

Form **EIA-846A**
(1-14-92)

Public reporting burden for this collection of information is estimated to average 8 hours per response, including the time of reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Energy Information Administration, Office of Statistical Standards, EI-73, 1000 Independence Avenue, SW, Washington, DC 20585; and to the Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, DC 20503.

In correspondence pertaining to this report, please refer to this Census File Number (CFN).

U.S. Department of Commerce
Bureau of the Census
Acting as Collecting and Compiling Agent For
UNITED STATES DEPARTMENT OF ENERGY
ENERGY INFORMATION ADMINISTRATION



**1991
MANUFACTURING ENERGY
CONSUMPTION SURVEY**

NOTICE - This survey is **mandatory** under the Federal Energy Administration Act of 1974, Pub.L. No. 93-275, and under Title 3, Subtitle B, of the Omnibus Budget Reconciliation Act of 1986, Pub.L. No. 99-509. Failure to respond may result in criminal fines, civil penalties, and other sanctions as provided by law. The **confidentiality** of your response to this survey is **protected by law** (title 13, U.S. Code). Your response may be seen only by sworn Census employees and may be used only for statistical purposes. The law also provides that copies retained in your files are **immune from legal process**.

Please correct errors in name, address, and ZIP Code. ENTER street and number if not shown.

PLEASE COMPLETE THIS FORM AND RETURN TO

BUREAU OF THE CENSUS
1201 East 10th Street
Jeffersonville, IN 47132-0001

NOTE

Please read the enclosed instructions before filling out this form. Complete each item. If you have any questions, call (301) 763-7066.

DUE DATE:

If you cannot file by the due date, a time extension request should be sent to the above address. Please include your 11-digit Census File Number (CFN).

Section I - NONCOMBUSTIBLE ENERGY SOURCES

Item Description (1)	Electricity (2)			Steam (3)			Industrial Hot Water (4)		
	10 Mil	Thou	kWh	11 Mil	Thou	Dol	12 Mil	Thou	Dol
1a. During 1991, what amount of each energy source was purchased by this establishment from utilities and delivered to this establishment site? (Do not include purchases by a central purchasing agent, quantities delivered from other establishments of your company, or quantities for which payment was made in-kind.)	01								
1b. What was the total expenditure for the purchased energy source(s) reported on line 1a?	02								
2a. During 1991, what amount of electricity and steam was purchased from nonutility suppliers by this establishment and delivered to this establishment site?	03								
2b. What was the total expenditure for the purchased energy source(s) reported on line 2a.?	04								
3. During 1991, what amount of each energy source was transferred from outside establishments and delivered to this establishment site? (DO NOT include the purchases reported in lines 1a and 2a. DO include quantities received from a central purchasing agent, quantities delivered from other establishments of your company, or quantities for which payment was made in-kind.)	05								
4. TOTAL QUANTITIES OF ELECTRICITY RECEIVED ONSITE (Sum of lines 1a, and 2a and 3.) NOTE - Copy this quantity for electricity to column 2, line 1 of Section III - FUEL SWITCHING.	06								
5. During 1991, how much electricity was generated on this establishment site by cogeneration? (Include ALL cogeneration facilities at this establishment site.)	07								
6. During 1991, how much of each energy source was generated onsite from solar power, wind power, hydropower, and geothermal sources?	08								
7. During 1991, how much electricity was generated onsite by processes other than those covered on lines 5 and 6?	09								
8. TOTAL ONSITE GENERATION OF ELECTRICITY. (Sum of lines 5, 6, and 7.)	10								
9. During 1991, how much electricity was sold or transferred to utilities?	11								
10. During 1991, how much of each energy source was sold or transferred to any establishments other than utilities?	12								
11. TOTAL ELECTRICITY SALES AND TRANSFERS OFFSITE (Line 9 plus line 10.)	13								
12. TOTAL ONSITE CONSUMPTION OF ELECTRICITY. (Line 4 plus line 8 minus line 11.) NOTE - Copy this quantity for electricity consumption to column 2, line 1 of Section IV, Estimated Percent Consumption by End Use.	14								
13. If line 3, column 2 has a nonzero entry, and any of your electricity suppliers was another establishment of your company, identify that establishment at right. If you received electricity transfers from more than one establishment of your company, provide their identifying information in the "Remarks" section.	Name of electricity supplier, if another establishment of your company								
	Address - Number and street								
15	City			State		ZIP Code		Phone - Area code and Number	
1									

Section II - COMBUSTIBLE ENERGY SOURCES

Energy Sources (1)	Census Use Only (2)	Units Used for Reporting Quantities (3)	Energy sources received onsite in 1991					
			Quantity purchased by and delivered to this establishment 01 (4)	Total expenditures, including delivery charges, of the quantity in column (4) 02 (5)			Total other receipts (transfers in and central purchases) 03 (6)	
				Mil	Thou	Dol		
A. SOLIDS								
1. Anthracite	40	Short Tons						
2. Bituminous and subbituminous coal	41	Short Tons						
3. Lignite	42	Short Tons						
4. Total coal (Sum of lines A1, A2, and A3)	46	Short Tons						
5. Breeze	44	Short Tons						
6. Coal coke	43	Short Tons						
7. Petroleum coke	70	Barrels						
8. Roundwood (wood cut specifically for fuel use)	80	Million Btu						
9. Wood chips, bark, and wood waste	81	Million Btu						
10. Biomass (e.g., bagasse, rice hulls, peanut hulls)	90	Million Btu						
11. Waste materials/scrap (e.g., wastepaper, packing materials, etc.)	72	Million Btu						
12. Other solids (Specify) 9198								
	91	Million Btu						
B. GASES (exclude oxygen, nitrogen, and inert gases)								
1. Acetylene	64	Million Btu						
2. Natural gas purchased directly from utilities	31	1,000 cu. ft.						
3. Natural gas purchased from transmission pipelines	32	1,000 cu. ft.						
4. Natural gas obtained from other sources such as brokers, producers, and onsite wells	33	1,000 cu. ft.						
5. Total natural gas (Sum of lines B2, B3, B4)	30	1,000 cu. ft.						
6. Hydrogen	63	Million Btu						
7. Waste and byproduct gases (e.g., vent gas, plant gas, still gas)	62	Million Btu						
8. Other gases (Specify) 9398								
	93	Million Btu						
C. LIQUIDS (42 gallons = 1 Barrel)								
1. LPG (butane, ethane, propane, butylene, ethylene, propylene, and mixtures)	24	Gallons						
2. Diesel fuel	28	Barrels						
3. Distillate fuel oil (numbers 1, 2, and 4 fuel oils - exclude diesel fuel reported on line C2 above)	29	Barrels						
4. Total diesel fuel and distillate fuel oil (Sum of lines C2 and C3)	22	Barrels						
5. Kerosene	27	Barrels						
6. Motor gasoline	23	Gallons						
7. Residual fuel oil (numbers 5, 6, Navy Special, and Bunker C)	21	Barrels						
8. Waste oils and tars	71	Million Btu						
9. Other liquids (Specify) 9598								
	95	Million Btu						

Section II - COMBUSTIBLE ENERGY SOURCES - Continued

Energy sources produced onsite in 1991		Energy sources consumed onsite in 1991			Total design storage capacity located onsite as of 12/31/91	Energy Sources
Quantity produced onsite	Does the entry in column (7) represent the product or byproduct of another energy source consumed onsite?	Quantity consumed as a fuel	Quantity consumed for all nonfuel purposes			
04 (7)	05 (8)	06 (9)	07 (10)	09 (11)	(12)	
					A. SOLIDS	
					Anthracite	
					Bituminous and subbituminous	
					Lignite	
		<i>Copy to line 1 on pages 4 and 6</i> ↘				Total coal
	1 <input type="checkbox"/> Yes 2 <input type="checkbox"/> No				Breeze	
	1 <input type="checkbox"/> Yes 2 <input type="checkbox"/> No				Coal coke	
	1 <input type="checkbox"/> Yes 2 <input type="checkbox"/> No				Petroleum coke	
					Roundwood	
					Wood chips, bark, and wood waste	
					Biomass	
					Waste materials	
	1 <input type="checkbox"/> Yes 2 <input type="checkbox"/> No				Other solids	
					B. GASES	
					Acetylene	
					Natural gas from utilities	
					N. gas pur. from trans. pipelines	
					Natural gas from other suppliers	
		<i>Copy to line 1 on pages 5 and 6</i> ↘				Total natural gas
	1 <input type="checkbox"/> Yes 2 <input type="checkbox"/> No				Hydrogen	
	1 <input type="checkbox"/> Yes 2 <input type="checkbox"/> No				Waste and byproduct gases	
	1 <input type="checkbox"/> Yes 2 <input type="checkbox"/> No				Other gases	
		<i>Copy to line 1 on pages 5 and 6</i> ↘				C. LIQUIDS
					LPG	
					Diesel fuel	
					Distillate fuel oil	
		<i>Copy to line 1 on pages 5 and 6</i> ↘				Total diesel fuel and distillate fuel oil
	1 <input type="checkbox"/> Yes 2 <input type="checkbox"/> No				Kerosene	
					Motor gasoline	
		<i>Copy to line 1 on pages 5 and 6</i> ↘				Residual fuel oil
	1 <input type="checkbox"/> Yes 2 <input type="checkbox"/> No				Waste oils and tars	
					Other liquids	

Section III - FUEL SWITCHING CAPABILITY

Item Description (1)	Total Electricity Received (2)	Total Coal Excluding Coal Coke and Breeze (3)
<p>1. Quantity Consumed - Copy the total electricity receipts from line 4 of section I, and the TOTAL quantities of coal products, natural gas, distillate fuel oil and diesel fuel, LPG, and residual fuel oil consumed onsite as a fuel from column (9) of section II.</p> <p style="text-align: right;">50</p>	<p>1,000 Kilowatthours</p>	<p>Short Tons</p>
<p><i>Now answer lines 2 and 3 as appropriate for the columns with nonzero entries in line 1. Don't consider differences in energy prices when estimating amounts.</i></p> <p>2. Quantity Nonswitchable - Enter the amount of the quantity in line 1 that could NOT have been replaced within 30 days by another energy source in 1991.</p> <p style="text-align: right;">51</p>	<p>1,000 Kilowatthours</p>	<p>Short Tons</p>
<p>3. Quantity Switchable - Subtract line 2 from line 1 and enter the results. This represents the total quantity of energy consumption that COULD HAVE BEEN replaced within 30 days by one or more alternative energy sources in 1991.</p> <p style="text-align: right;">52</p>	<p>1,000 Kilowatthours</p>	<p>Short Tons</p>
<p><i>Now answer lines 4 through 11 as appropriate for the columns with nonzero entries in line 3. Complete one column before starting another.</i></p> <p>4. Of the amount shown in line 3, what is the maximum amount that could have been replaced by electricity?</p> <p style="text-align: right;">53</p>		<p>Short Tons</p>
<p>5. Of the amount shown in line 3, what is the maximum amount that could have been replaced by coal (excluding coal coke and breeze)?</p> <p style="text-align: right;">67</p>	<p>1,000 Kilowatthours</p>	
<p>6. Of the amount shown in line 3, what is the maximum amount that could have been replaced by coal coke and breeze (excluding coal included in line 5 above)?</p> <p style="text-align: right;">69</p>	<p>1,000 Kilowatthours</p>	
<p>7. Of the amount shown in line 3, what is the maximum amount that could have been replaced by natural gas from any supplier(s)?</p> <p style="text-align: right;">57</p>	<p>1,000 Kilowatthours</p>	<p>Short Tons</p>
<p>8. Of the amount shown in line 3, what is the maximum amount that could have been replaced by total distillate fuel oil and diesel fuel?</p> <p style="text-align: right;">59</p>	<p>1,000 Kilowatthours</p>	<p>Short Tons</p>
<p>9. Of the amount shown in line 3, what is the maximum amount that could have been replaced by total LPG?</p> <p style="text-align: right;">61</p>	<p>1,000 Kilowatthours</p>	<p>Short Tons</p>
<p>10. Of the amount shown in line 3, what is the maximum amount that could have been replaced by residual fuel oil?</p> <p style="text-align: right;">63</p>	<p>1,000 Kilowatthours</p>	<p>Short Tons</p>
<p>11. Of the amount shown in line 3, what is the maximum amount that could have been replaced by any other energy source?</p> <p><i>Specify the energy source.</i> ↘</p> <p style="text-align: right;">99</p> <p style="text-align: right;">65</p>	<p>1,000 Kilowatthours</p>	<p>Short Tons</p>

Section III - FUEL SWITCHING CAPABILITY - Continued

30 Total Natural Gas (4)	22 Total Distillate Fuel Oil and Diesel Fuel (5)	24 LPG (6)	21 Residual Fuel Oil (7)
1,000 cu. ft.	Barrels	Gallons	Barrels
1,000 cu. ft.	Barrels	Gallons	Barrels
1,000 cu. ft.	Barrels	Gallons	Barrels
1,000 cu. ft.	Barrels	Gallons	Barrels
1,000 cu. ft.	Barrels	Gallons	Barrels
1,000 cu. ft.	Barrels	Gallons	Barrels
1,000 cu. ft.	Barrels	Gallons	Barrels
1,000 cu. ft.	Barrels	Gallons	Barrels
1,000 cu. ft.	Barrels	Gallons	Barrels
1,000 cu. ft.	Barrels	Gallons	Barrels
1,000 cu. ft.	Barrels	Gallons	Barrels

Section IV - ESTIMATED PERCENT CONSUMPTION BY END USE

Reasonable Approximations are Acceptable - See Instructions

Energy sources can be consumed either directly, in equipment such as motors, furnaces, kilns, etc., or indirectly through conversion to steam and hot water in a boiler. **All indirect use of energy sources listed below are represented by the single percent entry for boiler fuel.** The remaining categories are to split out direct use of energy. Thus, the percentages entered for boiler fuel and all direct uses should sum to 100 percent.

End uses (1)	Total Electricity Consumption		Total Coal Excluding Coal Coke and Breeze		Total Natural Gas		Total Distillate Fuel Oil and Diesel Fuel		LPG		Residual Fuel Oil	
	10	(2)	46	(3)	30	(4)	22	(5)	24	(6)	21	(7)
1. Copy Section I line 12 column (2) value for electricity to column (2). Copy Section II column (9) values for the energy sources in columns (3) through (7)	70	1,000 kWh		Short Tons		1,000 cu. ft.		Barrels		Gallons		Barrels
2. For the columns with nonzero entries in line 1, report the approximate percentage of each energy source used for the following purposes: (Complete one column before starting another.)												
A. BOILERS		Total Electricity Consumption		Total Coal Excluding Coal Coke and Breeze		Total Natural Gas		Total Distillate Fuel Oil and Diesel Fuel		LPG		Residual Fuel Oil
1. Boiler fuel	71	%		%		%		%		%		%
B. DIRECT PROCESS USES												
1. Process heating (e.g., kilns, furnaces, ovens)	72	%		%		%		%		%		%
2. Process cooling and refrigeration	73	%		%		%		%		%		%
3. Machine drive (e.g., motors, pumps, etc. associated with manufacturing process equipment)	74	%		%		%		%		%		%
4. Electro-chemical processes	75	%										
5. Other (Please specify any other uses of energy in the "Remarks" portion of the questionnaire.)	76	%		%		%		%		%		%
C. DIRECT NON-PROCESS USES												
1. Facility heating, ventilation, and air conditioning	77	%		%		%		%		%		%
2. Facility lighting	78	%										
3. Facility support other than C1 and C2 above (e.g., cooking, water heating, office equipment)	79	%		%		%		%		%		%
4. Onsite transportation	80	%				%		%		%		
5. Conventional electricity generation	81			%		%		%		%		%
6. Other (Please specify any other uses of energy in the "Remarks" portion of the questionnaire.)	82	%		%		%		%		%		%
TOTAL for all purposes		100%		100%		100%		100%		100%		100%

Section V - ESTABLISHMENT CHECKLIST

NOTE

This section is divided into six parts. **All establishments are to complete Parts A, B, and C.** If the first two digits of your establishment's four-digit SIC code are "20" (food industries) also complete Part D. If the first two digits of your establishment's SIC code are "22" (textile industries) complete Part E after Part C. If the first two digits of your establishment's four-digit SIC code are "32" (stone, clay, and glass industries) complete Part F after Part C. Your four-digit SIC code is included as part of the address mailing label on the first page of your questionnaire.

Part A. Estimated Square Footage of Buildings

1. What was the **approximate** total enclosed square footage of the buildings located on this establishment site as of December 31, 1991? *Mark (X) the box next to the category which best describes this square footage.*

- 1301
- | | |
|---|---|
| 1 <input type="checkbox"/> 25,000 square feet or less | 6 <input type="checkbox"/> 750,001 to 1 million square feet |
| 2 <input type="checkbox"/> 25,001 to 100,000 square feet | 7 <input type="checkbox"/> 1,000,001 to 5 million square feet |
| 3 <input type="checkbox"/> 100,001 to 200,000 square feet | 8 <input type="checkbox"/> 5,000,001 to 10 million square feet |
| 4 <input type="checkbox"/> 200,001 to 500,000 square feet | 9 <input type="checkbox"/> 10,000,001 to 25 million square feet |
| 5 <input type="checkbox"/> 500,001 to 750,000 square feet | 10 <input type="checkbox"/> Over 25 million square feet |
| | 11 <input type="checkbox"/> Don't know |

2. Of the square footage indicated above, **approximately** what percent had controlled heating or cooling, using equipment designed to modify the internal building temperature, during 1991? *Mark (X) the box next to the category which best describes this percentage.*

- 1302
- | | |
|---------------------------------------|---------------------------------------|
| 1 <input type="checkbox"/> All (100%) | 4 <input type="checkbox"/> About 25% |
| 2 <input type="checkbox"/> About 75% | 5 <input type="checkbox"/> None |
| 3 <input type="checkbox"/> About 50% | 6 <input type="checkbox"/> Don't Know |

Part B. Energy Management Activities

1. Was your establishment involved in any formal programs (company, utility, or third-party sponsored) at any time between January 1, 1989 and December 31, 1991 that were specifically targeted and designed to improve energy efficiency, reduce energy costs, or promote the use of a different energy source?

- 1303
- | | |
|--------------------------------|--------------------------|
| 1 <input type="checkbox"/> Yes | } Proceed to Question 2. |
| 2 <input type="checkbox"/> No | |

2. Did your electric or natural gas utility sponsor programs designed to lower/adjust your energy consumption or costs, timing, or promote the use of a different energy source (i.e., a Demand Side Management (DSM) program) at any time between January 1, 1989 and December 31, 1991? *(Mark (X) one.) If the answer to this question is "Yes", proceed to Question 3. If the answer is not "Yes", proceed to the instructions before Question 4.*

- 1304
- | | |
|--------------------------------|--|
| 1 <input type="checkbox"/> Yes | 3 <input type="checkbox"/> Establishment did not purchase electricity or natural gas from a utility. |
| 2 <input type="checkbox"/> No | 4 <input type="checkbox"/> Don't Know |

3. If you answered "Yes" to Question 2, did your establishment participate in a utility sponsored program at any time between January 1, 1989 and December 31, 1991?

- 1305
- | | |
|--------------------------------|-------------------------------|
| 1 <input type="checkbox"/> Yes | 2 <input type="checkbox"/> No |
|--------------------------------|-------------------------------|

NOTE *If you answered "Yes" to either Question 1 or Question 3, proceed to Question 4. If you answered "No" to both Question 1 and Question 3, proceed to Part C - General Technologies Checklist, on page 8.*

4. In what type(s) of energy efficiency activity(ies) was your establishment involved between January 1, 1989 and December 31, 1991? *(Mark (X) all that apply. Note that it is possible to have marks in both columns for any or all of the activities listed.)*

Energy Efficiency Activities (1)	Utility/Supplier Sponsored Involvement (2)	Involvement Through Own or Other (3rd Party) Sponsorship (3)
a. Energy audits	1306 1 <input type="checkbox"/>	1307 1 <input type="checkbox"/>
b. Direct electricity load control	1308 1 <input type="checkbox"/>	1309 1 <input type="checkbox"/>
c. Special rate schedule (e.g., interruptible or time-of-use)	1310 1 <input type="checkbox"/>	1311 1 <input type="checkbox"/>
d. Equipment installation or retrofit for the primary purpose of improving energy efficiency affecting:		
(1) Steam production (e.g., boilers, nozzles)	1312 1 <input type="checkbox"/>	1313 1 <input type="checkbox"/>
(2) Direct/indirect process heating	1314 1 <input type="checkbox"/>	1315 1 <input type="checkbox"/>
(3) Direct process cooling, refrigeration	1316 1 <input type="checkbox"/>	1317 1 <input type="checkbox"/>
(4) Direct machine drive (e.g., adjustable speed drives, motors, pumps)	1318 1 <input type="checkbox"/>	1319 1 <input type="checkbox"/>
(5) Facility heating, ventilation and air conditioning	1320 1 <input type="checkbox"/>	1321 1 <input type="checkbox"/>
(6) Facility lighting	1322 1 <input type="checkbox"/>	1323 1 <input type="checkbox"/>
e. Equipment retrofit or installation for the primary purpose of using a different energy source (e.g., electrification). <i>Exclude modifications made principally for energy efficiency</i>	1324 1 <input type="checkbox"/>	1325 1 <input type="checkbox"/>
f. Standby generation program	1326 1 <input type="checkbox"/>	1327 1 <input type="checkbox"/>
g. Equipment rebates	1328 1 <input type="checkbox"/>	1329 1 <input type="checkbox"/>
h. Other (Specify) <input checked="" type="checkbox"/>		
(1)	1330 1 <input type="checkbox"/>	1331 1 <input type="checkbox"/>
(2)	1332 1 <input type="checkbox"/>	1333 1 <input type="checkbox"/>
	1398	1399

Section V - ESTABLISHMENT CHECKLIST - Continued

All establishments should complete Part C. Mark (X) the box next to each technology that was in place at your establishment during 1991. Mark (X) all technologies that apply. If your establishment has a two-digit SIC code other than 20, 22, or 32, proceed to Section VI - Remarks. Establishments in SIC 20 should complete Part D - Technology Checklist for Food Industries, establishments in SIC 22 should complete Part E - Technology Checklist for Textile Industries, and establishments in SIC 32 should complete Part F - Technology Checklist for Stone, Clay and Glass Industries before proceeding to Section VI.

Part C. - General Technologies

- 1401 Computer control of building environment (e.g., space heating or cooling equipment, lights)
- 1402 Computer control of processes or major energy-using equipment (e.g., boilers, furnaces, conveyers) used in the manufacturing process
- 1403 Waste heat recovery
- 1404 Adjustable-speed motors

Part D. - SIC 20 Food Industries: Specific Technologies

- 1405 Infrared heating
- 1406 Microwave drying
- 1407 Closed-cycle heat pump system used to recover heat
- 1408 Open-cycle heat pump system used to produce steam
- 1409 Gas-driven rotary engines and/or turbines
- 1410 Membrane separation
- 1411 Irradiation
- 1412 Freeze concentration

Part E. - SIC 22 Textile Industries: Specific Technologies

- 1413 Open-end spinning
- 1414 Water-jar weaving
- 1415 Projectile weaving
- 1416 Wet-on-wet dyeing and finishing
- 1417 Indirect steam heating of dye
- 1418 Dye bath reuse
- 1419 Foam dyeing
- 1420 Foam printing
- 1421 Foam finishing
- 1422 Low-add-on finishing

Part F. - SIC 32 Stone, Clay, and Glass Industries: Specific Technologies

Glass related

Cement related

- 1423 Oxygen enriched combustion air
- 1424 Forehearth designed for independently applied heating and cooling operations and minimal energy use
- 1425 Forehearth designed to eliminate side to middle temperature gradients with improved temperature stability
- 1426 Batch preheaters
- 1427 Cogeneration system which uses waste heat rejected in furnace exhaust to generate steam in waste heat boilers
- 1428 Advanced glass refiner
- 1429 High-efficiency classifiers in closed-circuit grinding plants
- 1430 Improved grinding media and linings, wear resistant materials such as high chrome alloys, and classifying liners
- 1431 Waste heat drying
- 1432 Dry-suspension preheater kilns
- 1433 Dry-precalciner kilns
- 1434 Kiln combustion system improvement such as semi-direct/indirect coal firing, optimal oxygen levels and advanced burners matched to the kiln/cooler design flame control
- 1435 Controlled particle size cement

Section VI - REMARKS

Please use this space or attach a separate sheet for any explanations that may be essential in understanding your reported data. Be sure to include the name, address, and telephone number of power generating establishments of your company that transferred or delivered electricity or steam to your establishment in 1991 if you did not have enough room in Section I.

1599

Section VII - CERTIFICATION

Name of person to contact regarding this report - <i>Print or type</i>				Telephone number			
				Area code		Number	
				()			
Address - Number and street			City		State		ZIP Code
Period covered by this report:							
Month		Day		Year			
From:				To:			
Signature of authorized person							

**INSTRUCTIONS FOR FORM EIA-846A
1991 MANUFACTURING ENERGY CONSUMPTION SURVEY****A. Who is Responsible for Conducting the Manufacturing Energy Consumption Survey?**

The Manufacturing Energy Consumption Survey (MECS) was designed, and is being sponsored, by the Energy Information Administration (EIA) of the U.S. Department of Energy (DOE). The survey is administered and compiled by the U.S. Bureau of the Census for EIA. The survey is conducted every three years.

B. What is The Purpose of This Survey?

The MECS will collect data on energy consumption and usage patterns for the manufacturing sector of the U.S. economy. In addition, it will measure the short-term (within 30 days) capability of your establishment to substitute fuels in place of those actually consumed in 1991. The information obtained from the MECS forms will be used to publish aggregate statistics on the consumption of energy for fuel and nonfuel uses, energy characteristics of buildings in the manufacturing sector, energy consumption by end use, technologies currently in use by U.S. manufacturers, and on some energy-related issues such as energy prices, electricity generation onsite, fuel-switching capabilities, and participation in energy management programs. This information will be used by DOE to effectively implement actions identified in the National Energy Strategy as well as by utilities to assist in more accurate demand forecasts and resource planning.

C. Who Should Report?

This survey is **mandatory** under the Federal Energy Administration Act of 1974, P.L. 93-275, and under Title 3, Subtitle B of the Omnibus Budget Reconciliation Act of 1986, P.L. 99-509.

Form EIA-846A is addressed to establishments operating primarily in the manufacturing sector, SIC 20 through 39, except for SIC 24, 26, 28, 29, 3312, 3321, 3331, and 3339 as defined by the 1987 Standard Industrial Classification Manual (SIC). Establishments operating in those SICs will complete similar MECS forms. Response by establishments included in the MECS sample selected for the survey and receiving the MECS survey form is required by law. Failure to respond may result in criminal fines, civil penalties, and other sanctions as provided by law. Government-owned establishments that are privately operated are not exempt from completing this survey.

D. How Is My Privacy Protected?

Under Section 9 of Title 13, U.S. Code, your report to the Census Bureau is **confidential**. It may be seen only by sworn Census Bureau employees and may be used only for statistical purposes. The law also provides that copies retained in your files are immune from legal process.

E. When Is The Report Due?

The questionnaire should be returned no later than the due date specified on the form. Please use the enclosed return envelope. If the envelope has been misplaced, return the completed questionnaire to:

Bureau of the Census
1201 East 10th Street
Jeffersonville, IN 47132-0001

F. How Is a Manufacturing Establishment Defined?

A manufacturing establishment is an economic unit at a single physical location where the mechanical or chemical transformation of materials or substances into new products is performed. These operations are generally conducted in facilities described as plants, factories, or mills and characteristically use power-driven machines and material-handling equipment.

Manufacturing also includes such activities as the assembly of components of manufactured products and the blending of materials such as lubricating oil, plastics, resins, or liquors.

An establishment is not necessarily identical to a business concern or firm, either of which may consist of one or more establishments. An establishment may consist of one or more units that are engaged in separate or distinct activities. These units may be separated physically as well as economically, with separate records or substantially accurate reports available for each. If this establishment has previously completed the Annual Survey of Manufactures (ASM), Form MA-1000, conducted by the U.S. Census Bureau, establishment boundaries should correspond to those used for the ASM. **Each unit should be treated as a separate establishment ONLY if that was the determination made for the ASM. Do not consolidate two ASM establishments into a single establishment for purposes of the MECS, or separate a single ASM establishment into two MECS establishments.** Match the 11-digit Census File Number (CFN) located on the MECS questionnaire mailing label with the CFN on the ASM mailing label. Responses to MECS questions should include the same activities as those considered when responding to the matching ASM. If this establishment has never completed an ASM, report for all activities that occur at this physical location.

Section I - NONCOMBUSTIBLE ENERGY SOURCES

Energy sources used in manufacturing can be divided into two groups: combustible (capable of being burned), and noncombustible (such as electricity, steam, and industrial hot water). The purpose of section I is to collect 1991 data for noncombustible energy sources.

Column 2 collects data that will provide information on the components of onsite electricity production, and permit an estimate to be made of the total consumption of electricity at your establishment. Column 3 collects data on the additional contribution that steam makes to the total consumption of energy at your establishment and column 4 collects data on hot water used as an energy source at this establishment site. **Leave all shaded areas blank, no entries are required in these areas.**

Electricity is to be reported in thousands of kilowatthours. Steam and industrial hot water are to be reported in millions of Btu. If you keep your records for steam in pounds, use a factor of 1,200 Btu per pound of steam to convert your data into Btu. Industrial hot water should be reported at 140 Btu per pound and 7.84 pounds per gallon. **If you have more accurate Btu conversion factors for your establishment, use them instead of the more general factors given here.**

SPECIFIC INSTRUCTIONS

Line 1a - Quantity Purchased From Utilities - Enter the quantity of each noncombustible energy source that was purchased from a utility and delivered to this establishment site in 1991, regardless of when payment was made. For purposes of this question, utilities are companies that produce and/or deliver electricity and/or natural gas, and are legally obligated to provide service to the general public within their franchise area. Utilities do not include such generators of electricity as independent power producers, small power producers, or cogenerators not located at this establishment site. **Include** quantities purchased for **ANY** onsite use, for example, production of heat and power, lighting or space conditioning the establishment, electrolysis processes, or steam cleaning.

Exclude from line 1a all:

- quantities purchased from independent power producers, small power producers, or cogenerators not located at this establishment site.
- quantities delivered from other establishments in your company even if those quantities were repurchased from them by your establishment.
- quantities purchased and paid for by a central purchasing entity separate from this establishment.
- quantities for which payment was made in-kind.

Line 1b – Expenditures For Purchases From Utilities – Enter the total expenditures for the purchased quantities reported on line 1a. **Include** all expenditures regardless of when payment was actually made.

Line 2a – Quantity Purchased From Nonutilities – Enter the quantity of electricity and steam that was purchased from offsite nonutility power producers and delivered to this establishment site in 1991, regardless of when payment was made. **Include** quantities purchased for **ANY** onsite use, for example production of heat and power, lighting or space conditioning the establishment, electrolysis processes, or steam cleaning.

Exclude from line 2a all:

- quantities purchased from utilities (these should be included on line 1a).
- quantities delivered from other establishments in your company even if those quantities were repurchased from them by your establishment.
- quantities purchased and paid for by a central purchasing entity separate from this establishment.
- quantities for which payment was made in-kind.

Line 2b – Expenditures For Purchases From Nonutilities – Enter the total expenditures for the purchased quantities reported on line 2a. **Include** all expenditures regardless of when payment was actually made.

Line 3 – Other Quantities Received Onsite – Enter all additional quantities delivered to your establishment site in 1991 but not reported on lines 1a or 2a.

Include on line 3:

- quantities purchased and paid for by a central purchasing entity separate from this establishment.
- quantities transferred from another establishment of your company for which payment was not made.
- quantities delivered from another establishment of your company even if those quantities were repurchased from them by your establishment.
- quantities for which payment was made in-kind.

Line 4 – Total Quantities Received Onsite – Enter the sum of lines 1a, and 2a and 3 for electricity. **Copy this quantity to column 2 line 1 of Section III – Fuel Switching.**

Line 5 – Quantity Cogenerated – Enter the total quantity of electricity cogenerated at this establishment site from all energy sources during 1991. For purposes of this survey, cogeneration is defined as the production of electric energy and another form of useful energy (such as heat or steam) through the sequential use of energy. **Include** production from **ALL** cogeneration facilities located at this establishment site.

Line 6 – Quantity Generated from Renewables – Enter the total quantity of each noncombustible energy source generated onsite directly from solar power, wind power, hydropower, or geothermal sources.

Exclude any electricity produced as part of a cogeneration process; that is, electricity generated from geothermal steam before the steam itself is used. **Include** such quantities on line 5.

Line 7 – Other Generation – Enter the total quantity of electricity generated onsite by all other means not included on lines 5 and 6 above. For example, electricity generated by diesel generators should be reported here.

Line 8 – Total Onsite Generation – Enter the sum of lines 5, 6, and 7 for electricity.

Line 9 – Total Sales or Transfers to Utilities – Enter the total quantity of electricity sold or transferred by your establishment in 1991 to utilities. For purposes of this question, utilities are companies that produce and/or deliver electricity and/or natural gas, and are legally obligated to provide service to the general public within their franchise area. Utilities do not include such generators of electricity as independent power producers, small power producers, or cogenerators not located at this establishment site. **Include** quantities exchanged for the same or any other energy source(s).

Line 10 – Total Sales or Transfers to Nonutilities – Enter the total quantity of each noncombustible energy source sold or transferred in 1991 to establishments other than utilities. **Include** quantities exchanged for the same or any other energy source(s).

Line 11 – Total Electricity Sales and Transfers Offsite – Enter the sum of lines 9 (sales and transfers to utilities) and 10 (sales and transfers to nonutilities).

Line 12 – Total Onsite Consumption – For electricity, add the quantity on line 4 (total quantities received) to that on line 8 (total onsite generation), then subtract the quantity on line 11 (total sales and transfers offsite). Enter the remainder on line 12. This quantity represents the amount of electricity actually consumed at this establishment site in 1991. **Copy the column 2 (electricity) line 12 quantity to column 2 line 1 of Section IV – Estimated Percent Consumption by End Use.**

Line 13 – Nonutility Suppliers – If any electricity reported in column 2, line 3 was obtained by transfer from another establishment **of your company**, enter the name, address and telephone number of the supplying establishment. If you received transfers from more than one of this type of establishment, use the "Remarks" section to identify remaining suppliers.

Section II – COMBUSTIBLE ENERGY SOURCES

Column 1 – Energy Sources to be Reported – Twenty-three energy sources have been preprinted in column 1, separated into the general categories of solids (A), gases (B) and liquids (C). Prior to completing columns 4 through 11, determine from the criteria below which of the preprinted energy sources should be included for reporting and which excluded.

First, **INCLUDE** all preprinted energy sources that were –

1. consumed as a fuel(that is for heat, power or electricity generation), **or**
2. consumed as a nonfuel (e.g., feedstock).

Next, if your establishment consumed for any purpose any energy sources that are not included in the preprinted list, add those energy sources under the "Other" heading for solids, gases or liquids. **NOTE:** In making additional entries, the preprinted entry "Waste and Byproduct Gases" includes all waste gas streams (for example, refinery gas, fuel gas, vent gas, offgas, still gas, and other waste gases) produced onsite except hydrogen.

NOTE – The sum of lines 4 through 11 for each column must be at least as large as the entry on line 3 of that column, and may be larger if more than one alternative fuel could have been used.

Section IV – ESTIMATED PERCENT CONSUMPTION BY END USE

This portion of the survey is intended to provide information on the purposes for which various energy sources are used in the manufacturing sector. It is understood that records of consumption of specific energy sources for the various end uses are not ordinarily maintained. For this reason, **reasonable approximations of total consumption are acceptable for section IV.** These approximations should be based on the judgment of a person knowledgeable about the energy consumption and operation of your establishment. **They are not expected to be the result of modeling activity or formal engineering studies unless these results are routinely available.**

Prior to completing columns 2 through 7, determine from the criteria below which of the preprinted energy sources and end uses should be included for reporting and which excluded. First, **exclude** all end uses that were not applicable to this establishment during 1991. Next, **exclude** all energy sources that were not consumed as a fuel at this establishment site during 1991 (that is, energy sources which have a zero entry in section II column 9 or section I column 2 line 12). There should be no entries in any column for the excluded end uses and no entries on any line for the excluded energy sources. **Estimate** what percent of each energy source's total fuel consumption should be applied to each of the end uses. Complete one column before starting another.

Examples:

- If coal is used in boilers to generate steam, some of which is passed through an extractor/condensing turbine generator, all coal consumption would be reported in A1 – Boilers (steam production only).
- Auxiliary power for such uses as pump and fan drivers and emissions controls should be included in B5 – Direct Process Uses, "Other".

SPECIFIC INSTRUCTIONS

Line 1 – Total Fuel Consumption – Copy the section I line 12 column 2 value for electricity to column 2. Copy section II column 9 values for the energy sources in columns 3 through 7. Be sure to copy the **total** values for coal, natural gas, and distillate fuel oil and diesel fuel, as well as LPG and residual fuel oil. These values should be used as a reference for estimating the percentage distribution in lines A1 through C6 for each column.

Lines A1 through C6 – End Uses – Proceeding down each column, **estimate** what percent of the total fuel consumption was used for each of the listed end uses. The total of each column should sum to 100 percent.

Section V – ESTABLISHMENT CHECKLIST

This section is divided into six parts. Every establishment must complete Parts A through C. Part A includes a section for you to indicate the **estimated** square footage of the buildings on this establishment site and the **estimated** percentage that has controlled heating or cooling. Part B includes questions on your establishment's participation in energy management programs, and Part C lists different technologies or processes which may or may not have been used by your establishment in 1991.

Parts D through F list technologies specific to manufactures in certain SIC categories. Part D should be completed by establishments whose four-digit SIC code begins with "20". Part E should be completed by establishments whose four-digit SIC code begins with "22". Part F should be completed by establishments whose four-digit SIC code begins with "32". Your establishment's four-digit SIC code is included in the mailing label on this form.

SPECIFIC INSTRUCTIONS

Part A. Estimated Square Footage of Buildings on this Establishment Site – Estimate the total square footage of all buildings on this establishment site and place a check beside the appropriate category. For purposes of this question a building is:

- a structure enclosed by walls extending from the foundation to the roof.
- parking garages, even if not totally enclosed by walls and a roof.
- structures erected on pillars to elevate the first fully enclosed level.

Excluded from the definition of a building are:

- structures (other than the exceptions just noted) that are not totally enclosed by walls and a roof.
- mobile homes and trailers, even if they house manufacturing activity.
- structures not ordinarily intended to be entered by humans, such as storage tanks.
- nonbuildings that consume energy (such as pumps and construction sites).

Square footage is defined as all the area enclosed by the exterior walls of a building, including indoor parking facilities, basements, hallways, lobbies, stairways, and elevator shafts, in units of square feet.

Question 1, 1 through 11 – Question 1 identifies **approximate** square footage categories. Place a check mark next to the category that most closely describes your establishment.

Question 2, 1 through 6 – Question 2 identifies **approximate** percentage categories. Place a check mark next to the category that most closely describes how much of the square footage indicated in question 1 above had controlled heating or cooling using equipment designed to modify the internal building temperature during 1991.

Part B – Energy Management – Answer questions 1, 2, and 3. If your answer to questions 1 **or** 3 was "Yes", proceed to question 4. If your answers to questions 1 and 3 were **both** "No", proceed to Part C – General Technologies Checklist.

Question 1 – Indicate by checking the appropriate box whether or not your establishment was involved in any formal program(s) between January 1, 1989 and December 31, 1991 that was designed to improve overall energy efficiency, reduce energy costs, or promote the use of an alternative energy source. Formal programs include such things as official company policies designed specifically to minimize energy use, and programs sponsored by utilities or third parties.

Question 2 – Indicate by checking the appropriate box whether or not the electric or natural gas utility from which your establishment purchased energy between January 1, 1989 and December 31, 1991 sponsored programs designed to lower/adjust energy consumption or costs or promote the use of a different energy source.

Question 3 – If the answer to question 2 above is "Yes" indicate by checking the appropriate box whether or not your establishment participated in a utility-sponsored program.

If the answer to question 1 **or** question 3 is "Yes" proceed to question 4. If the answer to **both** question 1 and 3 is "No", proceed to Part C – General Technology Checklist.

Question 4, a through h – Question 4 lists different energy efficiency activities that your establishment might have been involved in between January 1, 1989 and December 31, 1991. Place a check mark next to each activity your establishment did actually participate in during that time. If participation was sponsored by a public utility or energy supplier check column 2.

Column 8 – Source of Onsite Production – For each energy source that has an entry in column 7, check the "Yes" box if the amount listed in column 7 resulted from consumption of any other energy source listed in Section II – Combustible Energy Sources. Check the "No" box if the energy source came from captive wells or mines, or is a product or byproduct/waste product from materials not listed in section II as a combustible energy source.

Examples include:

- waste oils and tars resulting from the incomplete burning of distillate or residual fuel oil would have the "Yes" box checked.
- wood chips produced as a byproduct of wood purchased for use as a raw material in a furniture plant would have the "No" box checked (the wood was originally purchased as an input, not as the energy source roundwood).

Column 9 – Onsite Fuel Consumption – Enter the quantity of each energy source consumed onsite as a fuel for the production of heat, steam, power, or the generation of electricity. Also include fuel consumed by vehicles dedicated primarily for use onsite. **Copy the entries, if any, in column 9 for total coal, total natural gas, LPG, total distillate fuel oil and diesel fuel, and residual fuel oil to their respective columns on line 1 of Section III-Fuel Switching and line 1 of Section IV - Estimated Percent Consumption by End Use.**

Column 10 – Onsite Nonfuel Consumption – Enter the quantity of each energy source that was consumed onsite for any purpose other than fuel use. **Include** all quantities consumed as feedstocks, raw materials, additives, or ingredients for products manufactured by this establishment. An example is distillate fuel oil used as a lubricant or solvent. **Exclude** all offsite dispositions such as sales and transfers to other establishments.

Column 11 – Onsite Storage Capacity – Enter the total design storage capacity located at this establishment site on December 31, 1991, for diesel fuel, distillate fuel oil (other than diesel), motor gasoline, and residual fuel oil. Report the shell capacity (that is, the design capacity of the storage tanks).

Include in column 11:

- onsite capacity of all storage facilities regardless of the intended disposition of the energy source (include both product storage tanks and tanks dedicated for onsite use).
- onsite capacity dedicated or leased for storage of energy sources owned by other establishments.

Section III – FUEL SWITCHING

This portion of the survey is intended to measure the short-term capability of your establishment to have used substitute energy sources in place of those actually consumed in 1991. Capability to use substitute energy sources means that this establishment's combustors (for example, boilers, furnaces, ovens, blast furnaces) had the machinery or equipment either in place or available for installation in 1991 so that substitutions could actually have been introduced within 30 days without extensive modifications.

NOTE – Fuel-switching capability, as measured by this survey, does not depend on the relative prices of energy sources; it depends only on the characteristics of your equipment and certain practical constraints such as legal restrictions on the quantities of particular fuels burned, or take-or-pay contracts with energy suppliers.

Fuel-switching capability sets limits on the extent to which you could switch to a substitute energy source if you wanted to or needed to. It has nothing to do with whether you would want to switch if you could. Therefore, **relative prices** of energy sources are **not related to fuel-switching CAPABILITY** and should be **ignored** when completing this section.

We recognize that records of fuel-switching capability are not regularly maintained. Accordingly, **reasonable approximations** of fuel-switching capability are **acceptable**. These approximations should be based on the judgment of a person knowledgeable about the fuel-switching capability and operations of your establishment. They are **not** expected to be formal engineering estimates based on a day-by-day analysis of the operating levels of individual combustors and interactions between them. Respond as realistically as possible, given your actual operations in 1991.

Base your estimates on the availability of substitute energy sources and the physical condition of your equipment during 1991. **Include** switching capability that could have resulted from the use of redundant and/or standby combustors, and from combustors that were already equipped to fire alternative fuels. Lines 1 through 3 of this portion of the form measure your establishment's overall capability to have switched from specific energy sources in 1991. Lines 4 through 11 describe your capability to replace a given energy source by specific alternative energy sources.

SPECIFIC INSTRUCTIONS

Line 1 – Quantity Consumed – Enter the total electricity received value from column 2 line 4 of section I, and the fuel consumption (column 9) values from section II for total coal, total natural gas, total distillate fuel oil and diesel fuel, LPG, and residual fuel oil. The quantities to be copied are noted in the appropriate boxes of sections I and II.

Line 2 – Quantity Nonswitchable – Enter the amount of the quantity reported on line 1 that could NOT have been replaced within 30 days by any other energy source in 1991, even given a severe curtailment. NOTE – **Include** only that portion of total electricity received (purchases plus transfers in) that could **NOT** have been replaced by either onsite-generated electricity or energy source(s) which accomplish the same purposes as the offsite-produced electricity (e.g. supplying heat or power). Portions of individual fuels may be non-switchable due to limitations such as:

- the characteristics of your physical plant (for example, single-fired combustors or the absence of redundant and/or standby combustors), or the requirements of your manufacturing process.
- binding take-or-pay contracts with energy suppliers that were in place.
- environmental regulations which limit the amounts of potential replacement fuels that could be burned.

DO NOT consider current relative prices of fuels as a limitation to switching capability.

Line 3 – Quantity Switchable – Subtract line 2 from line 1 and enter the results. These values represent the quantity of each energy source consumed that **COULD HAVE BEEN** replaced within 30 days by at least one other energy source in 1991. NOTE – If all entries on line 3 are zero, proceed to Section IV – Estimated Percent Consumption by End Use. For each entry on line 3 that is non-zero, complete the remainder of that column. **Complete one column before starting another.**

Lines 4 through 11 – Replacement Quantities – Report the maximum amount of the quantity shown on line 3 that could have been replaced within 30 days by each of the energy sources on lines 4 through 11, under the constraints listed in the instructions for line 2.

Report all amounts in the units of the energy source that is being replaced. **DO NOT** convert this amount to units of the replacement energy sources. NOTE – Be sure to take into account not only the fuels that could be directly substituted for offsite-produced electricity, but also the fuels needed to generate electricity onsite that could have been used in place of electricity purchases or transfers in.

Finally, if your **only** means of supply of an energy source during 1991 was as a byproduct of energy source inputs to any of your manufacturing processes, it should be included only if it was at least partially **consumed onsite as a fuel**. If the byproduct energy source was not consumed as a fuel it should be excluded. All excluded energy sources should be lined out, and no entries should be made in columns 4 through 11.

Example 1 – Your establishment depended entirely on electricity for heat and power, no combustible energy sources were consumed. In this instance, you should proceed directly to Section III - Fuel Switching.

Example 2 – Your establishment used electricity for lighting, natural gas for heating or as a feedstock, and propane for onsite transportation by forklifts. Complete the appropriate line(s) for natural gas (B2, B3, and/or B4) and line C1 for propane in addition to section I.

Example 3 – Residual fuel oil was consumed as a fuel and waste oils and tars were produced through incomplete combustion. Report all consumption of residual fuel oil in column 9 (fuel consumption).

- a. Report the quantity of waste oils and tar produced in column 7 (onsite production) **ONLY** if some or all of the byproduct energy source was also consumed onsite (at your establishment) as a fuel.
- b. If a portion of the waste oils and tars was consumed as a fuel and a portion shipped offsite, report the entire quantity produced in column 7 and the quantity consumed as a fuel in column 9.
- c. If the entire quantity was shipped offsite, with no portion consumed as a fuel onsite, do not report any of the onsite production of waste oils and tars.

Complete columns 4 through 11 for all energy sources that were not excluded by the above procedures. Entries should be made in accordance with the specific instructions for these columns. **Leave all shaded areas blank, no entries are required in these areas.**

Column 3 – Reporting Units – Use the indicated units for reporting all quantities. For those establishments that keep records in Btu, note that volume measures should be reported as actual physical quantities, rather than adjusted to represent a standard energy content. One barrel contains 42 gallons. A ton weighs 2,240 pounds and a short ton weighs 2,000 pounds.

The following list of Btu conversion factors should be used **only** if you do not know the actual Btu factor of the fuels consumed at your establishment site. Examples of conversion from physical quantities to Btu include:

- Your establishment consumed 250 cubic feet of acetylene in 1991. The Btu equivalent is –
 $250 \text{ Cu. ft.} \times 1,500 \text{ Btu per cubic foot}$
 $= 375,000 \text{ Btu}$
 $= 0.375 \text{ million Btu}$
- Your establishment consumed 300 pounds of acetylene in 1991. The Btu equivalent is –
 $300 \text{ pounds} \times 21,600 \text{ Btu per pound}$
 $= 6,480,000 \text{ Btu}$
 $= 6.480 \text{ million Btu}$

Acetylene	21,600 Btu/lb 1,500 Btu/cubic foot
Bagasse	4,081 Btu/ton
Biomass	5,300 Btu/ton
Hydrogen	61,084 Btu/lb 32,511 Btu/cubic foot 35,600 Btu/gallon
Natural gas	1.029 million Btu/ 1000 cubic feet

Petroleum coke	6.024 million Btu/barrel 30.12 million Btu/short ton
Pulping or black liquor	11 million Btu/ton
Roundwood	21.5 million Btu/cord 17.2 million Btu/short ton 0.014 million Btu/board foot
Still gas	6 million Btu/barrel 1,029 Btu/cubic foot
Waste materials (wastepaper)	7,500 Btu/lb
Waste oils and tars	6 million Btu/barrel
Wood waste (50% moisture)	9 million Btu/short ton
Green wood chips (50% moisture)	10 million Btu/short ton
Sawdust (7% moisture)	8,000 Btu/lb

NOTE: If your establishment uses more precise conversion values for your operations, use them in place of the approximations given above. Be sure to identify the conversion factor(s) used if different from those listed above in the "Remarks" section.

Column 4 – Quantity Purchased – Enter the quantity of each energy source that was purchased and delivered to this establishment site in 1991, regardless of when payment was made. **Include** quantities of those energy sources that were purchased for **ANY** onsite use, for example, the production of heat or power, building heating/cooling, electrolysis processes, steam cleaning, or as raw material input to any manufacturing operation (feedstock).

Exclude from column 4 all:

- quantities delivered from another establishment in your company even if those quantities were repurchased from them by your establishment.
- quantities purchased and paid for by a central purchasing entity separate from this establishment.
- quantities for which payment was made in-kind.

Column 5 – Expenditures – Enter the total expenditures for each of the purchased quantities reported in column 4. **Include** all expenditures regardless of when payment was made. Leave all shaded areas blank.

Column 6 – Other Receipts – For each included energy source, enter all additional quantities delivered to your establishment site in 1991 but not reported in column 4. Leave all shaded areas blank.

Include in column 6:

- quantities purchased and paid for by a central purchasing entity separate from this establishment.
- quantities transferred from another establishment of your company for which payment was not made.
- quantities delivered from another establishment of your company even if these quantities were repurchased from them by your establishment.
- quantities for which payment was made in-kind.

Column 7 – Onsite Production – Enter the total quantity of any energy source that was produced onsite in 1991 as a product, a byproduct, a waste material, or as the output from a captive (onsite) mine or well, **and** was at least partially consumed onsite. Enter the **TOTAL** quantity produced, even if that quantity exceeds the quantity consumed at this establishment. Examples include hydrogen, wood chips, and waste oils and tars.

Form **EIA-846B**
(2-10-92)

Public reporting burden for this collection of information is estimated to average 8 hours per response, including the time of reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Energy Information Administration, Office of Statistical Standards, EI-73, 1000 Independence Avenue, SW, Washington, DC 20585; and to the Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, DC 20503.

In correspondence pertaining to this report, please refer to this Census File Number (CFN).

U.S. Department of Commerce
Bureau of the Census
Acting as Collecting and Compiling Agent For
UNITED STATES DEPARTMENT OF ENERGY
ENERGY INFORMATION ADMINISTRATION



Petroleum Refineries
1991
MANUFACTURING ENERGY CONSUMPTION SURVEY

NOTICE - This survey is **mandatory** under the Federal Energy Administration Act of 1974, Pub.L. No. 93-275, and under Title 3, Subtitle B, of the Omnibus Budget Reconciliation Act of 1986, Pub.L. No. 99-509. Failure to respond may result in criminal fines, civil penalties, and other sanctions as provided by law. The **confidentiality** of your response to this survey is **protected by law** (title 13, U.S. Code). Your response may be seen only by sworn Census employees and may be used only for statistical purposes. The law also provides that copies retained in your files are **immune from legal process**.

Please correct errors in name, address, and ZIP Code. ENTER street and number if not shown.

PLEASE COMPLETE THIS FORM AND RETURN TO

BUREAU OF THE CENSUS
1201 East 10th Street
Jeffersonville, IN 47132-0001

NOTE

Please read the enclosed instructions before filling out this form. Complete each item. If you have any questions, call (301) 763-7066.

DUE DATE:

If you cannot file by the due date, a time extension request should be sent to the above address. Please include your 11-digit Census File Number (CFN).

Section I - NONCOMBUSTIBLE ENERGY SOURCES

Item Description (1)	10 Electricity (2)			11 Steam (3)			12 Industrial Hot Water (4)			
	Mil	Thou	kWh	Mil	Thou	Dol	Mil	Thou	Dol	
1a. During 1991, what amount of each energy source was purchased by this establishment from utilities and delivered to this establishment site? (Do not include purchases by a central purchasing agent, quantities delivered from other establishments of your company, or quantities for which payment was made in-kind.)										
1b. What was the total expenditure for the purchased energy source(s) reported on line 1a?										
2a. During 1991, what amount of electricity and steam was purchased from nonutility suppliers by this establishment and delivered to this establishment site?										
2b. What was the total expenditure for the purchased energy source(s) reported on line 2a.?										
3. During 1991, what amount of each energy source was transferred from outside establishments and delivered to this establishment site? (DO NOT include the purchases reported in lines 1a and 2a. DO include quantities received from a central purchasing agent, quantities delivered from other establishments of your company, or quantities for which payment was made in-kind.)										
4. TOTAL QUANTITIES OF ELECTRICITY RECEIVED ONSITE (Sum of lines 1a, and 2a and 3.) NOTE - Copy this quantity for electricity to column 2, line 1 of Section III - FUEL SWITCHING.										
5. During 1991, how much electricity was generated on this establishment site by cogeneration? (Include ALL cogeneration facilities at this establishment site.)										
6. During 1991, how much of each energy source was generated onsite from solar power, wind power, hydropower, and geothermal sources?										
7. During 1991, how much electricity was generated onsite by processes other than those covered on lines 5 and 6?										
8. TOTAL ONSITE GENERATION OF ELECTRICITY. (Sum of lines 5, 6, and 7.)										
9. During 1991, how much electricity was sold or transferred to utilities?										
10. During 1991, how much of each energy source was sold or transferred to any establishments other than utilities?										
11. TOTAL ELECTRICITY SALES AND TRANSFERS OFFSITE (Line 9 plus line 10.)										
12. TOTAL ONSITE CONSUMPTION OF ELECTRICITY. (Line 4 plus line 8 minus line 11.) NOTE - Copy this quantity for electricity consumption to column 2, line 1 of Section IV, Estimated Percent Consumption by End Use.										
13. If line 3, column 2 has a nonzero entry, and any of your electricity suppliers was another establishment of your company, identify that establishment at right. If you received electricity transfers from more than one establishment of your company, provide their identifying information in the "Remarks" section.	Name of electricity supplier, if another establishment of your company									
	Address - Number and street									
	15	City	State	ZIP Code	Phone - Area code and Number					
	1									

Section II - COMBUSTIBLE ENERGY SOURCES

IMPORTANT - HOW TO REPORT

1801 Check the box next to the correct description of the establishment identified on the address label. Then supply data for Section II according to the instructions for that description.

- 1 Establishment consists of REFINERY operations ONLY. (There may be nonrefinery (petrochemical) operations collocated, but those operations are identified as a separate establishment for purposes of the Annual Survey of Manufactures, Census Form MA-1000.) - **Complete Section II but do NOT make any entries in columns 9 and 10.**
- 2 Establishment consists of both REFINERY and NONREFINERY operations. - **Complete Section II including columns 9 and 10.**

Energy Sources (1)	Census Use Only (2)	Units Used for Reporting Quantities (3)	Energy sources received onsite in 1991				
			Quantity purchased by and delivered to this establishment (4)	Total expenditures, including delivery charges, of the quantity in column (4) (5)			Total other receipts (transfers in and central purchases) (6)
				02 Mil	Thou	Dol	
A. PETROLEUM BASED							
1. Crude oil/lease condensate	20	Barrels					
2. Butane as liquid petroleum gas (LPG) or natural gas liquids (NGL)	36	Gallons					
3. Ethane as liquid petroleum gas (LPG) or natural gas liquids (NGL)	37	Gallons					
4. Propane as liquid petroleum gas (LPG) or natural gas liquids (NGL)	38	Gallons					
5. Other LPG and NGL (e.g., butylene, ethylene, propylene, and mixtures)	39	Gallons					
6. Total LPG and NGL (Sum of lines A2, A3, A4, and A5)	24	Gallons					
7. Diesel fuel	28	Barrels					
8. Distillate fuel oil (numbers 1, 2, and 4 fuel oils)	29	Barrels					
9. Total diesel fuel and distillate fuel oil (Sum of lines A7 and A8)	22	Barrels					
10. Motor gasoline	23	Gallons					
11. Residual fuel oil (numbers 5, 6, Navy Special, and Bunker C)	21	Barrels					
12. Waste and byproduct gases (e.g., refinery off gas, vent gas, plant gas, still gas)	62	Million Btu					
13. Fluid catalytic cracking unit coke	77	Barrels					
14. Marketable petroleum coke - unrefined or green	78	Barrels					
15. Marketable petroleum coke - calcined	79	Barrels					
16. Waste oils and tars	71	Barrels					
17. Other (Specify) (1)	9598 95	Million Btu					
18. (2)	9698 96	Million Btu					
B. NONPETROLEUM BASED							
1. Anthracite	40	Short Tons					
2. Bituminous and subbituminous coal	41	Short Tons					
3. Lignite	42	Short Tons					
4. Total coal (Sum of B1, B2, and B3)	46	Short Tons					
5. Coal coke	43	Short Tons					
6. Breeze	44	Short Tons					

Section II - COMBUSTIBLE ENERGY SOURCES - Continued

Enter amounts for entire establishment			Amounts for nonrefinery operations only		Energy Sources (11)
Quantity produced onsite (7)	Quantity consumed as a fuel (8)	Quantity consumed for all nonfuel purposes (9)	Quantity shipped offsite to other establishments in 1991 (10)		
04	06	07	08		
				A. PETROLEUM BASED	
				Crude oil/lease condensate	
				Butane as liquid petroleum gas (LPG) or natural gas liquids (NGL)	
				Ethane as liquid petroleum gas (LPG) or natural gas liquids (NGL)	
				Propane as liquid petroleum gas (LPG) or natural gas liquids (NGL)	
				Other LPG and NGL (e.g., butylene, ethylene, propylene, and mixtures)	
	Copy to line 1 on pages 5 and 6 ↗			Total LPG and NGL (Sum of lines A2, A3, A4, and A5)	

				Diesel fuel	
				Distillate fuel oil (numbers 1, 2, and 4 fuel oils)	
	Copy to line 1 on pages 5 and 6 ↗			Total diesel fuel and distillate fuel oil (Sum of lines A7 and A8)	

				Motor gasoline	
	Copy to line 1 on pages 5 and 6 ↗			Residual fuel oil (numbers 5, 6, Navy Special, and Bunker C)	

				Waste and byproduct gases (e.g., refinery off gas, vent gas, plant gas, still gas)	
				Fluid catalytic cracking unit coke	
				Marketable petroleum coke - unrefined or green	
				Marketable petroleum coke - calcined	
				Waste oils and tars	
				Other (Specify)	
				B. NONPETROLEUM BASED	
				Anthracite	
				Bituminous and subbituminous coal	
				Lignite	
	Copy to line 1 on pages 4 and 6 ↗			Total coal (Sum of B1, B2, and B3)	

				Coal coke	
				Breeze	

Section II - COMBUSTIBLE ENERGY SOURCES - Continued from page 2

Energy Sources (1)	Census Use Only (2)	Units Used for Reporting Quantities (3)	Energy sources received onsite in 1991					
			Quantity purchased by and delivered to this establishment (4)	Total expenditures, including delivery charges, of the quantity in column (4) (5)			Total other receipts (transfers in and central purchases) (6)	
				01	02	03		Mil
B. NONPETROLEUM BASED - continued								
7. Natural gas purchased directly from utilities	31	1000 cu. ft.						
8. Natural gas purchased from transmission pipelines	32	1000 cu. ft.						
9. Natural gas obtained from other sources such as brokers, producers, and onsite wells	33	1000 cu. ft.						
10. Total natural gas (Sum of B7, B8, and B9)	30	1000 cu. ft.						
11. Hydrogen	63	Million Btu						
12. Waste materials (newspaper, packing materials, etc.)	72	Million Btu						
13. Other (Specify) (1)	9798							
	97	Million Btu						
14. (2)	9898							
	98	Million Btu						

Section III - FUEL SWITCHING CAPABILITY

Item Description (1)	Total Electricity Received		Total Coal Excluding Coal Coke and Breeze
	10	(2)	46
1. Quantity Consumed - Copy the total electricity receipts from line 4 of section I, and the TOTAL quantities of coal products, natural gas, distillate fuel oil and diesel fuel, LPG and NGL, and residual fuel oil consumed onsite as a fuel from column (8) of section II.	50	1,000 Kilowatthours	Short Tons
<i>Now answer lines 2 and 3 as appropriate for the columns with nonzero entries in line 1. Do not consider differences in energy prices when estimating amounts.</i>		1,000 Kilowatthours	Short Tons
2. Quantity Nonswitchable - Enter the amount of the quantity in line 1 that could NOT have been replaced within 30 days by another energy source in 1991.	51		
3. Quantity Switchable - Subtract line 2 from line 1 and enter the results. This represents the total quantity of energy consumption that COULD HAVE BEEN replaced within 30 days by one or more alternative energy sources in 1991.	52	1,000 Kilowatthours	Short Tons
<i>Now answer lines 4 through 11 as appropriate for the columns with nonzero entries in line 3. Complete one column before starting another.</i>			Short Tons
4. Of the amount shown in line 3, what is the maximum amount that could have been replaced by electricity?	53		
5. Of the amount shown in line 3, what is the maximum amount that could have been replaced by coal (excluding coal coke and breeze)?	67	1,000 Kilowatthours	
6. Of the amount shown in line 3, what is the maximum amount that could have been replaced by coal coke and breeze (excluding coal included in line 5 above)?	69	1,000 Kilowatthours	
7. Of the amount shown in line 3, what is the maximum amount that could have been replaced by natural gas from any supplier(s)?	57	1,000 Kilowatthours	Short Tons
8. Of the amount shown in line 3, what is the maximum amount that could have been replaced by total distillate fuel oil and diesel fuel?	59	1,000 Kilowatthours	Short Tons
9. Of the amount shown in line 3, what is the maximum amount that could have been replaced by total LPG and NGL?	61	1,000 Kilowatthours	Short Tons
10. Of the amount shown in line 3, what is the maximum amount that could have been replaced by residual fuel oil?	63	1,000 Kilowatthours	Short Tons
11. Of the amount shown in line 3, what is the maximum amount that could have been replaced by any other energy source?		1,000 Kilowatthours	Short Tons
Specify the energy source. ↘	99		
	65		

Section II - COMBUSTIBLE ENERGY SOURCES - Continued from page 3

Enter amount for entire establishment		Enter amounts for nonrefinery operations only		Energy Sources (11)
Quantity produced onsite 04 (7)	Quantity consumed as a fuel 06 (8)	Quantity consumed for all nonfuel purposes 07 (9)	Quantity shipped offsite to other establishments in 1991 08 (10)	
				B. NONPETROLEUM BASED - continued
				Natural gas purchased directly from utilities
				Natural gas purchased from transmission pipelines
				Natural gas obtained from other sources such as brokers, producers, and onsite wells
	Copy to line 1 below & on page 6 ↗ -----			Total natural gas (Sum of B7, B8, and B9)
				Hydrogen
				Waste materials (newspaper, packing materials, etc.)
				Other (Specify)

Section III - FUEL SWITCHING CAPABILITY - Continued

Total Natural Gas 30 (4)	Total Distillate Fuel Oil and Diesel Fuel 22 (5)	Total LPG and NGL 24 (6)	Residual Fuel Oil 21 (7)
1,000 cu. ft.	Barrels	Gallons	Barrels
1,000 cu. ft.	Barrels	Gallons	Barrels
1,000 cu. ft.	Barrels	Gallons	Barrels
1,000 cu. ft.	Barrels	Gallons	Barrels
1,000 cu. ft.	Barrels	Gallons	Barrels
1,000 cu. ft.	Barrels	Gallons	Barrels
1,000 cu. ft.	Barrels	Gallons	Barrels
1,000 cu. ft.	Barrels	Gallons	Barrels
1,000 cu. ft.	Barrels	Gallons	Barrels
1,000 cu. ft.	Barrels	Gallons	Barrels
1,000 cu. ft.	Barrels	Gallons	Barrels
1,000 cu. ft.	Barrels	Gallons	Barrels

Section IV - ESTIMATED PERCENT CONSUMPTION BY END USE

Reasonable Approximations are Acceptable - See Instructions

Energy sources can be consumed either directly, in equipment such as motors, furnaces, kilns, etc., or indirectly through conversion to steam and hot water in a boiler. **All indirect use of energy sources listed below are represented by the single percent entry for boiler fuel.** The remaining categories are to split out direct use of energy. Thus, the percentages entered for boiler fuel and all direct uses should sum to 100 percent.

End uses (1)	Total Electricity Consumption		Total Coal Excluding Coal Coke and Breeze		Total Natural Gas		Total Distillate Fuel Oil and Diesel Fuel		Total LPG and NGL		Residual Fuel Oil	
	10	(2)	46	(3)	30	(4)	22	(5)	24	(6)	21	(7)
1. Copy Section I line 12 column (2) value for electricity to column (2). Copy Section II column (8) values for the energy sources in columns (3) through (7)	70	1,000 kWh		Short Tons		1,000 cu. ft.		Barrels		Gallons		Barrels
2. For the columns with nonzero entries in line 1, report the approximate percentage of each energy source used for the following purposes: (Complete one column before starting another.)												
A. BOILERS												
1. Boiler fuel	71	%		%		%		%		%		%
B. DIRECT PROCESS USES												
1. Process heating (e.g., kilns, furnaces, ovens)	72	%		%		%		%		%		%
2. Process cooling and refrigeration	73	%		%		%		%		%		%
3. Machine drive (e.g., motors, pumps, etc. associated with manufacturing process equipment)	74	%		%		%		%		%		%
4. Electro-chemical processes	75	%										
5. Other (Please specify any other uses of energy in the "Remarks" portion of the questionnaire.)	76	%		%		%		%		%		%
C. DIRECT NON-PROCESS USES												
1. Facility heating, ventilation, and air conditioning	77	%		%		%		%		%		%
2. Facility lighting	78	%										
3. Facility support other than C1 and C2 above (e.g., cooking, water heating, office equipment)	79	%		%		%		%		%		%
4. Onsite transportation	80	%				%		%		%		
5. Conventional electricity generation	81			%		%		%		%		%
6. Other (Please specify any other uses of energy in the "Remarks" portion of the questionnaire.)	82	%		%		%		%		%		%
TOTAL for all purposes		100%		100%		100%		100%		100%		100%

Section V - ESTABLISHMENT CHECKLIST

NOTE

All establishments are to complete Parts A, B, and C.

Part A. Estimated Square Footage of Buildings

1. What was the **approximate** total enclosed square footage of the buildings located on this establishment site as of December 31, 1991? *Mark (X) the box next to the category which best describes this square footage.*

- | | | |
|------|---|---|
| 1301 | 1 <input type="checkbox"/> 25,000 square feet or less | 6 <input type="checkbox"/> 750,001 to 1 million square feet |
| | 2 <input type="checkbox"/> 25,001 to 100,000 square feet | 7 <input type="checkbox"/> 1,000,001 to 5 million square feet |
| | 3 <input type="checkbox"/> 100,001 to 200,000 square feet | 8 <input type="checkbox"/> 5,000,001 to 10 million square feet |
| | 4 <input type="checkbox"/> 200,001 to 500,000 square feet | 9 <input type="checkbox"/> 10,000,001 to 25 million square feet |
| | 5 <input type="checkbox"/> 500,001 to 750,000 square feet | 10 <input type="checkbox"/> Over 25 million square feet |
| | | 11 <input type="checkbox"/> Don't know |

2. Of the square footage indicated above, **approximately** what percent had controlled heating or cooling, using equipment designed to modify the internal building temperature, during 1991? *Mark (X) the box next to the category which best describes this percentage.*

- | | | |
|------|---------------------------------------|---------------------------------------|
| 1302 | 1 <input type="checkbox"/> All (100%) | 4 <input type="checkbox"/> About 25% |
| | 2 <input type="checkbox"/> About 75% | 5 <input type="checkbox"/> None |
| | 3 <input type="checkbox"/> About 50% | 6 <input type="checkbox"/> Don't Know |

Part B. Energy Management Activities

1. Was your establishment involved in any formal programs (company, utility, or third-party sponsored) at any time between January 1, 1989 and December 31, 1991 that were specifically targeted and designed to improve energy efficiency, reduce energy costs, or promote the use of a different energy source?

- | | | |
|------|--------------------------------|--------------------------|
| 1303 | 1 <input type="checkbox"/> Yes | } Proceed to Question 2. |
| | 2 <input type="checkbox"/> No | |

2. Did your electric or natural gas utility sponsor programs designed to lower/adjust your energy consumption or costs, timing, or promote the use of a different energy source (i.e., a Demand Side Management (DSM) program) at any time between January 1, 1989 and December 31, 1991? *(Mark (X) one.) If the answer to this question is "Yes", proceed to Question 3. If the answer is not "Yes", proceed to the instructions before Question 4.*

- | | | |
|------|--------------------------------|--|
| 1304 | 1 <input type="checkbox"/> Yes | 3 <input type="checkbox"/> Establishment did not purchase electricity or natural gas from a utility. |
| | 2 <input type="checkbox"/> No | 4 <input type="checkbox"/> Don't Know |

3. If you answered "Yes" to Question 2, did your establishment participate in a utility sponsored program at any time between January 1, 1989 and December 31, 1991?

- | | | |
|------|--------------------------------|-------------------------------|
| 1305 | 1 <input type="checkbox"/> Yes | 2 <input type="checkbox"/> No |
|------|--------------------------------|-------------------------------|

NOTE

If you answered "Yes" to either Question 1 or Question 3, proceed to Question 4. If you answered "No" to both Question 1 and Question 3, proceed to Part C - General Technologies Checklist, on page 8.

4. In what type(s) of energy efficiency activity(ies) was your establishment involved between January 1, 1989 and December 31, 1991? *(Mark (X) all that apply. Note that it is possible to have marks in both columns for any or all of the activities listed.)*

Energy Efficiency Activities (1)	Utility/Supplier Sponsored Involvement (2)	Involvement Through Own or Other (3rd Party) Sponsorship (3)
a. Energy audits	1306 1 <input type="checkbox"/>	1307 1 <input type="checkbox"/>
b. Direct electricity load control	1308 1 <input type="checkbox"/>	1309 1 <input type="checkbox"/>
c. Special rate schedule (e.g., interruptible or time-of-use)	1310 1 <input type="checkbox"/>	1311 1 <input type="checkbox"/>
d. Equipment installation or retrofit for the primary purpose of improving energy efficiency affecting:		
(1) Steam production (e.g., boilers, nozzles)	1312 1 <input type="checkbox"/>	1313 1 <input type="checkbox"/>
(2) Direct/indirect process heating	1314 1 <input type="checkbox"/>	1315 1 <input type="checkbox"/>
(3) Direct process cooling, refrigeration	1316 1 <input type="checkbox"/>	1317 1 <input type="checkbox"/>
(4) Direct machine drive (e.g., adjustable speed drives, motors, pumps)	1318 1 <input type="checkbox"/>	1319 1 <input type="checkbox"/>
(5) Facility heating, ventilation and air conditioning	1320 1 <input type="checkbox"/>	1321 1 <input type="checkbox"/>
(6) Facility lighting	1322 1 <input type="checkbox"/>	1323 1 <input type="checkbox"/>
e. Equipment retrofit or installation for the primary purpose of using a different energy source (e.g., electrification). <i>Exclude modifications made principally for energy efficiency</i>	1324 1 <input type="checkbox"/>	1325 1 <input type="checkbox"/>
f. Standby generation program	1326 1 <input type="checkbox"/>	1327 1 <input type="checkbox"/>
g. Equipment rebates	1328 1 <input type="checkbox"/>	1329 1 <input type="checkbox"/>
h. Other (Specify) <input checked="" type="checkbox"/>		
(1)	1330 1 <input type="checkbox"/>	1331 1 <input type="checkbox"/>
(2)	1332 1 <input type="checkbox"/>	1333 1 <input type="checkbox"/>
	1398	1399

First, **include** all preprinted energy sources that were –

1. consumed as a fuel (that is for heat, power or electricity generation) anywhere on the establishment site.
2. consumed as a nonfuel (feedstock) at the nonrefinery portion of the establishment.
3. shipped offsite from nonrefinery operations.

Next, if your establishment consumed as a fuel in refinery operations, consumed for any purpose in nonrefinery operations, or shipped offsite from nonrefinery operations any energy sources that are not included in the preprinted list, add those energy sources under the "Other" heading for petroleum based or nonpetroleum based energy sources.

NOTE – In making additional entries, the preprinted entry "Waste and Byproduct Gases" includes all waste gas streams (for example, refinery gas, fuel gas, vent gas, offgas, still gas, and other waste gases) produced onsite except hydrogen. Finally, if your **only** means of supply of an energy source during 1991 was as a byproduct of energy source inputs to any of your manufacturing processes, it should be included only if it was at least partially **consumed onsite as a fuel or shipped offsite** from nonrefinery operations. If the byproduct energy source was not consumed as a fuel or shipped offsite it should be excluded. All excluded energy sources should be lined out, and no entries should be made in columns 4 through 10.

Example 1 – Residual fuel oil is consumed as a fuel producing waste oils and tars through incomplete combustion. If a portion of the waste oils and tars was:

- a. consumed as a fuel and a portion shipped offsite, report **ONLY** the portion consumed as a fuel in column 8 (fuel consumption). Do not report the quantity shipped offsite because it was not a product of the nonrefinery operations of the establishment.
- b. used as a feedstock in the refinery and reprocessed, and a portion shipped offsite from the refinery, do not report any of the waste oils and tars since none was consumed anywhere at this establishment as a fuel.

Example 2 – Butane from refinery operations is transferred to the petrochemical portion of the establishment and used as a feedstock to produce butylene. The butylene is then used as a feedstock to produce butadiene which is shipped offsite. Report the butane in column 9 (nonrefinery operations nonfuel consumption). Butylene would **not** be reported because it is not used as a fuel or shipped offsite. Butadiene would **not** be reported in column 10 because it is not an identified energy source.

Complete columns 4 through 10 for all energy sources that were not excluded by the above procedures. Entries should be made in accordance with the specific instructions for these columns. **Leave all shaded areas blank, no entries are required in these areas.**

Column 1 – Energy Sources to be Reported – Twenty-four energy sources have been preprinted in column 1, separated into the general categories of petroleum and non-petroleum based. If your establishment consumed any energy sources for any purpose during 1991 that are not included in the preprinted list, add those energy sources under the "Other" heading for petroleum or non-petroleum based.

Column 3 – Reporting Units – Use the indicated units for reporting all quantities. For those establishments that keep records in Btu, note that volume measures should be reported as actual physical quantities, rather than adjusted to represent a standard energy content. One barrel contains 42 gallons. A ton weighs 2,240 pounds and a short ton weighs 2,000 pounds.

The following list of Btu conversion factors should be used **only** if you do not know the actual Btu factor of the fuels consumed at your establishment site.

Acetylene	21,600 Btu/lb 1,500 Btu/cubic foot
Bagasse	4,081 Btu/ton
Biomass	5,300 Btu/ton
Hydrogen	61,084 Btu/lb 32,511 Btu/cubic foot 35,600 Btu/gallon
Natural gas	1.029 million Btu/ 1000 cubic feet
Petroleum coke	6.024 million Btu/barrel 30.12 million Btu/short ton
Pulping or black liquor	11 million Btu/ton
Roundwood	21.5 million Btu/cord 17.2 million Btu/short ton 0.014 million Btu/board foot
Still gas	6 million Btu/barrel 1,029 Btu/cubic foot
Waste materials (wastepaper)	7,500 Btu/lb
Waste oils and tars	6 million Btu/barrel
Wood waste (50% moisture)	9 million Btu/short ton
Green wood chips (50% moisture)	10 million Btu/short ton
Sawdust (7% moisture)	8,000 Btu/lb

Column 4 – Quantity Purchased – Complete for nonpetroleum based energy sources only. Enter the quantity of each energy source that was purchased and delivered to this establishment site in 1991, regardless of when payment was made. Include quantities of those energy sources that were purchased for ANY onsite use, for example, the production of heat or power, electrolysis processes, steam cleaning, or as a petrochemical feedstock or a raw material input to any manufacturing operation (feedstock).

Exclude all:

- quantities delivered from another establishment in your company even if those quantities were repurchased from them by your establishment.
- quantities purchased and paid for by a central purchasing entity separate from this establishment.
- quantities for which payment was made in-kind.

Column 5 – Expenditures – Complete for nonpetroleum based energy sources only. Enter the total expenditures for each of the purchased quantities reported in column 4. **Include** all expenditures regardless of when payment was made.

Column 6 – Other Receipts – Complete for nonpetroleum based energy sources only. For each included energy source, enter all additional quantities delivered to your establishment site in 1991 but not reported in column 4.

Include:

- quantities purchased and paid for by a central purchasing entity separate from this establishment.
- quantities transferred from another establishment of your company for which payment was not made.
- quantities delivered from another establishment of your company even if these quantities were repurchased from them by your establishment.
- quantities for which payment was made in-kind.

Exclude any quantities transferred between a petroleum refinery and an adjacent petrochemical plant **if** the two are treated as a single establishment for this survey.

Column 7 – Onsite Production – Complete for nonpetroleum based energy sources only. Enter the total quantity of any energy source that was produced onsite in 1991 as a product, a byproduct, a waste material, or an output from a captive (onsite) mine or well, **and** was at least partially consumed onsite. Enter the TOTAL quantity produced, even if that quantity exceeds the quantity consumed at this establishment. Examples of byproducts include petroleum coke, hydrogen, and still gas. Examples of waste products include wood scraps, packing materials, waste paper and cardboard, and waste oils.

Column 8 – Onsite Fuel Consumption – Complete for ALL energy sources. Enter the quantity of each energy source consumed onsite as a fuel for the production of heat, steam, power, or the generation of electricity. Also include fuel consumed by vehicles dedicated primarily for use onsite. **Copy the entries, if any, in column 8 for total natural gas, total diesel fuel and distillate fuel oil, residual fuel oil, total LPG and NGL, and total coal to line 1 of Section III – Fuel Switching and line 1 of Section IV – Estimated Percent Consumption by End Use.**

Column 9 – Onsite Nonfuel Consumption – Include nonrefinery operations only. Enter the quantity of each energy source that was consumed onsite at the petrochemical plant for all purposes other than fuel use. **Include** all quantities consumed as feedstocks (for example, butane processed in producing rubber compounds), raw materials, additives, or ingredients for products manufactured by this establishment. **Exclude** all offsite dispositions such as sales and transfers to other establishments.

Column 10 – Shipments Offsite to Other Establishments – Include nonrefinery operations only. Enter the quantity of each energy source that was shipped offsite from this establishment to any other establishment. **Exclude** any quantities transferred between a petroleum refinery and a petrochemical plant if the two are treated as a single establishment for this survey.

Section III – FUEL SWITCHING

This portion of the survey is intended to measure the short-term capability of your establishment to have used substitute energy sources in place of those actually consumed in 1991. Capability to use substitute energy sources means that this establishment's combustors (for example, boilers, furnaces, ovens, blast furnaces) had the machinery or equipment either in place or available for installation in 1991 so that substitutions could actually have been introduced within 30 days without extensive modifications.

NOTE – Fuel-switching capability as measured by this survey does not depend on the relative prices of energy sources, it depends only on the characteristics of your equipment and certain practical constraints such as legal restrictions on the quantities of particular fuels burned, or take-or-pay contracts with energy suppliers. Fuel-switching capability sets limits on the extent to which you could switch to a substitute energy source if you wanted to or needed to. It has nothing to do with whether you would want to switch if you could. Therefore, **relative prices** of energy sources are **not related to fuel-switching CAPABILITY** and should be **ignored** when completing this section.

We recognize that records of fuel-switching capability are not regularly maintained. Accordingly, **reasonable approximations** of fuel-switching capability are **acceptable**. These approximations should be based on the judgment of a person knowledgeable about the fuel-switching capability and operation of your establishment. They are **not** expected to be formal engineering estimates based on a day-by-day analysis of the operating levels of individual combustors and interactions between them. Respond as realistically as possible, given your actual operations in 1991.

Base your estimates on the availability of substitute energy sources and the physical condition of your equipment during 1991. **Include** switching capability that could have resulted from the use of redundant and/or standby combustors, and from combustors that were already equipped to fire alternative fuels. Lines 1 through 3 of this portion of the form measure your establishment's overall capability to have switched from specific energy sources in 1991. Lines 4 through 11 describe your capability to replace a given energy source by specific alternative energy sources.

SPECIFIC INSTRUCTIONS

Line 1 – Quantity Consumed – Enter the total electricity received value from column 2 line 4 of Section I, and the fuel consumption (column 8) values from Section II for total coal, total natural gas, total distillate fuel oil and diesel fuel, total LPG and NGL, and residual fuel oil. The quantities to be copied are noted in the appropriate boxes of Sections I and II.

Line 2 – Quantity Nonswitchable – Enter the amount of the quantity reported on line 1 that could NOT have been replaced within 30 days by any other energy source in 1991, even given a severe curtailment. NOTE – **Include** only that portion of total electricity received (purchases plus transfers in) that could **NOT** have been replaced by either onsite-generated electricity or energy source(s) which accomplish the same purposes as the offsite-produced electricity (e.g. supplying heat or power). Portions of individual fuels may be nonswitchable due to limitations such as:

- the characteristics of your physical plant (for example, single-fired combustors or the absence of redundant and/or standby combustors), or the requirements of your manufacturing process.
- binding take-or-pay contracts with energy suppliers that were in place.
- environmental regulations which limit the amounts of potential replacement fuels that could be burned.

DO NOT consider current relative prices of fuels as a limitation to switching capability.

Line 3 – Quantity Switchable - Subtract line 2 from line 1 and enter the results. These values represent the quantity of each energy source consumed that **COULD HAVE BEEN** replaced within 30 days by at least one other energy source in 1991. NOTE – If all entries on line 3 are zero, proceed to Section IV – Estimated Percent Consumption by End Use. For each entry on line 3 that is non-zero, complete the remainder of that column. **Complete one column before starting another.**

Lines 4 through 11 – Replacement Quantities – Report the maximum amount of the quantity shown on line 3 that could have been replaced within 30 days by each of the energy sources on lines 4 through 11, under the constraints listed in the instructions for line 2. Report all amounts in the units of the energy source that is being replaced. **DO NOT** convert this amount to units of the replacement energy sources. NOTE – Be sure to take into account not only the fuels that could be directly substituted for offsite-produced electricity, but also the fuels needed to generate electricity onsite that could have been used in place of electricity purchases or transfers in.

NOTE – The sum of lines 4 through 11 for each column must be at least as large as the entry on line 3 of that column, and may be larger if more than one alternative fuel could have been used.

Section IV – ESTIMATED PERCENT CONSUMPTION BY END USE

This portion of the survey is intended to provide information on the purposes for which various energy sources are used in the manufacturing sector.

It is understood that records of consumption of specific energy sources for the various end uses are not ordinarily maintained. For this reason, **reasonable approximations of total consumption are acceptable for Section IV.** These approximations should be based on the judgment of a person knowledgeable about the energy consumption and operation of your establishment. **They are not expected to be the result of modeling activity or formal engineering studies unless these results are routinely available.**

Prior to completing columns 2 through 7, determine from the criteria below which of the preprinted energy sources and end uses should be included for reporting and which excluded. First, **exclude** all end uses that were not applicable to this establishment during 1991. Next, **exclude** all energy sources that were not consumed as a fuel at this establishment site during 1991 (that is, energy sources which have a zero entry in Section II column 8 or Section I line 12 column 2). There should be no entries in any column for the excluded end uses and no entries on any line for the excluded energy sources. **Estimate** what percent of each energy source's total fuel consumption should be applied to each of the end uses. **Complete one column before starting another.**

SPECIFIC INSTRUCTIONS

Line 1 – Total Fuel Consumption – Copy the Section I line 12 column 2 value for electricity to column 2. Copy Section II column 8 values for the energy sources in columns 3 through 7. Be sure to copy the **total** values for coal, natural gas, LPG and NGL, residual fuel oil, and distillate fuel oil and diesel fuel. These values should be used as a reference for estimating the percentage distribution in lines A1 through C6 for each column.

Lines A1 through C6 – End Uses – Proceeding down each column, **estimate** what percent of the total fuel consumption was used for each of the listed end uses. The total of each column should sum to 100 percent.

Section V – ESTABLISHMENT CHECKLIST

This section is divided into three parts. Every establishment must complete Parts A through C. Part A includes a section for you to indicate the **estimated** square footage of the buildings on this establishment site and the **estimated** percentage that has controlled heating or cooling. Part B includes questions on your establishment's participation in energy management programs, and Part C lists different technologies or processes which may or may not have been used by your establishment in 1991.

SPECIFIC INSTRUCTIONS

Part A – Estimated Square Footage of Buildings on this Establishment Site – Estimate the total square footage of all buildings on this establishment site and place a check beside the appropriate category. For purposes of this question a building is:

- a structure enclosed by walls extending from the foundation to the roof.
- parking garages, even if not totally enclosed by walls and a roof.
- structures erected on pillars to elevate the first fully enclosed level.

Excluded from the definition of a building are:

- structures (other than the exceptions just noted) that are not totally enclosed by walls and a roof.
- mobile homes and trailers, even if they house manufacturing activity.
- structures not ordinarily intended to be entered by humans, such as storage tanks.
- nonbuildings that consume energy (such as pumps and construction sites).

Square footage is defined as all the area enclosed by the exterior walls of a building, including indoor parking facilities, basements, hallways, lobbies, stairways, and elevator shafts, in units of square feet.

Question 1, 1 through 11 – Question 1 identifies **approximate** square footage categories. Place a check mark next to the category that most closely describes your establishment.

Question 2, 1 through 6 – Question 2 identifies **approximate** percentage categories. Place a check mark next to the category that most closely describes how much of the square footage indicated in Question 1 above had controlled heating or cooling using equipment designed to modify the internal building temperature during 1991.

Part B – Energy Management – Answer questions 1, 2, and 3. If your answer to questions 1 **or** 3 was "Yes", proceed to question 4. If your answers to questions 1 and 3 were **both** "No", proceed to Part C – General Technologies Checklist.

Question 1 – Indicate by checking the appropriate box whether or not your establishment was involved in any formal program(s) between January 1, 1989 and December 31, 1991 that was designed to improve overall energy efficiency, reduce energy costs, or promote the use of an alternative energy source. Formal programs include such things as official company policies designed specifically to minimize energy use, and programs sponsored by utilities or third parties.

Question 2 – Indicate by checking the appropriate box whether or not the electric or natural gas utility from which your establishment purchased energy between January 1, 1989 and December 31, 1991 sponsored programs designed to lower/adjust energy consumption or costs or promote the use of a different energy source.

Question 3 – If the answer to Question 2 above is "Yes", indicate by checking the appropriate box whether or not your establishment participated in a utility-sponsored program.

If the answer to Question 1 **or** Question 3 is "Yes", proceed to Question 4. If the answer to **both** Question 1 and 3 is "No", proceed to Part C – General Technologies.

Question 4, a through h – Question 4 lists different energy efficiency activities that your establishment might have been involved in between January 1, 1989 and December 31, 1991. Place a check mark next to each activity your establishment did actually participate in during that time. If participation was sponsored by a public utility or energy supplier check column (2). If participation was sponsored through your establishment, an energy services company, or another organization check column (3). Check each activity that applies. Note that it is possible to have check marks in both columns for the activities listed.

Part C – General Technologies – Lists technologies which could apply to any establishment no matter what they produce as an end product. Place a checkmark beside each technology listed that was used by your establishment. **Every establishment should complete Part C.**

Section VI – REMARKS

Please provide any explanations that may be helpful to us in understanding your reported data. Attach a separate sheet if necessary.

Section VII – CERTIFICATION

Period Covered By This Report – Enter the month, day, and year of the beginning and the end of the period covered by your report. If a calendar year report: "From January 1 to December 31, 1991,;" if a fiscal year, specify which (such as "From December 1, 1990 to November 30, 1991"). If a part-year report is submitted because the establishment was not in operation or under your company's control for the entire year, specify the actual period covered: for example "January 2, 1991 to August 15, 1991," or "June 1, 1991 to December 31, 1991."

INSTRUCTIONS FOR FORM EIA-846B
Petroleum Refineries
1991 MANUFACTURING ENERGY CONSUMPTION SURVEY

A. Who is Responsible for Conducting the Manufacturing Energy Consumption Survey?

The Manufacturing Energy Consumption Survey (MECS) was designed, and is being sponsored, by the Energy Information Administration (EIA) of the U.S. Department of Energy (DOE). The survey is administered and compiled by the U.S. Bureau of the Census for EIA. The survey is conducted every three years.

B. What is The Purpose of This Survey?

The MECS will collect data on energy consumption and usage patterns for the manufacturing sector of the U.S. economy. In addition, it will measure the short-term (within 30 days) capability of your establishment to substitute fuels in place of those actually consumed in 1991. The information obtained from the MECS forms will be used to publish aggregate statistics on the consumption of energy for fuel and nonfuel uses, energy characteristics of buildings in the manufacturing sector, energy consumption by end use, technologies currently in use by U.S. manufacturers, and on some energy-related issues such as energy prices, electricity generation onsite, fuel-switching capabilities, and participation in energy management programs. This information will be used by DOE to effectively implement actions identified in the National Energy Strategy as well as by utilities to assist in more accurate demand forecasts and resource planning.

C. Who Should Report?

This survey is **mandatory** under the Federal Energy Administration Act of 1974, P.L. 93-275, and under Title 3, Subtitle B of the Omnibus Budget Reconciliation Act of 1986, P.L. 99-509.

Form EIA-846B is addressed to establishments operating primarily in the Petroleum Refining Industry (SIC 2911) as defined by the 1987 Standard Industrial Classification Manual (SIC). Establishments operating in other manufacturing SIC classifications will complete similar MECS forms. If your establishment has received EIA-846B but is not a petroleum refinery, call the Census Bureau, Industry Division, at (301) 763-7066 to report this. Response by establishments included in the MECS sample selected for the survey and receiving the MECS survey form is required by law. Failure to respond may result in criminal fines, civil penalties, and other sanctions as provided by law. Government-owned establishments that are privately operated are NOT exempt from completing this survey.

D. How Is My Privacy Protected?

Under Section 9 of Title 13, U.S. Code, your report to the Census Bureau is **confidential**. It may be seen only by sworn Census Bureau employees and may be used only for statistical purposes. The law also provides that copies retained in your files are immune from legal process.

E. When Is The Report Due?

The questionnaire should be returned no later than the due date specified on the form. Please use the enclosed return envelope. If the envelope has been misplaced, return the completed questionnaire to:

Bureau of the Census
1201 East 10th Street
Jeffersonville, IN 47132-0001

F. How Is a Manufacturing Establishment Defined?

A manufacturing establishment is an economic unit at a single physical location where the mechanical or chemical transformation of materials or substances into new products is performed.

These operations are generally conducted in facilities described as plants, factories, or mills and characteristically use power-driven machines and material-handling equipment. Manufacturing also includes such activities as the assembly of components of manufactured products and the blending of materials such as lubricating oil, plastics, resins, or liquors.

An establishment is not necessarily identical to a business concern or firm, either of which may consist of one or more establishments. An establishment may consist of one or more units that are engaged in separate or distinct activities. These units may be separated physically as well as economically, with separate records or substantially accurate reports available for each. If this establishment has previously completed the Annual Survey of Manufactures (ASM), Form MA-1000, conducted by the U.S. Census Bureau, establishment boundaries should correspond to those used for the ASM. **Each unit should be treated as a separate establishment ONLY if that was the determination made for the ASM. Do not consolidate two ASM establishments into a single establishment for purposes of the MECS, or separate a single ASM establishment into two MECS establishments.** Match the 11-digit Census File Number (CFN) located on the MECS questionnaire mailing label with the CFN on the ASM mailing label. Responses to MECS questions should include the same activities as those considered when responding to the matching ASM. If this establishment has never completed an ASM, report for all activities that occur at this physical location.

Section I – NONCOMBUSTIBLE ENERGY SOURCES

Energy sources used in manufacturing can be divided into two groups: combustible (capable of being burned), and noncombustible (such as electricity, steam, and industrial hot water). The purpose of section I is to collect 1991 data for noncombustible energy sources.

Column 2 collects data that will provide information on the components of onsite electricity production, and permit an estimate to be made of the total consumption of electricity at your establishment. Column 3 collects data on the additional contribution that steam makes to the total consumption of energy at your establishment and column 4 collects data on hot water used as an energy source at this establishment site. **Leave all shaded areas blank, no entries are required in these areas.**

Electricity is to be reported in thousands of kilowatthours. Steam and industrial hot water are to be reported in millions of Btu. If you keep your records for steam in pounds, use a factor of 1,200 Btu per pound of steam to convert your data into Btu. Industrial hot water should be reported at 140 Btu per pound and 7.84 pounds per gallon. **If you have more accurate Btu conversion factors for your establishment, use them instead of the more general factors given here.**

SPECIFIC INSTRUCTIONS

Line 1a – Quantity Purchased From Utilities – Enter the quantity of each noncombustible energy source that was purchased from a utility and delivered to this establishment site in 1991, regardless of when payment was made. For purposes of this question, utilities are companies that produce and/or deliver electricity and/or natural gas, and are legally obligated to provide service to the general public within their franchise area. Utilities do not include such generators of electricity as independent power producers, small power producers, or cogenerators not located at this establishment site. **Include** quantities purchased for **ANY** onsite use, for example, production of heat and power, lighting or space conditioning the establishment, electrolysis processes, or steam cleaning.

CONTINUE ON PAGE 2

Exclude from line 1a all:

- quantities purchased from independent power producers, small power producers, or cogenerators not located at this establishment site.
- quantities delivered from other establishments in your company even if those quantities were repurchased from them by your establishment.
- quantities purchased and paid for by a central purchasing entity separate from this establishment.
- quantities for which payment was made in-kind.

Line 1b – Expenditures For Purchases From Utilities – Enter the total expenditures for the purchased quantities reported on line 1a. **Include** all expenditures regardless of when payment was actually made.

Line 2a – Quantity Purchased From Nonutilities – Enter the quantity of electricity and steam that was purchased from offsite nonutility power producers and delivered to this establishment site in 1991, regardless of when payment was made. **Include** quantities purchased for **ANY** onsite use, for example production of heat and power, lighting or space conditioning the establishment, electrolysis processes, or steam cleaning.

Exclude from line 2a all:

- quantities purchased from utilities (these should be included on line 1a).
- quantities delivered from other establishments in your company even if those quantities were repurchased from them by your establishment.
- quantities purchased and paid for by a central purchasing entity separate from this establishment.
- quantities for which payment was made in-kind.

Line 2b – Expenditures For Purchases From Nonutilities – Enter the total expenditures for the purchased quantities reported on line 2a. **Include** all expenditures regardless of when payment was actually made.

Line 3 – Other Quantities Received Onsite – Enter all additional quantities delivered to your establishment site in 1991 but not reported on lines 1a or 2a.

Include on line 3:

- quantities purchased and paid for by a central purchasing entity separate from this establishment.
- quantities transferred from another establishment of your company for which payment was not made.
- quantities delivered from another establishment of your company even if those quantities were repurchased from them by your establishment.
- quantities for which payment was made in-kind.

Line 4 – Total Quantities Received Onsite – Enter the sum of lines 1a, and 2a and 3 for electricity. **Copy this quantity to column 2 line 1 of Section III – Fuel Switching.**

Line 5 – Quantity Cogenerated – Enter the total quantity of electricity cogenerated at this establishment site from all energy sources during 1991. For purposes of this survey, cogeneration is defined as the production of electric energy and another form of useful energy (such as heat or steam) through the sequential use of energy. **Include** production from **ALL** cogeneration facilities located at this establishment site.

Line 6 – Quantity Generated from Renewables – Enter the total quantity of each noncombustible energy source generated onsite directly from solar power, wind power, hydropower, or geothermal sources.

Exclude any electricity produced as part of a cogeneration process; that is, electricity generated from geothermal steam before the steam itself is used. **Include** such quantities on line 5.

Line 7 – Other Generation – Enter the total quantity of electricity generated onsite by all other means not included on lines 5 and 6 above. For example, electricity generated by diesel generators should be reported here.

Line 8 – Total Onsite Generation – Enter the sum of lines 5, 6, and 7 for electricity.

Line 9 – Total Sales or Transfers to Utilities – Enter the total quantity of electricity sold or transferred by your establishment in 1991 to utilities. For purposes of this question, utilities are companies that produce and/or deliver electricity and/or natural gas, and are legally obligated to provide service to the general public within their franchise area. Utilities do not include such generators of electricity as independent power producers, small power producers, or cogenerators not located at this establishment site. **Include** quantities exchanged for the same or any other energy source(s).

Line 10 – Total Sales or Transfers to Nonutilities – Enter the total quantity of each noncombustible energy source sold or transferred in 1991 to establishments other than utilities. **Include** quantities exchanged for the same or any other energy source(s).

Line 11 – Total Electricity Sales and Transfers Offsite – Enter the sum of lines 9 (sales and transfers to utilities) and 10 (sales and transfers to nonutilities).

Line 12 – Total Onsite Consumption – For electricity, add the quantity on line 4 (total quantities received) to that on line 8 (total onsite generation), then subtract the quantity on line 11 (total sales and transfers offsite). Enter the remainder on line 12. This quantity represents the amount of electricity actually consumed at this establishment site in 1991. **Copy the column 2 (electricity) line 12 quantity to column 2 line 1 of Section IV – Estimated Percent Consumption by End Use.**

Line 13 – Nonutility Suppliers – If any electricity reported in column 2, line 3 was obtained by transfer from another establishment of your company, enter the name, address and telephone number of the supplying establishment. If you received transfers from more than one of this type of establishment, use the "Remarks" section to identify remaining suppliers.

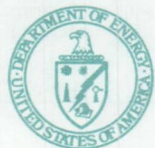
Section II – COMBUSTIBLE ENERGY SOURCES

Form EIA-846B is addressed to establishments that are either a petroleum refinery only, or a petroleum refinery and adjacent petrochemical plant that are identified as a single establishment for purposes of the ASM. For purposes of this survey, a refinery is an installation that manufactures finished petroleum products from crude oil, unfinished oils, natural gas liquids, other hydrocarbons, and alcohol. Processes used by a refinery include fractional distillation, cracking (both catalytic and hydrocracking), coking, reforming, alkylation, isomerization, polymerization, hydrotreating and sweetening. Products include, but are not limited to, unfinished oils, motor gasoline, aviation gasoline, special naphthas, kerosene, distillate fuel oil, residual fuel oil, lubricating oils, asphalt and road oil, waxes, petroleum coke, still gas and petrochemical feedstocks. A petrochemical operation produces substances by the chemical treatment of raw materials derived from petroleum or natural gas. Among the final products are plastics (including synthetic rubbers), synthetic fibers, chemicals, drugs, and detergents.

Prior to completing columns 4 through 10, determine from the criteria on the next page which of the preprinted energy sources should be included for reporting and which excluded.

Form **EIA-846C**
(2-10-92)

U.S. Department of Commerce
Bureau of the Census
Acting as Collecting and Compiling Agent For
UNITED STATES DEPARTMENT OF ENERGY
ENERGY INFORMATION ADMINISTRATION



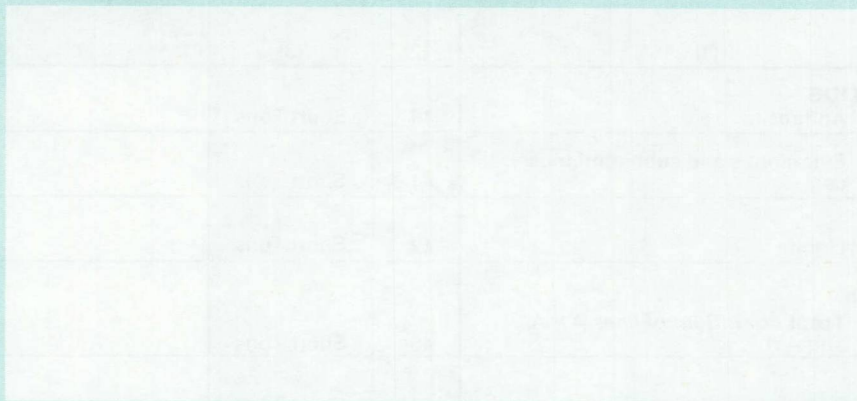
**Chemicals and Allied Products;
Lumber and Wood Products;
Paper and Allied Products;
Products of Petroleum and Coal; and
Selected Primary Metal Industries**

**1991
MANUFACTURING ENERGY
CONSUMPTION SURVEY**

NOTICE - This survey is **mandatory** under the Federal Energy Administration Act of 1974, Pub.L. No. 93-275, and under Title 3, Subtitle B, of the Omnibus Budget Reconciliation Act of 1986, Pub.L. No. 99-509. Failure to respond may result in criminal fines, civil penalties, and other sanctions as provided by law. The **confidentiality** of your response to this survey **is protected by law** (title 13, U.S. Code). Your response may be seen only by sworn Census employees and may be used only for statistical purposes. The law also provides that copies retained in your files are **immune from legal process**.

Public reporting burden for this collection of information is estimated to average 8 hours per response, including the time of reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Energy Information Administration, Office of Statistical Standards, EI-73, 1000 Independence Avenue, SW, Washington, DC 20585; and to the Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, DC 20503.

In correspondence pertaining to this report, please refer to this Census File Number (CFN).



Please correct errors in name, address, and ZIP Code. ENTER street and number if not shown.

PLEASE COMPLETE THIS FORM AND RETURN TO

BUREAU OF THE CENSUS
1201 East 10th Street
Jeffersonville, IN 47132-0001

NOTE

Please read the enclosed instructions before filling out this form. Complete each item. If you have any questions, call (301) 763-7066.

DUE DATE:

If you cannot file by the due date, a time extension request should be sent to the above address. Please include your 11-digit Census File Number (CFN).

Section I - NONCOMBUSTIBLE ENERGY SOURCES

Item Description (1)	Electricity (2)			Steam (3)			Industrial Hot Water (4)		
	10 Mil	Thou	kWh	11 Mil	Thou	Dol	12 Mil	Thou	Dol
1a. During 1991, what amount of each energy source was purchased by this establishment from utilities and delivered to this establishment site? (Do not include purchases by a central purchasing agent, quantities delivered from other establishments of your company, or quantities for which payment was made in-kind.)	01								
1b. What was the total expenditure for the purchased energy source(s) reported on line 1a?	02								
2a. During 1991, what amount of electricity and steam was purchased from nonutility suppliers by this establishment and delivered to this establishment site?	03								
2b. What was the total expenditure for the purchased energy source(s) reported on line 2a.?	04								
3. During 1991, what amount of each energy source was transferred from outside establishments and delivered to this establishment site? (DO NOT include the purchases reported in lines 1a and 2a. DO include quantities received from a central purchasing agent, quantities delivered from other establishments of your company, or quantities for which payment was made in-kind.)	05								
4. TOTAL QUANTITIES OF ELECTRICITY RECEIVED ONSITE (Sum of lines 1a, and 2a and 3.) NOTE - Copy this quantity for electricity to column 2, line 1 of Section III - FUEL SWITCHING.	06								
5. During 1991, how much electricity was generated on this establishment site by cogeneration? (Include ALL cogeneration facilities at this establishment site.)	07								
6. During 1991, how much of each energy source was generated onsite from solar power, wind power, hydropower, and geothermal sources?	08								
7. During 1991, how much electricity was generated onsite by processes other than those covered on lines 5 and 6?	09								
8. TOTAL ONSITE GENERATION OF ELECTRICITY. (Sum of lines 5, 6, and 7.)	10								
9. During 1991, how much electricity was sold or transferred to utilities?	11								
10. During 1991, how much of each energy source was sold or transferred to any establishments other than utilities?	12								
11. TOTAL ELECTRICITY SALES AND TRANSFERS OFFSITE (Line 9 plus line 10.)	13								
12. TOTAL ONSITE CONSUMPTION OF ELECTRICITY. (Line 4 plus line 8 minus line 11.) NOTE - Copy this quantity for electricity consumption to column 2, line 1 of Section IV, Estimated Percent Consumption by End Use.	14								
13. If line 3, column 2 has a nonzero entry, and any of your electricity suppliers was another establishment of your company, identify that establishment at right. If you received electricity transfers from more than one establishment of your company, provide their identifying information in the "Remarks" section.	Name of electricity supplier, if another establishment of your company								
	Address - Number and street								
15	City	State	ZIP Code	Phone - Area code and Number					
1									

Section II - COMBUSTIBLE ENERGY SOURCES

Energy Sources (1)	Census Use Only (2)	Units Used for Reporting Quantities (3)	Energy sources received onsite in 1991					
			Quantity purchased by and delivered to this establishment (4)	Total expenditures, including delivery charges, of the quantity in column (4) (5)			Quantity of other receipts (transfers in and central purchases) (6)	
				01	02	03		
				Mil	Thou	Dol		
A. SOLIDS								
1. Anthracite	40	Short Tons						
2. Bituminous and subbituminous coal	41	Short Tons						
3. Lignite	42	Short Tons						
4. Total coal (Sum of lines A1, A2, and A3)	46	Short Tons						
5. Breeze	44	Short Tons						
6. Coal coke	43	Short Tons						
7. Fluid catalytic cracking unit coke	77	Barrels						
8. Marketable petroleum coke - unrefined or green	78	Barrels						
9. Marketable petroleum coke - calcined	79	Barrels						
10. Roundwood (wood cut specifically for fuel use)	80	Million Btu						
11. Wood chips, bark, and wood waste	81	Million Btu						
12. Biomass (e.g., bagasse, rice hulls, peanut hulls)	90	Million Btu						
13. Waste materials/scrap (e.g., wastepaper, packing materials, etc.)	72	Million Btu						
14. Other solids (Specify) 9198	91	Million Btu						
B. GASES (exclude oxygen, nitrogen, and inert gases)								
1. Natural gas purchased directly from utilities	31	1,000 cu. ft.						
2. Natural gas purchased from transmission pipelines	32	1,000 cu. ft.						
3. Natural gas obtained from other sources such as brokers, producers, and onsite wells	33	1,000 cu. ft.						
4. Total natural gas (Sum of lines B1, B2, and B3)	30	1,000 cu. ft.						
5. Acetylene	64	Million Btu						
6. Blast furnace gas	60	Million Btu						
7. Coke oven gas	61	Million Btu						
8. Hydrogen	63	Million Btu						
9. Waste and byproduct gases (e.g., refinery gas, vent gas, plant gas, still gas)	62	Million Btu						
10. Other gases (Specify) 9398	93	Million Btu						
C. LIQUIDS (42 gallons = 1 Barrel)								
1. Butane as liquid petroleum gas (LPG) or natural gas liquids (NGL)	36	Gallons						
2. Ethane as liquid petroleum gas (LPG) or natural gas liquids (NGL)	37	Gallons						
3. Propane as liquid petroleum gas (LPG) or natural gas liquids (NGL)	38	Gallons						
4. Other (LPG) and (NGL) (e.g., butylene, ethylene, propylene, and mixtures)	39	Gallons						
5. Total (LPG) and (NGL) (Sum of lines C1, C2, C3, and C4)	24	Gallons						

Section II - COMBUSTIBLE ENERGY SOURCES - Continued

Energy sources produced onsite in 1991		Energy sources consumed onsite in 1991			Quantity shipped offsite to other establishments in 1991	Total design storage capacity located onsite as of 12/31/91	Census Use Only
Quantity produced onsite	Does the entry in column (7) represent the product or byproduct of another energy source consumed onsite?	Quantity consumed as a fuel	Quantity consumed for all nonfuel purposes				
04 (7)	05 (8)	06 (9)	07 (10)	08 (11)	09 (12)	(13)	
						40	
						41	
						42	
		<i>Copy to line 1 on pages 4 and 6 ↗</i>					46
	1 <input type="checkbox"/> Yes 2 <input type="checkbox"/> No					44	
	1 <input type="checkbox"/> Yes 2 <input type="checkbox"/> No					43	
						77	
	1 <input type="checkbox"/> Yes 2 <input type="checkbox"/> No					78	
	1 <input type="checkbox"/> Yes 2 <input type="checkbox"/> No					79	
						80	
						81	
						90	
						72	
	1 <input type="checkbox"/> Yes 2 <input type="checkbox"/> No					91	
						31	
						32	
						33	
		<i>Copy to line 1 on pages 5 and 6 ↗</i>					30
						64	
						60	
						61	
	1 <input type="checkbox"/> Yes 2 <input type="checkbox"/> No					63	
	1 <input type="checkbox"/> Yes 2 <input type="checkbox"/> No					62	
	1 <input type="checkbox"/> Yes 2 <input type="checkbox"/> No					93	
						36	
						37	
						38	
						39	
		<i>Copy to line 1 on pages 5 and 6 ↗</i>					24

Section II - COMBUSTIBLE ENERGY SOURCES - Continued from page 2

Energy Sources (1)	Census Use Only (2)	Units Used for Reporting Quantities (3)	Energy sources received onsite in 1991				
			Quantity purchased by and delivered to this establishment (4)	Total expenditures, including delivery charges, of the quantity in column (4) (5)			Quantity of other receipts (transfers in and central purchases) (6)
				02 Mil	Thou	Dol	
C. LIQUIDS - Continued							
6. Diesel fuel	28	Barrels					
7. Distillate fuel oil (numbers 1, 2, and 4 fuel oils - exclude diesel fuel reported on line C6 above)	29	Barrels					
8. Total diesel fuel and distillate fuel oil (Sum of lines C6 and C7)	22	Barrels					
9. Kerosene	27	Barrels					
10. Motor gasoline	23	Gallons					
11. Pulping or black liquor	73	Million Btu					
12. Residual fuel oil (numbers 5, 6, Navy Special, and Bunker C)	21	Barrels					
13. Waste oils and tars	71	Million Btu					
14. Other liquids (Specify)	9598						
	95	Million Btu					

Section III - FUEL SWITCHING CAPABILITY

Item Description (1)	10 (2)	46 (3)
1. Quantity Consumed - Copy the total electricity receipts from line 4 of section I, and the TOTAL quantities of coal products, natural gas, distillate fuel oil and diesel fuel, LPG and NGL, and residual fuel oil consumed onsite as a fuel from column (9) of section II.	1,000 Kilowatthours	Short Tons
Now answer lines 2 and 3 as appropriate for the columns with nonzero entries in line 1. Don't consider differences in energy prices when estimating amounts.	1,000 Kilowatthours	Short Tons
2. Quantity Nonswitchable - Enter the amount of the quantity in line 1 that could NOT have been replaced within 30 days by another energy source in 1991.		
3. Quantity Switchable - Subtract line 2 from line 1 and enter the results. This represents the total quantity of energy consumption that COULD HAVE BEEN replaced within 30 days by one or more alternative energy sources in 1991.	1,000 Kilowatthours	Short Tons
Now answer lines 4 through 11 as appropriate for the columns with nonzero entries in line 3. Complete one column before starting another.		Short Tons
4. Of the amount shown in line 3, what is the maximum amount that could have been replaced by electricity?		
5. Of the amount shown in line 3, what is the maximum amount that could have been replaced by coal (excluding coal coke and breeze)?	1,000 Kilowatthours	
6. Of the amount shown in line 3, what is the maximum amount that could have been replaced by coal coke and breeze (excluding coal included in line 5 above)?	1,000 Kilowatthours	
7. Of the amount shown in line 3, what is the maximum amount that could have been replaced by natural gas from any supplier(s)?	1,000 Kilowatthours	Short Tons
8. Of the amount shown in line 3, what is the maximum amount that could have been replaced by total distillate fuel oil and diesel fuel?	1,000 Kilowatthours	Short Tons
9. Of the amount shown in line 3, what is the maximum amount that could have been replaced by total LPG and NGL?	1,000 Kilowatthours	Short Tons
10. Of the amount shown in line 3, what is the maximum amount that could have been replaced by residual fuel oil?	1,000 Kilowatthours	Short Tons
11. Of the amount shown in line 3, what is the maximum amount that could have been replaced by any other energy source? Specify the energy source.	1,000 Kilowatthours	Short Tons

Section II - COMBUSTIBLE ENERGY SOURCES - Continued from page 3

Energy sources produced onsite in 1991			Energy sources consumed onsite in 1991			Quantity shipped offsite to other establishments in 1991	Total design storage capacity located onsite as of 12/31/91	Census Use Only
Quantity produced onsite	Does the entry in column (7) represent the product or byproduct of another energy source consumed onsite?	Quantity consumed as a fuel	Quantity consumed for all nonfuel purposes	Quantity shipped offsite to other establishments in 1991	Total design storage capacity located onsite as of 12/31/91			
04 (7)	05 (8)	06 (9)	07 (10)	08 (11)	09 (12)	(13)		
						28		
						29		
		Copy to line 1 below & on page 6 ↗				22		
	1 <input type="checkbox"/> Yes 2 <input type="checkbox"/> No					27		
						23		
						73		
		Copy to line 1 below & on page 6 ↗				21		
	1 <input type="checkbox"/> Yes 2 <input type="checkbox"/> No					71		
						95		

Section III - FUEL SWITCHING CAPABILITY - Continued

Total Natural Gas	Total Distillate Fuel Oil and Diesel Fuel	Total LPG and NGL	Residual Fuel Oil
30 (4)	22 (5)	24 (6)	21 (7)
1,000 cu. ft.	Barrels	Gallons	Barrels
1,000 cu. ft.	Barrels	Gallons	Barrels
1,000 cu. ft.	Barrels	Gallons	Barrels
1,000 cu. ft.	Barrels	Gallons	Barrels
1,000 cu. ft.	Barrels	Gallons	Barrels
1,000 cu. ft.	Barrels	Gallons	Barrels
1,000 cu. ft.	Barrels	Gallons	Barrels
1,000 cu. ft.	Barrels	Gallons	Barrels
1,000 cu. ft.	Barrels	Gallons	Barrels
1,000 cu. ft.	Barrels	Gallons	Barrels
1,000 cu. ft.	Barrels	Gallons	Barrels
1,000 cu. ft.	Barrels	Gallons	Barrels
1,000 cu. ft.	Barrels	Gallons	Barrels
1,000 cu. ft.	Barrels	Gallons	Barrels

Section IV - ESTIMATED PERCENT CONSUMPTION BY END USE

Reasonable Approximations are Acceptable - See Instructions

Energy sources can be consumed either directly, in equipment such as motors, furnaces, kilns, etc., or indirectly through conversion to steam and hot water in a boiler. **All indirect use of energy sources listed below are represented by the single percent entry for boiler fuel.** The remaining categories are to split out direct use of energy. Thus, the percentages entered for boiler fuel and all direct uses should sum to 100 percent.

End uses (1)	Total Electricity Consumption		Total Coal Excluding Coal Coke and Breeze		Total Natural Gas		Total Distillate Fuel Oil and Diesel Fuel		Total LPG and NGL		Residual Fuel Oil	
	10	(2)	46	(3)	30	(4)	22	(5)	24	(6)	21	(7)
1. Copy Section I line 12 column (2) quantity for electricity to column (2). Copy Section II column (9) quantities for the energy sources in columns (3) through (7)	70	1,000 kWh		Short Tons		1,000 cu. ft.		Barrels		Gallons		Barrels
2. For the columns with nonzero entries in line 1, report the approximate percentage of each energy source used for the following purposes: (Complete one column before starting another.)												
A. BOILERS												
1. Boiler fuel	71	%		%		%		%		%		%
B. DIRECT PROCESS USES												
1. Process heating (e.g., kilns, furnaces, ovens)	72	%		%		%		%		%		%
2. Process cooling and refrigeration	73	%		%		%		%		%		%
3. Machine drive (e.g., motors, pumps, etc. associated with manufacturing process equipment)	74	%		%		%		%		%		%
4. Electro-chemical processes	75	%										
5. Other (Please specify any other uses of energy in the "Remarks" portion of the questionnaire.)	76	%		%		%		%		%		%
C. DIRECT NON-PROCESS USES												
1. Facility heating, ventilation, and air conditioning	77	%		%		%		%		%		%
2. Facility lighting	78	%										
3. Facility support other than C1 and C2 above (e.g., cooking, water heating, office equipment)	79	%		%		%		%		%		%
4. Onsite transportation	80	%				%		%		%		
5. Conventional electricity generation	81			%		%		%		%		%
6. Other (Please specify any other uses of energy in the "Remarks" portion of the questionnaire.)	82	%		%		%		%		%		%
TOTAL for all purposes		100%		100%		100%		100%		100%		100%

Section V - ESTABLISHMENT CHECKLIST

NOTE

This section is divided into six parts. **All establishments are to complete Parts A, B, and C.** If the first two digits of your establishment's four-digit SIC code are "26" (paper and allied products) also complete Part D. If the first two digits of your establishment's SIC code are "28" (chemicals and allied products) complete Part E after Part C. If the first two digits of your establishment's four-digit SIC code are "33" (primary metal industries) complete Part F after Part C. Your four-digit SIC code is included as part of the address mailing label on the first page of your questionnaire.

Part A. Estimated Square Footage of Buildings

1. What was the **approximate** total enclosed square footage of the buildings located on this establishment site as of December 31, 1991? *Mark (X) the box next to the category which best describes this square footage.*

- | | | |
|------|---|---|
| 1301 | 1 <input type="checkbox"/> 25,000 square feet or less | 6 <input type="checkbox"/> 750,001 to 1 million square feet |
| | 2 <input type="checkbox"/> 25,001 to 100,000 square feet | 7 <input type="checkbox"/> 1,000,001 to 5 million square feet |
| | 3 <input type="checkbox"/> 100,001 to 200,000 square feet | 8 <input type="checkbox"/> 5,000,001 to 10 million square feet |
| | 4 <input type="checkbox"/> 200,001 to 500,000 square feet | 9 <input type="checkbox"/> 10,000,001 to 25 million square feet |
| | 5 <input type="checkbox"/> 500,001 to 750,000 square feet | 10 <input type="checkbox"/> Over 25 million square feet |
| | | 11 <input type="checkbox"/> Don't know |

2. Of the square footage indicated above, **approximately** what percent had controlled heating or cooling, using equipment designed to modify the internal building temperature, during 1991? *Mark (X) the box next to the category which best describes this percentage.*

- | | | |
|------|---------------------------------------|---------------------------------------|
| 1302 | 1 <input type="checkbox"/> All (100%) | 4 <input type="checkbox"/> About 25% |
| | 2 <input type="checkbox"/> About 75% | 5 <input type="checkbox"/> None |
| | 3 <input type="checkbox"/> About 50% | 6 <input type="checkbox"/> Don't Know |

Part B. Energy Management Activities

1. Was your establishment involved in any formal programs (company, utility, or third-party sponsored) at any time between January 1, 1989 and December 31, 1991 that were specifically targeted and designed to improve energy efficiency, reduce energy costs, or promote the use of a different energy source?

- | | | |
|------|--------------------------------|--------------------------|
| 1303 | 1 <input type="checkbox"/> Yes | } Proceed to Question 2. |
| | 2 <input type="checkbox"/> No | |

2. Did your electric or natural gas utility sponsor programs designed to lower/adjust your energy consumption or costs, timing, or promote the use of a different energy source (i.e., a Demand Side Management (DSM) program) at any time between January 1, 1989 and December 31, 1991? *(Mark (X) one.) If the answer to this question is "Yes", proceed to Question 3. If the answer is not "Yes", proceed to the instructions before Question 4.*

- | | | |
|------|--------------------------------|--|
| 1304 | 1 <input type="checkbox"/> Yes | 3 <input type="checkbox"/> Establishment did not purchase electricity or natural gas from a utility. |
| | 2 <input type="checkbox"/> No | 4 <input type="checkbox"/> Don't Know |

3. If you answered "Yes" to Question 2, did your establishment participate in a utility sponsored program at any time between January 1, 1989 and December 31, 1991?

- | | | |
|------|--------------------------------|-------------------------------|
| 1305 | 1 <input type="checkbox"/> Yes | 2 <input type="checkbox"/> No |
|------|--------------------------------|-------------------------------|

NOTE If you answered "Yes" to either Question 1 or Question 3, proceed to Question 4. If you answered "No" to both Question 1 and Question 3, proceed to Part C - General Technologies Checklist, on page 8.

4. In what type(s) of energy efficiency activity(ies) was your establishment involved between January 1, 1989 and December 31, 1991? *(Mark (X) all that apply. Note that it is possible to have marks in both columns for any or all of the activities listed.)*

Energy Efficiency Activities (1)	Utility/Supplier Sponsored Involvement (2)	Involvement Through Own or Other (3rd Party) Sponsorship (3)
a. Energy audits	1306 1 <input type="checkbox"/>	1307 1 <input type="checkbox"/>
b. Direct electricity load control	1308 1 <input type="checkbox"/>	1309 1 <input type="checkbox"/>
c. Special rate schedule (e.g., interruptible or time-of-use)	1310 1 <input type="checkbox"/>	1311 1 <input type="checkbox"/>
d. Equipment installation or retrofit for the primary purpose of improving energy efficiency affecting:		
(1) Steam production (e.g., boilers, nozzles)	1312 1 <input type="checkbox"/>	1313 1 <input type="checkbox"/>
(2) Direct/indirect process heating	1314 1 <input type="checkbox"/>	1315 1 <input type="checkbox"/>
(3) Direct process cooling, refrigeration	1316 1 <input type="checkbox"/>	1317 1 <input type="checkbox"/>
(4) Direct machine drive (e.g., adjustable speed drives, motors, pumps)	1318 1 <input type="checkbox"/>	1319 1 <input type="checkbox"/>
(5) Facility heating, ventilation and air conditioning	1320 1 <input type="checkbox"/>	1321 1 <input type="checkbox"/>
(6) Facility lighting	1322 1 <input type="checkbox"/>	1323 1 <input type="checkbox"/>
e. Equipment retrofit or installation for the primary purpose of using a different energy source (e.g., electrification). <i>Exclude modifications made principally for energy efficiency</i>	1324 1 <input type="checkbox"/>	1325 1 <input type="checkbox"/>
f. Standby generation program	1326 1 <input type="checkbox"/>	1327 1 <input type="checkbox"/>
g. Equipment rebates	1328 1 <input type="checkbox"/>	1329 1 <input type="checkbox"/>
h. Other (Specify) <input checked="" type="checkbox"/>		
(1)	1330 1 <input type="checkbox"/>	1331 1 <input type="checkbox"/>
(2)	1332 1 <input type="checkbox"/>	1333 1 <input type="checkbox"/>
	1398	1399

Section V - ESTABLISHMENT CHECKLIST - Continued

All establishments should complete Part C. Mark (X) the box next to each technology that was in place at your establishment during 1991. Mark (X) all technologies that apply. If your establishment has a two-digit SIC code other than 26, 28, or 33, proceed to Section VI - Remarks. Establishments in SIC 26 should complete Part D - Technology Checklist for Paper and Allied Products, establishments in SIC 28 should complete Part E - Technology Checklist for Chemicals and Allied Products, and establishments in SIC 33 should complete Part F - Technology Checklist for Primary Metal Industries before proceeding to Section VI.

Part C. - General Technologies

- 1401 Computer control of building environment (e.g., space heating or cooling equipment, lights)
- 1402 Computer control of processes or major energy-using equipment (e.g., boilers, furnaces, conveyers) used in the manufacturing process
- 1403 Waste heat recovery
- 1404 Adjustable-speed motors

Part D. - SIC 26 Paper and Allied Products

- 1436 Continuous digesters
- 1437 Displacement bleaching process
- 1438 Top-wire (hybrid) paper forming
- 1439 Extended nip press
- 1440 Higher nip pressures
- 1441 Extended Deliquification displacement heating processes
- 1442 Multi-effect falling-film evaporators for black liquor evaporation and concentration
- 1443 Vapor recompression evaporation of black liquor
- 1444 Waste-heat recovery technologies in lime kilns
- 1445 Improved filtration techniques allowing flexibility in the selection of fuel other than natural gas and distillate fuel oil for lime calcination.

Part E. - SIC 28 Chemicals and Allied Products

- 1446 Replacement of electrically heated platens in the thermoset molding process with a gas-fired central thermal fluid system.
- 1447 Processing residuals as alternative feedstocks
- 1448 Biomass materials (e.g., lignocellulosics, food crops, food wastes) used as alternative feedstocks
- 1449 Bioprocessing of petroleum, natural gas, coal or other fossil-based feedstocks

Innovative processing and separations that; (1) Substitute use of fossil-based feedstocks with biomass materials, (2) Increase overall process efficiency, or (3) Reduce environmental impacts and waste processing, such as:

- 1450 Direct microbial
- 1451 Bioprocessing
- 1452 Gasification of biomass feedstocks
- 1453 Fast pyrolysis of biomass feedstocks
- 1454 Immobilized enzyme processes
- 1455 Innovative catalytic processes
- 1456 Recycling of materials
- 1457 Hydrolysis of biomass materials
- 1458 Enhanced bioprocessing with genetically engineered feedstocks or organisms
- 1459 Fermentation
- 1460 Fractionation of biomass
- 1461 Distillation process improvements
- 1462 Hydrocarbon cracking enhancements

Part F. - SIC 33 Primary Metal Industries

- 1463 Dry quenching during the coking process
- 1464 External desulfurization of the charge for ironmaking
- 1465 Hydrocarbon injection to maintain blast furnace temperatures
- 1466 Direct reduction ironmaking - sponge iron produced directly from iron ore
- 1467 Continuous casting
- 1468 Thin slab/strip casting
- 1469 Waste heat boilers/heat exchangers in combination with reheat furnaces
- 1470 Evaporative cooling of skid rails
- 1471 Electric induction reheat furnaces
- 1472 Hot charging - moving steel directly from the caster to the reheat furnace
- 1473 Direct rolling required no reheating
- 1474 Plasmasmelt smelting of partially reduced iron powder with pulverized coal
- 1475 Cold bonding (COBO) pelletizing technique
- 1476 Preheating combustion air
- 1477 Preheating raw materials
- 1478 Top gas pressure recovery from the blast furnace
- 1479 Slab heat recovery
- 1480 Continuous annealing
- 1481 Continuous cold rolling
- 1482 Bottom tap vessels
- 1483 Injection steelmaking
- 1484 Electroslag remelting
- 1485 Vacuum arc remelting
- 1486 Oxygen injection to blast furnace
- 1487 Coal injection to blast furnace
- 1488 Steel ladle metallurgy with reheat furnace

Section VI - REMARKS

Please use this space or attach a separate sheet for any explanations that may be essential in understanding your reported data. Be sure to include the name, address, and telephone number of power generating establishments of your company that transferred or delivered electricity or steam to your establishment in 1991 if you did not have enough room in Section I.

1599

Section VII - CERTIFICATION

Name of person to contact regarding this report - <i>Print or type</i>				Telephone number Area code Number () ()			
Address - Number and street			City		State	9-digit ZIP Code	
Period covered by this report:		Month	Day	Year	Month	Day	Year
From:				To:			
Signature of authorized person							

INSTRUCTIONS FOR FORM EIA-846C

Chemicals and Allied Products; Lumber and Wood Products; Paper and Allied Products;
Products of Petroleum and Coal; and Selected Primary Metal Industries

1991 MANUFACTURING ENERGY CONSUMPTION SURVEY

A. Who is Responsible for Conducting the Manufacturing Energy Consumption Survey?

The Manufacturing Energy Consumption Survey (MECS) was designed, and is being sponsored, by the Energy Information Administration (EIA) of the U.S. Department of Energy (DOE). The survey is administered and compiled by the U.S. Bureau of the Census for EIA. The survey is conducted every three years.

B. What is The Purpose of This Survey?

The MECS will collect data on energy consumption and usage patterns for the manufacturing sector of the U.S. economy. In addition, it will measure the short-term (within 30 days) capability of your establishment to substitute fuels in place of those actually consumed in 1991. The information obtained from the MECS forms will be used to publish aggregate statistics on the consumption of energy for fuel and nonfuel uses, energy characteristics of buildings in the manufacturing sector, energy consumption by end use, technologies currently in use by U.S. manufacturers, and on some energy-related issues such as energy prices, electricity generation onsite, fuel-switching capabilities, and participation in energy management programs. This information will be used by DOE to effectively implement actions identified in the National Energy Strategy as well as by utilities to assist in more accurate demand forecasts and resource planning.

C. Who Should Report?

This survey is **mandatory** under the Federal Energy Administration Act of 1974, P.L. 93-275, and under Title 3, Subtitle B of the Omnibus Budget Reconciliation Act of 1986, P.L. 99-509.

Form EIA-846C is addressed to establishments operating primarily in SIC 24, 26, 28, 29 (excluding SIC 2911) 3312, 3321, 3331, and 3339 as defined by the 1987 Standard Industrial Classification Manual (SIC). Manufacturing establishments operating in other SIC classifications will complete similar MECS forms. Response by establishments included in the MECS sample selected for the survey and receiving the MECS survey form is required by law. Failure to respond may result in criminal fines, civil penalties, and other sanctions as provided by law. Government-owned establishments that are privately operated are not exempt from completing this survey.

D. How Is My Privacy Protected?

Under Section 9 of Title 13, U.S. Code, your report to the Census Bureau is **confidential**. It may be seen only by sworn Census Bureau employees and may be used only for statistical purposes. The law also provides that copies retained in your files are immune from legal process.

E. When Is The Report Due?

The questionnaire should be returned no later than the due date specified on the form. Please use the enclosed return envelope. If the envelope has been misplaced, return the completed questionnaire to:

Bureau of the Census
1201 East 10th Street
Jeffersonville, IN 47132-0001

F. How Is a Manufacturing Establishment Defined?

A manufacturing establishment is an economic unit at a single physical location where the mechanical or chemical transformation of materials or substances into new products is performed. These operations are generally conducted in facilities described as plants, factories, or mills and characteristically use power-driven machines and material-handling equipment.

Manufacturing also includes such activities as the assembly of components of manufactured products and the blending of materials such as lubricating oil, plastics, resins, or liquors.

An establishment is not necessarily identical to a business concern or firm, either of which may consist of one or more establishments. An establishment may consist of one or more units that are engaged in separate or distinct activities. These units may be separated physically as well as economically, with separate records or substantially accurate reports available for each. If this establishment has previously completed the Annual Survey of Manufactures (ASM), Form MA-1000, conducted by the U.S. Census Bureau, establishment boundaries should correspond to those used for the ASM. **Each unit should be treated as a separate establishment ONLY if that was the determination made for the ASM. Do not consolidate two ASM establishments into a single establishment for purposes of the MECS, or separate a single ASM establishment into two MECS establishments.** Match the 11-digit Census File Number (CFN) located on the MECS questionnaire mailing label with the CFN on the ASM mailing label. Responses to MECS questions should include the same activities as those considered when responding to the matching ASM. If this establishment has never completed an ASM, report for all activities that occur at this physical location.

Section I - NONCOMBUSTIBLE ENERGY SOURCES

Energy sources used in manufacturing can be divided into two groups: combustible (capable of being burned), and noncombustible (such as electricity, steam, and industrial hot water). The purpose of section I is to collect 1991 data for noncombustible energy sources.

Column 2 collects data that will provide information on the components of onsite electricity production, and permit an estimate to be made of the total consumption of electricity at your establishment. Column 3 collects data on the additional contribution that steam makes to the total consumption of energy at your establishment through net transfers and steam generated onsite by renewable energy sources. Column 4 collects data on hot water used as an energy source at this establishment site. **Leave all shaded areas blank, no entries are required in these areas.**

Electricity is to be reported in thousands of kilowatthours. Steam and industrial hot water are to be reported in millions of Btu. If you keep your records for steam in pounds, use a factor of 1,200 Btu per pound of steam to convert your data into Btu. Industrial hot water should be reported at 140 Btu per pound and 7.84 pounds per gallon. **If you have more accurate Btu conversion factors for your establishment, use them instead of the more general factors given here.**

SPECIFIC INSTRUCTIONS

Line 1a - Quantity Purchased From Utilities - Enter the quantity of each noncombustible energy source that was purchased from a utility and delivered to this establishment site in 1991, regardless of when payment was made. For purposes of this question, utilities are companies that produce and/or deliver electricity and/or natural gas, and are legally obligated to provide service to the general public within their franchise area. Utilities do not include such generators of electricity as independent power producers, small power producers, or cogenerators not located at this establishment site. **Include** quantities purchased for **ANY** onsite use, for example, production of heat and power, lighting or space conditioning the establishment, electrolysis processes, or steam cleaning.

CONTINUE ON PAGE 2

Exclude from line 1a all:

- quantities purchased from independent power producers, small power producers, or cogenerators not located at this establishment site.
- quantities delivered from other establishments in your company even if those quantities were repurchased from them by your establishment.
- quantities purchased and paid for by a central purchasing entity separate from this establishment.
- quantities for which payment was made in-kind.

Line 1b – Expenditures For Purchases From Utilities – Enter the total expenditures for the purchased quantities reported on line 1a. **Include** all expenditures regardless of when payment was actually made.

Line 2a – Quantity Purchased From Nonutilities – Enter the quantity of electricity and steam that was purchased from offsite nonutility power producers and delivered to this establishment site in 1991, regardless of when payment was made. **Include** quantities purchased for **ANY** onsite use, for example production of heat and power, lighting or space conditioning the establishment, electrolysis processes, or steam cleaning.

Exclude from line 2a all:

- quantities purchased from utilities (these should be included on line 1a).
- quantities delivered from other establishments in your company even if those quantities were repurchased from them by your establishment.
- quantities purchased and paid for by a central purchasing entity separate from this establishment.
- quantities for which payment was made in-kind.

Line 2b – Expenditures For Purchases From Nonutilities – Enter the total expenditures for the purchased quantities reported on line 2a. **Include** all expenditures regardless of when payment was actually made.

Line 3 – Other Quantities Received Onsite – Enter all additional quantities delivered to your establishment site in 1991 but not reported on lines 1a or 2a.

Include on line 3:

- quantities purchased and paid for by a central purchasing entity separate from this establishment.
- quantities transferred from another establishment of your company for which payment was not made.
- quantities delivered from another establishment of your company even if those quantities were repurchased from them by your establishment.
- quantities for which payment was made in-kind.

Line 4 – Total Quantities Received Onsite – Enter the sum of lines 1a, and 2a and 3 for electricity. **Copy this quantity to column 2 line 1 of Section III – Fuel Switching.**

Line 5 – Quantity Cogenerated – Enter the total quantity of electricity cogenerated at this establishment site from all energy sources during 1991. For purposes of this survey, cogeneration is defined as the production of electric energy and another form of useful energy (such as heat or steam) through the sequential use of energy. **Include** production from **ALL** cogeneration facilities located at this establishment site.

Line 6 – Quantity Generated from Renewables – Enter the total quantity of each noncombustible energy source generated onsite directly from solar power, wind power, hydropower, or geothermal sources.

Exclude from line 6 any electricity produced as part of a cogeneration process; that is, electricity generated from geothermal steam before the steam itself is used. **Include** such quantities on line 5.

Line 7 – Other Generation – Enter the total quantity of electricity generated onsite by all other means not included on lines 5 and 6 above. For example, electricity generated by diesel generators should be reported here.

Line 8 – Total Onsite Generation – Enter the sum of lines 5, 6, and 7 for electricity.

Line 9 – Total Sales or Transfers to Utilities – Enter the total quantity of electricity sold or transferred by your establishment in 1991 to utilities. For purposes of this question, utilities are companies that produce and/or deliver electricity and/or natural gas, and are legally obligated to provide service to the general public within their franchise area. Utilities do not include such generators of electricity as independent power producers, small power producers, or cogenerators not located at this establishment site. **Include** quantities exchanged for the same or any other energy source(s).

Line 10 – Total Sales or Transfers to Nonutilities – Enter the total quantity of each noncombustible energy source sold or transferred in 1991 to establishments other than utilities. **Include** quantities exchanged for the same or any other energy source(s).

Line 11 – Total Electricity Sales and Transfers Offsite – Enter the sum of lines 9 (sales and transfers to utilities) and 10 (sales and transfers to nonutilities).

Line 12 – Total Onsite Consumption – For electricity, add the quantity on line 4 (total quantities received) to that on line 8 (total onsite generation), then subtract the quantity on line 11 (total sales and transfers offsite). Enter the remainder on line 12. This quantity represents the amount of electricity actually consumed at this establishment site in 1991. **Copy the column 2 (electricity) line 12 quantity to column 2 line 1 of Section IV – Estimated Percent Consumption by End Use.**

Line 13 – Nonutility Suppliers – If any electricity reported in column 2, line 3 was obtained by transfer from another establishment **of your company**, enter the name, address and telephone number of the supplying establishment. If you received transfers from more than one of this type of establishment, use the "Remarks" section to identify remaining suppliers.

Section II – COMBUSTIBLE ENERGY SOURCES

Column 1 – Energy Sources to be Reported – Thirty-one energy sources have been preprinted in column 1, separated into the general categories of solids (A), gases (B), and liquids (C). Prior to completing columns 4 through 12, determine from the criteria below which of the preprinted energy sources should be included for reporting and which excluded.

First, **INCLUDE** all preprinted energy sources that were –

1. consumed as a fuel(that is for heat, power or electricity generation), **or**
2. consumed as a nonfuel (e.g., feedstock), **or**
3. shipped from this establishment site during 1991.

Next, if your establishment consumed for any purpose or shipped offsite any energy sources that are not included in the preprinted list, add those energy sources under the "Other" heading for solids, gases or liquids. NOTE: In making additional entries, the preprinted entry "Waste and Byproduct Gases" includes all waste gas streams (for example, refinery gas, fuel gas, vent gas, offgas, still gas, and other waste gases) produced onsite except hydrogen.

Finally, if your **only** means of supply of an energy source during 1991 was as a byproduct of energy source inputs to any of your manufacturing processes, it should be included only if it was at least partially **consumed onsite as a fuel or shipped offsite**. If the byproduct energy source was not consumed as a fuel or shipped offsite it should be excluded. All excluded energy sources should be lined out, and no entries should be made in columns 4 through 12.

Example 1 – Coal is received onsite and converted into coke which is then shipped offsite. Complete columns 4 through 12 for coal and coke. Report the quantity of coal consumed as a feedstock in column 10 (nonfuel consumption), the quantity of coke produced onsite in column 7, and the quantity of coke shipped offsite in column 11 (shipments offsite).

Example 2a – Residual fuel oil is consumed as a fuel producing waste oils and tars through incomplete combustion. Report all consumption of waste oils and tar if at least part of that consumption was as a fuel. Column 11 (shipments offsite) does not require an entry for waste oils and tars.

Example 2b – If a portion of the waste oils and tars were consumed and a portion shipped offsite, report the entire quantity produced in column 7 (onsite production), and the portion consumed as a fuel in column 9 (fuel consumption).

Example 3 – Butane is used as a feedstock to produce butylene onsite. The butylene is then used as a feedstock to produce butadiene which is shipped offsite. Report the butane in column 10. Butylene would not be reported in column 10 because it is not used as a fuel or shipped offsite. Butadiene would not be reported in column 11 because it is not an identified energy source.

Complete columns 4 through 12 for all energy sources that were not excluded by the above procedures. Entries should be made in accordance with the specific instructions for these columns.

Leave all shaded areas blank, no entries are required in these areas.

Column 3 – Reporting Units – Use the indicated units for reporting all quantities. For those establishments that keep records in Btu, note that volume measures should be reported as actual physical quantities, rather than adjusted to represent a standard energy content. One barrel contains 42 gallons. A ton weighs 2,240 pounds and a short ton weighs 2,000 pounds.

The following list of Btu conversion factors should be used **only** if you do not know the actual Btu factor of the fuels consumed at your establishment site.

Acetylene	21,600 Btu/lb 1,500 Btu/cubic foot
Bagasse	4,081 Btu/ton
Biomass	5,300 Btu/ton
Breeze	19.8 million Btu/short ton
Butane	21,308 Btu/lb
Butylene	20,787 Btu/lb
Coal Coke	24.8 million Btu/short ton
Distillate fuel oil	5.825 million Btu/barrel
Ethane	22,320 Btu/lb
Ethylene	21,644 Btu/lb
Hydrogen	61,084 Btu/lb 32,511 Btu/cubic foot 35,600 Btu/gallon
Isobutane	21,257 Btu/lb

Natural gas	1.029 million Btu/1,000 cu. ft. 10.29 therms/1,000 cu. ft.
Petroleum coke	6.024 million Btu/barrel 30.12 million Btu/short ton
Propane	21,661 Btu/lb
Propylene	21,041 Btu/lb
Pulping or black liquor	11 million Btu/ton
Residual fuel oil	6.287 million Btu/barrel
Roundwood	21.5 million Btu/cord 17.2 million Btu/short ton 0.014 million Btu/board foot
Still gas	6 million Btu/barrel 1,029 Btu/cubic foot
Waste materials (wastepaper)	7,500 Btu/lb
Waste oils and tars	6 million Btu/barrel
Wood waste (50% moisture)	9 million Btu/short ton
Green wood chips (50% moisture)	10 million Btu/short ton
Sawdust (7% moisture)	8,000 Btu/lb

NOTE: If your establishment uses more precise conversion values for your operations, use them in place of the approximations given above. Be sure to identify the conversion factor(s) used if different from those listed above in the "Remarks" section.

Column 4 – Quantity Purchased – Enter the quantity of each energy source that was purchased and delivered to this establishment site in 1991, regardless of when payment was made. **Include** quantities of those energy sources that were purchased for **ANY** onsite use, for example, the production of heat or power, building heating/cooling, electrolysis processes, steam cleaning, or as raw material input to any manufacturing operation (feedstock).

Exclude from column 4 all:

- quantities delivered from another establishment in your company even if those quantities were repurchased from them by your establishment.
- quantities purchased and paid for by a central purchasing entity separate from this establishment.
- quantities for which payment was made in-kind.

Column 5 – Expenditures – Enter the total expenditures for each of the purchased quantities reported in column 4. **Include** all expenditures regardless of when payment was made. Leave all shaded areas blank.

Column 6 – Other Receipts – For each included energy source, enter all additional quantities delivered to your establishment site in 1991 but not reported in column 4. Leave all shaded areas blank.

Include in column 6:

- quantities purchased and paid for by a central purchasing entity separate from this establishment.
- quantities transferred from another establishment of your company for which payment was not made.
- quantities delivered from another establishment of your company even if these quantities were repurchased from them by your establishment.
- quantities for which payment was made in-kind.

Question 1 – Indicate by checking the appropriate box whether or not your establishment was involved in any formal program(s) between January 1, 1989 and December 31, 1991 that was designed to improve overall energy efficiency, reduce energy costs, or promote the use of an alternative energy source. Formal programs include such things as official company policies designed specifically to minimize energy use, and programs sponsored by utilities or third parties.

Question 2 – Indicate by checking the appropriate box whether or not the electric or natural gas utility from which your establishment purchased energy between January 1, 1989 and December 31, 1991 sponsored programs designed to lower/adjust energy consumption or costs or promote the use of a different energy source.

Question 3 – If the answer to question 2 above is "Yes" indicate by checking the appropriate box whether or not your establishment participated in a utility-sponsored program.

If the answer to question 1 **or** question 3 is "Yes" proceed to question 4. If the answer to **both** question 1 and 3 is "No", proceed to Part C – General Technologies.

Question 4, a through h – Question 4 lists different energy efficiency activities that your establishment might have been involved in between January 1, 1989 and December 31, 1991. Place a check mark next to each activity your establishment did actually participate in during that time. If participation was sponsored by a public utility or energy supplier check column (2). If participation was sponsored through your establishment, an energy services company, or another organization check column (3). Check each activity that applies. Note that it is possible to have check marks in both columns for the activities listed.

Part C – General Technologies – Lists technologies which could apply to any establishment no matter what they produce as an end product. Place a checkmark beside each technology listed that was used by your establishment. The technologies identified in sections C through F include some, but not all, of the energy efficient technologies currently available to U.S. manufacturers. They were obtained from industry experts and official DOE publications. **Every establishment should complete Part C.**

Your four-digit SIC code is included as part of the address mailing label on the first page of your questionnaire. If your establishment is not classified in SIC 26, 28 or 33, proceed to Section VI – Remarks and Section VII – Certification after completing Part C.

Establishments in the following SIC categories should complete the additional technology checklist identified:

- SIC 26 (paper industries) complete Part D.
- SIC 28 (chemical industries) complete Part E.
- SIC 33 (primary metals) complete Part F.

Section VI – REMARKS

Please provide any explanations that may be helpful to us in understanding your reported data. Attach a separate sheet if necessary.

Section VII – CERTIFICATION

Period Covered By This Report – Enter the month, day, and year of the beginning and the end of the period covered by your report. If a calendar year report: "From January 1 to December 31, 1991,"; if a fiscal year, specify which (such as "From December 1, 1990 to November 30, 1991"). If a part-year report is submitted because the establishment was not in operation or under your company's control for the entire year, specify the actual period covered: for example "January 2, 1991 to August 15, 1991," or "June 1, 1991 to December 31, 1991."

quantities delivered from another establishment or your company even if those quantities were purchased from them by your establishment.

quantities purchased and paid for by a central purchasing entity separate from this establishment.

quantities for which payment was made in kind.

Column 5 – Expenditures – Enter the total expenditures for each of the purchased quantities reported in column 4. Include all expenditures regardless of when payment was made. Leave blank shaded areas blank.

Column 6 – Other Receipts – For each included energy source, enter all additional quantities delivered to your establishment and in 1991 but not reported in column 4. Leave all shaded areas blank.

include in column 6:

- quantities purchased and paid for by a central purchasing entity separate from this establishment.
- quantities transferred from another establishment or your company for which payment was not made.
- quantities delivered from another establishment or your company even if those quantities were purchased from them by your establishment.
- quantities for which payment was made in kind.

Complete column 4 through 12 for all energy sources that were not excluded by the above procedures. Entries should be made in accordance with the specific instructions for these columns. Leave all shaded areas blank; no entries are required in these areas.

Column 3 – Reporting Units – Use the indicated units for reporting all quantities. For those establishments that keep records in Btu, note that volume measures should be reported as actual physical quantities, rather than adjusted to represent a standard energy content. One barrel contains 42 gallons. A ton weighs 2,240 pounds and a short ton weighs 2,000 pounds.

The following list of Btu conversion factors should be used only if you do not know the actual Btu factor of the fuels consumed at your establishment site.

Analytane	21,000 Btu/lb
Bassase	1,500 Btu/cubic foot
Biomass	4,081 Btu/lb
Breeze	15.8 million Btu/short ton
Butane	21,308 Btu/lb
Butylene	20,787 Btu/lb
Coal/Coal	24.9 million Btu/short ton
Distillate fuel oil	6,822 million Btu/barrel
Ethane	22,320 Btu/lb
Ethylene	21,844 Btu/lb
Hydrogen	61,084 Btu/lb
Isobutane	21,527 Btu/lb

Column 7 – Onsite Production – Enter the total quantity of any energy source that was produced onsite in 1991 as a product, a byproduct, a waste material, or as the output from a captive (onsite) mine or well, **and** was at least partially consumed onsite. Enter the TOTAL quantity produced, even if that quantity exceeds the quantity consumed at this establishment. Examples of byproducts include petroleum coke, hydrogen, and still gas. Examples of waste products include wood scraps, packing materials, waste paper and cardboard, and waste oils.

Column 8 – Source of Onsite Production – For each energy source that has an entry in column 7, check the "Yes" box if the amount listed in column 7 resulted from consumption of any other energy source listed in Section II – Combustible Energy Sources. Check the "No" box if the energy source came from captive wells or mines, or is a product or byproduct/waste product from materials not listed in section II as a combustible energy source.

Examples include:

- hydrogen produced as a byproduct of natural gas in an ammonia plant would have the "Yes" box checked.
- hydrogen produced through the electrolysis of brine in a chlorine plant would have the "No" box checked.
- coke oven gas produced during the coal coking process would have the "Yes" box checked.
- pulping (black) liquor, used in the chemical pulping of wood, that is burned in a recovery furnace or otherwise combusted, would have the "No" box checked because wood is usually not considered an energy source unless specifically purchased for that purpose (e.g., roundwood).

Column 9 – Onsite Fuel Consumption – Enter the quantity of each energy source consumed onsite as a fuel for the production of heat, steam, power, or the generation of electricity. Also include fuel consumed by vehicles dedicated primarily for use onsite. **Copy the entries, if any, in column 9 for total coal, total natural gas, total LPG and NGL, total distillate fuel oil and diesel fuel, and residual fuel oil to their respective columns for line 1 of Section III - Fuel Switching and line 1 of Section IV - Estimated Percent Consumption by End Use.**

Column 10 – Onsite Nonfuel Consumption – Enter the quantity of each energy source that was consumed onsite for all purposes other than fuel use. **Include** all quantities consumed as feedstocks (for example, coal used to produce coke, butane processed in producing rubber compounds), raw materials, additives, or ingredients for products manufactured by this establishment. **Exclude** all offsite dispositions such as sales and transfers to other establishments.

Column 11 – Shipments Offsite to Other Establishments – Complete only the unshaded portion of the column. Enter the quantity of each energy source that was shipped from this establishment site to any other location. **Exclude** shipments between a petrochemical plant and an adjacent refinery if they are considered a single establishment for the ASM.

Column 12 – Onsite Storage Capacity – Complete only the unshaded portion of the column. Enter the total design storage capacity located at this establishment site on December 31, 1991, for the components of LPG and NGL, diesel fuel and distillate fuel oil, motor gasoline, and residual fuel oil. Report the shell capacity (that is, the design capacity of the storage tanks) in the units of measure specified.

Include in column 12:

- onsite capacity of all storage facilities regardless of the intended disposition of the energy source (include both product storage tanks and tanks dedicated for onsite use).
- onsite capacity dedicated or leased for storage of energy sources owned by other establishments.

Section III – FUEL SWITCHING

This portion of the survey is intended to measure the short-term capability of your establishment to have used substitute energy sources in place of those actually consumed in 1991. Capability to use substitute energy sources means that this establishment's combustors (for example, boilers, furnaces, ovens, blast furnaces) had the machinery or equipment either in place or available for installation in 1991 so that substitutions could actually have been introduced within 30 days without extensive modifications.

NOTE – Fuel-switching capability, as measured by this survey, does not depend on the relative prices of energy sources; it depends only on the characteristics of your equipment and certain practical constraints such as legal restrictions on the quantities of particular fuels burned, or take-or-pay contracts with energy suppliers. Fuel-switching capability sets limits on the extent to which you could switch to a substitute energy source if you wanted to or needed to. It has nothing to do with whether you would want to switch if you could. Therefore, **relative prices** of energy sources are **not related to fuel-switching CAPABILITY** and should be **ignored** when completing this section.

We recognize that records of fuel-switching capability are not regularly maintained. Accordingly, **reasonable approximations** of fuel-switching capability are **acceptable**. These approximations should be based on the judgment of a person knowledgeable about the fuel-switching capability and operations of your establishment. They are **not** expected to be formal engineering estimates based on a day-by-day analysis of the operating levels of individual combustors and interactions between them. Respond as realistically as possible, given your actual operations in 1991.

Base your estimates on the availability of substitute energy sources and the physical condition of your equipment during 1991. **Include** switching capability that could have resulted from the use of redundant and/or standby combustors, and from combustors that were already equipped to fire alternative fuels. Lines 1 through 3 of this portion of the form measure your establishment's overall capability to have switched from specific energy sources in 1991. Lines 4 through 11 describe your capability to replace a given energy source by specific alternative energy sources.

SPECIFIC INSTRUCTIONS

Line 1 – Quantity Consumed – Enter the total electricity received value from column 2 line 4 of section I, and the fuel consumption (column 9) values from section II for total coal, total natural gas, total distillate fuel oil and diesel fuel, total LPG and NGL, and residual fuel oil. The quantities to be copied are noted in the appropriate boxes of sections I and II.

Line 2 – Quantity Nonswitchable – Enter the amount of the quantity reported on line 1 that could NOT have been replaced within 30 days by any other energy source in 1991, even given a severe curtailment. **NOTE** – **Include** only that portion of total electricity received (purchases plus transfers in) that could **NOT** have been replaced by either onsite-generated electricity or energy source(s) which accomplish the same purposes as the offsite-produced electricity (e.g. supplying heat or power).

Portions of individual fuels may be non-switchable due to limitations such as:

- the characteristics of your physical plant (for example, single-fired combustors or the absence of redundant and/or standby combustors), or the requirements of your manufacturing process.
- binding take-or-pay contracts with energy suppliers that were in place.
- environmental regulations which limit the amounts of potential replacement fuels that could be burned.

DO NOT consider current relative prices of fuels as a limitation to switching capability.

Line 3 – Quantity Switchable – Subtract line 2 from line 1 and enter the results. These values represent the quantity of each energy source consumed that **COULD HAVE BEEN** replaced within 30 days by at least one other energy source in 1991. NOTE – If all entries on line 3 are zero, proceed to Section IV – Estimated Percent Consumption by End Use. For each entry on line 3 that is non-zero, complete the remainder of that column. **Complete one column before starting another.**

Lines 4 through 11 – Replacement Quantities – Report the maximum amount of the quantity shown on line 3 that could have been replaced within 30 days by each of the energy sources on lines 4 through 11, under the constraints listed in the instructions for line 2.

Report all amounts in the units of the energy source that is being replaced. **DO NOT** convert this amount to units of the replacement energy sources. NOTE – Be sure to take into account not only the fuels that could be directly substituted for offsite-produced electricity, but also the fuels needed to generate electricity onsite that could have been used in place of electricity purchases or transfers in.

NOTE – The sum of lines 4 through 11 for each column must be at least as large as the entry on line 3 of that column, and may be larger if more than one alternative fuel could have been used.

Section IV – ESTIMATED PERCENT CONSUMPTION BY END USE

This portion of the survey is intended to provide information on the purposes for which various energy sources are used in the manufacturing sector. It is understood that records of consumption of specific energy sources for the various end uses are not ordinarily maintained. For this reason, **reasonable approximations of total consumption are acceptable for section IV.** These approximations should be based on the judgment of a person knowledgeable about the energy consumption and operations of your establishment. **They are not expected to be the result of modeling activity or formal engineering studies unless these results are routinely available.**

Prior to completing columns 2 through 7, determine from the criteria below which of the preprinted energy sources and end uses should be included for reporting and which excluded. First, **exclude** all end uses that were not applicable to this establishment during 1991. Next, **exclude** all energy sources that were not consumed as a fuel at this establishment site during 1991 (that is, energy sources which have a zero entry in section II column 9 or section I column 2 line 12). There should be no entries in any column for the excluded end uses and no entries on any line for the excluded energy sources. **Estimate** what percent of each energy source's total fuel consumption should be applied to each of the end uses. **Complete one column before starting another.**

Examples:

- If all coal is used in boilers to generate steam, some of which is passed through an extractor/condensing turbine generator, all coal consumption would be reported in A1 – Boiler fuel.
- Auxiliary power for such uses as pump and fan drivers and emissions controls should be included in B5 – Direct Process Uses, "Other".

SPECIFIC INSTRUCTIONS

Line 1 – Total Fuel Consumption – Copy the section I line 12 column 2 value for electricity to column 2. Copy section II column 9 values for total coal, total natural gas, total distillate fuel oil and diesel fuel, total LPG and NGL, and residual fuel oil in columns 3 through 7. These values should be used as a reference for estimating the percentage distribution in lines A1 through C6 for each column.

Lines A1 through C6 – End Uses – Proceeding down each column, **estimate** what percent of the total fuel consumption was used for each of the listed end uses. The total of each column should sum to 100 percent.

Section V – ESTABLISHMENT CHECKLIST

This section is divided into six parts. Every establishment must complete Parts A through C. Part A includes a section for you to indicate the **estimated** square footage of the buildings on this establishment site and the **estimated** percentage that has controlled heating or cooling. Part B includes questions on your establishment's participation in energy management programs, and Part C lists different technologies or processes which may or may not have been used by your establishment in 1991. Parts D through F list technologies specific to manufacturers in certain SIC categories. Part D should be completed by establishments whose four-digit SIC code begins with "26". Part E should be completed by establishments whose four-digit SIC code begins with "28". Part F should be completed by establishments whose four-digit SIC code begins with "33". Your establishment's four-digit SIC code is included in the mailing label on this form.

SPECIFIC INSTRUCTIONS

Part A. Estimated Square Footage of Buildings on this Establishment Site – **Estimate** the total square footage of all buildings on this establishment site and place a check beside the appropriate category. For purposes of this question a building is:

- a structure enclosed by walls extending from the foundation to the roof.
- parking garages, even if not totally enclosed by walls and a roof.
- structures erected on pillars to elevate the first fully enclosed level.

Excluded from the definition of a building are:

- structures (other than the exceptions just noted) that are not totally enclosed by walls and a roof (such as oil refineries, steel mills, and water towers).
- mobile homes and trailers, even if they house manufacturing activity.
- structures not ordinarily intended to be entered by humans, such as storage tanks.
- nonbuildings that consume energy (such as pumps and construction sites).

Square footage is defined as all the area enclosed by the exterior walls of a building, including indoor parking facilities, basements, hallways, lobbies, stairways, and elevator shafts, in units of square feet.

Question 1, 1 through 11 – Question 1 identifies **approximate** square footage categories. Place a check mark next to the category that most closely describes your establishment.

Question 2, 1 through 6 – Question 2 identifies **approximate** percentage categories. Place a check mark next to the category that most closely describes how much of the square footage indicated in question 1 above had controlled heating or cooling using equipment designed to modify the internal building temperature during 1991.

Part B – Energy Management – Answer questions 1, 2, and 3. If your answer to questions 1 or 3 was "Yes", proceed to question 4. If your answers to questions 1 and 3 were **both** "No", proceed to Part C – General Technologies Checklist.