.	91	SOLID WASTE,ANIMAL,ANAEROPIC DIGESTION	62	63	93
TRANS. DIST., STORAGE	92	SOLID WASTE,METHANE PIPELINE	63	64	
REFINING & CONV.	93	SOLID WASTE,HUMAN,ANAEROBIC DIGESTION	66	63	91
CENIRAL STA. CONV.	94	SOLID WASTE,CO-COMBUSTION POWER PLANT	66	10	10 12 13 24 25 26 39 59 60 61 67
EXTRACTION	95	SOLID WASTE,HUMAN,COLLECTION AND TRANSPORT	65	66	74 80 87 100 103 120 125 128 145

	REFINING & CONV.	96	SOLID WASTE,HUMAN,INTERMEDIATE BTU GAS PRODUCTION	66	0	
	" "	97	SOLID WASTE,HUMAN,LOW BTU GAS PRODUCTION	66	32	38
<u>WIND:</u>	EXTRACTION	98	WIND,WIND POWER	67	68	
	CENT./DECENT. STA. CONV.	99	WIND,WIND GENERATOR	68	10	
	TRANS., DIST., STORAGE	100	ELECTRIC,TO CENTRALIZED TRANSMISSION	69	10	10 12 13 24 25 26 39 59 60 61 67
	" "	101	ELECTRIC,TO DECENTRALIZED TRANSMISSION	69	70	74 80 87 94 103 120 125 128 145
<u>HYDROPOWER:</u>	EXTRACTION	102	HYDROELECTRIC,DAM	71	72	
	CENTRAL STA. CONV.	103	HYDROELECTRIC,POWER PLANT	72	10	10 12 13 24 25 26 39 59 60 61 67
<u>NAT. GAS:</u>	EXTRACTION	104	NATURAL GAS,EXTRACTION,OFF SHORE	71	72	80 87 94 100 120 125 128 145
	"	105	NATURAL GAS,EXTRACTION,ONSHORE	73	74	105
	TRANSPORT & STORAGE	106	NATURAL GAS,GATHERING PIPELINE	74	75	104
	REFINING & CONV.	107	NATURAL GAS,PROCESSING,NGL SEPARATION	75	76	
	TRANSPORT & STORAGE	108	NATURAL GAS,TRANS. & DISTRIB.,TRUCK	76	77	146
	REFINING & CONV.	109	NATURAL GAS,PROCESSING,H2S REMOVAL	75	79	
	UTILIZATION	110	NATURAL GAS,EXPORTS	81	78	
	TRANSPORT & STORAGE	111	NATURAL GAS,TRANSPORTATION AND DISTRIBUTION,PIPELINE	79	81	112 156 157
	EXTRACTION	112	NATURAL GAS,IMPORTS	80	81	111 156 157
	TRANSPORT & STORAGE	113	NATURAL GAS,STORAGE,UNDERGROUND STORAGE	81	82	114 119
	" "	114	NATURAL GAS,STORAGE,HOLDER STORAGE	81	82	113 119
	REFINING & CONV.	115	NATURAL GAS,STORAGE,LIQUEFACTION	81	83	116
	EXTRACTION	116	NATURAL GAS,LNG IMPORTS	85	83	115
	TRANSPORT & STORAGE	117	NATURAL GAS,LNG STORAGE	83	84	
	UTILIZATION	118	NATURAL GAS,LNG EXPORTS	83	86	
	REFINING & CONV.	119	NATURAL GAS,CONVERSION,LNG VAPORIZATION	84	83	113 114
	CENTRAL STA. CONV.	120	NATURAL GAS,STEAM-ELECTRIC POWER PLANT	82	10	10 12 13 24 25 26 39 59 60 61 67
<u>SOLAR:</u>	EXTRACTION	121	SOLAR,FLAT PLATE COLLECTION FOR WATER HEATING	87	88	74 80 87 94 100 103 125 128 145
	"	122	SOLAR,FLAT PLATE COLLECTION FOR SPACE HEATING	89	90	
	"	123	SOLAR,PHOTOVOLTAIC COLLECTOR	91	92	
	TRANSPORT & STORAGE	124	SOLAR,BATTERY STORAGE	92	93	
	TRANS., DIST., & STORAGE	125	SOLAR,TO CENTRALIZED TRANSMISSION	89	10	10 12 13 24 25 26 39 59 60 61 67
	" "	126	SOLAR,DECENTRALIZED TRANSMISSION	93	94	74 80 87 94 100 103 120 128 145
	CENT. STA. CONV.	127	SOLAR,CENTRAL RECEIVER/TURBO GENERATOR	95	96	

	TRAN., DIST., & STORAGE	128	SOLAR, TO CENTRALIZED TRANSMISSION	96	10	10 12 13 24 25 26 39 59 60 61 67
<u>OIL:</u>	EXTRACTION	129	OIL, CRUDE IMPORTS	97	100	74 80 87 94 100 103 120 125 145
	"	130	OIL, EXTRACTION, ONSHORE WELLS	99	100	130 131
	"	131	OIL, EXTRACTION, OFFSHORE WELLS	99	100	129 131
	UTILIZATION	132	OIL, CRUDE IMPORTS	100	104	129 130
	TRANSPORT & STORAGE	133	OIL, TRANSPORTATION, PIPE LINE	100	101	134 135 136 137
	" "	134	OIL, TRANSPORTATION, TANKER	100	101	133 135 136 137
	" "	135	OIL, TRANSPORTATION, BARGE	100	101	133 134 136 137
	" "	136	OIL, TRANSPORTATION, TANK TRUCK	100	101	133 134 135 137
	" "	137	OIL, TRANSPORTATION, TANK CAR	100	101	133 134 135 136
	" "	138	OIL, STORAGE, FIXED-ROOF STORAGE	101	102	139
	" "	139	OIL, STORAGE, FLOATING-ROOF STORAGE	101	102	138
	EXTRACTION	140	OIL, REFINED IMPORTS	98	40	69 70 141
	REFINING & CONV.	141	OIL, REFINING	102	40	69 70 140
	UTILIZATION	142	OIL, REFINED EXPORTS	40	105	
	TRANSPORT & STORAGE	143	OIL, STORAGE, FIXED-ROOF STORAGE	40	103	144
	" "	144	OIL, STORAGE, FLOATING-ROOF STORAGE	40	103	143
	CENTRAL STA. CONV.	145	OIL, OIL FIRED POWER PLANT	103	10	10 12 13 24 25 26 39 59 60 61 67
	TRANS., DIST., STORAGE	146	OIL, DISTRIBUTION, PROPANE ALLOCATION	103	77	74 80 87 94 100 103 120 125 128
<u>OIL (SHALE):</u>	EXTRACTION	147	OIL, SHALE, UNDERGROUND MINE	106	107	148
	"	148	OIL, SHALE, SURFACE MINE	106	107	147
	TRANSPORT & STORAGE	149	OIL, SHALE, TRANSPORTATION, CONVEYOR	107	108	
	" "	150	OIL, SHALE, TRANSPORTATION, TRUCK	108	109	
	REFINING & CONV.	151	OIL, PREPROCESSING CRUSHING	109	110	
	" "	152	OIL, PROCESSING, GAS COMBUSTION	110	111	153 154
	" "	153	OIL, PROCESSING, TOSCO II	110	111	152 154
	" "	154	OIL, PROCESSING, IN-SITU	112	11	152 153
	TRANSPORT, DIST., STOR.	155	OIL, DISTRIBUTION, PIPELINE	111	101	133 134 135 136 137
NAT. GAS:	TRANSPORT, DIST., STOR.	156	NATURAL GAS, PIPELINE FROM HI BTU GASSIFICATION	31	81	111 112 157
	" "	157	METHANE, INTERMEDIATE	64	81	111 112 156
	" "	158	ELECTRIC, INTERMEDIATE	11	113	
	" "	159	COKE, INTERMEDIATE	33	114	

TRANS., DIST., STORAGE	160	COAL, INTERMEDIATE	34	114
"	161	WOOD, INTERMEDIATE	52	116
"	162	ANIMAL POWER, INTERMEDIATE	54	117
"	163	HUMAN POWER, INTERMEDIATE	56	118
"	164	DRIED AGRICULTURE RESIDUALS, INTERMEDIATE	58	120
"	165	DRIED ANIMAL RESIDUALS, INTERMEDIATE	62	121
"	166	INT. RTU GAS, INTERMEDIATE	119	122
"	167	WIND, DECENTRALIZED, INTERMEDIATE	70	123
"	168	PROPANE, INTERMEDIATE	77	124
"	169	NATURAL GAS, INTERMEDIATE	82	125
"	170	SOLAR, TO WATER HEAT, INTERMEDIATE	88	126
"	171	SOLAR, TO SPACE HEAT, INTERMEDIATE	90	127
"	172	SOLAR, DECENTRALIZED TRANSMISSION, INTERMEDIATE	94	128
"	173	OIL, INTERMEDIATE	103	129
<u>URB. HOUSEHOLD:</u> UTILIZATION	174	URBAN HOUSEHOLD, WOOD, INTERMEDIATE	116	130
"	175	URBAN HOUSEHOLD, COAL, INTERMEDIATE	115	131
"	176	URBAN HOUSEHOLD, NATURAL GAS, INTERMEDIATE	125	132
"	177	URBAN HOUSEHOLD, ELECTRIC, INTERMEDIATE	113	133
"	178	URBAN HOUSEHOLD, OIL, INTERMEDIATE	129	134
"	179	URBAN HOUSEHOLD, WOOD, COOKING WOOD	130	135
"	180	URBAN HOUSEHOLD, COAL, COOKING COAL	131	136
"	181	URBAN HOUSEHOLD, NATURAL GAS, COOKING NATURAL GAS	132	137
"	182	URBAN HOUSEHOLD, ELECTRIC, COOKING ELECTRIC	133	138
"	183	URBAN HOUSEHOLD, OIL, COOKING OIL	134	139
"	184	URBAN HOUSEHOLD, ELECTRIC, ELECTRIC LIGHTING	133	139
"	185	URBAN HOUSEHOLD, OIL, OIL LIGHTING	134	141
"	186	URBAN HOUSEHOLD, COAL, SPACE HEAT COAL	131	142
"	187	URBAN HOUSEHOLD, NATURAL GAS, SPACE HEAT NATURAL GAS	132	143
"	188	URBAN HOUSEHOLD, ELECTRIC, SPACE HEAT ELECTRIC	133	144
"	189	URBAN HOUSEHOLD, OIL, SPACE HEAT OIL	134	145
"	190	URBAN HOUSEHOLD, NATURAL GAS, WATER HEAT NATURAL GAS	132	146
"	191	URBAN HOUSEHOLD, ELECTRIC, WATER HEAT ELECTRIC	133	147

"	192	URBAN HOUSEHOLD,OIL,WATER HEAT OIL	134	148
"	193	URBAN HOUSEHOLD,WOOD,OTHER #1 WOOD	130	149
"	194	URBAN HOUSEHOLD,COAL,OTHER #1 COAL	131	150
"	195	URBAN HOUSEHOLD,NATURAL GAS,OTHER #1 NATURAL GAS	132	151
"	196	URBAN HOUSEHOLD,ELECTRIC,OTHER #1 ELECTRIC	133	152
"	197	URBAN HOUSEHOLD,OIL,OTHER #1 OIL	134	153
"	198	URBAN HOUSEHOLD,WOOD,OTHER #2 WOOD	130	154
"	199	URBAN HOUSEHOLD,COAL,OTHER #2 COAL	131	155
"	200	URBAN HOUSEHOLD,NATURAL GAS,OTHER #2 NATURAL GAS	132	156
"	201	URBAN HOUSEHOLD,ELECTRIC,OTHER #2 ELECTRIC	133	157
"	202	URBAN HOUSEHOLD,OIL,OTHER #2 OIL	134	158
"	203	URBAN HOUSEHOLD,WOOD,OTHER #3 WOOD	130	159
"	204	URBAN HOUSEHOLD,COAL,OTHER #3 COAL	131	160
"	205	URBAN HOUSEHOLD,NATURAL GAS,OTHER #3 NATURAL GAS	132	161
"	206	URBAN HOUSEHOLD,ELECTRIC,OTHER #3 ELECTRIC	133	162
"	207	URBAN HOUSEHOLD,OIL,OTHER #3 OIL	134	163
"	208	URBAN HOUSEHOLD,WOOD,OTHER #4 WOOD	130	164
"	209	URBAN HOUSEHOLD,COAL,OTHER #4 COAL	131	165
"	210	URBAN HOUSEHOLD,NATURAL GAS,OTHER #4 NATURAL GAS	132	166
"	211	URBAN HOUSEHOLD,ELECTRIC,OTHER #4 ELECTRIC	133	167
"	212	URBAN HOUSEHOLD,OIL,OTHER #4 OIL	134	168
"	213	URBAN HOUSEHOLD,WOOD,OTHER #5 WOOD	130	169
"	214	URBAN HOUSEHOLD,COAL,OTHER #5 COAL	131	170
"	215	URBAN HOUSEHOLD,NATURAL GAS,OTHER #5 NATURAL GAS	132	171
"	216	URBAN HOUSEHOLD,ELECTRIC,OTHER #5 ELECTRIC	133	172
"	217	URBAN HOUSEHOLD,OIL,OTHER #5 OIL	134	173
"	218	URBAN COMMERCIAL,WOOD,INTERMEDIATE	116	174
"	219	URBAN COMMERCIAL,COAL,INTERMEDIATE	115	175
"	220	URBAN COMMERCIAL,NATURAL GAS,INTERMEDIATE	125	176
"	221	URBAN COMMERCIAL,ELECTRIC,INTERMEDIATE	113	177
"	222	URBAN COMMERCIAL,OIL,INTERMEDIATE	129	178
"	223	URBAN COMMERCIAL,ELECTRIC,LIGHTING ELECTRIC	177	179

URBAN COMM.: UTILIZATION

"	224	URBAN COMMERCIAL.COAL.SPACE HEAT COAL	175	180
"	225	URBAN COMMERCIAL.NATURAL GAS.SPACE HEAT NATURAL GAS	176	181
"	226	URBAN COMMERCIAL.ELECTRIC.SPACE HEAT ELECTRIC	177	182
"	227	URBAN COMMERCIAL.OIL.SPACE HEAT OIL	178	183
"	228	URBAN COMMERCIAL.NATURAL GAS.WATER HEAT NATURAL GAS	176	184
"	229	URBAN COMMERCIAL.ELECTRIC.WATER HEAT ELECTRIC	177	185
"	230	URBAN COMMERCIAL.OIL.WATER HEAT OIL	178	186
"	231	URBAN COMMERCIAL.WOOD.OTHER #1 WOOD	174	187
"	232	URBAN COMMERCIAL.COAL.OTHER #1 COAL	175	188
"	233	URBAN COMMERCIAL.NATURAL GAS.OTHER #1 NATURAL GAS	176	189
"	234	URBAN COMMERCIAL.ELECTRIC.OTHER #1 ELECTRIC	177	190
"	235	URBAN COMMERCIAL.OIL.OTHER #1 OIL	178	191
"	236	URBAN COMMERCIAL.WOOD.OTHER #2 WOOD	174	192
"	237	URBAN COMMERCIAL.COAL.OTHER #2 COAL	175	193
"	238	URBAN COMMERCIAL.NATURAL GAS.OTHER #2 NATURAL GAS	176	194
"	239	URBAN COMMERCIAL.ELECTRIC.OTHER #2 ELECTRIC	177	195
"	240	URBAN COMMERCIAL.OIL.OTHER #2 OIL	178	196
"	241	URBAN COMMERCIAL.WOOD.OTHER #3 WOOD	174	197
"	242	URBAN COMMERCIAL.COAL.OTHER #3 COAL	175	198
"	243	URBAN COMMERCIAL.NATURAL GAS.OTHER #3 NATURAL GAS	176	199
"	244	URBAN COMMERCIAL.ELECTRIC.OTHER #3 ELECTRIC	177	200
"	245	URBAN COMMERCIAL.OIL.OTHER #3 OIL	178	201
"	246	URBAN COMMERCIAL.WOOD.OTHER #4 WOOD	174	202
"	247	URBAN COMMERCIAL.COAL.OTHER #4 COAL	175	203
"	248	URBAN COMMERCIAL.NATURAL GAS.OTHER #4 NATURAL GAS	176	204
"	249	URBAN COMMERCIAL.ELECTRIC.OTHER #4 ELECTRIC	177	205
"	250	URBAN COMMERCIAL.OIL.OTHER #4 OIL	178	206
"	251	URBAN COMMERCIAL.WOOD.OTHER #5 WOOD	174	207
"	252	URBAN COMMERCIAL.COAL.OTHER #5 COAL	175	208
"	253	URBAN COMMERCIAL.NATURAL GAS.OTHER #5 NATURAL GAS	176	209
"	254	URBAN COMMERCIAL.ELECTRIC.OTHER #5 ELECTRIC	177	210
"	255	URBAN COMMERCIAL.OIL.OTHER #5 OIL	178	211

"	256	URBAN COMMERCIAL,WOOD,OTHER #6 WOOD	174	212
"	257	URBAN COMMERCIAL,COAL,OTHER #6 COAL	175	213
"	258	URBAN COMMERCIAL,NATURAL GAS,OTHER #6 NATURAL GAS	176	214
"	259	URBAN COMMERCIAL,ELECTRIC,OTHER #6 ELECTRIC	177	215
"	260	URBAN COMMERCIAL,OIL,OTHER #6 OIL	178	216
<u>RURAL HOUSEHOLD:</u> UTILIZATION	261	RURAL HOUSEHOLD,WOOD,INTERMEDIATE	116	217
"	262	RURAL HOUSEHOLD,COAL,INTERMEDIATE	115	218
"	263	RURAL HOUSEHOLD,NATURAL GAS,INTERMEDIATE	125	219
"	264	RURAL HOUSEHOLD,ELECTRIC,INTERMEDIATE	113	220
"	265	RURAL HOUSEHOLD,OIL,INTERMEDIATE	129	221
"	266	RURAL HOUSEHOLD,ANIMAL WASTE,INTERMEDIATE	121	222
"	267	RURAL HOUSEHOLD,WIND,INTERMEDIATE	123	223
"	268	RURAL HOUSEHOLD,INT. BTU GAS FROM SOLID WASTE,INTERMEDIATE	122	224
"	269	RURAL HOUSEHOLD,AGRICULTURAL RESIDUALS,INTERMEDIATE	120	225
"	270	RURAL HOUSEHOLD,SOLAR FROM DECENTRALIZED,INTERMEDIATE	128	226
"	271	RURAL HOUSEHOLD,WOOD,COOKING	217	227
"	272	RURAL HOUSEHOLD,COAL,COOKING	218	228
"	273	RURAL HOUSEHOLD,NATURAL GAS,COOKING	219	229
"	274	RURAL HOUSEHOLD,ELECTRIC,COOKING	220	230
"	275	RURAL HOUSEHOLD,OIL,COOKING	221	231
"	276	RURAL HOUSEHOLD,ANIMAL WASTE,COOKING	222	232
"	277	RURAL HOUSEHOLD,WIND,COOKING	223	233
"	278	RURAL HOUSEHOLD,INT. RTU GAS,COOKING	224	234
"	279	RURAL HOUSEHOLD,AGRICULTURAL RESIDUALS,COOKING	225	236
"	280	RURAL HOUSEHOLD,SOLAR,COOKING	226	237
"	281	RURAL HOUSEHOLD,WOOD,LIGHTING	217	237
"	282	RURAL HOUSEHOLD,COAL,LIGHTING	218	238
"	283	RURAL HOUSEHOLD,NATURAL GAS,LIGHTING	219	239
"	284	RURAL HOUSEHOLD,ELECTRIC,LIGHTING	220	240
"	285	RURAL HOUSEHOLD,OIL,LIGHTING	221	241
"	286	RURAL HOUSEHOLD,ANIMAL WASTE,LIGHTING	222	242
"	287	RURAL HOUSEHOLD,WIND,LIGHTING	223	243

"	288	RURAL HOUSEHOLD,INT. BTU GAS,LIGHTING	224	244
"	289	RURAL HOUSEHOLD,AGRICULTURAL RESIDUALS,LIGHTING	225	245
"	290	RURAL HOUSEHOLD,SOALR,LIGHTING	226	246
"	291	RURAL HOUSEHOLD,SOLAR,SPACE HEAT,INTERMEDIATE	127	247
"	292	RURAL HOUSEHOLD,SOLAR,WATER HEAT,INTERMEDIATE	126	248
"	293	RURAL HOUSEHOLD,WOOD,SPACE HEAT	217	249
"	294	RURAL HOUSEHOLD,COAL,SPACE HEAT	218	250
"	295	RURAL HOUSEHOLD,NATURAL GAS,SPACE HEAT	219	251
"	296	RURAL HOUSEHOLD,ELECTRIC,SPACE HEAT	220	252
"	297	RURAL HOUSEHOLD,OIL,SPACE HEAT	221	253
"	298	RURAL HOUSEHOLD,ANIMAL WASTE,SPACE HEAT	222	254
"	299	RURAL HOUSEHOLD,INT. BTU GAS,SPACE HEAT	224	255
"	300	RURAL HOUSEHOLD,AGRICULTURAL RESIDUALS,SPACE HEAT	225	256
"	301	RURAL HOUSEHOLD,SOLAR DECENTRALIZED,SPACE HEAT	226	257
"	302	RURAL HOUSEHOLD,SOLAR,SPACE HEAT	247	258
"	303	RURAL HOUSEHOLD,WOOD,WATER HEAT	217	259
"	304	RURAL HOUSEHOLD,COAL,WATER HEAT	218	260
"	305	RURAL HOUSEHOLD,NATURAL GAS,WATER HEAT	219	261
"	306	RURAL HOUSEHOLD,ELECTRIC,WATER HEAT	220	262
"	307	RURAL HOUSEHOLD,OIL,WATER HEAT	221	263
"	308	RURAL HOUSEHOLD,ANIMAL WASTE,WATER HEAT	222	264
"	309	RURAL HOUSEHOLD,INT. BTU GAS,WATER HEAT	224	265
"	310	RURAL HOUSEHOLD,AGRICULTURAL RESIDUALS,WATER HEAT	225	266
"	311	RURAL HOUSEHOLD,SOLAR DECENTRALIZED,WATER HEAT	226	267
"	312	RURAL HOUSEHOLD,SOLAR,WATER HEAT	248	268
<u>RURAL AGRIC.:</u> UTILIZATION	313	RURAL AGRICULTURE,WOOD,INTERMEDIATE	116	269
"	314	RURAL AGRICULTURE,COAL,INTERMEDIATE	115	270
"	315	RURAL AGRICULTURE,NATURAL GAS,INTERMEDIATE	125	271
"	316	RURAL AGRICULTURE,ELECTRIC,INTERMEDIATE	113	272
"	317	RURAL AGRICULTURE,OIL,INTERMEDIATE	129	273
"	318	RURAL AGRICULTURE,ANIMAL WASTE,INTERMEDIATE	121	274
"	319	RURAL AGRICULTURE,WIND,INTERMEDIATE	123	275

RURAL AGRIC.: UTILIZATION

"	320	RURAL AGRICULTURE,INT. BTU GAS,INTERMEDIATE	122	276
"	321	RURAL AGRICULTURE,AGRICULTURAL RESIDUALS,INTERMEDIATE	120	277
"	322	RURAL AGRICULTURE,SOLAR DECENTRALIZED,INTERMEDIATE	128	278
"	323	RURAL AGRICULTURE,SOLAR,SPACE HEAT,INTERMEDIATE	127	279
"	324	RURAL AGRICULTURE,SOLAR,WATER HEAT,INTERMEDIATE	126	280
"	325	RURAL AGRICULTURE,ANIMAL POWER,INTERMEDIATE	117	281
"	326	RURAL AGRICULTURE,HUMAN POWER,INTERMEDIATE	118	282
"	327	RURAL AGRICULTURE,COAL,RURAL SOIL PREPARATION	270	283
"	328	RURAL AGRICULTURE,NATURAL GAS,RURAL SOIL PREPARATION	271	284
"	329	RURAL AGRICULTURE,OIL,RURAL SOIL PREPARATION	273	285
"	330	RURAL AGRICULTURE,ANIMAL POWER,RURAL SOIL PREPARATION	281	286
"	331	RURAL AGRICULTURE,HUMAN POWER,RURAL SOIL PREPARATION	282	287
"	332	RURAL AGRICULTURE,COAL,FEEDSTOCKS	270	288
"	333	RURAL AGRICULTURE,NATURAL GAS,FEEDSTOCKS	271	289
"	334	RURAL AGRICULTURE,OIL,FEEDSTOCKS	273	290
"	335	RURAL,WOOD,AGRICULTURE END USE 1	269	292
"	336	RURAL,COAL,AGRICULTURE END USE 1	270	293
"	337	RURAL,NATURAL GAS,AGRICULTURE END USE 1	271	294
"	338	RURAL,ELECTRIC,AGRICULTURE END USE 1	272	295
"	339	RURAL,OIL,AGRICULTURE END USE 1	273	296
"	340	RURAL,ANIMAL WASTE,AGRICULTURE END USE 1	274	297
"	341	RURAL,WIND,AGRICULTURE END USE 1	275	298
"	342	RURAL,INT. BTU GAS,AGRICULTURE END USE 1	276	299
"	343	RURAL,AGRICULTURAL RESIDUALS,AGRICULTURE END USE 1	277	300
"	344	RURAL,SOLAR DECENTRALIZED,AGRICULTURE END USE 1	278	301
"	345	RURAL,ANIMAL POWER,AGRICULTURE END USE 1	281	302
"	346	RURAL,HUMAN POWER,AGRICULTURE END USE 1	282	303
"	347	RURAL,WOOD,AGRICULTURE END USE 2	269	304
"	348	RURAL,COAL,AGRICULTURE END USE 2	270	305
"	349	RURAL,NATURAL GAS,AGRICULTURE END USE 2	271	306
"	350	RURAL,ELECTRIC,AGRICULTURE END USE 2	272	307
"	351	RURAL,OIL,AGRICULTURE END USE 2	273	308

"	352	RURAL,ANIMAL WASTE,AGRICULTURE END USE 2	274	309
"	353	RURAL,WIND,AGRICULTURE END USE 2	275	310
"	354	RURAL,INT. BTU GAS,AGRICULTURE END USE 2	276	311
"	355	RURAL,AGRICULTURAL RESIDUALS,AGRICULTURE END USE 2	277	312
"	356	RURAL,SOLAR DECENTRALIZED,AGRICULTURE END USE 2	278	313
"	357	RURAL,ANIMAL POWER,AGRICULTURE END USE 2	281	314
"	358	RURAL,HUMAN POWER,AGRICULTURE END USE 2	282	315
"	359	RURAL,WOOD,AGRICULTURE END USE 3	269	316
"	360	RURAL,COAL,AGRICULTURE END USE 3	270	317
"	361	RURAL,NATURAL GAS,AGRICULTURE END USE 3	271	318
"	362	RURAL,ELECTRIC,AGRICULTURE END USE 3	272	319
"	363	RURAL,OIL,AGRICULTURE END USE 3	273	320
"	364	RURAL,ANIMAL WASTE,AGRICULTURE END USE 3	274	321
"	365	RURAL,WIND,AGRICULTURE END USE 3	275	322
"	366	RURAL,INT. BTU GAS,AGRICULTURE END USE 3	276	323
"	367	RURAL,AGRICULTURAL RESIDUALS,AGRICULTURE END USE 3	277	324
"	368	RURAL,SOLAR DECENTRALIZED,AGRICULTURE END USE 3	278	325
"	369	RURAL,ANIMAL POWER,AGRICULTURE END USE 3	281	326
"	370	RURAL,HUMAN POWER,AGRICULTURE END USE 3	282	327
"	371	RURAL,WOOD,AGRICULTURE END USE 4	269	328
"	372	RURAL,COAL,AGRICULTURE END USE 4	270	329
"	373	RURAL,NATURAL GAS,AGRICULTURE END USE 4	271	330
"	374	RURAL,ELECTRIC,AGRICULTURE END USE 4	272	331
"	375	RURAL,OIL,AGRICULTURE END USE 4	273	332
"	376	RURAL,ANIMAL WASTE,AGRICULTURE END USE 4	274	333
"	377	RURAL,WIND,AGRICULTURE END USE 4	275	334
"	378	RURAL,INT. BTU GAS,AGRICULTURE END USE 4	276	335
"	379	RURAL,AGRICULTURAL RESIDUALS,AGRICULTURE END USE 4	277	336
"	380	RURAL,SOLAR DECENTRALIZED,AGRICULTURE END USE 4	278	337
"	381	RURAL,ANIMAL POWER,AGRICULTURE END USE 4	281	338
"	382	RURAL,HUMAN POWER,AGRICULTURE END USE 4	282	339
"	383	RURAL,WOOD,AGRICULTURE END USE 5	269	340

"	384	RURAL.COAL.AGRICULTURE END USE 5	270	341
"	385	RURAL.NATURAL GAS.AGRICULTURE END USE 5	271	342
"	386	RURAL.ELECTRIC.AGRICULTURE END USE 5	272	343
"	387	RURAL.OIL.AGRICULTURE END USE 5	273	344
"	388	RURAL.ANIMAL WASTE.AGRICULTURE END USE 5	274	345
"	389	RURAL.WIND.AGRICULTURE END USE 5	275	346
"	390	RURAL.INT. BTU GAS.AGRICULTURE END USE 5	276	347
"	391	RURAL.AGRICULTURAL RESIDUALS.AGRICULTURE END USE 5	277	348
"	392	RURAL.SOLAR DECENTRALIZED.AGRICULTURE END USE 5	278	349
"	393	RURAL.ANIMAL POWER.AGRICULTURE END USE 5	281	350
"	394	RURAL.HUMAN POWER.AGRICULTURE END USE 5	282	351
<u>RURAL SM. INDUSTRY:</u> UTILIZATION	395	RURAL SMALL INDUSTRY.WOOD.INTERMEDIATE	116	352
"	396	RURAL SMALL INDUSTRY.COAL.INTERMEDIATE	115	353
"	397	RURAL SMALL INDUSTRY.NATURAL GAS.INTERMEDIATE	125	354
"	398	RURAL SMALL INDUSTRY.ELECTRIC.INTERMEDIATE	113	355
"	399	RURAL SMALL INDUSTRY.OIL.INTERMEDIATE	129	356
"	400	RURAL SMALL INDUSTRY.ANIMAL WASTE.INTERMEDIATE	121	357
"	401	RURAL SMALL INDUSTRY.WIND.INTERMEDIATE	123	358
"	402	RURAL SMALL INDUSTRY.INT. BTU GAS.INTERMEDIATE	122	359
"	403	RURAL SMALL INDUSTRY.AGRICULTURAL RESIDUALS.INTERMEDIATE	120	360
"	404	RURAL SMALL INDUSTRY.SOLAR DECENTRALIZED.INTERMEDIATE	128	361
"	405	RURAL SMALL INDUSTRY.SOLAR SPACE HEAT.INTERMEDIATE	127	362
"	406	RURAL SMALL INDUSTRY.SOLAR WATER HEAT.INTERMEDIATE	126	363
"	407	RURAL SMALL INDUSTRY.HUMAN POWER.INTERMEDIATE	117	364
"	408	RURAL SMALL INDUSTRY.ANIMAL POWER.INTERMEDIATE	118	365
"	409	RURAL SMALL INDUSTRY.WOOD.AGRICULTURE PROCESSING	352	366
"	410	RURAL SMALL INDUSTRY.COAL.AGRICULTURE PROCESSING	353	367
"	411	RURAL SMALL INDUSTRY.NATURAL GAS.AGRICULTURE PROCESSING	354	368
"	412	RURAL SMALL INDUSTRY.ELECTRIC.AGRICULTURE PROCESSING	355	369
"	413	RURAL SMALL INDUSTRY.OIL.AGRICULTURE PROCESSING	356	370
"	414	RURAL SMALL INDUSTRY.ANIMAL WASTE.AGRICULTURE PROCESSING	357	371
"	415	RURAL SMALL INDUSTRY.WIND.AGRICULTURE PROCESSING	358	372

"	416	RURAL SMALL INDUSTRY,INT. BTU GAS,AGRICULTURE PROCESSING	359	373
"	417	RURAL SMALL INDUSTRY,AGRIC. RESIDUALS,AGRIC. PROCESSING	360	374
"	418	RURAL SMALL INDUSTRY,SOLAR DECENTRALIZED,AGRIC. PROCESSING	361	375
"	419	RURAL SMALL INDUSTRY,SOLAR SPACE HEAT,AGRIC. PROCESSING	362	376
"	420	RURAL SMALL INDUSTRY,SOLAR WATER HEAT,AGRIC. PROCESSING	363	377
"	421	RURAL SMALL INDUSTRY,HUMAN POWER,AGRIC. PROCESSING	364	378
"	422	RURAL SMALL INDUSTRY,ANIMAL POWER,AGRIC. PROCESSING	365	379
"	423	RURAL SMALL INDUSTRY,WOOD,HANDICRAFT PRODUCTION	352	380
"	424	RURAL SMALL INDUSTRY,COAL,HANDICRAFT PRODUCTION	353	381
"	425	RURAL SMALL INDUSTRY,NATURAL GAS,HANDICRAFT PRODUCTION	354	382
"	426	RURAL SMALL INDUSTRY,ELECTRIC,HANDICRAFT PRODUCTION	355	383
"	427	RURAL SMALL INDUSTRY,OIL,HANDICRAFT PRODUCTION	356	384
"	428	RURAL SMALL INDUSTRY,ANIMAL WASTE,HANDICRAFT PRODUCTION	357	385
"	429	RURAL SMALL INDUSTRY,WIND,HANDICRAFT PRODUCTION	358	386
"	430	RURAL SMALL INDUSTRY,INT. BTU GAS,HANDICRAFT PRODUCTION	359	387
"	431	RURAL SMALL INDUSTRY,AGRIC. RESIDUALS,HANDICRAFT PRODUCTION	360	388
"	432	RURAL SMALL INDUSTRY,SOLAR DECENTRALIZED,HANDICRAFT PROD.	361	389
"	433	RURAL SMALL INDUSTRY,SOLAR SPACE HEAT,HANDICRAFT PRODUCTION	362	390
"	434	RURAL SMALL INDUSTRY,SOLAR WATER HEAT,HANDICRAFT PRODUCTION	363	391
"	435	RURAL SMALL INDUSTRY,HUMAN POWER,HANDICRAFT PRODUCTION	364	392
"	436	RURAL SMALL INDUSTRY,ANIMAL POWER,HANDICRAFT PRODUCTION	365	393
MISC. RURAL: UTILIZATION	437	MISCELLANEOUS RURAL,WOOD,INTERMEDIATE	116	393
"	438	MISCELLANEOUS RURAL,COAL,INTERMEDIATE	115	394
"	439	MISCELLANEOUS RURAL,NATURAL GAS,INTERMEDIATE	125	395
"	440	MISCELLANEOUS RURAL,ELECTRIC,INTERMEDIATE	113	396
"	441	MISCELLANEOUS RURAL,OIL,INTERMEDIATE	129	397
"	442	MISCELLANEOUS RURAL,ANIMAL WASTE,INTERMEDIATE	121	398
"	443	MISCELLANEOUS RURAL,WIND,INTERMEDIATE	123	399
"	444	MISCELLANEOUS RURAL,INT.BTU GAS,INTERMEDIATE	122	400
"	445	MISCELLANEOUS RURAL,AGRICULTURAL RESIDUALS,INTERMEDIATE	120	401
"	446	MISCELLANEOUS RURAL,SOLAR DECENTRALIZED,INTERMEDIATE	128	402
"	447	MISCELLANEOUS RURAL,SOLAR SPACE HEAT,INTERMEDIATE	127	403

"	448	MISCELLANEOUS RURAL,SOLAR WATER HEAT,INTERMEDIATE	126	404
"	449	MISC.RURAL,WOOD,RURAL END USE 1	393	405
"	450	MISC.RURAL,COAL,RURAL END USE 1	394	406
"	451	MISC.RURAL,NATURAL GAS,RURAL END USE 1	395	407
"	452	MISC.RURAL,ELECTRIC,RURAL END USE 1	396	408
"	453	MISC.RURAL,OIL,RURAL END USE 1	397	409
"	454	MISC.RURAL,ANIMAL WASTE,RURAL END USE 1	398	410
"	455	MISC.RURAL,WIND,RURAL END USE 1	399	411
"	456	MISC.RURAL,INT. BTU GAS,RURAL END USE 1	400	412
"	457	MISC.RURAL,AGRICULTURAL RESIDUALS,RURAL END USE 1	401	413
"	458	MISC.RURAL,SOLAR DECENTRALIZED,RURAL END USE 1	402	414
"	459	MISC.RURAL,SOLAR SPACE HEAT,RURAL END USE 1	403	415
"	460	MISC.RURAL,SOLAR WATER HEAT,RURAL END USE 1	404	416
"	461	MISC.RURAL,WOOD,RURAL END USE 2	393	417
"	462	MISC.RURAL,COAL,RURAL END USE 2	394	418
"	463	MISC.RURAL,NATURAL GAS,RURAL END USE 2	395	419
"	464	MISC.RURAL,ELECTRIC,RURAL END USE 2	396	420
"	465	MISC.RURAL,OIL,RURAL END USE 2	397	421
"	466	MISC.RURAL,ANIMAL WASTE,RURAL END USE 2	398	422
"	467	MISC.RURAL,WIND,RURAL END USE 2	399	423
"	468	MISC.RURAL,INT. BTU GAS,RURAL END USE 2	400	424
"	469	MISC.RURAL,AGRICULTURAL RESIDUALS,RURAL END USE 2	401	425
"	470	MISC.RURAL,SOLAR DECENTRALIZED,RURAL END USE 2	402	426
"	471	MISC.RURAL,SOLAR SPACE HEAT,RURAL END USE 2	403	427
"	472	MISC.RURAL,SOLAR WATER HEAT,RURAL END USE 2	404	428
"	473	MISC.RURAL,WOOD,RURAL END USE 3	393	429
"	474	MISC.RURAL,COAL,RURAL END USE 3	394	430
"	475	MISC.RURAL,NATURAL GAS,RURAL END USE 3	395	431
"	476	MISC.RURAL,ELECTRIC,RURAL END USE 3	396	432
"	477	MISC.RURAL,OIL,RURAL END USE 3	397	433
"	478	MISC.RURAL,ANIMAL WASTE,RURAL END USE 3	398	434
"	479	MISC.RURAL,WIND,RURAL END USE 3	399	435

"	480	MISC.RURAL.INT. BTU GAS,RURAL END USE 3	400	436
"	481	MISC.RURAL.AGRICULTURAL RESIDUALS,RURAL END USE 3	401	437
"	482	MISC.RURAL.SOLAR DECENTRALIZED,RURAL END USE 3	402	438
"	483	MISC.RURAL.SOLAR SPACE HEAT,RURAL END USE 3	403	439
"	484	MISC.RURAL.SOALR WATER HEAT,RURAL END USE 3	404	440
"	485	MISC.RURAL.WOOD,RURAL END USE 4	393	441
"	486	MISC.RURAL.COAL,RURAL END USE 4	394	442
"	487	MISC.RURAL.NATURAL GAS,RURAL END USE 4	395	443
"	488	MISC.RURAL.ELECTRIC,RURAL END USE 4	396	444
"	489	MISC.RURAL.OIL,RURAL END USE 4	397	445
"	490	MISC.RURAL.ANIMAL WASTE,RURAL END USE 4	398	446
"	491	MISC.RURAL.WIND,RURAL END USE 4	399	447
"	492	MISC.RURAL.INT. BTU GAS,RURAL END USE 4	400	448
"	493	MISC.RURAL.AGRICULTURAL RESIDUALS,RURAL END USE 4	401	449
"	494	MISC.RURAL.SOLAR DECENTRALIZED,RURAL END USE 4	402	450
"	495	MISC.RURAL.SOLAR SPACE HEAT,RURAL END USE 4	403	451
"	496	MISC.RURAL.SOALR WATER HEAT,RURAL END USE 4	404	452
"	497	MISC.RURAL.WOOD,RURAL END USE 5	393	453
"	498	MISC.RURAL.COAL,RURAL END USE 5	394	454
"	499	MISC.RURAL.NATURAL GAS,RURAL END USE 5	395	455
"	500	MISC.RURAL.ELECTRIC,RURAL END USE 5	396	456
"	501	MISC.RURAL.OIL,RURAL END USE 5	397	457
"	502	MISC.RURAL.ANIMAL WASTE,RURAL END USE 5	398	458
"	503	MISC.RURAL.WIND,RURAL END USE 5	399	459
"	504	MISC.RURAL.INT. BTU GAS,RURAL END USE 5	400	460
"	505	MISC.RURAL.AGRICULTURAL RESIDUALS,RURAL END USE 5	401	461
"	506	MISC.RURAL.SOLAR DECENTRALIZED,RURAL END USE 5	402	462
"	507	MISC.RURAL.SOLAR SPACE HEAT,RURAL END USE 5	403	463
"	508	MISC.RURAL.SOALR WATER HEAT,RURAL END USE 5	404	464
"	509	INDUSTRY,ELECTRIC,INTERMEDIATE	113	465
"	510	INDUSTRY,NATURAL GAS,INTERMEDIATE	125	466
"	511	INDUSTRY,COAL,INTERMEDIATE	115	467

INDUSTRY: UTILIZATION

"	512	INDUSTRY.OIL.INTERMEDIATE	129	468
"	513	INDUSTRY,ELECTRIC,INDUSTRY 1	465	469
"	514	INDUSTRY.NATURAL GAS,INDUSTRY 1	466	470
"	515	INDUSTRY.COAL,INDUSTRY 1	467	471
"	516	INDUSTRY.OIL,INDUSTRY 1	468	472
"	517	INDUSTRY,ELECTRIC,INDUSTRY 2	465	473
"	518	INDUSTRY,NATURAL GAS,INDUSTRY 2	466	474
"	519	INDUSTRY.COAL,INDUSTRY 2	467	475
"	520	INDUSTRY.OIL,INDUSTRY 2	468	476
"	521	INDUSTRY,ELECTRIC,INDUSTRY 3	465	477
"	522	INDUSTRY,NATURAL GAS,INDUSTRY 3	466	478
"	523	INDUSTRY.COAL,INDUSTRY 3	467	479
"	524	INDUSTRY.OIL,INDUSTRY 3	468	480
"	525	INDUSTRY,ELECTRIC,INDUSTRY 4	465	481
"	526	INDUSTRY,NATURAL GAS,INDUSTRY 4	466	482
"	527	INDUSTRY.COAL,INDUSTRY 4	467	483
"	528	INDUSTRY.OIL,INDUSTRY 4	468	484
"	529	INDUSTRY,ELECTRIC,INDUSTRY 5	465	485
"	530	INDUSTRY,NATURAL GAS,INDUSTRY 5	466	486
"	531	INDUSTRY.COAL,INDUSTRY 5	467	487
"	532	INDUSTRY.OIL,INDUSTRY 5	468	488
"	533	INDUSTRY,ELECTRIC,INDUSTRY 6	465	489
"	534	INDUSTRY,NATURAL GAS,INDUSTRY 6	466	490
"	535	INDUSTRY.COAL,INDUSTRY 6	467	491
"	536	INDUSTRY.OIL,INDUSTRY 6	468	492
"	537	INDUSTRY,ELECTRIC,INDUSTRY 7	465	493
"	538	INDUSTRY,NATURAL GAS,INDUSTRY 7	466	494
"	539	INDUSTRY.COAL,INDUSTRY 7	467	495
"	540	INDUSTRY.OIL,INDUSTRY 7	468	496
"	541	INDUSTRY,ELECTRIC,INDUSTRY 8	465	497
"	542	INDUSTRY,NATURAL GAS,INDUSTRY 8	466	498
"	543	INDUSTRY.COAL,INDUSTRY 8	467	499

TRANSPORTATION: UTILIZATION

"	544	INDUSTRY.OIL.INDUSTRY 8.NATIONAL	468	500
"	545	INDUSTRY.ELECTRIC.INDUSTRY 9.NATIONAL	465	501
"	546	INDUSTRY.NATURAL GAS.INDUSTRY 9.NATIONAL	466	502
"	547	INDUSTRY.COAL.INDUSTRY 9.NATIONAL	467	503
"	548	INDUSTRY.OIL.INDUSTRY 9.NATIONAL	468	504
"	549	INDUSTRY.ELECTRIC.IRON AND STEEL.NATIONAL	465	505
"	550	INDUSTRY.NATURAL GAS.IRON AND STEEL.NATIONAL	466	506
"	551	INDUSTRY.COAL.IRON AND STEEL.NATIONAL	467	507
"	552	INDUSTRY.OIL.IRON AND STEEL.NATIONAL	468	508
"	553	INDUSTRY.NATURAL GAS.FEEDSTOCKS.NATIONAL	466	509
"	554	INDUSTRY.COAL.FEEDSTOCKS.NATIONAL	467	510
"	555	INDUSTRY.OIL.FEEDSTOCKS.NATIONAL	468	511
"	556	TRANSPORTATION.COAL.INTERMEDIATE.NATIONAL	115	512
"	557	TRANSPORTATION.OIL.INTERMEDIATE.NATIONAL	129	513
"	558	TRANSPORTATION.ELECTRIC.INTERMEDIATE.NATIONAL	113	514
"	559	TRANSPORTATION.ELECTRIC.PERSONAL AUTO.NATIONAL	514	515
"	560	TRANSPORTATION.OIL.PERSONAL AUTO.NATIONAL	513	516
"	561	TRANSPORTATION.OIL.SHIP.NATIONAL	513	517
"	562	TRANSPORTATION.ELECTRIC.PERSONAL BUS.NATIONAL	514	518
"	563	TRANSPORTATION.OIL.PERSONAL BUS.NATIONAL	513	519
"	564	TRANSPORTATION.OIL.AIRPLANE.NATIONAL	513	520
"	565	TRANSPORTATION.ELECTRIC.PERSONAL METRO.NATIONAL	514	521
"	566	TRANSPORTATION.OIL.PERSONAL METRO.NATIONAL	513	522
"	567	TRANSPORTATION.OIL.FREIGHT TRUCK.NATIONAL	513	523
"	568	TRANSPORTATION.COAL.FREIGHT RAIL.NATIONAL	512	524
"	569	TRANSPORTATION.OIL.FREIGHT RAIL.NATIONAL	513	525
"	570	TRANSPORTATION.ELECTRIC.FREIGHT RAIL.NATIONAL	514	526
"	571	TRANSPORTATION.OIL.FREIGHT AIR.NATIONAL	513	526
"	572	TRANSPORTATION.COAL.FREIGHT BARGE.NATIONAL	512	527
"	573	TRANSPORTATION.OIL.FREIGHT BARGE.NATIONAL	513	528
"	574	TRANSPORTATION.ELECTRIC.PERSONAL TRAIN.NATIONAL	514	529
"	575	TRANSPORTATION.COAL.PERSONAL TRAIN.NATIONAL	512	530
"	576	TRANSPORTATION.OIL.PERSONAL TRAIN.NATIONAL	513	531

NOTES AND REFERENCES

1. W. A. Sevian, "The Energy System Network Simulator (ESNS): General Description and Sample Analysis," BNL-50492 (Sept. 1975), Brookhaven National Laboratory. This document outlines the original concept of an energy system flows calculator.
2. The Reference Energy Systems approach to energy systems analysis for developing countries is described in Policy Analysis Division, National Center for Analysis of Energy Systems, "An Analytical Framework for the Assessment of Energy Resource and Technology Options for Developing Countries", BNL-50800 (February 1978), Brookhaven National Laboratory.