FINAL REPORT

MASTER

ECONOMIC IMPACT STUDY OF CONSUMER PRODUCT EFFICIENCIES

CONTRACT NO. EM-78-C-01-5142

SUBMITTED TO:

U.S. DEPARTMENT OF ENERGY

SUBMITTED BY:

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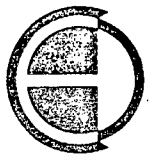
DISCLAIMER



INTRODUCTION

This report constitutes the Final Report for Chase Econometric Associates' Contract EM-78-C-01-5142 with the Department of Energy. The Report briefly summarizes the activities carried out and outputs produced under this contract. The report is organized by task and subtask. The task reports, which constitute the deliverables under the contract and contain the results, are included by reference and listed at the end of the report.

During the period in which contract EM-78-C-01-5142 was in force, a number of unforeseen circumstances occurred. The Department of Energy reorganized the entire research project at least twice, changing both the identity and roles of the participating contractors and substantially extending the schedule. In addition, Chase Econometrics and its subcontractors had great difficulty obtaining data to be provided by DOE, and also experienced extensive technical problems with some of the econometric modeling. As a result, the results produced under this contract are only preliminary. The analysis has been continued during FY1980 under Contract DE-AC01-80CS20337.

TASK I: DIRECT IMPACT ON INDUSTRY

Subtask I-A: Materials

Chase used INFORUM, its input-output model to develop baseline estimates of the key materials inputs used to produced household appliances.[1] Historical and forecast estimates of the baseline value of shipments in 1972 dollars by product type, fuel type are presented from 1972 to 2000 for aluminum, copper, steel, cast iron, plastic, polyurethane foam, and fiberglass. These value of shipments estimates for steel, polyurethane foam, fiberglass and cast iron were converted to physical units for the same product types and period.

In addition, Chase prepared a report[2] on the methodology to be used to evaluate the impacts of changes in efficiency standards on the materials inputs. This preliminary analysis was carried out for

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[1]Reports 2, 8, 9, 19, 24, and 30.

[2]Report 5.

refrigerators and refrigerator freezers.

Subtask II-B: Labor Inputs

Chase used INFORUM to forecast baseline labor requirements in thousands of person-years for each of the appliance types and fuel types.[3] Data on baseline labor requirements from 1976 through 2000 were presented, and preliminary estimates of changes in labor requirements due to appliance efficiency standards were included for refrigerators and refrigerator freezers.[4]

Subtask I-C: Energy Inputs

Baseline forecasts of energy consumption by appliance industries, product type, and appliance fuel type were calculated for the period 1976-2000 for fuel oil, natural gas and coal. The forecasts, which were

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[3]Reports 2, 9, 19 and 30.

[4]Report 5.

developed using INFORUM, were presented both in terms of the value of shipments and the physical units of each fuel type consumed in the manufacture of each appliance.[5]

Subtask I-D: Investment

Dynamics Associates, subcontractor to Chase Econometrics, compiled a historical series for the period 1966 to 1977 of annual investment outlays and other relevant financial variables for the major firms producing household appliances.[6] These financial statistics were analyzed for each firm with respect to its specific manufacturing industry. Data on market share by firm for each appliance type were presented. Dynamics also developed estimates of the incremental investment required by producers of each appliance by type design option.[7]

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[5]Reports 2, 9, 19 and 30.

[6]Report 3.

[7]Reports 11, 18, and 33.

TASK II: DIRECT IMPACT ON CONSUMERS

Subtask II-A: Life Cycle Cost to the Consumer

Dynamics Associates developed a computerized model of life cycle costs and benefits of a design option of an appliance.[8] The three basic costs considered by the model are the purchase price of the appliance, the cost of the energy used to operate the appliance and the appliance maintenance cost. Chase reviewed literature on Life Cycle Costing.[9]

Subtask II-B: Usage Patterns

Dynamics and RDA, a subcontractor to Dynamics, analyzed consumer usage patterns of appliances on both the national and regional levels.[10] Data on annual

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[8]Report 1.

[9]Report 25.

[10]Reports 4, 6, 10, 12, 13, 14, and 15.

amounts of energy consumed by region were presented for selected appliances. In addition, the literature and data sources for appliance usage were reviewed.

Subtask II-C/D: Long Term Demand Forecast and Analysis

Dynamics and RDA developed demand models of appliance to analyze the direct impact of design options on consumer demand.[11] Baseline forecasts were developed at the national level (Subtask II-C) and regional level (Subtask II-D), by appliance product type and fuel type, to 1990.[12]

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[11]Reports 20, 23, 27, 28, 29, and 32.

[12]Baseline forecasts to the year 2000 were delivered in January and March 1980, subsequent to this contract.

TASK III: ENERGY SAVINGS AND IMPACT ON UTILITIES

Subtask III-A: Residential Energy Savings

Through the use of INFORUM, Chase developed baseline projections of energy consumption at various stages of production and use of household appliances.[13] These series include both historical and forecast data. To facilitate integration of analyses, Chase also reviewed and reported on the Oak Ridge National Laboratory energy model.[14]

Subtask III-B: Cost and Impact on Utility Generating Capacity

Chase presented historical data on capacity, investment, fuel costs and operating costs for electric utility plants by region and fuel type.[15] Monthly

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[13]Report 7.

[14]Reports 16 and 21.

[15]Report 22.

data on energy production and consumption by fuel were analyzed in order to identify seasonal consumption peaks and mix of fuels used during the peaks.

MODIFICATION: DATA MANAGEMENT

Under a modification to the original contract, Chase Econometrics carried out data management services for the Consumer Products Efficiency Branch of DOE. Chase surveyed and inventoried all economic data held by CPEB's staff -- both in hard copy form and electronically stored data.[16] Chase also substantially completed a similar inventory of the much more extensive CPEB files of engineering data.[17] In addition, Chase developed several alternatives for an information indexing and data retrieval system for the CPEB economic data. These were presented to DOE, together with recommendations.[18]

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[16] Report 17.

[17] This inventory has been completed and delivered under a subsequent contract (No. DE-AC01-80CS20337).

[18] Report 31. Construction of the indexing and data retrieval system is to be carried out under the subsequent contract.

BIBLIOGRAPHY: REPORTS DELIVERED

TO D.O.E.

REPORT REFERENCE NUMBER	DATE OF DELIVERY	TITLE OF REPORT	FIRM*	TASK NO.
1.	11/20/78	Life Cycle Cost Model	Dynamics	II-A
2.	1/20/79	Baselines of Factor Inputs to Production of Appliances	CEAI	I-A, I-B, I-C, I-D
3.	1/20/79	Capital Investment Within the Appliance Industry	Dynamics	I-D
4.	1/20/79	Usage Patterns	Dynamics	II-B
5.	2/20/79	Changes in Factor Requirements Due to Appliance Efficiency Regulations: Preliminary Analysis for Refrigerators and Refrigerator Freezers	CEAI	I-A
6.	2/20/79	Appliance Usage Recommendations	Dynamics	II-B
7.	2/20/79	Baselines of Energy Consumption	CEAI	III-A
8.	3/20/79	Preliminary Forecasting Equation for Baseline of Shipments of Fibrous Glass for Insulation	CEAI	I-A
9.	3/20/79	Conversion of Materials and Energy Baselines From Values of Shipments to Physical Units	CEAI	I-A, I-B, I-C
10.	3/20/79	Preliminary Review of Data and Analysis of Economic Factors for Room Air Conditioners	RDA	II-B
11.	4/20/79	Proposed Methodology to Assess the Impact of Additional Capital Investment Requirements of the Minimum Energy Efficiency Standards Program on the Appliance Industry	Dynamics	I-D

*Subcontractors under the contract are Dynamics Associates and Regional Data Associates.

REPORT REFERENCE NUMBER	DATE OF DELIVERY	TITLE OF REPORT	FIRM	TASK NO.
12.	4/20/79	Appliance Backgrounds	Dynamics	II-B
13.	4/20/79	Appliance Background for Water Heaters	RDA	II-B
14.	4/10/79	Appliance Background for Central Air Conditioners	RDA	II-B
15.	6/29/79	Preliminary Review of Data and Analysis of Economic Factors for Central Heating	RDA	II-B
16.	6/29/79	Preliminary Survey of the Oak Ridge National Laboratory	CEAI	III-A
17.	7/6/79	Inventory of Consumer Products Efficiency Branch Economics Data Files	CEAI	Data Management
18.	7/18/79	Revised Methodology to Assess the Impact of Additional Capital Investment Requirements of the Minimum Energy Efficiency Standards Program on the Appliance Industry	Dynamics	I-D
19.	7/20/79	Baselines of Direct Factor Inputs to Production of Appliances - Forecasts to the Year 2000	CEAI	I-A, I-B I-C, I-D
20.	7/20/79	Summary of the Regional Data Associates Housing Model and Data and Forecasting Services	RDA	II-C/D
21.	7/21/79	Survey of Oak Ridge National Laboratory Publications	CEAI	III-A
22.	7/20/79	Electric Utility Capacity, Investment and Costs	CEAI	III-B
23.	7/23/79	Proposed Demand Modeling Methodology - Draft Report	RDA	II-C/D
24.	7/30/79	Baselines of Material Inputs to Production of Appliances - Forecasts to the Year 2000 (Adjusted Data)	CEAI	I-A

REPORT REFERENCE NUMBER	DATE OF DELIVERY	TITLE OF REPORT	FIRM	TASK NO.
25.	8/20/79	Literature on Life Cycle Costing: Data Sources and Methods	CEAI	II-A
26.	8/20/79	Oak Ridge National Laboratory's Residential Energy Use Model	CEAI	III-A
27.	10/15/79	Appliance Demand Models and Forecasts	Dynamics	II-C/D
28.	10/15/79	Analysis of Demand for Room Air Conditioning	RDA	II-C/D
29.	10/15/79	Analysis of Demand for Central Air Conditioners	RDA	II-C/D
30.	11/13/79	Summary Review of Modeling and Forecasting Assumptions	CEAI	Joint
31.	11/13/79	Alternative Bibliographic Systems for Use by the CPEB: Analysis and Recommendations	CEAI	Data Management
32.	11/16/79	Demand Analysis of Water Heaters	Dynamics	II-C/D
33.	11/30/79	Potential Investment Impacts of Minimum Energy Efficiency Standards on Appliance Manufacturers	Dynamics	I-D