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COSTS AND BENEFITS OF INDUSTRIAL REPORTING AND VOLUNTARY TARGETS FOR ENERGY EFFICIENCY

A Report to the Congress of the United States

**Prepared in Response to Section 131(c)
of the Energy Policy Act of 1992
(Public Law 102-486)**

Volume II: Appendices

**U.S. Department of Energy
Office of Policy, Planning, and Program Evaluation
Washington, DC 20585**

February 1994

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MASTER

A handwritten signature in black ink, appearing to be a stylized 'S' or 'Q'.

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APPENDIX A.

DESCRIPTION OF THE INDUSTRIAL ENERGY CONSERVATION (CE-189) PROGRAM FROM 10 CFR PART 445

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TITLE 10—ENERGY; REVISED AS OF JANUARY 1, 1992**CHAPTER II—DEPARTMENT OF ENERGY****SUBCHAPTER D—ENERGY CONSERVATION****PART 445—INDUSTRIAL ENERGY CONSERVATION PROGRAM****SUBPART A—GENERAL PROVISIONS****445.1 Purpose and scope.**

This part sets forth the regulations for the Industrial Energy Conservation Program established under Part E of Title III of the Act. It includes criteria and procedures for the identification of reporting corporations, reporting requirements, criteria and procedures for exemption from filing reports directly with DOE, voluntary industrial energy efficiency improvement targets and voluntary recovered materials utilization targets. The purpose of the program is to promote increased energy conservation by American industry and, as it relates to the use of recovered materials, to conserve valuable energy and scarce natural resources.

445.2 Definitions.

For the purpose of this part—

“Act” means the Energy Policy and Conservation Act (Pub. L. 94-163, 80 Stat. 971), as amended by the National Energy Conservation Policy Act (Pub. L. 95-619, 92 Stat. 3207).

“Btu” means British thermal unit.

“Chief executive officer” means, within a corporation or a sponsor, the chief executive officer or other individual who is in charge of the corporation or sponsor.

“Commercial quality production” means the manufacture of products suitable for shipment and/or sale.

“Control” means the ability to direct or cause the direction of the management and policies of a corporation. Whether control is present involves a question of fact to be determined from such criteria as a degree of ownership (especially of

voting shares), contractual arrangements and other means of influence, such as ability to appoint a majority of a corporation's board of directors, whether by sufficient stock ownership or other means.

"Corporation" means a person as defined in section 3(2)(b) of the Act (any corporation, company, association, firm, partnership, society, trust, joint venture or joint stock company) and includes any person which controls, is controlled by, or is under common control with such person.

"DOE" means the Department of Energy.

"Energy efficiency" means the amount of energy in Btu's consumed per unit of production.

"Energy source" means electricity, purchased steam, natural gas, bituminous coal, anthracite, coke, ethane, propane, LPG, natural gasoline, gasoline (including aviation), special naphtha, kerosene, distillate fuel oil (including diesel), still gas, petroleum coke, residual fuel oil, crude oil, and any other material consumed as a fuel in manufacturing.

"Exempt corporation" means an identified corporation which DOE determines, pursuant to section 445.37, is not required to report directly to DOE.

"Feedstock" means petroleum products, natural gas or coal used as a raw material which is processed to become a part of the chemical composition of a manufactured product other than an energy source.

"Identified corporation" means a corporation identified by DOE in accordance with section 445.15. A corporation is an identified corporation for a year in which it consumed, in accordance with section 445.13, at least one trillion Btu's.

"Major energy-consuming industry" is an industry listed in section 445.5(a).

"Manufacturing" means the mechanical or chemical transformation of materials or substances into new products, as described on page 57 of the Office of Management and Budget Standard Industrial Classification Manual (1972).

"Manufacturing operation" means the mechanical or chemical transformation of materials or substances into a product classified with SIC codes 22, 26, 30, or 33; which is measured in a single unit of production. Manufacturing operations include, but are not limited to, the production of iron, steel, aluminum,

copper, lead, zinc, wood pulp, paper, spun textile goods, woven textile goods, felt textile goods, non-woven textile goods, tires and tire products, rubber footwear, and industrial rubber products.

"Obsolete scrap" means recovered materials created by the use and subsequent discard of a product. Examples are discarded tires, automobiles, and newspapers. This includes recovered materials from outside the United States which are used in manufacturing operations in the United States.

"Plant" means an economic unit of a corporation at a single physical location where manufacturing is performed.

"Plant report" means a duly completed report on the form provided by DOE for plant reporting in accordance with section 375(c) of the Act, or on such other form as provides information equivalent to that required to be reported on the form provided by DOE.

"Product" means an item or grouping of items (separate parts of, or all of a product line) that is the production of a manufacturing corporation that is classified within a major energy-consuming industry.

"Production" means the quantity of a corporation's product output, throughput, or activity.

"Program" means the Industrial Energy Conservation Program.

"Prompt industrial scrap" means recovered materials generated by an industrial process and used as input to a manufacturing operation other than the industrial process which generated it. An example is metal fabrication stamping waste which is used in manufacturing steel. This includes recovered materials from outside the United States which are used in manufacturing operations in the United States.

"Recovered materials" means any of the following energy-saving recovered materials: aluminum, copper, lead, zinc, iron, steel, paper and allied paper products, textiles, and rubber, recovered from solid waste.

"SIC" means the Standard Industrial Classification system described in the Office of Management and Budget Standard Industrial Classification Manual (1972).

"Solid waste" means any garbage, refuse, sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility and other discarded material including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities; but does not include solid or dissolved materials in domestic sewage, or solid or dissolved materials in irrigation flows, or industrial discharges which are point sources subject to permits under section 402 of the Federal Water Pollution Control Act, as amended (86 Stat. 880), or source, special nuclear or by-product material as defined by the Atomic Energy Act of 1954, as amended (68 Stat. 923).

"Sponsor" means a trade association or other person who operates or intends to operate a reporting program which collects data from one or more corporations.

"United States" means each of the several States, the District of Columbia, the Commonwealth of Puerto Rico, and any territory or possession of the United States.

"Waste" means "solid waste".

445.3 Management of the program.

The Office of Industrial Programs, Office of the Assistant Secretary for Conservation and Solar Energy, Department of Energy, will implement and manage the program.

445.4 Handling of information submitted under the program.

(a) Except as otherwise provided in this section, the handling of information submitted to DOE under this part shall be governed by DOE's Freedom of Information regulations, 10 CFR Part 1004.

(b) DOE will not disclose any information obtained under this part which is a trade secret or other matter described in 5 U.S.C 552(b) (4), disclosure of which may cause significant competitive harm, except to committees of Congress upon request of such committees; and information from plant reporting forms made available to DOE for verification purposes under section 445.26(a) shall not be released to the public.

(c) A corporation or sponsor which claims that information provided to DOE under this part is a trade secret or commercial or financial information that is privileged or confidential within the meaning of the Freedom of Information Act (FOIA) exemption in 5 U.S.C. 552(b) (4), and that disclosure of this information would cause significant corporate competitive damage, must so inform DOE by providing at the time of the submission of the information a detailed item-by-item explanation of whether the information is customarily treated as confidential by the corporation and the industry, and a detailed explanation of the anticipated competitive damage which would result from public disclosure.

(d) Prior to disclosing any information other than in response to a request made under 10 CFR Part 1004, DOE will grant any person who submitted information in accordance with paragraph (c) of this section an opportunity to comment on the proposed disclosure by providing at least seven days notice of DOE's determination to disclose such information. For purposes of this paragraph, notice is deemed to be given when mailed to the person who provided the information.

(e) Any information submitted to DOE by a corporation or sponsor under this part shall not be considered energy information, as defined by section 11(e) (1) of the Energy Supply and Environmental Coordination Act of 1974 (15 U.S.C. 796), for purposes of any verification examination authorized to be conducted by the Comptroller General under section 501 of the Act.

445.5 Major energy-consuming industries.

(a) For purposes of this part, the following 2-digit SIC code manufacturing industries are the major energy-consuming industries:

- (1) SIC 20—Food and kindred products;
- (2) SIC 21—Tobacco products;
- (3) SIC 22—Textile mill products;
- (4) SIC 23—Apparel and other textile products;
- (5) SIC 24—Lumber and wood products;
- (6) SIC 25—Furniture and fixtures;

- (7) SIC 26—Paper and allied products;
- (8) SIC 27—Printing and publishing;
- (9) SIC 28—Chemicals and allied products;
- (10) SIC 29—Petroleum and coal products;
- (11) SIC 30—Rubber and miscellaneous plastic products;
- (12) SIC 31—Leather and leather products;
- (13) SIC 32—Stone, clay and glass products;
- (14) SIC 33—Primary metal industries;
- (15) SIC 34—Fabricated metal products;
- (16) SIC 35—Machinery, except electrical;
- (17) SIC 36—Electric, electronic equipment;
- (18) SIC 37—Transportation equipment;
- (19) SIC 38—Instruments and related products; and
- (20) SIC 39—Miscellaneous manufacturing industries.

(b) The following major energy-consuming industries are the industries for which reporting on the use of recovered materials is required under section 445.22(b):

- (1) SIC 22—Textile mill products;
- (2) SIC 26—Paper and allied products;
- (3) SIC 30—(excluding Rubber products SIC 3079, as provided in section 445.22(d));
- (4) SIC 33—Primary metal industries.

445.6 Procedures for appeals.

Any appeal of a determination by DOE pursuant to any provision of this part shall be filed with the Office of Hearings and Appeals, U.S. Department of Energy, Washington, D.C. 20585, within 30 days of the date of that

determination, pursuant to the procedures for such an appeal stated in 10 CFR Part 205, Subpart H. A person has not exhausted its administrative remedies until an appeal has been filed under that subpart, and an order granting or denying the appeal has been issued.

445.7 General information-gathering authority.

In addition to the exercise of authority under Part E of Title III of the Act, DOE may exercise any authority available under any other provision of law to obtain such information with respect to industrial energy efficiency and industrial recovered materials use which it determines is necessary or appropriate to the attainment of the objectives of the program. Nothing in this part shall limit the authority of DOE to require reports of energy information under any other law.

SUBPART B—IDENTIFICATION OF CORPORATIONS

445.11 Scope.

This subpart contains the criteria and procedures for the annual identification of corporations.

445.12 Requirement for corporations to file a report on energy consumption.

(a) Except as provided by paragraph (b) of this section, a corporation which consumed, as determined according to section 445.13, at least one trillion Btu's of energy in a calendar year within a major energy-consuming industry shall file a report on that energy consumption with DOE as provided in section 445.14.

(b) Any corporation which was identified by DOE under section 445.15 within a major energy-consuming industry for a calendar year and which consumed, as determined according to section 445.13, at least one trillion Btu's of energy within the same major energy-consuming industry in the next calendar year, need not file a new report of its energy consumption in that industry.

(c) Any corporation which was identified by DOE under section 445.15 within a major energy-consuming industry for a calendar year and which consumed, as determined according to section 445.13, less than one trillion Btu's of energy within the same major energy-consuming industry in the next calendar year

shall file a report on its energy consumption in that industry as provided by section 445.14. The failure of a corporation described in this paragraph to file a report may result in the continued identification of the corporation by DOE under section 445.15. (OMB control number 1904-0036)

445.13 Computation of energy consumption.

(a) For purposes of this subpart, energy consumed is the sum of the Btu contents of all energy sources consumed by a corporation in a manufacturing industry within the United States and includes energy used for—

- (1) Direct manufacturing activities;
- (2) Thermal self-generation of electricity;
- (3) Heating, ventilating and air conditioning of manufacturing buildings and plant offices, as well as manufacturing services such as shops, cafeteria, other plant personnel services, and plant chemical and analytical laboratories;
- (4) In-plant transportation, such as lift trucks, conveyors, cranes, and railroads;
- (5) Transportation on a manufacturer's property between mining operations and manufacturing facilities;
- (6) Raw material storage; and
- (7) Services for finished product warehouses within a plant fence if directly related to manufacturing activities.

(b) For purposes of this subpart, energy consumed does not include (where such use is metered separately or can otherwise be identified)—

- (1) All uses of electricity self-generated by thermal means;
- (2) Services for corporate and divisional offices not contiguous to a plant;
- (3) Services for basic research not contiguous to a plant;
- (4) Services for regional distribution centers;
- (5) Fuel for corporate aircraft, salesmen's cars and over-the-highway trucks;

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- (6) By-product fuels sold and shipped, or stored for sale;
 - (7) Facility start-up energy (to point of commercial quality production);
 - (8) Waste used as fuel;
 - (9) Transport of intermediate product to another producer for finishing within the same two-digit industry;
 - (10) Fuels received for storage for later disposition; and
 - (11) Feedstocks.

(c) For purposes of this section, where energy is consumed in manufacturing in one major energy-consuming industry for purposes of manufacturing an end product in another major energy-consuming industry, and such energy is not separately metered or cannot otherwise be identified, the energy is consumed in the major energy-consuming industry of the end product.

(d) To avoid double-counting in the case of thermally self-generated electricity, a corporation's electricity consumption shall be comprised only of purchased electricity and self-generated hydropower. For example, where a corporation consumes coal in the thermal generation of electricity for its own use, the Btu's of the coal, but not the Btu's of the electricity, shall be included.

(e) Where a corporation can measure or reliably estimate the Btu content of its energy sources (except electricity), energy consumed must be determined by reference to those actual or estimated Btu contents. Where a corporation cannot measure or reliably estimate the Btu contents of its energy sources, and in the case of electricity, the following conversion factors (Btu's/energy unit) must be used:

- (1) Electricity, 3,412/kwh;
- (2) Natural gas, 1,020/cu. ft;
- (3) Bituminous coal, 22,565,000/short ton;
- (4) Anthracite, 25,400,000/short ton;
- (5) Coke, 26,000,000/short ton;
- (6) Petroleum coke, 30,120,000/short ton;

- (7) Ethane, 73,380/gal;
- (8) Propane, 91,620/gal;
- (9) LPG, 95,500/gal;
- (10) Natural gasoline, 110,000/gal;
- (11) Gasoline (including aviation), 124,950/gal;
- (12) Special Naphtha, 124,950/gal;
- (13) Kerosene, 135,000/gal;
- (14) Distillate fuel oil (including diesel), 138,690/gal;
- (15) Still gas, 400/cu. ft;
- (16) Residual fuel oil, 149,690/gal;
- (17) Crude Oil, 138,100/gal; and
- (18) Other energy sources (including purchased steam), (to be determined by calorimetric measurement or engineering standard as appropriate for consuming corporation).

445.14 Report on energy consumption.

(a) The reports required by section 445.12 (a) and (c) must include the following information:

(1) The name, title, address and phone number of the individual responsible for reporting energy data for the corporation;

(2) The Internal Revenue Service "Employer Identification Number" (EIN) for the corporation; and

(3) The following statement, completed as appropriate:
_____ consumed at least one trillion Btu's of energy in
(name of corporation)
calendar year _____ in SIC(s) _____ (For only those corporations filing
pursuant to section 445.12(c) substitute or add the completed phrase: (and)
consumed less than one trillion Btu's of energy in calendar year _____ in

SIC(s) _____), as determined according to 10 CFR 445.13. I certify that all the information in this report is true and accurate to the best of my knowledge.

(Signature of Chief Executive Officer or individual designated by such officer)

Date of Submission

(b) Reports required by section 445.12 must be received by DOE by February 28 following the close of the calendar year for which the corporation is required to report and must be sent to the following address: Office of Industrial Programs, U.S. Department of Energy, Room 2H-085, 1000 Independence Avenue, SW, Washington, D.C. 20585. The deadline and address for submission of the report may be changed by DOE by the publication of a notice of the change in the FEDERAL REGISTER.

(c) Where a corporation controls, is controlled by or is under common control with another corporation, the corporation required to file the report is the corporation which controls.

(1) Where a corporation controls a joint venture, that corporation shall include the energy consumed by the joint venture in its energy consumption. Where more than one corporation controls a joint venture, each controlling corporation shall include in its energy consumption an equal percentage of the energy consumed by the joint venture during the calendar year for which the report is filed.

(2) Where a corporation is under common control, each controlling corporation shall include in its energy consumption an equal percentage of the energy consumed by the corporation under common control.

(3) A corporation shall supply to DOE, upon request, any material which DOE may require to verify control.

(d) All data used by a corporation in determining its energy consumption must be retained by the corporation for at least five years. (OMB control number 1904-0036)

445.15 Identification of corporations by DOE.

(a) Annually, after reviewing the information filed pursuant to section 445.12, and any other information on corporate energy consumption available to it, DOE will identify each corporation which consumed at least one trillion Btu's of energy within a major energy-consuming industry in the previous year, pursuant to the procedures set forth in paragraph (b) of this section.

(b) DOE will publish in the Federal Register a list identifying corporations. If this list must be supplemented, DOE may publish an updated list or may notify a corporation of its identification by certified mail.

445.16 Request for modification.

(a) A corporation may file a request with DOE to modify its identification pursuant to section 445.15, on the grounds of clerical or technical error.

(b) Notwithstanding the provisions of section 445.6, the request must be filed with DOE within 30 days of the identification of the corporation, at the Office of Industrial Programs, U.S. Department of Energy, Room 2H-085, 1000 Independence Avenue, SW., Washington, D.C. 20585, and marked "Industrial Energy Conservation Program: Request for Modification." DOE may change the address for the submission of such requests by the publication of a notice of such change in the Federal Register.

(c) 10 CFR 205.131 and 205.134 provide the format for such a request.

(d) The request must adequately explain how the corporation erred in its report of energy consumption or how DOE erred in identifying the corporation.

(e) DOE shall respond to the request by granting or denying it within 20 days of the receipt of the request by the Office of Industrial Programs.

SUBPART C—REPORTING REQUIREMENTS

445.21 Plant reporting requirements.

(a) An identified corporation shall have at its headquarters in the United States a separate report on the progress each plant of the identified corporation has made during the reporting period in improving its energy efficiency in each major energy-consuming industry within which the corporation is identified.

(b) The reports required under paragraph (a) of this section must be prepared on a plant reporting form which has been—

- (1) Published and made available for this purpose by DOE, or
- (2) Developed and used by the identified corporation.

(c) The reports required under paragraph (a) of this section must be completed in a manner sufficiently timely to permit the data from such reports to be aggregated in the corporation's report required by section 445.22. (OMB control number 1904-0003)

445.22 Corporate reporting requirements.

(a) The chief executive officer (or individual designated by such officer) of each identified corporation shall report by the date specified in section 445.25 on the progress the corporation has made in improving its energy efficiency in each major energy-consuming industry within which the corporation is identified, including data aggregated from plant reports required under section 445.21.

(b) The chief executive officer (or individual designated by such officer) of each corporation identified within any of SIC(s) 22, 26, 30 or 33 also shall report by the date specified in section 445.25 on the progress the corporation has made to increase its utilization of recovered materials in each of these four industries within which the corporation is identified. (OMB control number 1904-0003)

(c) The information required under paragraphs (a) and (b) of this section must be submitted by SIC code—

- (1) To DOE on a corporate reporting form which has been published and made available for this purpose by DOE, or
- (2) For an exempt corporation, to a sponsor of an adequate reporting program on a corporate reporting form—
 - (i) Described in paragraph (c)(1) of this section, or
 - (ii) Which provides information equivalent to that required to be reported on the form described in paragraph (c)(1) of this section, accompanied by the certification required by the DOE form.

(d) Notwithstanding the requirements of paragraph (b) of this section, the chief executive officer of a corporation identified within SIC 30, all of whose manufacturing operations are within SIC 3079, (miscellaneous plastics products), shall not be required to report on the progress the corporation has made to increase its utilization of recovered materials in SIC 30.

445.23 Sponsor reporting requirements.

(a) The chief executive officer (or individual designated by such officer) of each sponsor of an adequate reporting program, as determined pursuant to section 445.37, shall report by the date specified in section 445.25 to DOE, as follows:

(1) For each major energy-consuming industry for which the sponsor has an adequate reporting program, on the progress the exempt corporations which participate in the adequate reporting program have made in improving their energy efficiency in that major energy-consuming industry, and

(2) For each of SIC(s) 22, 26, 30 and 33 for which the sponsor has an adequate reporting program, on the progress the exempt corporations which are required to report under section 445.22(b), and which participate in the adequate reporting program, have made to increase their utilization of recovered materials.

(b) The information required under paragraph (a) of this section must be submitted to DOE on a sponsor reporting form which has been—

(1) Published and made available for this purpose by DOE, or

(2) Previously supplied by the sponsor to DOE in its submission under section 445.35, accompanied by the certification required by the DOE form.

(c) Notwithstanding paragraph (a) of this section, a sponsor, in preparing its report, may aggregate data from reports filed with it by exempt corporations under section 445.22(c)(2) with data from reports by nonidentified corporations, only to the extent that the reports from the nonidentified corporations meet the requirements of section 445.22.

445.24 Reporting period.

The reporting period for each report required by this subpart is the calendar year for which each corporation covered by the report is an identified corporation.

445.25 Reporting date and address.

All reports submitted to DOE under this subpart must be received by DOE by the June 1 following the end of the reporting period and must be sent to the address provided in the instructions to the appropriate DOE form. This deadline and address may be changed by DOE by timely notification of such change to identified corporations and sponsors of adequate reporting programs.

445.26 Data retention.

(a) All forms submitted to an identified corporation under section 445.21 and all other data used by that corporation in preparing reports under section 445.22, must be retained by the corporation for at least five years from the filing date and must be made available to DOE promptly upon request for verification. (OMB control number 1904-0003)

(b) All reports submitted by an exempt corporation to a sponsor under section 445.22(c)(2) must be retained by the exempt corporations for at least five years from the filing date. Upon request for verification the reports must be made promptly available to DOE by the corporation at its headquarters. (OMB control number 1904-0003)

(c) All data, other than reports described in paragraph (b) of this section, used by a sponsor in preparing reports submitted to DOE under section 445.23 must be retained by the sponsor for at least five years from the filing date and must be made available to DOE promptly upon request for verification. (OMB control number 1904-0003)

SUBPART D—EXEMPTION CRITERIA AND PROCEDURES**445.31 Scope.**

This subpart contains the criteria and procedures for the exemption of identified corporations from the requirement of filing corporate reporting forms directly with DOE. These exemptions are effective for one year and renewable annually.

445.32 Criteria for the exemption of corporations.

In order for an identified corporation to be exempt from filing the corporate report required by section 445.22 directly with DOE, pursuant to section 445.37, the corporation must—

- (a) File a timely and complete request to be an exempt corporation pursuant to section 445.34;
- (b) Participate in an adequate reporting program; and
- (c) If it was previously determined to be an exempt corporation, have met the requirements of section 445.22(a), (b) and (c)(2) for the period it has been exempt.

445.33 Criteria for adequate reporting programs.

In order for a reporting program of a sponsor to be determined an adequate reporting program for a major energy-consuming industry, pursuant to section 445.37, the sponsor must—

- (a) File a timely and complete request to be a sponsor with an adequate reporting program, pursuant to section 445.35;
- (b) If its program previously was determined to be adequate, have met the requirements of section 445.23 and have provided each identified corporation which participated in the reporting program with (1) specific written guidance for preparing and submitting the corporate report under section 445.22(c)(2) to the sponsor, and (2) a copy of the report which the sponsor filed with DOE under section 445.23.

445.34 Request to be an exempt corporation.

- (a) An identified corporation may seek an exemption by submitting a request to DOE describing its participation in an adequate reporting program.
- (b) This request must include the following information:
 - (1) The name and address of the identified corporation,
 - (2) The name and telephone number of the person responsible for preparing the report required by section 445.22 on behalf of the corporation,

(3) The name, address, and telephone number of the sponsor in whose reporting program the corporation has arranged to participate, together with the enumeration of all major energy-consuming industries for which the corporation will submit reports to the sponsor;

(4) A statement that it will meet the requirements of section 445.22(a), (b) and (c)(2) and section 445.26 (a) and (b);

(5) A statement of how the corporation will report to the sponsor, either—

(i) On the DOE corporate reporting form, or

(ii) On some other reporting form, designated by the corporation;

and

(6) A certification by the chief executive officer (or other individual designated by such officer) of the corporation as follows:

I certify that all information provided in this request is true and accurate to the best of my knowledge.

(c) Notwithstanding the requirements of paragraph (a) of this section, any corporation which was exempt under section 445.37 for a calendar year and for which all information required by paragraph (b) of this section is unchanged, need not refile a request for the next year. (OMB control number 1904-0036)

445.35 Request to be a sponsor with adequate reporting programs.

(a) A sponsor may seek to have its reporting program determined to be adequate by submitting a request to DOE describing its reporting program.

(b) This request must include the following information:

(1) The name and address of the sponsor;

(2) The name and telephone number of the person responsible for preparing the report required by section 445.23 on behalf of the sponsor;

(3) A listing of each major energy-consuming industry covered by its reporting programs;

(4) A statement that the sponsor will meet the requirements of section 445.23 and 445.26(c);

(5) A statement of how the sponsor will submit the reports required by section 445.23 to DOE; either—

(i) On the DOE sponsor reporting form; or

(ii) On some other reporting form, designated by the sponsor;

(6) If the sponsor designates some other form, a copy of the form, together with an index referencing each and every item on the DOE form to the corresponding identical item on the form submitted;

(7) A statement that the sponsor will provide each identified corporation which participates in the reporting program with—

(i) Specific written guidance for preparing and submitting the corporate report under section 445.22(c)(2) to the sponsor; and

(ii) A copy of the report which the sponsor files with DOE under section 445.23; and

(8) A certification signed by the chief executive officer (or other individual designated by such officer) as follows:

I certify that all information provided in this request is true and accurate to the best of my knowledge.

(c) Notwithstanding the requirements of paragraph (a) of this section, a sponsor which was determined to have an adequate reporting program for a calendar year and for which all information required by paragraph (b) of this section are unchanged, need not refile a request for the next year, if its chief executive officer (or other individual designated by such officer) submits a certification that all items in the request filed the previous year are still true and accurate to the best of his knowledge. (OMB control number 1904-0036)

445.36 Filing deadline and address.

The requests made pursuant to section 445.34 and section 445.35 must be received by DOE by February 28 of each year and must be sent to the following address: Office of Industrial Programs, U.S. Department of Energy,

Room 2H-085, 1000 Independence Avenue, S.W., Washington, D.C. 10585. DOE may change the deadline and address for submission of such requests by publishing a notice of such change in the Federal Register.

445.37 Determination of exempt corporations and adequate reporting programs.

(a) Annually, in accordance with the criteria set forth in section 445.32 and section 445.33, DOE will exempt corporations and determine the adequacy of the reporting programs in which they participate, pursuant to the procedures set forth in paragraph (b) of this section.

(b) DOE will publish in the FEDERAL REGISTER for public comment its proposal to exempt corporations and to determine as adequate the reporting programs in which they participate. After considering comments from interested persons, DOE will exempt corporations and determine the adequacy of the reporting programs in which they participate by publishing a list of corporations and sponsors of programs in the Federal Register.

445.38 Failure to report.

(a) If a sponsor of an adequate reporting program fails to submit the report required by section 445.23 by the deadline established in section 445.25, DOE may, by notice to the sponsor and to the identified corporations which participate in its program, revoke its determination that the sponsor has an adequate reporting program. Within 30 days after the notice is mailed, each such corporation must submit a corporate report directly to DOE as provided in section 445.22(c)(1).

(b) If a sponsor determines that an exempt corporation has failed to file a timely corporate report as required by section 445.22(c)(2), it should submit a report as required by section 445.23 only on those corporations which filed the corporate report with the sponsor. If an exempt corporation does not file the report required by section 445.22 with a sponsor, it must file the report required by section 445.22 directly with DOE.

**SUBPART E—VOLUNTARY ENERGY EFFICIENCY
IMPROVEMENT TARGETS AND VOLUNTARY RECOVERED
MATERIALS UTILIZATION TARGETS**

445.41 Purpose and scope.

(a) This subpart contains the energy efficiency improvement targets and the recovered materials utilization targets established by DOE pursuant to section 374 and 374A of the Act.

(b) No liability shall attach to, and no civil or criminal penalties shall be imposed on, any corporation for any failure to meet any energy efficiency improvement target or any recovered materials utilization target contained in this subpart.

445.42 Energy efficiency improvement targets.

(a) Each energy efficiency improvement target is a percentage figure which represents, for a major energy-consuming industry, the percentage reduction in energy consumption per unit of production which DOE has determined that such industry can achieve between calendar year 1972 and January 1, 1980, as established in 42 FR 29642, June 9, 1977, "Final Industrial Energy Efficiency Improvement Targets." Each target is set at a level which represents the maximum feasible improvement in energy efficiency that each industry can achieve.

(b) The energy efficiency improvement targets are set forth in Table I.

Table I

SIC code	Major energy-consuming industry	Target
20	Food and kindred products	12
22	Textile mill products	22
26	Paper and allied products	20
28	Chemicals and allied products	14
29	Petroleum and coal products	12
32	Stone, clay, and glass products	16
33	Primary metal industries	9
34	Fabricated metal products	24
35	Machinery except electrical	15
37	Transportation equipment	15

445.43 Modification of energy efficiency improvement targets.

An energy efficiency improvement target in section 445.42 may be modified at any time if DOE—

- (a) Determines that such target cannot reasonably be attained or could reasonably be made more stringent, and
- (b) Publishes such determination in the FEDERAL REGISTER together with a statement of the basis and justification for the modification after providing an opportunity for public comment on any proposed modification.

445.44 Recovered materials utilization targets.

- (a) Recovered materials utilization targets are established for each of the following industries—textile mill products, paper and allied products, metals and metal products, and rubber
- (b) Each recovered materials utilization target is a percentage figure which represents, for each industry subdivision listed in paragraph (c) of this section, the amount of recovered materials from prompt industrial and obsolete scrap which DOE has determined can be used per unit of production by calendar year 1987. Each target is set at a level which represents the maximum feasible increase in the utilization of recovered materials which the industry can achieve progressively by January 1, 1987.
- (c) The recovered materials utilization targets are set forth in Tables II, III, IV, and V.

Table II—Textile Mill Products

Industry subdivision	Recovered materials utilization target	Recovered materials utilization in reference year 1978
Broad woven fabric mills, wool	13	13
Yarn mills, wool	13	13
Felt goods, except woven felt hats	80	59
Padding and upholstery filling	93	93
Nonwoven fabrics	15	17
Cordage and twine	22	22
All other textile mill products	0	0

Table III—Paper and Allied Products

Industry subdivision	Recovered materials utilization target	Recovered materials utilization in reference year 1978
Newsprint	18	14
Tissue	30	28
Printing and writing paper	6	7
Packaging and industrial converting papers	4	4
Unbleached kraft paperboard	10	4
Semichemical paperboard	26	26
Solid bleached paperboard	0	0
Recycled paperboard	108	108
Construction paper	55	55
Insulating and hard pressed board	17	22

Table IV—Rubber

Industry subdivision	Recovered materials utilization target	Recovered materials utilization in reference year 1978
Tires and tire repair materials	5	2
Rubber industrial products	5	3
Rubber footwear	15	0
Tire retreading and repair	12	9

Table V—Metals and Metal Products

Industry subdivision	Recovered materials utilization target	Recovered materials utilization in reference year 1978
Ferrous	41	38
Aluminum	35	30
Copper	50	47
Lead	60	51
Zinc	36	33

445.45 Modification of recovered materials utilization targets.

Any recovered materials utilization target in section 445.44 may be modified if DOE—

- (a) Determines that such target cannot reasonably be attained, or that the target should require greater use of recovered materials, and
- (b) Publishes such determination in the Federal Register together with a basis and justification for the modification, after providing an opportunity for public comment on the proposed modification.

APPENDIX B.

DESCRIPTION OF STATISTICAL ANALYSIS OF THE CE-189 PROGRAM

A statistical analysis was performed on available data to determine the independent impacts of the CE-189 Program (hereafter, the program) on the energy intensity of industry. This analysis was conducted at three different levels, under the hypothesis that the program had direct impacts on energy intensity. At the first level (step 1), a simple test was conducted to determine if the onset and end of the program made a difference in energy intensity for 20 industries. A second test (step 2) took into account some of the other factors that might have influenced intensity change in industry, with the impact of the program analyzed after these other impacts are extracted. The third level of detail (step 3) argues that many factors beyond energy price can effect intensity changes, so the analysis at this level of detail took some of these other factors into account. The results of this analysis indicate that there is no statistical evidence that the CE-189 Program had an effect on energy intensity or changes in energy intensity regardless of the level of analysis. The three sections following provide results for each of the three analytical steps.

Step 1: Direct Impact of CE-189

The simplest of tests posits a direct relationship between the program and energy intensity of each of the 20 two-digit Standard Industrial Classification (SIC) code manufacturing industries covered by the program. Advantage is taken of the fact that the program went into effect at different times for different industries, so the program was initiated for the energy-intensive industries in 1976 and the remainder of the two-digit industries in 1980. For each of these industries, the change in energy intensity is observed for the year in which the program took effect and for the year when the program was stopped. The null hypothesis is that the program going into effect should have been coincident with an improvement in intensity while the stopping of the program should have been coincident with a worsening or no improvement in intensity. Under this assumption, the probability that the program's implementation and termination had the expected effects on energy intensity is calculated. With a normal distribution governing the variation of the impact of the

program, the probability that the program had this direct impact is rejected at the 5-percent probability level.

More formally, the test is conducted as follows: for each of the 10 industries affected by the program in 1976, the intensity was observed to have been less than, equal to, or greater than that of the prior year. If the intensity was less than that of the year before the program went into effect, the "score" was one (expectation fulfilled); if it was equal to or greater than the prior year's intensity, the score was zero. The same test was conducted for the industries that were required to participate in 1980. Then, for all 20 industries, a score of one was given to an industry with greater intensity in 1985 (when the program was terminated) than in the previous year. There are 40 observations for this test, two (program initiating, program terminating) for each of the 20 industries.

The actual observations were compared with the expected observations (all ones) using a Student's *t*-score. In this case, 12 of the possible 40 observations were the incorrect sign. The mean of the sample is thus 0.7. When variation about this mean is taken into account, the computed *t*-score is 2.27. With a sample size of 40, the probability of this occurring by chance is rejected at the 5-percent probability level.

Even though this test rejects the hypothesis that the program had a direct impact on industry energy intensity, there can be little reliance on such a simple test. The test implicitly assumes that the program was the major causal force in the decline or increase in energy intensity and that each of the industries would be affected in a similar manner. Both of these assumptions are naive. Therefore, further evidence on the impact of the program on energy intensity must be garnered by a more conditional approach.

Step 2: Impact After Accounting for Price Impacts

It is clear that factors other than the program influence energy intensity, a major one being the price of energy. If energy prices are relatively high, economic theory suggests that a firm will search for ways to reduce, at least relatively, the use of energy in production. This, in turn, will lower the energy intensity of the industry. But because each industry uses energy differently, one need not expect that all industries will respond similarly. Accordingly, the second step examines the impact of the program taking into account both interindustry effects and the effect of energy prices on energy intensity.

The approach used in step 2 is regression analysis. The dependent variable is annual energy intensity from 1973 to 1988 for 20 two-digit industries. The independent variables are the price of energy (in dollars per million Btu) for the industrial sector as a whole, a dummy variable with ones for each year the program was in place, and in one variant of the regression, the lagged value of the dependent variable. The program dummy variable was constructed so that a value of zero indicated that the program was not operating while a value of one indicated that the program was in effect. For energy-intensive industries, the dummy variable has a value of one for the period 1976 through 1985; for the other industries, the dummy variable has a value of one between 1980 and 1985. In another variant of the regression, separate dummies were introduced to account for interindustry differences. The regressions were estimated, both combined and separately, for each of the two-digit industries. The dummy variable that captures the effect of the program was structured so that, if the program contributed to improved energy efficiency (that is, less intensity), the estimated coefficient on the dummy would be negative. Similarly, the expectation was that increases in prices would reduce intensity, so the coefficient on that variable would also be negative. The regression equation, then, was as follows:

$$\text{Intensity}_i = a_0 + a_1 \times \text{Price} + a_2 \times \text{ProgDummy}_j$$

or

$$\text{Intensity}_{t,i} = a_0 + a_1 \times \text{Intensity}_{t-1,i} + a_2 \times \text{Price} + a_3 \times \text{ProgDummy}_j$$

where Intensity is calculated as energy use divided by output for each (i) industry. The price variable for this analysis is the industrial sector price (weighted average full price) in dollars per million Btu as reported in the Energy Information Administration's *State Energy Price and Expenditure Report* (SEPER). *ProgDummy* was constructed with two variations (j)—one for the program as it applied to the energy-intensive industries, and one as it applied to those industries that did not enter the program until 1980. One variation of the regression stacked each of the industry intensities, along with the associated independent variables, to see if the combined set of information gave similar results. One variation of this overall regression included a set of dummy variables for each industry except SIC code 20 (food and kindred products). Table B-1 reports the results of these regressions.

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Table B-1. Results of Step 2 Regression Analysis Using Energy Intensity as Dependent Variable (t-values in parenthesis)

Independent Variable	SIC Code									
	20	21	22	23	24	25	26	27	28	29
R. Squared	0.864288	0.207509	0.881801	0.769662	0.762433	0.725512	0.585069	0.762509	0.877104	0.5413
Constant	0.021238	0.001137	0.031439	0.005787	0.018954	0.007394	0.057447	0.003203	0.077778	0.058014
Price	0.000172 (-9.65)	0.000112 (1.97)	0.000322 (-10.43)	0.000115 (-5.85)	0.000351 (-5.74)	0.000141 (-4.82)	0.000811 (-4.55)	0.00005 (-5.21)	0.000872 (-10.34)	0.001191 (-4.18)
Program Dummy	0.002406 (4.29)	-0.00053 (-1.45)	0.004777 (4.57)	0.00089 (2.37)	0.002663 (2.33)	0.000691 (1.50)	0.005527 (2.10)	0.000223 (1.51)	0.017548 (6.19)	0.00791 (2.04)
Constant	0.00802	-0.0005	0.00727	0.0011	0.00082	0.00243	0.01537	0.00086	0.02544	-0.0069
Lagged Intensity	0.59932 (4.40)	1.21824 (9.58)	0.75469 (4.70)	0.71625 (4.10)	0.8921 (8.98)	0.61466 (3.20)	0.6955 (3.59)	0.65454 (3.24)	0.66501 (5.51)	1.08256 (4.20)
Price	-0.0006 (-2.35)	0.00003 (0.55)	-0.0007 (-1.13)	-0.00007 (-0.44)	-0.00005 (-0.21)	-0.0002 (-0.90)	-0.001 (-1.07)	-0.00003 (-0.41)	-0.0032 (-2.68)	0.00049 (0.32)
Program Dummy	0.00096 (1.93)	-0.00003 (-0.14)	0.00116 (0.13)	-0.0002 (-0.42)	0.00012 (0.23)	-0.00002 (-0.05)	0.00287 (1.36)	-0.00009 (-0.57)	0.00589 (2.10)	-0.0009 (-0.27)
Independent Variable	SIC Code									
	30	31	32	33	34	35	36	37	38	39
R. Squared	0.592332	0.661042	0.741015	0.340752	0.833437	0.746477	0.775884	0.526537	0.865211	0.653157
Constant	0.017748	0.006535	0.067171	0.048686	0.009249	0.006845	0.00886	0.005343	0.006259	0.006236
Price	0.0004289 (-3.65)	0.000132 (-3.93)	0.000881 (-6.55)	0.000608 (-2.76)	0.00010 (-8.64)	0.000131 (-6.57)	0.000187 (-5.94)	0.00009 (-4.07)	0.00008 (-7.41)	0.000144 (-4.81)
Program Dummy	0.001717 (1.23)	0.000424 (0.98)	0.010515 (3.67)	0.002582 (1.31)	0.001417 (4.52)	0.001266 (2.98)	0.001455 (2.39)	0.000631 (2.07)	0.000589 (2.20)	0.001192 (2.54)
Constant	0.00257	0.00273	0.01586	0.03339	0.00335	0.00242	0.00039	0.00058	0.00491	0.00178
Lagged Intensity	0.81577 (6.34)	0.45033 (1.45)	0.74967 (5.30)	0.30748 (1.31)	0.62758 (4.01)	0.64658 (3.73)	0.88773 (10.76)	0.84931 (5.84)	0.19858 (0.71)	0.67522 (3.69)
Price	-0.0001 (-0.46)	-0.00009 (-0.26)	-0.0014 (-1.46)	-0.0011 (-1.45)	-0.0003 (-2.04)	-0.0003 (-1.46)	-0.0003 (-0.27)	-0.0004 (-0.50)	-0.0005 (-2.10)	-0.0002 (-0.99)
Program Dummy	-0.0004 (-0.54)	-0.0003 (-0.46)	0.00235 (1.02)	0.00155 (0.75)	0.00046 (1.41)	0.00009 (0.21)	-0.00005 (-0.19)	0.00011 (0.57)	0.0004 (1.07)	0.00012 (0.28)

For all industries taken together and for the separate two-digit industries, the addition of the lagged dependent variable confused the picture considerably. Most of the variation in energy intensity can be explained by the level of intensity that existed previously. On a year-to-year basis, very little of the difference in intensity is explained by energy prices or the existence of the program. More precisely, when the lagged dependent variable was included, in most cases neither the dummy variable nor the price variable was statistically significant.

When this variable is not included, both the dummy variable and the price variable are significant, but the dummy variable typically has the wrong sign. That is to say, the regression suggests that energy intensity worsened rather than improved during the program years. This result generally holds for all industries taken together, for the two-digit industries considered alone, and when the interindustry dummy variables are included. As shown in Table B-2, when all industry observations are concatenated, price and the program dummy account for only 15 percent of the variation in energy intensity, but both of these variables are highly significant (t -value > 6.5), with a negative coefficient on the price and a positive coefficient for the program effect. For each industry taken separately, the same results hold generally, but with one exception: tobacco. In this case, the price variable has the incorrect sign and the dummy variable is not significantly different from zero at the 0.05 level of significance. This industry also has the lowest explained variation of all the industries. For tobacco, the price and program variables explain 21 percent of the variation in intensity. The range goes to a high of 88 percent of the variation explained for textiles.

Interesting results are obtained when industry dummies are included in the regression. Again, the price variable is highly significant and has the correct sign. The program dummy has the wrong sign, but is also highly significant, indicating that something retarded energy-intensity improvements over the program's duration. When interindustry variations are taken into account, the explained variation increases from 15 percent to 96 percent. Using food processing as the base industry, all industries except petroleum refining significantly differ in their energy-intensity changes from that base industry. Moreover, the more energy-intensive industries—pulp and paper; chemicals; stone, clay and glass; and primary metals—had positive coefficients, as would be expected.

Table B-2. Concatenated Regression Results

Step 2 Regression		Step 3 Regression	
Independent Variable	Coefficient t - Value	Coefficient t - Value	
Constant	0.0323	33.600	6.98
Price	-0.0049	-3.7708	-2.88
Program Dummy	0.0162	14.234	3.41
Constant	0.0007	-0.33267	-0.92
Lagged Intensity	0.969	0.9789	300.77
Price	0.00009	0.12497	1.37
Program Dummy	-0.00019	-0.45978	-1.7
Constant	0.23833	10.165	6.86
SIC 21 Dummy	-0.0107	-28.348	5.88
SIC 22 Dummy	0.003385	-16.9747	14.52
SIC 23 Dummy	-0.01002	-27.7928	10.18
SIC 24 Dummy	-0.00293	-21.9683	11.54
SIC 25 Dummy	-0.00891	-26.5554	11.228
SIC 26 Dummy	0.028207	3.630832	39.567
SIC 27 Dummy	-0.01065	-28.3068	8.6707
SIC 28 Dummy	0.030075	5.181734	117.48
SIC 29 Dummy	0.021954	0.100255	41.872
SIC 30 Dummy	-0.00221	-21.3777	11.609
SIC 31 Dummy	-0.00866	-26.6771	18.96
SIC 32 Dummy	0.030932	5.893162	116.84
SIC 33 Dummy	0.027491	3.036712	115.35
SIC 34 Dummy	-0.00852	-26.8575	32.29
SIC 35 Dummy	-0.01116	-29.0464	24.261
SIC 36 Dummy	-0.00893	-26.8953	18.865
SIC 37 Dummy	-0.01071	-28.6718	11.619
SIC 38 Dummy	-0.00933	-27.2276	11.076
SIC 39 Dummy	-0.00956	-27.416	9.3055
Price	-0.00253	-13.88	-2.4263
Program Dummy	0.0055	10.12	4.2548
			6.28

Step 3: Accounting for Changes in Fuel Use and Differences in Growth

Step 3 was a replication of step 2, but with significant differences. First, the industry definition is more detailed—the Bureau of Labor Statistics (BLS) level of industry detail is used as a basis for the analysis: in manufacturing there are, at this point, 68 industries rather than 40. Energy consumption data for these 68 industries are derived from the National Energy Accounts with extensions from 1985 to 1991 undertaken at Pacific Northwest Laboratory (PNL) (the data construction is explained in the PNL letter report *Technical Documentation for the Trends Report*, 1994). Energy consumption is then divided by industry output (again from BLS) to construct the intensity variables. Price is again the weighted average fuel price derived from SEPER. As with step 2, program dummy variables were constructed for energy-intensive and non-intensive industries, with these variables being assigned at the three-digit SIC level of industry detail based on average intensity over the entire period. The results of step 2 were replicated with this slightly different set of data to verify that the results reported above hold. In total, 43 regressions were performed at the two-digit level as a check on step 2 results, and 139 regressions were performed at the BLS level of detail. Partial results are reported in Table B-3, which contains the two-digit results, and Table B-4, which contains the regression results for price and the program variable at the BLS level of detail. Table B-2 contains the results of the BLS industry level of detail with the interindustry effects taken into account. As with step 2, all of these results indicate that the program effects are perverse: the program variable mostly enters with the wrong sign and is insignificant at the 5-percent probability level.

Conclusion

The analysis was pursued at different levels to increase the opportunity to establish a statistical link between program implementation or termination and changes in energy intensity. From a statistical perspective, it is not surprising that at different levels of analysis instances arose where there appears to be a link between program implementation and termination and improvements in energy intensity. At the level of all manufacturing, there is no evidence that the program has a significant effect. At the two-digit level, one can point to

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Table B-3. Results of Step 3 Regression Analysis Using Energy Intensity as Dependent Variable (t-values in parenthesis)

Independent Variable	SIC Code									
	20	21	22	23	24	25	26	27	28	29
R. Squared	0.73465	0.44866	0.86709	0.023563	0.89951	0.88092	0.82543	0.38255	0.68893	0.8218
Constant	3.9353 (33.34)	0.69841 (9.04)	16.574 (40.87)	3.6704 (34.93)	6.8724 (36.12)	4.7524 (38.64)	42.317 (34.60)	0.95312 (27.15)	139.31 (24.51)	43.762 (42.86)
Price	-0.22157 (-7.38)	0.089843 (4.00)	-1.4393 (-10.89)	-0.37866 (-12.39)	-0.61099 (-12.62)	-0.37067 (-10.36)	-2.9789 (-9.58)	-0.017616 (-1.73)	-9.4531 (-6.54)	-2.3636 (-9.10)
Program Dummy	0.22096 (2.36)	-2.6176 (-3.42)	2.0676 (4.39)	0.42123 (4.05)	0.0064636 (.056)	0.21053 (1.73)	2.8868 (2.98)	-0.052893 (-1.52)	13.161 (2.92)	0.0072382 (.009)

Independent Variable	SIC Code									
	30	31	32	33	34	35	36	37	38	39
R. Squared	0.84118	0.30422	0.74647	0.7382	0.67459	0.59964	0.88431	0.78696	0.54691	0.89449
Constant	5.419 (31.84)	14.079 (12.13)	136.16 (23.91)	131.68 (34.16)	31.691 (26.97)	23.637 (18.58)	17.581 (30.57)	6.2001 (29.42)	4.2567 (20.20)	2.1467 (39.27)
Price	-0.49067 (-9.92)	-1.0272 (-3.04)	-10.021 (-6.92)	-7.2869 (-7.43)	-1.9228 (-6.43)	-1.7497 (-5.41)	-1.9764 (-11.82)	-0.45508 (-8.49)	-0.29 (-4.74)	-0.18353 (-11.55)
Program Dummy	0.75512 (4.48)	3.0799 (2.68)	22.417 (4.96)	7.9493 (2.60)	1.6858 (1.81)	0.44042 (.44)	2.923 (5.13)	0.34531 (2.06)	0.34831 (1.67)	0.15337 (2.83)

the tobacco industry as possibly having improved energy intensity as a result of the program. When the two-digit data are further disaggregated into 68 sectors, 6 industries appear to be positively affected by the program.

But at none of these levels is the evidence convincing. To believe that the tobacco industry was positively affected by the program requires that one also believe that increases in energy prices will result in increases in energy intensity, which the preponderance of evidence rejects. Even at the more detailed level, the same is true for two of the six cases in which the program variable is suggested as having an effect on energy efficiency. Four cases out of 68 (or 88 if the two-digit results are included) fail to provide a convincing case, especially since 11 of 20 two-digit results and 31 of 68 more detailed results provide convincing statistical evidence that the program actually made energy intensity worse.

As with any statistical analysis, factors may have been overlooked that, if included, would reverse this conclusion. *But the weight of this analysis, which takes into account energy prices, previous energy-intensity levels, and within-industry variation as well as the program effects, argues to the contrary—that the CE-189 Program did not, by itself, have any significant effect on industry energy intensity.*

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Table B-4. Regression Statistics (t-values in parenthesis)

BLS Industry Number	R-Squared	Independent Variables		
		Constant	Price	Program Dummy
8	0.4915	0.071877 (23.43)	-0.032733 (-3.67)	0.0059701 (0.20)
9	0.40489	1.0941 (15.10)	-0.077412 (-3.67)	0.094991 (1.32)
10	0.93944	5.2155 (39.29)	-0.57422 (-14.88)	0.30833 (-2.35)
11	0.85475	2.3996 (30.87)	-0.21268 (-9.41)	0.14241 (1.85)
12	0.69185	2.3528 (24.56)	-0.15799 (-5.67)	0.68121 (0.72)
13	0.61567	18.929 (21.33)	-1.1185 (-4.95)	2.8659 (4.07)
14	0.74382	102.29 (22.45)	-7.937 (-6.85)	17.985 (4.97)
15	0.80434	14.947 (34.16)	-0.96547 (-8.68)	1.566 (4.51)
16	0.14833	38.04 (30.07)	-0.70921 (-2.20)	1.2584 (1.25)
17	0.78695	22.318 (21.90)	-2.0628 (-7.96)	4.0879 (5.05)
18	0.4633	60.143 (17.76)	-3.657 (-4.25)	1.5849 (0.59)
19	0.48177	11.183 (14.62)	-0.85787 (-4.41)	1.0181 (1.68)
20	0.7455	6.8347 (16.93)	-0.88992 (-7.58)	1.7495 (4.38)
21	0.70636	11.435 (28.43)	-0.70041 (-6.85)	0.88408 (2.77)
22	0.78976	2.85 (53.92)	-0.12536 (-8.16)	0.15565 (2.97)
23	0.7394	2.4773 (29.53)	-0.17131 (-7.02)	0.19237 (2.32)
24	0.82293	3.6851 (28.12)	-0.35024 (-9.19)	0.48975 (3.77)

Table B-4. Regression Statistics (t-values in parenthesis) (continued)

BLS Industry Number	R-Squared	Independent Variables		
		Constant	Price	Program Dummy
25	0.097186	2.374 (10.61)	-0.29184 (-0.45)	0.0019574 (0.01)
26	0.15354	3.0944 (26.01)	-0.02875 (-0.83)	-0.14182 (-1.20)
27	0.21347	1.7071 (15.16)	-0.056528 (-1.73)	0.29822 (2.67)
28	0.46761	2.511 (16.79)	-0.18793 (-4.32)	0.39991 (2.70)
29	-0.030656	2.0052 (13.14)	-0.0048444 (-0.11)	0.15203 (1.01)
30	0.74606	1.9792 (24.71)	-0.17508 (-7.52)	0.29727 (3.75)
31	0.1975	1.6556 (15.06)	-0.034222 (-1.07)	-0.12966 (-1.19)
32	0.055403	1.2995 (13.69)	0.029636 (1.07)	0.041301 (0.44)
33	0.52331	2.3001 (26.81)	-0.11891 (-4.77)	0.22592 (2.66)
34	0.56976	1.9468 (21.42)	-0.62032 (-2.35)	-0.19934 (-2.21)
35	0.86147	6.9755 (14.90)	-1.4132 (-10.39)	1.689 (3.64)
36	0.74497	2.4818 (21.49)	-0.23963 (-7.14)	0.27313 (2.39)
37	0.81682	3.0576 (32.37)	-0.2549 (-9.28)	0.48043 (5.14)
38	0.91201	3.8097 (33.59)	-0.4614 (-13.99)	0.81123 (7.22)
39	0.2391	2.0183 (21.18)	-0.073106 (-2.64)	0.079142 (0.84)
40	0.86296	3.0649 (19.26)	-0.50609 (-10.94)	0.88757 (5.63)
41	0.84607	3.4663 (21.83)	-0.44194 (-9.57)	0.4518 (2.87)

Table B-4. Regression Statistics (t-values in parenthesis) (continued)

BLS Industry Number	R-Squared	Independent Variables		
		Constant	Price	Program Dummy
42	0.90918	2.1645 (33.28)	-0.23892 (-12.64)	0.21285 (3.30)
43	0.68308	1.6703 (23.61)	-0.13392 (-6.51)	0.32216 (4.60)
44	0.92011	1.103 (35.32)	-0.11474 (-12.64)	0.050844 (1.64)
45	0.78536	1.8118 (23.67)	-0.18056 (-8.11)	0.23657 (3.12)
46	0.79169	1.9737 (34.10)	-0.13936 (-8.28)	0.18558 (3.24)
47	0.61941	0.93369 (14.61)	-0.0414 (-2.23)	-0.17648 (-2.79)
48	0.51662	3.323 (18.36)	-0.2486 (-4.72)	0.52479 (2.93)
49	0.89449	2.1467 (39.27)	-0.18353 (-11.55)	0.15337 (2.83)
50	0.88378	4.156 (49.81)	-0.28996 (11.95)	0.48543 (5.87)
51	0.44866	0.69841 (9.04)	0.089843 (4.00)	-0.26176 (-3.42)
52	0.45015	7.1451 (17.70)	-0.48666 (-4.15)	0.83227 (2.08)
53	0.95017	6.7213 (51.29)	-0.66934 (-17.57)	0.6447 (4.97)
54	0.18721	4.7077 (12.2)	-0.28329 (-2.53)	0.59059 (1.55)
55	0.93012	1.4894 (43.11)	-0.15287 (-15.22)	0.19107 (5.58)
56	0.82195	2.181 (24.67)	-0.22579 (-8.78)	0.23016 (2.63)
57	0.84246	37.109 (33.47)	-2.8587 (-10.14)	3.2338 (3.67)
58	0.51327	2.8801 (19.97)	-0.16868 (-4.02)	0.082406 (0.58)

Table B-4. Regression Statistics (t-values in parenthesis) (continued)

BLS Industry Number	R-Squared	Independent Variables		
		Constant	Price	Program Dummy
59	-0.078492	2.2738 (24.18)	0.016096 (0.59)	-0.071953 (-0.77)
60	0.38255	0.95312 (27.15)	-0.017616 (-1.73)	-0.052893 (-1.52)
61	0.76134	30.827 (22.1)	-2.7874 (-7.86)	3.4017 (3.07)
62	0.62657	42.364 (14.52)	-3.9541 (-5.33)	8.62 (3.72)
63	0.74171	2.7663 (4.11)	1.309 (6.68)	-0.94114 (-1.41)
64	-0.079596	10.52 (18.67)	-0.096489 (-0.67)	0.24741 (0.55)
65	0.17928	11.671 (7.65)	0.51877 (1.34)	-2.8773 (-2.38)
66	0.64317	23.715 (13.91)	-2.6054 (-6.01)	1.7533 (1.30)
67	0.72522	2.5618 (31.44)	-0.16568 (-7.00)	0.46237 (5.73)
68	-0.088389	1.4237 (11.08)	0.025193 (0.67)	-0.058111 (-0.46)
69	0.88553	13.29 (25.91)	-1.5845 (-12.14)	1.843 (4.53)
70	0.8407	28.604 (45.75)	-1.3516 (-8.50)	-1.4503 (-2.92)
71	0.81098	6.5059 (18.48)	-0.87789 (-8.58)	0.97881 (2.81)
72	0.37524	9.0237 (16.80)	-0.31021 (-2.27)	1.445 (3.39)
73	0.84118	5.419 (31.84)	-0.49067 (-9.92)	0.75512 (4.48)
74	0.1749	11.649 (10.11)	-0.57634 (-1.97)	1.79 (1.96)
75	0.64991	0.97454 (26.39)	-0.056183 (-5.23)	0.027514 (0.75)

APPENDIX C.

OBJECTIVES AND STRUCTURES OF SOME EXISTING FEDERAL AND PRIVATE-SECTOR PROGRAMS INCORPORATING REPORTING ELEMENTS

Contents

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C-1. Manufacturing Energy Consumption Survey (DOE/EIA)

Objective

Collect data on industrial energy consumption for use in government statistical analyses.

Brief Description

The Manufacturing Energy Consumption Survey (MECS) is a triennial survey of manufacturing establishments mandated by Congress to provide information on the quantity of fuels consumed, energy expenditures, fuel-switching capabilities, and the use of nonpurchased sources of energy. The Energy Information Administration (EIA) is responsible for the survey, which is distributed to a sample of approximately 16,000 establishments selected by the Bureau of the Census to represent the overall manufacturing sector. The selected establishments are required to participate under the provisions of Section 13 (b) of the Federal Energy Administration Act of 1974 (Public Law 93-275).

In 1991, MECS was expanded to include several new areas of inquiry, including (1) data on how energy is used by manufacturers, (2) characteristics (size and space conditioning) of buildings on establishment sites, (3) participation in demand-side management programs, and (4) the penetration of energy technologies. Beginning in 1994, MECS will be conducted biannually.

When manufacturing establishments are presented with the reporting form, they are given a timeframe within which to respond. The confidentiality of all responses is guaranteed by statutes governing the Census Bureau, which aggregates the information into formats specified by EIA. All information leaving the Census Bureau is stripped of any association with the establishments surveyed.

Costs

EIA currently funds MECS at \$1.45 million per survey, not including the cost of approximately three full-time equivalents (FTEs) at EIA. EIA estimates the average time required to complete the survey at 8 hours. Assuming an industry cost of \$50 per hour (a total of \$400 per establishment), industry's incurred cost for MECS is \$6.4 million. Thus, all costs for MECS total approximately \$8.1 million per survey.

Benefits

MECS does not have an objective against which benefits can be quantified, other than supplying the statistics required by the Federal Government. No energy or cost savings are associated with the survey. MECS sufficiently fulfills its intended objective of providing a statistically sound sample of energy use in U.S. manufacturing establishments.

C-2. Green Lights Program (EPA)

Objective

Improve energy efficiency in commercial and industrial sector lighting systems.

Brief Description

Partners in the Environmental Protection Agency's (EPA's) Green Lights Program voluntarily agree to, within 6 years, upgrade lighting systems in all facilities where those upgrades are determined to be profitable according to an annualized rate of return equivalent to the prime interest rate plus 6 percentage points. Partners also agree to report annually on their progress in implementing the Green Lights upgrades.

Lighting projects are identified through lighting audits conducted at the participating facilities. Program allies, which include lighting equipment manufacturers and consultants, often provide these audits to participating corporations free of charge as a way to generate business. Partners may also choose to conduct the audits themselves.

EPA provides a package of networking, technical, and marketing support tools to aid Green Lights Partners in their efforts, at no cost to those companies.

Costs

Costs to Green Lights Partners include staff resources for the implementation team. The team typically includes an implementation director, regional or divisional coordinators, facility staff, a financial analyst, public relations and environmental affairs specialists, and senior management. These people are involved in conducting the analysis, establishing the implementation plan, and seeing the plan through to completion. Each year, each participating corporation's facilities submit a one-page form to report progress toward achieving the 6-year total lighting upgrade goal. In addition, a separate

implementation report required for each facility retrofit provides “before and after” details on the types, wattages, fixtures, and so forth, of the lighting equipment being upgraded; progress toward the goals established by the program; the percentage of floorspace audited to date; the percentage of identified actions implemented; and other related information. A particular facility may have multiple retrofits in a particular year, thus requiring multiple reports. In addition to these costs are the actual costs of implementation, that is, for new equipment and for disposing of old equipment.

EPA bears the cost of monitoring the progress of all participants, publishing reports and brochures about the program, and providing support and materials as promised in the memorandum of understanding signed with each Green Lights Partner.

Benefits

EPA reports that Green Lights Partners typically cut their lighting bills in half and that a typical upgrade yields an after-tax internal rate of return of between 20 and 40 percent. In addition, Partners enhance their environmental image, gain significant long-term public relations and competitive advantages, and increase employee productivity and morale.

C-3. The 33/50 Program (EPA)

Objective

Reduce releases and offsite transfers of 17 priority pollutants reported in the Toxic Release Inventory to 50 percent of 1988 levels by 1995 (with an interim goal of 33 percent by 1992).

Brief Description

EPA has asked 7,000 U.S. companies to voluntarily reduce releases of the 17 targeted chemicals, through whatever means available and to whatever extent possible. The focus of the program is on preventing the use of these chemicals rather than their capture following use. Program participants examine production processes, identify cost-effective pollution-prevention practices, and make a voluntary commitment in a letter to EPA establishing goals and reduction plans. Companies are encouraged to include facilities located outside of the United States. Through the program, each participating company makes its own contribution to the national goal. Some are naturally able to contribute more than others, but each still makes a valued contribution. The program allows significant flexibility in attempts to accommodate the different situations of different companies; for example, companies are allowed to select their own baseline years to measure reductions against if 1988 is unsuitable. Progress toward the reductions is tracked through the companies' submissions to the Toxic Release Inventory, so no additional paperwork (that is, no reporting) is required beyond the initial letter of commitment to EPA.

Costs

Costs of this program are virtually negligible because focusing on pollution prevention is considered to be a sound business practice and no additional reporting is required.

Benefits

The program offers benefits in the form of public relations for participating companies. Companies also have a clear incentive to find cost-effective ways to prevent pollution if such means exist. The program serves to focus efforts on this objective.

C-4. Conservation Verification Protocol (EPA)

Objective

Provide a rigorous yet flexible set of quantification methods to verify that utility conservation programs are reducing energy consumption.

Brief Description

EPA established the Conservation Verification Protocol (CVP) for utilities to use in reporting energy savings from conservation measures aimed at reducing sulfur dioxide emissions under the acid rain provisions of the Clean Air Act. A special pool of 300,000 emission allowances is available to utilities that implement conservation measures or meet electricity demand through renewable energy generation. The CVP allows EPA to verify the savings claimed.

The primary users of the CVP under the acid rain provisions are expected to be public power utilities. Use of the protocol is voluntary, but some form of proof is required if utilities wish to receive the EPA emission allowances for implementation of conservation measures. The CVP embodies an incentive structure designed to encourage more and improved *measurement* and less reliance on *estimation* of energy savings, while allowing for simple verification procedures through engineering estimates and stipulated savings (that is, standard algorithms for calculating energy savings from specific measures). The stipulated savings approach is generally much less expensive and time consuming to implement; however, it is designed to be conservative and often results in fewer energy-savings credits than conventional verification procedures. Metering and evaluation may consist of utility bill analysis, periodic inspections of retrofitted equipment, and confirmation of the continued operation of that equipment.

EPA has prepared a special form for use in applying for the emissions credits. Annual followups are required for 3 years to ensure that savings are continuing. Applicants have a choice of three different followup procedures involving three different levels of effort on their behalf, with a corresponding decrease in credits for the less rigorous options. EPA reserves the right to conduct audits of utilities if deemed necessary; these are anticipated to be relatively rare, required only in special circumstances.

Costs

The costs incurred in savings verification depend on the type of program and the verification procedures used by the utility. The EPA form for applying for emission credits is estimated to require 78 hours to complete. No other estimates of program costs were available.

Benefits

Verification is required before utilities can claim sulfur dioxide reductions, thus gaining reduction credits for conservation activities. Utilities should also be able to use the results reported to EPA for future efforts in which a documented history of energy efficiency improvement would be valuable. EPA's method for reporting information back to the utilities and to the public has not been detailed.

C-5. American Forest and Paper Association

Objective

Track changes in energy use and demonstrate continued progress in energy efficiency improvement in the industry.

Brief Description

Since the original CE-189 Program was terminated, the American Forest and Paper Association (AFPA) has continued a voluntary reporting program using a form similar to the CE-189 form. There are no targets, and the corporations now submit annual rather than quarterly versions of the reports. Participating corporations make up about 90 percent of the industry in the United States. They report energy-consumption data in the format requested on the form, but do not calculate intensities (this is instead done on an aggregate basis by the association) or report on any conservation measures undertaken during the year. Some reformatting of company data is typically required. The association compiles the data and reports it back in aggregate form, with no analysis or commentary (the summary report is essentially tables of numbers).

Costs

The current cost of data reporting is the equivalent of one full-time person at AFPA. The labor cost to individual companies varies according to the degree of centralization of the company's organizational structure. Estimates range from 3 to 6 staff-days per year per facility. Additional "learning curve" costs are incurred at plants when there is a turnover in staff.

Benefits

Tracking changes in energy use within the industry allows AFPA to better represent the industry to the Government in filings, hearings, and so forth. Benefits may also occur through the ability to demonstrate that the industry

has continued efforts to improve efficiency. Information collected within a company cannot be meaningfully used to competitively benchmark against other corporations, outside of giving a general idea of relative competitiveness within the industry, because of the variety of factors within the numbers produced.

C-6. American Petroleum Institute (Strategies for Today's Environmental Partnership Program)

Objective

Improve the petroleum industry's environmental, health, and safety performance; document performance improvements; and communicate to the public.

Brief Description

Strategies for Today's Environmental Partnership (STEP) is based on the American Petroleum Institute's (API's) Environmental Mission Statement and Guiding Environmental Principles and includes management practices in seven areas: pollution prevention, operating and process safety, community awareness, crisis readiness, product stewardship, proactive government interaction, and resource conservation. These management practices form the basis of API Recommended Practice 9000, which API members voluntarily institute in their operations.

As an example of the STEP program, the API Guiding Environmental Principle relating to energy conservation is "to economically develop and produce natural resources and to conserve those resources by using energy efficiently." One of the five management practices in the area of resource conservation is to "improve energy efficiency and resource conservation through facility design, operation, and maintenance, considering product mix, raw material supply, technological and economic constraints, and sound business principles." Similar practices exist in each of the seven subject areas.

Using an annual STEP self-assessment process, individual companies measure their progress in implementing the management practices in the industry sectors of production, refining, and transportation. The individual companies provide the results to an independent contractor of API for industry-wide compilation. The first annual STEP self-assessment was under way as this report was being compiled. API will use the results to establish an industry baseline of participation.

Other programs within STEP document health, safety, and environmental performance; establish industry programs with environmental objectives, such as used oil recycling and development or revision of industry standards for health, safety, and environmental performance; and support research on environmental questions relating to the petroleum industry.

Costs

No cost estimates are available for this program.

Benefits

A record of improved environmental performance in the petroleum industry, including the area of resource conservation, should allow the industry to expand its domestic operations in all sectors without excessive regulatory restrictions and at the same time help improve the public's perception of the industry and its products.

C-7. Chemical Manufacturer's Association (Energy Efficiency and CO₂ Emissions Survey)

Objective

Demonstrate continued progress in energy efficiency improvement in the chemicals industry.

Brief Description

The annual Energy Efficiency and CO₂ Emissions Survey is part of the Chemical Manufacturers Association's (CMA's) Energy Efficiency Continuous Improvement Program, undertaken by CMA because of the industry's high levels of energy consumption. Participation in the survey is voluntary, although corporations consuming more than 1 trillion British thermal units per year (including feedstocks) are strongly encouraged to participate. The survey provides data on purchased fuels, steam, electricity, onsite-generated fuels, feedstock energy, total sales and transfer dollars, and total pounds of production. In addition, companies are given the opportunity to identify major energy efficiency efforts and corporate changes that had an impact on performance during the year.

Costs

The survey emphasizes use of data that corporations have already compiled for their own purposes. Additional costs are therefore minimal and consist mainly of additional staff time to fill out the report (little or no reformatting is required). A precise estimate of the staff time necessary to complete the form is not available, but is probably no more than a few hours per facility. CMA staff time for collecting the reports, aggregating the data, and reporting back to members requires approximately one-fourth of one staff-year.

Benefits

Reintroduced in 1989 after a gap of 3 years, the survey has not been in existence long enough to determine if it has any positive influence on energy efficiency behavior in the industry. CMA reports summary data back to the industry each year. Companies primarily use these data to benchmark their performance against that of the industry, which helps them determine their relative competitiveness. CMA hopes that the annual survey also serves to heighten member companies' energy awareness and perhaps facilitate greater energy efficiency improvement efforts. Data derived from the reports are also useful in CMA's communications with Congress and other organizations regarding the industry's energy efficiency performance.

C-8. Portland Cement Association

Objective

Collect data on energy use and other production inputs in the industry to provide benchmarking capability for individual companies.

Brief Description

The Portland Cement Association (PCA) annually distributes a form to its members to gather the following data: plant information (for example, number of kilns, processing methods used, total capacity), energy consumed by fuel type, production during the year, number of employees by plant function, energy conservation measures undertaken during the year, and special or unusual circumstances affecting energy consumption. Participation in the survey is voluntary, although in 1991 the response rate was 98.8 percent, representing 76.9 percent of the U.S. cement industry. Some of Canada's cement industry also participates. PCA then produces a summary report of aggregate data, including trends in the industry, industry statistics, and brief commentary based on the information provided in the responses.

Costs

The information required to complete the form is very basic; most respondents with ready access to company records probably can complete the form in less than an hour.

Benefits

Companies can compare their performance with the averages reported.

C-9. American Iron and Steel Institute (Energy Conservation Reporting and Energy Statistical Reporting)

The American Iron and Steel Institute has two energy reporting programs, one for energy conservation reporting and one for energy statistical reporting.

Energy Conservation Reporting

Objective

Help improve energy efficiency in the iron and steel industry by disseminating "success story" types of information.

Brief Description

Members of the Institute's Energy Technical Committee complete, on a voluntary basis, "Energy Conservation Opportunity" forms describing efficiency measures recently undertaken or efficiency opportunities identified, and make presentations on those measures at the committee's meetings. Presentations normally describe the measure, its costs, and results. Fact sheets that accompany the presentation include a list of contacts.

Costs

The presentations are made as part of the Institute's Energy Technical Committee meetings. The only additional costs incurred are staff time to copy material or prepare slides and other presentation materials prior to the meeting. These costs are believed to be minimal.

Benefits

The verbal format allows a level of technical depth to be communicated to other participants that would not be possible through a traditional reporting-type program. Followups frequently occur through the list of contacts. This method of information sharing supplements the Institute's traditional methods of gathering information, such as statistical comparisons and benchmarking.

Energy Statistical Reporting

Objective

Track statistics related to industry consumption of fuels.

Brief Description

Members voluntarily submit quarterly and annual information on purchased fuels to the Institute, which then compiles a summary report. Data are reported for consumption of natural gas, electricity, oil, and coal, broken down into subcategories for each fuel source (for example, consumption of coal in producing coke, fuel consumption for cogeneration of steam and electricity). The numbers reported to the association typically come from the purchasing records of the member companies as opposed to specifically measured energy use within the plants.

Costs

All of the data reported to the association already reside within the purchasing departments of member companies. The only additional cost of this effort to companies is the time required to transfer the information to the reporting form, which amounts to no more than a few hours. The staff requirement on the part of the association to compile the incoming information and produce and distribute the quarterly and annual reports is estimated to be about 4 staff-days per year.

Benefits

The information gathered by the association is useful in illustrating trends in the industry and in providing information for public policy discussions. This information does not directly serve to help improve energy efficiency in the industry because it is not process-specific; the Institute's energy conservation reporting program is used for that purpose.

APPENDIX D. INDUSTRIAL CONSULTATION PROCESS

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D.1. Federal Register Notice of Public Inquiry

[6450-01-P]

DEPARTMENT OF ENERGY
OFFICE OF DOMESTIC AND INTERNATIONAL ENERGY POLICY
CONSULTATION WITH ENERGY INTENSIVE INDUSTRIES

AGENCY: Office of Energy Demand Policy, Department of Energy

ACTION: Notice of Initiation of Consultation with Affected Industries
and Interested Parties.

SUMMARY: In accordance with Section 131(c) of the Energy Policy Act of 1992 (Public Law 102-486), the Office of Energy Demand Policy of the Department of Energy is preparing a report to Congress on the costs and benefits of establishing mandatory energy efficiency reporting requirements and voluntary energy efficiency improvement targets and the role of such activities in improving energy efficiency in energy intensive industries. The Department is initiating consultations with potentially affected industries and is seeking information from energy intensive industries and other industries that consume a significant amount of energy.

DATE: Respondents are requested to submit two copies of all correspondence related to this issue. Information should be submitted within 30 days of publication of this notice in the *Federal Register*. If you expect that you will be submitting information, but find it difficult to do so within the 30-day time period, please advise the contact, listed below, of your intentions.

ADDRESS: Comments and suggestions should be submitted in writing to: Mr. Jeffery Dowd, Office of Energy Demand Policy (EP-50), Office of Domestic and International Energy Policy, Department of Energy, 1000 Independence Avenue, S.W., Washington D.C. 20585, FAX (202) 586-8134.

FOR FURTHER INFORMATION CONTACT: Requests for additional information should be directed to Mr. Jeffery Dowd, Industry Specialist, at the above address, or by telephone at (202) 586-7258.

SUPPLEMENTARY INFORMATION: Section 131(c) of the Energy Policy Act of 1992 requires that:

... the Secretary shall, in consultation with affected industries, evaluate and report to the Congress regarding the establishment of Federally-mandated energy efficiency reporting requirements and voluntary energy efficiency improvement targets for energy intensive industries. Such report shall include an evaluation of the costs and benefits of such reporting requirements and voluntary energy efficiency improvement targets, and recommendations regarding the role of such activities in improving energy efficiency in energy intensive industries.

Industries, corporations, and other interested parties are invited to submit comments and suggestions on the costs and benefits and potential role of mandatory reporting requirements and voluntary energy efficiency targets in improving energy efficiency. The Department is especially interested in hearing from industries and associations that are currently administering energy efficiency reporting programs and/or were involved in the previous Industrial Energy Efficiency Improvement Program (CE-189). The latter program, which was established by the Energy Policy and Conservation Act of 1976, was operated by the Department from 1976 to 1985 (10 CFR Part 445 (1992)).

These questions are being listed as a guide to responses to this notice. Response to these questions is voluntary:

1. If you were involved in the previous CE-189 program, are you aware of costs and benefits to your corporation or establishment that may have been associated with the program?
2. Would increased awareness of energy efficiency performance in your corporation make a difference to any of your operations (e.g., setting goals to reduce energy use, establishing in-house energy use record-keeping, budget control, and monitoring; or facilitating capital investment in higher-efficiency equipment)?
3. Do you have any suggestions for addressing issues that were raised concerning the previous CE-189 program? Relevant issues include:
 - Reporting mechanisms, including reporting authority (e.g., reporting directly to the Department of Energy verses reporting through an industry association or other qualified third-party sponsor)
 - Reporting entity (i.e., at the establishment or corporation level)

- Appropriate data reporting level (by two-digit or four-digit SIC code)
 - Measures of efficiency
 - Reporting frequency, or
 - Selection of base year.
4. The CE-189 program established voluntary targets for energy efficiency improvement in energy intensive industries. If new voluntary targets are established, would such targets facilitate or increase the likelihood of energy efficiency improvements in your corporation or establishment? How should they be developed and at what SIC level?
 5. What mechanisms other than mandatory reporting requirements and voluntary targets could be used to encourage increased energy efficiency by energy intensive industries? What are your views on the advantages and disadvantages of such mechanisms, as compared with establishment of mandatory reporting requirements and voluntary energy efficiency improvement targets?
 6. What is your opinion on the advantages and disadvantages of establishing mandatory reporting requirements and voluntary targets for corporations and establishments that consume less than 1 trillion BTU per year?
 7. What specific options for establishing mandatory reporting and voluntary targets would you suggest be included in the Department's evaluation?

Respondents are also invited to submit additional information that they believe is relevant to the evaluation, including general comments and suggestions.

All written information provided by industry will be available for public inspection at the Department of Energy, Freedom of Information Reading Room, Room 1E190, 1000 Independence Avenue, S.W., Washington D.C. 20585, between the hours 9:00am to 4:00pm, Monday through Friday, except Federal holidays. Pursuant to provisions of 10 CFR 1004.11 (1983), any person submitting information believed to be confidential and exempt by law from public disclosure should submit one copy only of the document and, if possible, 10 additional copies in which information believed to be confidential has been deleted. The Department of Energy will determine the confidential status of the information and treat it accordingly.

In addition to publication of this announcement in the *Federal Register*, the Department will be contacting representatives of industries and trade associa-

tions that are in energy intensive industries, as well as other interested parties. In initial contacts planned for the next two months, these persons and associations will be asked if they would like to provide opinions, ideas, and information that they believe to be relevant to the evaluation of costs and benefits of mandatory reporting requirements and voluntary energy efficiency improvement targets and recommendations to be included in the report. Following development of preliminary findings from the evaluation, the Department expects to further consult with industry and other interested parties to provide an opportunity for informal comments and additional information. The latter consultations are tentatively scheduled for early September. Comments and suggestions provided by industry in response to this notice and in the course of individual consultations will be used in preparing the Report to Congress.

Issued in Washington, DC on April 30, 1993.

(Signature of Vito Stagliano, Acting Assistant Secretary, Office of Domestic and International Energy Policy)

D.2. Written Submissions in Response to the Federal Register Notice

Responses from: American Iron & Steel Institute
American Petroleum Institute
Equipment Manufacturers Institute
National Association of Manufacturers
Portland Cement Company
Amoco Oil Company
Chemical Manufacturers Association
Council of Industrial Boiler Owners
Computer and Business Equipment
Manufacturers Association

Note: Letters are attached under separate cover.

D.3. Narrative Reports from Meetings Between DOE and Industry Trade Associations

This Section presents the narrative summaries of 3 interviews, 11 meetings, and 2 conference calls conducted between May 20 and July 21, 1993 with representatives of energy-intensive industries. These summaries are entered into the public record in keeping with the requirements of Section 131(c) of the Energy Policy Act of 1992. Section 131(c) states:

No later than one year after the date of the enactment of this Act, the Secretary shall, in consultation with affected industries, evaluate and report to the Congress regarding the establishment of Federally mandated energy efficiency reporting requirements and voluntary energy efficiency improvement targets for energy intensive industries. Such report shall include an evaluation of the costs and benefits of such reporting requirements and voluntary energy efficiency improvement targets, and recommendations regarding the role of such activities in improving energy efficiency in energy intensive industries.

These narratives represent the second of three phases in the industry consultation process conducted by the U.S. Department of Energy's Office of Energy Demand Policy. The first phase was public comment in response to a Federal Register Notice published on May 3, 1993. The third phase was a day-long workshop for industry representatives held on September 8, 1993 in Arlington, VA. The narrative reports included are listed on the following page.

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Aluminum Association	July 13, 1993	D-9
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American Meat Institute	July 14, 1993	D-28
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Computer and Business Equipment Manufacturers Association—Subcommittee of the Government Relations Committee	July 15, 1993	D-39
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Refractories Institute	June 15, 1993	D-65
Steel Manufacturers Association	July 12, 1993	D-69

Aluminum Association
July 13, 1993, 3:00 p.m.

Energy Use

Energy comprises roughly 30 percent of the cost of aluminum ingot, and about the same for rolled products. Energy costs for fabricating are in the two- to five-percent range.

Costs and Benefits of CE-189

A preferred component of the CE-189 program was its third party collection aspect, which protected the companies from misuse of data or unauthorized disclosure of proprietary information. A benefit of the program was the ability to use the CE-189 data to provide the industry with credibility on energy consumption issues; the end of the program subjected industry members to claims of being "energy gluttons." These individuals also felt that reporting programs, such as CE-189, have more benefit to the smaller, mid-size companies that could not take advantage of technology transfer programs or actively participate in the transfer of ideas.

The representatives stated that while the numbers derived through CE-189 did not contain much meaning, the program did allow benchmarking of their own companies against the industry as a whole, e.g., "we're using X btu/\$value of shipments vs. the industry average of Y." Beyond that, however, the numbers are meaningless. Essentially, the data loses usefulness as it becomes more aggregated. Given the plants' "job shop" characteristic, in which products vary from truck trailers one month to window frames the next, the individuals involved spent a great deal of time trying to explain variances in the numbers reported from month to month.

The assessment of the group was that they would have taken the same course of action to improve energy efficiency without CE-189, as a matter of basic economic survival. This is especially true today, when the world price for aluminum is currently less than the cost of production in the United States and Western Europe, and when international competitiveness is judged by kilowatt hour per pound of aluminum.

Issues Related to CE-189

The CE-189 program was less of a burden in the past than a similar program would be today, largely because the aluminum industry decentralized its operations in the 1980s. Corporate-level energy management programs have been transferred, or pushed down, to the plant level. In many instances, corporate data is simply not tracked. (One member company representative is an exception, with staff who report energy efficiency data at the corporate level.) Tremendous variation now exists in measures of production, fabrication, and use of different technologies within individual plants; this variation would make data collection, assimilation, and justification at the corporate level extremely difficult.

Energy efficiency receives a great deal of attention without a major push from the corporate level. Energy costs will swing loads from one plant to another; in the most extreme cases, one factor determining which plants are picked for closure is energy costs. One representative stated his company is paying 500 percent more for energy than in 1979 ("from 4 mil electricity to 20-22 mil today"), and capacity is being curtailed such that he cannot produce the demand he contracted for. In another example, the rates in New York have jumped 59 percent in the past four years. Concerning the issue of voluntary targets, the member company representatives prefer to use their internal goals of continuous improvement, as opposed to setting a specific energy or cost reduction goal.

Information-sharing pertaining to technologies does take place. Energy efficiency, however, is a competitive factor, and therefore not shared. Companies will hire private consultants or conduct their own research to determine whether they are a high or low cost producer based on local energy price and production efficiency. The Aluminum Association used to have a conservation committee which met semi-annually; the Association now has an energy advisory panel which meets on an ad hoc basis.

Information sharing on technology development takes place in workshops such as one which the Aluminum Association is sponsoring on energy conservation, scheduled to be held in Louisville, KY, in October of 1993. The anticipated agenda will look more closely at the electrical side of manufacturing than has been the case in the past. Workshops are held every 18 to 24 months, and participation by the secondary market is high. (It was felt

that the secondary market offered many opportunities to improve energy efficiency, but technical and financial assistance would be required to take advantage of these opportunities).

Decision-Making Related to Investments in Energy Efficiency

Capital is the second largest cost after energy in the industry. Improvements are made through capital investments based on whether the investment will pay for itself, and how quickly. The industry representatives noted that a greenfield site hasn't been built in the United States since 1979. Plants are usually rebuilt from the floor up (the shell of the building is all that is "old"). Within a plant, renovations are made one pot line at a time.

Generally, decisions for capital allocation are made at the division or corporate level, depending on the degree of decentralization at a given corporation. Investment opportunities are suggested by the plants, in response to corporate demands for increased economic performance. At the plant level, energy is one driver in selecting investment opportunities. The representatives also reported that, by one estimate, 90 percent of the easiest energy efficiency gains have been achieved. The remainder will be very hard to get at the plant level.

As a final note during the discussion, the company representatives asked that the federal government reconcile its environmental regulations with energy efficiency goals. They pointed out that regulations concerning pot liners and scrubbers, for example, force decisions which impact energy efficiency, but are not energy related.

Participants from the Association

Robert Cole	Kaiser Aluminum and Chemical Corporation
Gordon Fry	Aluminum Association
Carl Sunser	Alcan Rolled Products Company
Ken Younger	Reynolds Metals Company

**American Bakers Association
Environmental Committee
June 15, 1993, 2:00 pm**

Member companies of the American Bakers Association did participate in CE-189; the Grocery Manufacturers Association recommended that the American Bakers Association be invited to participate in the industry consultation process.

Bakers Question Assumptions Underlying 131(c)

The members of the Environmental Committee immediately questioned the assumption that they were running their businesses inefficiently. Other concerns included the paperwork burden which would result from a new reporting program, and that a new program's "voluntary" status might change if Congress were to impose a penalty on those who failed to meet specified energy efficiency targets.

In addition, members felt that a reporting program could potentially interfere with the baker's decisions concerning product quality, for example, the choice to use an indirect-fired oven even though it is more energy-intensive than a direct-fired oven. Such a decision would normally be made depending on the desired moisture content in the final product.

Members also felt that they could more quickly respond to energy efficiency opportunities without the involvement of government. Members noted that they could have made the investment decision and have put new equipment in place in the time it would take the government to process the reporting program data.

Whether the bakers industry would be included under a new program using the same parameters as CE-189 was left open to question; one member stated that he personally did not feel that the bakers should be categorized as an energy intensive industry.

Costs of Energy and Companies' Response

Energy comprises 2-4 percent of the sales price of baked goods, and is 4-8 percent of the cost of manufacturing. By itself, energy is not a significant factor when compared to ingredient and labor costs.

A typical electric bill for a large bakery is \$100,000 per month. Smaller operations may be billed at \$15,000 to \$20,000 per month. In addition, bakeries have gas bills and high transportation fuel bills. Interstate (a company represented at the meeting) has 7,000 vehicles on the road devoted to delivery of goods from the industry.

One company has a ratchet clause with its utility to help reduce its energy bills. As a result, the company sheds loads and uses off-peak scheduling to control costs during the cooling season. This same company recently installed a cogeneration system and is now looking at absorption chillers to use the excess steam produced.

Many of the companies are reportedly participating in various efficiency programs, e.g., the Environmental Protection Agency's Green Lights, and utility power factoring and rebate programs. It was also mentioned that companies have had many problems dealing with utilities, especially in power factoring. The equipment which utilities installed outside the plants cut the utilities' costs but not the bakers'. The bakers therefore introduced power factoring inside the plant on their own.

Information is shared in informal meetings and in more formal settings such as meetings of the American Society of Bakery Engineers at which papers on energy management are presented. When presented with a cooperative approach between government and industry to identify processes, new technologies, and product designs to improve energy efficiency, the bakers reported that they do not currently have available the capital required to cost-share research.

Members reported that they would most benefit by DOE's simplifying the purchasing of natural gas, allowing them to buy at the wellhead as opposed to from a local distributor or utility. Most bakeries are small, regionally-based, family-owned businesses which do not have access to the natural gas market.

Energy Tracking, Targeting Practices

One representative mentioned that as the plant manager for his company he oversees a weekly energy audit and signs off on the utility bill. This individual tracks energy costs himself, and is responsible for reducing them as part of a larger goal to reduce costs in general. He mentioned that targets to achieve specific energy reduction goals (kwh and cubic feet of natural gas) are set annually in the forecasting budget.

Other companies reported that they had similar staff, but that in all cases energy consumption was only one of this individual's duties. Companies cannot afford to have an individual, much less a team, concentrate solely on energy consumption.

The industry has become more efficient in its production over the last few decades. This has resulted from a downsizing of the industry where older, less efficient plants have closed, as well as introduction of more efficient technology. Whereas 20 to 30 years ago, it took three ovens to produce 200 loaves of bread per minute, today one oven will do the job. Similarly, one "proofer" (box or area where the dough rises) now does the job that required three proofers in the past.

The plants are pretty much alike and have similar processes; energy usage is therefore easy to monitor. Members reported that two plants producing the same volume of product would have similar energy consumptions. There is not a marked variability between plants as might be the case in other industries.

Suppliers and Vendors Have Important Role

Suppliers of equipment to the industry must include estimated energy costs in installation quotes in order to sell equipment. In addition, information on the potential for heat exchange with the systems is also requested. One aspect of baking equipment is that energy costs will exceed the capital cost over its lifecycle.

All of the innovation in the industry comes from the equipment vendors; there are no continuous process improvements originating at the plant level in this industry as occur in other industries. When a new oven design or other piece of equipment is developed, this information is made available to all equipment buyers at once.

**American Forest and Paper Association
July 14, 1993, 12:00 Noon
at the Association**

Energy Use

The biggest energy users in the industry are large, integrated mills. Energy is about eight percent of the final product cost for the pulp and paper industry, as measured by the cost of purchased energy. A large percentage of the energy used in a modern plant is derived from process by-products, such as spent pulp liquor or tree bark. Energy is but a small part of the cost for converting mills and fabricators, who have more of a sales orientation, and focus on product quality and customer satisfaction. The representatives felt that opportunities for dramatic improvement in energy efficiency were taken advantage of several years ago, and remaining incremental energy advantages achieved by large capital investments may not be cost effective.

Costs and Benefits of CE-189

All of the company representatives attending the meeting had experience with the CE-189 program. The Association continues the energy efficiency reporting practices established by CE-189 virtually unchanged, although the reporting frequency has been extended from quarterly to annually. The current energy reporting effort is useful to the association for information purposes. Any change in format or information requirements would require a significant investment in setup and retraining costs for both the Association and the individual corporations.

The current cost of data reporting is the equivalent of one full time person at the Association. The labor cost to individual companies varies depending on the degree of centralization of the company's organizational structure. One representative estimated that it takes three person days a month for ten plants combined; another estimated that it takes a half-day per month at each plant, assuming the raw data is already available (has been collected in some other format). Some companies will have a corporate energy staff that looks beyond efficiency questions (e.g., fuel purchasing), while at plants, energy efficiency is part of a broader job description (e.g., process engineering).

The representatives noted that a significant degree of follow-up is required for data verification at the both the corporate and association levels. Additional costs are incurred as a result of turnover in the plants, which creates a recurring

and steep learning curve for the individuals responsible for selecting energy efficiency data to communicate upwards to management. Internal information management systems are so nearly unique that a centralized training function such as might be provided by the U.S. Department of Energy would not be useful. Training of value would have to focus on means of extracting reporting data from within the plant's operations.

Issues Related to CE-189

The energy efficiency information gathered is used as an indicator of performance, a "barometer" of overall operating efficiency, but is not "scrubbed" as part of the accounting process. The information collected within a company cannot be used to competitively benchmark against other corporations because too many factors affect the number. Looking at each piece of data in isolation does not convey much meaning. At issue is whether reporting would continually create problems in trying to compare apples to apples; the context in which the data is compared could turn a given number into either an increase or a decrease in energy efficiency.

The Association used to perform special studies on energy consumption for a given type of mill or process in a given geographic region. The data was printed out for companies willing to pay for it. This service was discontinued when the manufacturers failed to find the information useful due to high variation among individual mills. Confidentiality concerns and exposure to risk in energy litigation were additional reasons cited for the discontinuation.

Confidentiality is a major issue when considering a program such as CE-189. The representatives cited as an example a letter for the Energy Information Administration dated August 9, 1991, which explained a ruling by the U.S. Department of Justice directing EIA "to provide company-specific data in its possession to any requesting Federal Government department, official, and agency for official use." The effect of the change was that "should your data be asked for specifically in individual company form, EIA must proceed to honor such requests." The Justice Department ruling raises concerns among the Association members concerning ultimate use (or misuse) of data which would be collected under a new program, should it be proposed and implemented.

Another issue is the form which energy efficiency data reported might take. AFPA members are currently reassessing their data needs, and opinion is

forming that a "cradle to grave" or lifecycle analysis may be more useful than specific energy use numbers.

Members stated that management is aware of energy costs and saving opportunities, but that there was no cause and effect relationship between the CE-189 program and the level of attention given to energy efficiency. They doubted that energy reporting or voluntary targets would automatically lead to increased awareness of or investment in energy efficient technologies. At the plant level, operations people will meet in an energy committee, so that they think about energy costs and saving opportunities in carrying out a wide variety of duties. To quote, there are "no imposed criteria that DOE could put upon us to behave any differently than we are now."

Decision-Making

In addition to being one of the most energy intensive industries, pulp and paper is the most capital-intensive manufacturing industry. The industry is always restrained by the availability of capital, and a constant prioritization guides corporate decisionmaking. Generally speaking, corporate management does not tell plant operations how to spend money. Plants will make requests, then corporate decision-makers will take into consideration budget limitations and corporate priorities in approving them. Corporate decision-makers tend to be conservative in choosing investments. Given a total operations budget ranging \$1 to \$10 billion, a single investment can be a very large percentage of the total; companies can therefore not afford investments in unproven technologies or processes.

While investments may not be counted as "energy projects" per se, energy-related improvements frequently accompany process improvements. For example, boiler audits will cover not only energy efficiency but also safety and environmental concerns. High efficiency motors, lighting, and insulation are covered by capital improvement projects.

It is worth noting that 60 percent of all capital spent in paper mills is devoted to environmental projects. While conventional wisdom leads one to assume that energy-related benefits are derived from environmental projects, often the opposite is true. Investments in internal process changes to reduce environmental costs may increase energy costs, such as occurs when replacing chlorine in the bleaching stage with other, more energy-intensive alternative inputs.

Other examples of conflicting environmental and energy efficiency goals exist. They include lightweight paper products, which relates to source reduction needs; increased environmental controls; increased cogeneration, which on paper seems to increase energy use without reflecting cost savings; greater process integration, which again boosts energy use on paper, resulting from manufacture of chemicals on the site, without reflecting cost savings; and waste minimization/utilization. Increased use of recycled paper products appears to increase consumption in the industry because much of the energy required is normally supplied by waste products. These wastes are not present with recycled materials, therefore the energy they provide must instead be purchased in the form of conventional fuels from offsite.

Possible Approaches to Improving Energy Efficiency

The AFPA and member company representatives felt that joint R&D efforts with DOE are the most effective way for the Department of Energy to promote energy efficiency in the pulp and paper industry. AFPA is currently conducting joint research with DOE on instrumentation and processes, including modeling of a recovery boiler. Joint research takes place among firms as well. In terms of product and dollars, technology development and deployment will make the greatest impact on energy efficiency.

Participants from the American Forest and Paper Association

John Heissenbuttel	AFPA
Allen Koleff	Stone Container
Mike Levy	AFPA
Jeremy Metz	AFPA
John Murphy	Champion
Bill Nicholson	Potlatch
Sam Robinson	AFPA
Tom Single	James River
Mark Yacker	AFPA

American Iron and Steel Institute
May 20, 1993, 1:30 p.m.

Energy Use in the Steel Industry

AISI represents about two-thirds of the industry in terms of tonnage output. In terms of energy consumption, the entire industry (as opposed to AISI members only) uses 3 percent of U.S. energy, and 10 percent of total industrial energy consumption. About 20 percent of the industry's manufacturing cost is energy. Energy is exceeded only by labor in terms of single input factor cost, and is the most expensive material cost.

Integrated producers use more energy in their production processes than non-integrated producers. Integrated producers start with raw iron ore and coke (a derivative of coal), and combine these in the blast furnace to produce pig iron, which is then later processed into steel. Sixty percent of the energy used by integrated producers is in the form of coke. Non-integrated producers start by remelting scrap steel, thereby saving the blast furnace step and its associated energy consumption. Energy use amounted to 22 million Btu/ton of steel shipped in 1992, down from 35 million Btu/ton in 1975, representing a 40 percent decrease in energy per unit of steel shipped.

Energy Efficiency Measures Undertaken by the Industry

Improved energy efficiency frequently accompanies technological improvements. An example is continuous casting, a direct production process which eliminates discrete heating and cooling steps found in the older batch process. Continuous casting also improves yield, which affects the resulting calculation of energy intensity. Another example of energy savings accompanying technological change has resulted from the greater industry reliance on electric furnace steel production by non-integrated producers, from 25 percent 15 years ago to 40 percent now.

Energy conservation programs (non-process energy efficiency improvements) also contribute to decreasing Btu/unit production. At the corporate and plant level, energy/facility managers hold meetings on energy conservation. The types of measures promoted are simple things like turning off the lights when not in use. The benefits of conserving energy are brought to a more personal employee level by relating them to company performance.

Retrofitting normally accounts for the majority of energy efficiency improvements made. These retrofits typically require large capital investment. Continuous casting implies \$350 million capital investment in retrofitting. On the other hand, energy efficiency is almost never the primary driver of investment; rather, customer-oriented issues like product quality or cost are. If a furnace retrofit only offers a payback of 8-10 years from energy savings, it probably won't be replaced because energy consumption is not a customer issue per se.

Retrofits to improve processes and associated energy consumption can also be made for plants that lack capital, in lieu of new construction. For example, the conventional soaking pit typically used 1.1-1.2 million Btu per ton several years ago. Now, by employing liquid center charge technology in these same pits, energy use has been reduced to 0.57-0.6 million Btu per ton. Making this modification did not require a large outlay of capital relative to installation of new pits.

Reaching Point of Diminishing Returns

Corporations are revamping the steel making industry, tearing down and replacing lower quality facilities. But the industry is reaching the point of diminishing returns. From '73-'87, large efficiency improvements occurred. But in '88, the rate of efficiency gains really started to flatten out, even though the industry has continued to increase the percentage of steel made using continuous casting. There are much fewer opportunities for energy conservation prospects than before. There are thermodynamic limits to the amount of energy that can be saved in the process. Also, plants have been operating at 75-80 percent of capacity over the last few years, which results in less than optimal energy utilization.

Current Data Collection and Information Sharing

Steel is a cost-driven industry. Upper management pays close attention to energy information because of the cost and hence competitiveness implications. The industry gathers information on its own to track total consumption of fuels, including natural gas, electricity, oil, and coal. AISI also breaks the data down into use subcategories for each fuel source—coke, cogeneration, and so on. The numbers come from the purchasing department, i.e., "what's coming over the fence," as opposed to measuring energy exchange within the plant. The information gathered by AISI is useful for illustrating trends in the industry, and to help inform public policy discussions.

Energy management teams are currently in place and participate in the information gathering and sharing activities of the industry. In fact, energy management teams were in place *before* CE-189 was implemented. While it may appear worthwhile to try to categorize actions taken according to conditions existing before CE-189, during CE-189, and post-CE-189 (i.e., during the MECS program), the fact is, there are too many variables to do this. Implementation of energy efficiency cannot be examined in the industry in the light of only a single or even a few factors.

The level of detail of available information has not changed over time. The industry knows how much energy is going into production, and what is accounted for in the final product. The accuracy of the data has changed, however, because it is much less subject to human error. Data gathering has been improved by computer control. Sophisticated computers collect, analyze and print out Btu/ton information.

Data sheets are produced daily, providing a profile on energy consumption by process (e.g., rolling), but cannot desegregate by product. Essentially, these systems primarily produce gross numbers—are the results in or out of range of normal consumption? Also, if the rate of change in Btu/ton drops or rises too quickly, this raises a question about the quality of the numbers. Investigation generally produces a logical answer to unexpected variations. The emphasis on reporting energy efficiency has also not changed over time. The effort to examine energy as part of cost neither began in 1976 with CE-189 nor stopped in 1985 when the program ended.

The industry communicates well within itself. "Energy conservation opportunities" are one set of tools used to share information. At the Energy Committee meetings, each company is supposed to bring a fact sheet on conservation opportunities identified or acted upon to compare and share with others. The industry has done this for several years. The fact sheet will include a list of contacts, and follow-up from other Committee members frequently occurs. That is a preferred method of sharing information, as opposed to statistical comparisons or benchmarking.

Gaps in Data Gathering and Reporting

The industry lacks good measurement of energy flows within the plant. This gap in data gathering makes it difficult to report energy in any reliable way. Companies are trying to get a handle on how to define energy distribution

within the plant and throughout the company. Also, there is not a standard unit for comparing energy use. Plants differ in how they measure energy use based on the requirements of their internal accounting systems or traditional practice, for example. Some companies use Btus, some kWh, some still use therms.

There is not currently a good way for accounting for product content differences (e.g., value added) in comparisons of unit energy consumption between plants. Electric furnace producers and integrated steel producers differ according to the products they produce, e.g., reinforcing bar and light steel, as opposed to complex alloys. The differing materials and processing contents with these products makes energy consumption comparisons difficult. A real need for such a methodology exists, especially in making international comparisons. Another area where data gathering and reporting can be improved is at the process level. Currently, measurements are too varied across different corporations and plants to be of use for comparison purposes.

CE-189

All of the U.S. companies represented at the industry consultation meeting on May 20 had been involved in CE-189, although none of the individuals had been personally involved. Contact at Bethlehem: Mr. Fillman, involved in CE-189, can be reached at (215) 694-3675. Joe Thiel at Inland will also check to see if others at Inland were involved in CE-189. The AISI members asked why CE-189 was stopped. It was explained that CE-189 had achieved its objectives. The targets set by the program were met.

Costs, Not Reporting, Drive Energy Efficiency Efforts

For the steel industry, CE-189 did not make a difference in terms of the amount of efficiency investment undertaken. The industry would have taken steps to improve energy efficiency even in the absence of CE-189, because of cost rises in oil prices, gas prices, and expensive coal contracts. The driving forces for investment are really yield and quality (and hence unit cost). Energy efficiency improvement is frequently a fortunate by-product of investment made in response to these other drivers. An example is a furnace designed for a quality product in which heat distribution is precisely and evenly controlled. The improved control also improves energy efficiency.

The industry is not a slave to the number of energy units per unit of production, and in fact may actually be willing to expend more energy to lower labor costs or the cost of some other material. Producing what the customer wants is also very important. Value-added products, like coatings, take energy to produce but are demanded by the customer. Galvanizing lines will increase energy use, but the galvanizing process is required by customer demand. Energy efficiency measures are constantly pursued, but the measures have to be cost effective. When energy efficiency is competing with productivity enhancements and quality control for a limited supply of capital, typically, the energy efficiency program needs a handsome return on investment in order to surpass other projects.

In response to a question about whether managers' performance ratings were linked to energy efficiency, the AISI members stated that relationships are drawn between energy efficiency and performance, but only as part of a larger performance goal to decrease overall production costs. Quality and cost is what managers are rewarded on (and energy is not a sole factor of cost).

Quality Control Also Derives Benefits for Energy Efficiency

In some instances, companies will make trade-offs between energy and cost and product quality improvements. In general, the priority is to refine the quality of the product, to make it right the first time. This reduces the need to expend extra energy or labor fixing mistakes, and costs are thereby reduced.

CE-189 Had No Direct Benefit

Individuals at the meeting report that there was no discernible benefit in terms of energy savings resulting from participation in the CE-189 program. On the contrary, the process was quite people-intensive. "We had our own reporting system for upper management. Our managers were looking at our own numbers (as opposed to those gathered to comply with CE-189). It took several people to fill out the DOE forms, there was a big problem trying to level the numbers out to meet the requirements." The reporting of corporations' percent change over the base year did not contribute to surpassing targets. The technology drove energy efficiency efforts, not the targets themselves.

New Program?

The following issues were mentioned as concerns to the steel industry regarding possible establishment of a new program:

- A new program is another weight to sink marginally-operating plants.
 - Wouldn't want to change reporting requirements from what is currently being done for AISI and the Energy Information Administration.
 - The ground rules for reporting are a concern; in CE-189, if a plant was shut down, the reporting structure or the base for reporting changed. The ground rules for reporting required a lot of doubling back to reexamine baseline numbers.
 - Suggestion that whomever is responsible for receiving data rely on trade associations as opposed to individual companies, on the assumption that the trade associations are already gathering the information.
 - Make clear to those providing information what the data will be used for. "Unless I understand the value of the information you're collecting, it's difficult for me to know what to provide. It's extremely difficult to benchmark each other for comparisons. I don't understand the value of this exercise to the country or to industry. We submit reports to EIA, but never see anything back."
 - The program will need to look at pay-offs of energy technologies in terms of their competing with customer requirements and other things competing for capital. Targets have to be put in the context of the plant, and each company is different. There is no level of detail at which targets would be of use, except for facilities within the plant.

Information of Most Use Under New Program

Information related to individual processes would be of most use in individual corporations. Once the information is aggregated to the plant level, it loses its usefulness. Corporations already know where energy is going in and where it is coming out. The need is to find out where the energy is being lost and its quality (temperature). For example, the temperature of the stack gases, temperature and volume of water exiting the plant, etc. are of interest. The intermediate goal is to measure the quality of energy lost, with the end goal of recovering that energy.

There is a need for other systems, where measures are shown that have been demonstrated to be cost-effective. Corporations already know where they are in terms of their energy intensity vs. the competition. The main focus is determining *how* to reduce their intensity. The industry is more interested in tech transfer than reporting requirements and targets. Technical information is shared within the industry. Corporations receive information from their equipment suppliers and from their competitors. Major projects with DOE will often leap-frog technology; this is a good expenditure of funds and the industry is very interested in participating in these programs. Direct steel making is a current example. If successful, this technology may change the face of the industry.

Where to Start in Setting Targets

Two ideas were proposed regarding where to start in terms of defining targets and establishing an effective targets program: detailed industry studies and examination of other model programs incorporating targets. There were two previous studies related to identifying the potential for energy savings within the iron and steel industry.

The IISI study in 1982 looked at three model plants (integrated, steel furnace, one other) and state-of-the-art technology at the time. It designed these model plants with state-of-the-art technology in all processes and equipment, and then estimated the various energy flows through each plant. The real value of the study was in information pertaining to the potential savings in individual processes given the then-current technology. AISI is investigating whether IISI would be interested in updating the study. This study was valuable for comparison purposes, rather than from a realistic design perspective. No one can go out and install state-of-the-art technology in a greenfield plant from beginning to end because of the associated costs. Firms need to know where the biggest bang for the buck exists and make choices on what technologies and *processes* to install.

A second valuable study was done by Battelle in 1975 for the purpose of establishing the targets for CE-189. This study incorporated a useful definition of energy utilization in various processes which was of interest to the industry. A new study incorporating elements of these previous studies could be very valuable to the industry. Currently, industry sees a need for a good, thorough international comparison of processes. The industry representatives also

mentioned an Oak Ridge report, *Energy Efficiency: How Far Can We Go?*, as containing a useful list of references.

The industry representatives at the meeting also suggested that in looking for good examples of targets programs, the DOE look at EPA's 33/50 program. In this program, companies set their own targets for reductions in toxic substances that are included on a list. EPA set national goals for reductions of emissions of the 17 substances on the list, then went to companies to gain individual commitments on voluntary targets for percentage reductions and timetables. As a follow-up to the program, EPA publishes an annual report on progress toward its national goal and industry contributions to that goal.

EPA's program does not have a hard-edged verification system; rather, companies participating make their commitment to EPA a business goal upon which they are publicly judged. The difference is "you put it up on the wall for all to see." The commitments are not just given lip service within a company, but are also a commitment to people outside the company. The key point is that EPA set the overall targets, but companies looked at the options available and decided how they could best contribute. A possible drawback of this approach is that companies could put forward a target based on what is already under development, as opposed to setting a goal and then taking on new initiatives to reach it.

Focus on Technology Development of Greater Benefit to Industry

DOE should be funding new technology development and looking at ways to recover lost resources. DOE could help the industry's equipment suppliers to develop better furnaces, for example. DOE should focus on demonstration and adoption of new technology, and help industry understand what can be done to become better at using energy. Industry will then share this information. Most big picture research efforts require collaboration and cost-sharing within the industry.

DOE's clean coal program is a good example of federal dollars being well spent. Industry needs guidance on where to spend money, how to get bang for the buck. The domestic industry is looking around the world at technologies used by international competitors, but can't justify adopting a lot of what they are doing because the cost of energy in the U.S. is much less.

DOE could also help with technology transfer across industries. The steel industry and utilities share a problem of large amounts of heat escaping in the form of low temperature cooling water, for example. This presents an opportunity for potential energy savings that exists across industries, if it can be economically recovered. Technology transfer from one industry to another will give energy management staff something they can take to management to support the proposed investment. DOE should consider sponsoring seminars and workshops to aid in technology development and transfer, and using an incentives approach, similar to EPA's environmental leadership program, OSHA's gold star, Commerce's Baldrige award.

Note on Canada

Canada may be formulating a similar effort under the auspices of the Canadian Industry Programme for Energy Conservation. The goal is to enhance economic competitiveness by increasing energy efficiency, at the same time decreasing CO₂ emissions. Canada's energy agency is currently undergoing the same industry consultation process as DOE.

On the Workshop

AISI stated they would like to have a couple of seats at the consultation workshop scheduled in September. They noted that they would also like to have some information or findings to review prior to attending the workshop. For the workshop (and the consultation process), DOE ought to also consider consulting with the steel manufacturers association, which represents electric furnace producers.

Participants from AISI:

Bruce Steiner	AISI
Joe Thiel	Inland
Tony Martocci	Bethlehem
Douglas Trerice	U.S. Steel
Ed Barnes	Dofasco
Bob Wright	LTV Steel
Kevin Morray	The Tinken Company

**American Meat Institute
Meeting with Deb Atwood
July 14, 1993, 2:00 p.m.**

The message we received from this conversation is that the members of the American Meat Institute do not believe a reporting program will achieve the stated objective of increasing corporate management's attention on energy efficiency. In fact, company managers are very conscious of the energy flows within their plants, and their level of consumption. In addition to following energy efficiency guidelines which AMI produced in 1978 and conducting audits to cut costs in several areas that include energy, member companies are working with utilities and taking advantage of incentive programs for energy conservation. They also rely on vendors and the market in general to convey information about the energy efficiency characteristics of new equipment. Finally, member companies are exploring ways to capitalize on the potential for methane-based electricity cogeneration.

AMI is concerned that a new program would take the form of a regulatory mandate. This concern is amplified when considering the meat industry's experience with the Occupational Safety and Health Administration's (OSHA) 200 Logs and the Environmental Protection Agency's (EPA) Toxic Release Inventory (TRI) reports. AMI expressed concern that the TRI form would become the model for a new program on energy efficiency under the aegis of the Department of Energy. AMI suggested more effective models such as the Voluntary Protection Program at OSHA, and the programs under the pollution prevention umbrella at EPA. AMI also believes that incentive-driven programs, including investment tax credits, would be more effective in promoting energy efficiency in the meat industry. The incentives will need to recognize that investment decisions made in the meat packing and processing plants are based on two primary criteria: price and durability. An additional concern is that a reporting program would have enforcement mechanisms unfavorable to industry, and that enforcement and verification would add to the costs of the program.

A particular concern of the meat industry in developing an energy efficiency reporting program is that it be flexible enough to accommodate the many health and safety regulations imposed through meat inspections. Many aspects

of the meat industry cannot be modified to improve efficiency because of health regulations. Nonetheless, areas of opportunity may exist in refrigeration, motors not exposed to the packing and processing operations, and boilers.

Additional Contacts

Jens Knudson	American Meat Institute
Steve Prestwich	National Broiler Council
Kent Anderson	International Institute of Ammonia Refrigeration

American Petroleum Institute

July 15, 1993, 2:30 p.m.

Energy Use

Energy use in the petroleum industry is assessed at the individual operating unit. At the refinery level, managers look at energy use in terms of operating efficiency of particular equipment, as opposed to overall measures of energy efficiency. Examples of measures used include stack temperature and air flow. Energy cost as a percentage of the final product will differ from plant to plant. API representatives noted that the biggest single refinery cost is the raw material cost (i.e., cost of crude oil), followed by labor, and then routine maintenance. At a refinery, a company may have anywhere from 6 to 15 process engineers; one to three employees, most likely chemical or mechanical engineers, will be devoted to improving process improvements, which include energy efficiency improvements.

Opportunities for energy efficiency improvements exist, though mostly at the margin, such as energy efficiency benefits derived from upgrading electric motors. On the whole, however, most plants already have energy efficient equipment in place, having made considerable improvements over the past 20 years.

API is working with its members to improve energy use practices through its STEP program, "Strategies for Today's Environmental Partnership," and the development of management practices based on the guiding principles outlined in STEP. A set of management practices on resource conservation were approved in May. These are recommended practice for API members; although they are voluntary (because of anti-trust constraints), most companies traditionally adopt or exceed recommended management practices.

Progress will be measured through a self-assessment at the corporate level, and aggregated at the industry level by API. Progress measurements will be collected for refining, marketing, transportation, and exploration/production. The first set of assessments are due to be sent out to companies in December, allowing API, through an accounting firm to protect data confidentiality, to develop a baseline by March 1994. Looking at the longer term, API plans to hold workshops to concentrate on areas of lower performance as identified by the survey where API can assist its members in implementing the management practices, which are aimed at improving performance.

Costs and Benefits of CE-189

Broadly speaking, API is not aware of any particular benefit derived from CE-189. Costs were incurred in collecting, compiling, and justifying the numbers. Companies were put in the position of putting together information for the government that was not used in daily operations. API relied upon many adjustment factors to explain variations that occurred when aggregating the numbers reported by its members; after a while, the adjustments began driving the numbers reported.

Nevertheless, the adjustments were absolutely essential because over time the quality of the crude oil imports changed and the composition and specifications of outputs changed. These changes affected energy use in the refineries so that a simple measure of energy use and throughput would not provide a reliable measure of changes in energy use efficiency. About 50 companies submitted data to API, which then aggregated it. API has no idea of the manpower required to do this, especially since many companies have multiple plants and had to assemble the data at the corporate level before sending it on to API. Moreover, due to recent downsizing in the industry, there is little expertise and institutional memory left regarding CE-189.

Issues Related to CE-189

CE-189 was conducted in an entirely different economic environment concerning energy use. As oil prices rose in the 1970s, economic incentives encouraged improvements in energy efficiency, leading to very attractive energy efficiency investments. In today's climate, oil prices are low and most analysts, including DOE, do not anticipate an uptrend, lessening the economic incentives for improving energy efficiency.

Were a program similar to CE-189 established, resistance to the reporting aspects of the program would exist within the oil industry. The Institute has broached the idea of conducting energy efficiency reporting on behalf of its members, but has in fact met resistance. Member companies have their own data systems which they protect. Furthermore, to achieve consistency and comparability of the energy efficiency data collected, member companies would have to change the way in which internal data is gathered and formatted. The way in which energy efficiency would be measured under a new program was also mentioned as a concern.

Information sharing does take place in the industry, especially in technical for a such as those offered through API's standards development program. Four hundred standards, recommended practices, and technical bulletins are reviewed on a regular basis. Through program-sponsored events, API members exchange information on the existing technology, operating practices technology development, and other issues related to issuance of a new standard.

Decision-Making

Companies already have their own programs in place, consistent with but older than STEP, to guide resource investments. Performance objectives, including those related to energy efficiency, will vary dramatically from company to company. Variables include the company's line of business within the industry (i.e., which may range from large integrated corporations, to very small service or engineering firms), financial situation, its product mix, and compliance with environmental measures. Legislative and regulatory requirements and corporate policies will provide guidance to the plants on specific performance objectives to be achieved.

Possible Approaches to Improving Energy Efficiency

API felt that the Department of Energy should consider focusing on industries below the targeted ten most energy intensive industries, where awareness about energy efficiency is lower, and where greater opportunities for energy efficiency improvements exist, along with a need for assistance in information sharing and networking. Technology transfer may also be an area in which government can play a constructive role in improving energy efficiency within the industry.

Analogous to this type of activity is API's pollution prevention program. API supports a pollution prevention task force whose objectives include identifying pollution control opportunities and developing and managing pollution prevention projects. The scope of the task force is multi-media covering air, water, and waste and both refining and distribution. The task force has conducted several surveys and studies, one of which includes the finding that in a crude unit refinery a correlation exists between energy efficiency and pollution prevention, and that reductions in all media can be obtained. The drivers for this work are the high costs of waste management and disposal. API funds this work entirely internally, which indicates that the industry considers pollution prevention to be an important issue.

Participants from API

Len Bower

Barbara Bush

Cammie Hussey

David Miller

John Peschke

Walt Retzsch

Also Participating: Bob Fisher, representing Arco

Chemical Manufacturers Association
June 10, 1993

Attachments

Two attachments are included with these notes: (1) a letter from Mr. Robert A. Roland, former president, Chemical Manufacturers Association (CMA) and (2) a presentation by the Dow Chemical company, *Involving Employees in Energy Conservation and Waste Reduction*, which was provided as a follow-up to the meeting by Mr. Parker.

Structure of the Chemical Industry

The chemical industry is highly energy intensive and has been very committed to monitoring energy consumption and energy efficiency, both before and after the CE-189 program. However, wide variation among individual plants in the industry and constant change in the types of products produced makes it difficult to implement a rigorous reporting program such as CE-189. The association resumed its own voluntary annual energy survey in 1988 and has recently established a voluntary energy efficiency program.

Energy Use

Energy represents about 10 percent of overall costs in the industry. If feedstock use is included, energy costs can rise to 70 percent for some products. Thus, energy is an important cost component for the industry. In their discussion of energy, representatives distinguished between energy consumption for either fuel or feedstock use.

Decision Making in the Chemical Industry

Representatives emphasized that cost is the driver for business decisions. Overall productivity or overall efficiency, rather than energy efficiency, is the goal of industry and targeting energy efficiency improvement by itself will fail because energy is only one factor in production. Investment in modern, energy-efficient technologies is undertaken only if a company is going to invest in new plant for reasons other than energy efficiency. Chemical facilities depreciate over time. When the time comes for replacement or upgrading, the most energy efficient facilities that can be economically justified will be installed. But the replacement decision—and also any decision on incremental changes—will be purely economic. Furthermore, decisions may not be uniform

across different plants within a corporation because costs (energy, labor, distribution) vary so much by region. The "hurdle" rate varies from company to company and depends on capital availability.

Costs and Benefits of the CE-189 Program

Most representatives at the meeting were not directly involved with the previous program. However, in the words of one representative, "We have heard horror stories—it was comparatively complex and got away from reality." Several expressed the opinion that establishing a similar program would be a "horrible mistake." The wide variation within the industry, and between facilities in the same grouping (e.g., the petrochemical industry) makes it impossible to have targets.

One representative, who was knowledgeable about CE-189, voiced several criticisms of the program:

1. The reporting was time-consuming and a major effort, especially in the beginning. For example, a lot of time was required to come up with BTU per pound for the 250 products produced in the company.
2. It was difficult to ensure accuracy of the reported data. Over time, changes in the industry, especially changes in the products, required constant updates.
3. Accuracy was also a problem in meeting the targets. The introduction of new products presented a problem for estimating energy efficiency because there were so many issues to try and sort out.
4. The program did not offer any value to industry. Rather, it was a costly effort to report information that did not affect business decisions.

In a subsequent conversation, one representative stated that to get an efficiency improvement of 10 percent in the electricity generated on-site, the company would need to undertake an investment of \$2 billion.

The CMA Energy Efficiency Program

Following termination of the CE-189 annual energy reporting program, CMA instituted its own annual energy survey in 1988. The participation rate in this annual survey is approximately 50 percent of CMA's members, and includes most of the major energy users. In addition to the annual energy survey, CMA adopted an "Energy Efficiency Continuous Improvement Program" in January

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1993. This new program is separate from CMA's Responsible Care® program, but is fully consistent with it.

Establishment of the new energy efficiency program was driven by economics and by recognition that, given its high energy consumption, the industry needs to communicate its progress on pursuing energy efficient production methods. Energy is an important component of cost and the industry faces a competitive, global market. The program was viewed as a good way to raise visibility among upper management and encourage companies to participate in energy efficiency continuous improvement.

Some issues related to effective operation of the annual energy survey are still problematical. When asked how measures of efficiency were calculated, representatives acknowledged that measuring energy input against constant dollar sales or value-added is not a perfect solution, and that estimating on the basis of pounds of product was "a bear." They emphasized that these were "just ballpark" measures, which would not require a lot of effort in comparison with the CE-189 program, and that the program was not intended to be rigorous. Members did not believe that they could spare time gathering data to meet rigorous standards, given the competition that they currently face.

Unlike the CE-189 program, the association's own annual energy survey uses existing, internal data that the companies have compiled for their own purposes and that requires only a few days to compile. For some companies, which have a wide variety of products, confidentiality is not an issue; the variety effectively masks the energy consumption for any particular product. In most cases, however, data security is a concern. Companies report to CMA, which "rigorously" safeguards their individual data and reports only aggregate data. The association sends out summary data to all members annually.

Representatives reported that it is too early to tell what the impact of this new efficiency program has been on investment, if any. Companies view the program as a good way of benchmarking their energy consumption with that of the average and of helping to measure competitiveness.

Possible Approaches to Improving Energy Efficiency

Representatives reported that there was a high level of information sharing within the industry, although on a generic basis. Information is shared at professional meetings (e.g., the American Institute of Chemical Engineers) and

conferences (e.g., the Industrial Energy Technology Conference sponsored by Texas A & M). Tom Parker agreed to send a copy of a presentation recently given by the DOW chemical company (see attached).

Additionally, consultant surveys are frequently commissioned. These surveys allow companies to compare their energy performance with that of others, while maintaining confidentiality of the companies surveyed.

Representatives recommended that industries that had already established a voluntary program should be exempt, if Congress decided to establish a program to encourage energy efficiency. They questioned why the data submitted for the MECS was not adequate.

Alternate approaches that government could adopt to encourage energy efficiency were suggested:

- Put in place a program that provides incentives, e.g., the Baldrige Quality Award. CMA reported that they already have a safety award program and intend to set up something for energy efficiency also. The association is currently examining how to establish the program and whether they would allow companies to be evaluated on the basis of a submitted record.
- Encourage overall productivity improvement rather than energy efficiency; frequently, increases in productivity are accompanied by increases in energy efficiency.

Representatives expressed interest in the grants program under Section 131 of EPACT. To date, the association has not thought out their response; they acknowledged, however, that prestige would be a major factor affecting their response to any new government program.

Participants from CMA:

Peter Burke	Rohm and Haas Company
Paul Cicio	The DOW Chemical Company
David Damron	Hoechst Celanese Corporation
Gary Griffith	CMA
Royce Laffitte	Eastman Chemical Company
Haig Moreton	BASF Corporation
Tom Parker	CMA
John de Ruyter	DuPont
Sivam Rangavajjula	EIF Atochem North America, Inc.
Steve Smith	BASF Corporation
Tim Soles	Amoco Chemical Company
Mike Turner	Exxon Chemical Company

**Computer and Business Equipment Manufacturers Association—
Environment Subcommittee of the Government Relations Committee
July 15, 1993, 10:00 a.m.**

When discussing energy efficiency, the CBEMA members first think of the energy efficiency of their products. CBEMA is a leader in the Environmental Protection Agency's (EPA) Energy Star program. Companies receive many benefits from their participation in the Energy Star program, including competitive advantage (EPA allows product labeling with the Energy Star symbol), response to consumer demand, market access to the federal government, leadership in international standards and product labeling which increases opportunities for international trade, and related positive public relations.

In addition, CBEMA members are subject to Section 125 of the Energy Policy Act of 1992 (EPAAct). This section requires DOE to consult with CBEMA and related organizations in providing financial and technical assistance to support a voluntary national testing and information program. The program centers around types of commercial office equipment which are widely used and present significant opportunities for reduced energy consumption.

CBEMA members reported that energy efficiency on the manufacturing or facilities side of their operations already receives some degree of attention from corporate management. One company representative mentioned that a report on energy efficiency, in terms of both facilities and product consumption, was soon to be presented to the Board of Directors. This same company recently joined EPA's Green Lights program; because an estimated two-year pay back was longer than what is generally accepted for investment decisions, high level authorization was required. Joining the program was seen as a long-term means of reducing manufacturing costs. In general, energy efficiency is tracked as part of the cost structure of the companies, and special attention is being paid today because of the prospect of an energy tax.

Computer and business equipment manufacturers have cut energy consumption and increased their productivity over the past several years. The manufacturing process as it stands today is energy efficient. Part of the reason for this is that manufacturing processes must be on par with the "high tech" nature of the business as a whole. Secondly, micromanufacturing and micromachining processes consume less energy generally than the traditional molding and stamping processes one finds in other industries such as steel, aluminum, or

pulp and paper. Commensurate reductions in materials used also contribute to greater energy efficiency in the manufacturing process.

The opinion of the group was that a reporting program would not encourage companies to do more than what is already being done.

Recommended Contacts

National Electrical Manufacturers Association (NEMA)

Microelectronics and Computer Technology Corporation (MCC)

**Construction Industry Manufacturers Association
Conference Call 7/21/93, 4:00 p.m. EDT**

Energy Use

The conference call participants estimate that energy is less than ten percent of their final product cost. The bulk of the power is consumed by welding processes, machining, and assembly processes. If energy costs are tracked separately, it is generally done so at the plant level. For example, one company represented generates monthly graphs comparing electricity consumption with labor hours, and presents the information at management meetings. The graphs are used to track trends. This company also produces quarterly energy cost reports that are delivered to management.

Energy goals are market-driven; plant engineering and investments in energy efficient equipment are a function of the market of available new technologies and applications.

Examples of energy efficiency projects being implemented include:

- Relighting projects to replace fluorescent lights with more efficient sodium lights;
- Changes in operations to improve the energy efficiency of a chill water system;
- Tracking and repairing of air leaks, and reviewing a compressed air system to more efficiently move air to the assembly system and lower the set point in the compressor room;
- Purchase and installation of high efficiency motors; and
- Participation in utility demand-side management programs.

Company representatives noted the recent change in attitude at utilities, to a willingness to view power consumers as partners and themselves as vendors or suppliers of a commodity. Detroit Edison, for example, is working with Detroit Diesel Corp. to improve efficiencies throughout the plant. Experts from Detroit Edison are working with company representatives to improve the energy efficiency of the plant's powerhouse, HVAC system, and boiler controls, among others. The utility also founded Energy Partners in the Detroit area, in which plant engineers from General Motors and its subsidiaries meet on a routine basis to work on energy efficiency problems.

Costs and Benefits of, Issues Related to CE-189

Don Witas of CIMA was personally involved in the CE-189 program. Nine CIMA members were required to report under CE-189; today only one of those companies, Ingersoll-Rand, is still under the CIMA umbrella. Others have merged with or been bought by other concerns, or have gone out of business. The companies which participated in CE-189 reduced their energy consumption about 20 percent compared to the base year over the life of the program.

CE-189 was helpful as a catalyst for energy efficiency efforts. As a result of CE-189, CIMA put together an Energy Management Council of 30 to 40 energy management representatives. The Council sponsored seminars and meetings on energy utilization, and published booklets. One such booklet presented a checklist for conducting an energy audit, and CIMA published 20,000 copies, in part through a U.S. Department of Energy grant. CIMA reports it still occasionally receives requests for the energy audit booklet. A separate publication included information on energy projects and savings; member companies relied on the publication to help stimulate thinking and replicate successful projects. The Council no longer exists, primarily because cutbacks in staff have affected members who would have participated on the Council. Currently no company has personnel solely devoted to energy efficiency, instead adding the energy management function to a broader management or engineering portfolio.

The conference call participants noted that energy efficiency improvements tend to be cyclical; once a program is introduced and completed, individuals tend to focus on other things, paying less attention to energy efficiency measures and practices. The participants suggested the cycle time for refocusing and repeating energy audits would be around the five-year mark. The participants stated that an energy "watchdog" in their plants would help prevent waning attention to energy efficiency.

The major cost of CE-189 cited by Witas was that it became cumbersome to comply, which detracted from the benefits received. No specifics on labor hours required to complete the report were available. Witas stated that the report did not require much time at the association level, largely because only nine companies participated, and energy managers at those companies had direct responsibility for completing their reports. For the energy managers, however, reporting requirements quickly become burdensome and are a double

edged sword: for maximum usefulness the reports require process-level detail, but such finely detailed reports increase costs and create a compliance burden. A useful compromise presented by one participant would be to require a detailed report once every five years.

From the Association's point of view, were another program mandated, anything to minimize the reporting burden would be appreciated. If the program were to be maintained on a bi-annual basis, and provide generic information on savings opportunities from simple measures, it might stimulate interest in the construction manufacturing industry. Meeting participants felt that any new program should be supported by technical information and studies on energy efficiency opportunities (including dollar savings) to ease achievement of energy targets and improvements between reports. Developing training courses and opportunities for informal idea sharing in conjunction with a new program would make it more attractive.

The participants also felt that a program would be more successful if incentives for voluntary participation were created, following the same model as the pollution prevention programs developed by the Environmental Protection Agency, and if the program placed greater emphasis on "doing" rather than "reporting." The program should state an end goal, and leave it to the companies' discretion as to how best the goal may be achieved. They also cautioned that the goal ought not to be quantified, because there may be less incentive to continue improvements once a quantified goal is surpassed.

Decision Making

Company representatives are generally looking for a one-year payback or less on investments. Limited capital is the main constraint on energy management.

Information to help guide investment decisions exists, but is not readily available from equipment vendors. Some degree of effort is required to locate information. Of particular concern is energy efficiency labeling and product information. Equipment may be promoted as "energy efficient," but the level of efficiency may actually range from 2 to 25 percent. Often times energy efficiency figures are not provided at all. Individuals may share information through organizations such as the Institute of Electrical Engineers or the American Society for Mechanical Engineers, but these are not industry-specific.

Companies in the construction manufacturing industry can get better returns on investments by focusing on management practices and manufacturing processes. While these investments may have derivative benefits for energy efficiency, the decision to invest is not defined in terms of energy efficiency. Improving product quality is the overriding goal.

Participants in the Conference Call

Mike Burke	Detroit Diesel Corp.
Tom Dunlop	Detroit Diesel Corp.
Ray Netherton	GOMACO Corp.
Don Witas	CIMA

Fertilizer Institute
July 20, 1993, 2:00 p.m.

Energy Use

Representatives at the meeting estimated that energy, including feedstocks, comprises about 15 to 20 percent of the product cost for phosphate rock production, with energy costs driven by electricity consumption in mining operations. The energy cost of ammonia production is much higher: 80 to 85% of the cost in making ammonia is natural gas at current price levels. As the cost of gas increases, so will the percentage cost of energy to produce ammonia. Waste heat from an exothermic reaction involving phosphate rock and sulfuric acid is used to generate power in most phosphoric acid production plants, and some nitrogen plants use cogeneration systems to produce electricity. In 1975, natural gas use in production of ammonia stood at 40 million Btu/ton, with about 22 million of that total as feedstock input. Since 1975, largely in response to market forces, the industry has reduced its process energy consumption from 18 to under 13 million Btu/ton.

The Institute and its member companies believe that there is not much more to be gained in the energy efficiency of the industry's operations. Process improvements are achieved through the purchase of proven technologies and applied research. Process innovations have progressed much more slowly in recent years. Equipment used in the plants includes high efficiency motors and lighting. In fact, the biggest reduction in energy consumption can be found in HVAC improvements, re-lamping, and other facility improvements, as opposed to the manufacturing process per se. Capital constraints make it difficult for companies to make such facility improvements, however. When replacing equipment, state of the art technology is usually available through the equipment suppliers, although companies cannot afford to replace less efficient equipment before the life cycle is complete. Environmental regulations tend to increase energy consumption. For example, the Clean Water Act requires treatment of run-off water at distribution terminals, which increases energy use at those facilities. In sum, the barrier to investment in energy efficiency improvements is not a lack of information, but a lack of capital.

Costs and Benefits of, Issues Related to CE-189

The Fertilizer Institute aggregated and submitted data for the industry in the CE-189 program, though none of the meeting participants had direct

experience with the program. The fertilizer industry is opposed to new reporting requirements, and sees no benefit from participation in such a program. One concern is that a new program would require companies to reformulate data already being collected at the operating level. Each facility knows precisely how much energy is used in its respective operations, from mining to shipping the finished product. Monitoring of energy consumption and prices is sufficiently high to shift production from one plant to another, in response to increases in electricity rates, for example. Energy data loses its usefulness once it is aggregated to the corporate level, due to wide variation in products and their respective levels of production.

The Fertilizer Institute last gathered industry-wide figures for calendar year 1987. This information was of some limited interest to members because it provided them with the industry average energy consumption. Once CE-189 was disbanded, industry members expressed less interest continuing an industry-wide survey. Efforts to track industry-wide consumption for all products ceased after this last study.

Energy costs and consumption are now tracked through annual surveys of the production costs of seven major products. The Institute conducts the cost analysis to respond to government and congressional interest in the industry. Were member company interest in an industry-wide energy survey to increase, the Institute could conduct an energy survey on an annual or bi-annual basis, and would most likely work through a consulting or accounting firm to meet confidentiality and antitrust concerns.

Another concern with a program similar to CE-189 is the implication that less energy consumption is always better. The industry fears that targets would be arbitrarily set by the government, without concern for the total picture of operating environment of the industry, making compliance difficult if not impossible. They also expressed the concern that a federal program would be duplicating the energy efficiency efforts of the states.

Finally, the fertilizer industry would gain no external public relations benefits from participation in a reporting program. Most of the industry's time and effort on public relations is focused on environmental concerns and food safety. While energy is a substantial cost, it is not their primary business, which public relations efforts are designed to promote. The use of energy efficiency information in the public relations realm would be limited to

communications with industry members (e.g., Institute newsletter), the Institute's annual report, and perhaps as background in testimony before Congress.

Decision-Making

Information sharing about energy efficiency in the industry occurs during the period of decisionmaking when purchasing new equipment. Major information sources for the industry are equipment suppliers, and they are also the major innovators in the industry. Very little research and development takes place within corporations. A second major information source is technical organizations such as the Institute of Chemical Engineers, American Mechanical Engineers, and the American Chemical Society.

Possible Approaches to Improving Energy Efficiency

The Institute and the company members present at the meeting stated that ways to improve energy efficiency do exist. PUHCA reform was cited as one area in which the federal government might direct its attention. For example, one company representative described the situation in which a phosphate manufacturing process in Florida, served by one utility, is prevented from supplying power to its mining operations, thirty miles away and served by another utility. If the processing plant would be allowed to make the power available to the mining utility, it would reduce emissions, and the mining utility would avoid having to make base load investments. Public utility commissions each have their own agenda, and raise a barrier to a true national energy strategy.

The attendees at the meeting questioned the logic of trying to raise awareness of energy consumption in industries that already have strong economic incentive to be aware of it. These individuals felt the government's efforts would be better directed at less energy intensive industries, where more efficiency opportunities might exist.

Participants

Jesse Carr, Jr.	Texasgulf
Karl Johnson	The Fertilizer Institute
Ray Poponyak	CF Industries

National Association of Manufacturers

June 16, 1993, 2:00 p.m.

The National Association of Manufacturers (NAM) represents more than 12,000 member companies, of every size, in every state. In combination with NAM's National Industrial Council and Associations Council, NAM speaks for 85 percent of American industry.

Energy Use

The representatives participating in this meeting stated that energy use in their companies ranged from .5 to 2 percent of production cost. This figure increases significantly when looking at industries in which energy is consumed as a feedstock. An example cited by one of the industry representatives is that feedstock and fuel together account for 50-plus percent of the variable cost of manufacturing plastics in an average plant.

Costs and Benefits of the CE-189 Program

The industry representatives recounted their experience with the CE-189 program. One representative's company had already collected and recorded data and had conservation programs in place prior to CE-189. The major additional labor cost of the program was time spent re-formatting and justifying the numbers to suit the needs of CE-189, with little or no benefit to the company. This representative estimated that, given the need to gather and analyze data from 30 sites, the labor costs would amount to \$400,000 (in today's dollars) to respond to CE-189.

Another major cost was assumed in restructuring this particular company's data base to meet the requirements of the CE-189 program. In illustration of this point, \$40,000 was required to reconfigure the company's data base to meet Green Lights reporting requirements. Were CE-189 re-introduced, the company estimates it would take \$100,000 to revise the data base, to gather data, account for programmers' time in inputting data, and gain the necessary approvals and concurrence.

Another representative pointed out that the data collected at his company, as compared to that required by CE-189, was much more sophisticated and qualitative in nature.

Issues Related to CE-189

One representative stated that he failed to see how mandatory reporting will improve management. The reporting requirement would not make companies do what they ought to be doing themselves in the absence of the program. Most companies, this representative believes, are looking at, if not now providing, incentives for energy efficiency. The representatives encouraged an approach which would define targets broadly, similar to that used by Green Lights.

The relative costs of investments are also a factor in looking at a program like CE-189. The economy forces the issue of whether a company can afford to upgrade a plant. A company representative mentioned that it would take a \$2 billion investment to achieve 10 percent energy efficiency in the electricity generated onsite in their plants. The representatives expressed concern that a program similar to CE-189 would interfere with corporate decisionmaking, especially if upgrades in facilities will increase energy cost.

Energy consumption is only one factor in an economic equation determining investment decisions. In today's manufacturing environment, if a company automates facilities to reduce overall costs, energy consumption could greatly increase. The decision may still be cost-effective, however, due to an offset in labor or other costs. The general feeling of the group was that a program similar to CE-189 could lead companies to have tunnel vision, in that they might focus on energy efficiency to the exclusion of other factors.

Possible Approaches to Improving Energy Efficiency

The representatives asked whether the definition of "industry" ought to be broadened, to extend beyond manufacturing to the commercial sector generally. For example, energy efficiency gains can be made in transportation (as an industry in and of itself, and as contributing to other industries). The representatives also pointed out that industry is increasing its electricity use, while use of natural gas is declining. Generally, the representatives reported that total usage of energy is not a good measure to identify energy efficiency opportunities and gains; energy per unit would be better.

One company representative stated that his company has very well-run energy conservation programs and energy reduction plans; international competitiveness is the major driver for this effort. Another industry representative described a current, highly structured corporate program, in which energy

consumption is tracked by plant and management is kept aware of actual costs. This effort requires one man hour per plant per month to gather information. The data conveys usage and cost for every fuel (steam, natural gas, electricity) per plant; and per unit as applied to assembly (energy usage and cost per unit); or process (energy usage and cost for stamping one ton of steel). This company also establishes energy efficiency goals at the division level.

By way of contrast, another representative described a production environment in which energy efficiency data are less useful because too much variety exists from plant to plant. Variables to be accounted for include the structure of the building, the regional location of the plant, production swings based on consumer demand, and equipment differences. Comparisons are therefore not meaningful. Production moves from plant to plant, and is based on lowest cost and capacity available; furthermore, production lines are upgraded selectively. Given these factors, even comparing product lines or energy use by process becomes difficult.

Research and development (R&D) is taking place in areas which will have a positive impact on reducing energy use, though the R&D is not specifically targeted at energy efficiency. For example, one company represented spends \$1.2 billion a year on research and development, half of which is on process research. As a consequence, the company has doubled the amount of product without increasing per unit energy use. This representative pointed out that his company established an energy efficiency program to boost productivity, as measured by Btu and dollars.

When asked how government might help manufacturers improve energy efficiency, general responses included: seminars, organized with industry input, for industry to describe energy efficiency technologies and approaches; a clearinghouse for data, especially success stories; and award and incentive programs (e.g., 131b and 131a).

The representatives described in particular the need to help plant managers with decision-making. Decisions are simple where a straight cost reduction would result from an energy efficiency measure, and where a proven technology is being considered. However there are many people in positions to make decisions who lack basic information on past and current performance. Training for facilities management staff, especially those working at smaller facilities, would help in the decision-making area, as would cost effective

demand-side management (DSM) programs to give industry a point of reference on energy efficiency opportunities.

In some cases, the utility may influence on energy efficiency. One industry representative is participating in a rebate program. This company is seeking to capture utility DSM rebates for 26 locations; the rebates shorten the pay-back period and may move an investment decision from the "no go" to the "go" column. In response to this goal, the central energy staff have identified some 100 projects, of which most are in manufacturing. Furthermore, this industry representative believes that DOE should encourage states to offer flexible alternatives to the mandatory surcharge/rebate type industrial DSM programs. These self-directed programs would allow an industrial facility to use its own funds where it decides to apply them and meet an established corporate energy efficiency goal.

Participants from National Association of Manufacturers

Paul Cicio	Dow Chemical Company
Dwight Hawks	General Motors
John Hendricks	Boeing
Susan Hogg	National Association of Manufacturers
Henry Riewerts	Nabisco Biscuit Company
Glen Skovholt	Honeywell

National Food Processors Association
June 9, 1993

Structure of the Food Industry

The food industry is marked by wide variation in product and process and energy use varies greatly. One representative commented that it is difficult to compare energy use across different producers because of differences in plant design. Emphasizing plant variation between producers of the same product, he commented that food producers typically "start in a shack and develop into a factory."

Representatives suggested that we consult also with the following associations, to ensure that we had captured the diversity in the industry: the Edible Oil Refining and Shortening Institute, the Frozen Foods Association, the American Dairy Association, and the Grocery Manufacturers' Association. The Institute for Food Distribution, located in Fairlong, NJ, may be a useful source of research data.

Energy Use

Energy costs vary. Several participants estimated that energy costs represented 10 to 15 percent of total production costs; another participant gave a much lower figure of one percent. Foods which use most energy are frozen foods or foods requiring dehydration and concentration. For example, frozen foods must be cooked first, then cooled and frozen; freeze-dried coffee must be evaporated then freeze-dried. Energy does not represent the largest component of total cost even for these products. The largest component is commodity cost.

Decision Making in the Food Production Industry

In making decisions on investment, representatives noted that the cost of energy was part of an overall evaluation process. The basic issue is one of competition for a limited pool of resources. Some expenditures are required, e.g., meeting OSHA and other regulatory requirements; energy efficiency must compete for the remaining resources, along with other programs in the environmental area such as water and waste minimization. The major driver in all decisions is cost. Innovation, for example is driven by economics and the effort to reduce costs.

One representative observed that the food industry decided on energy efficiency expenditures in three primary ways:

- In terms of payback;
- As a way of obtaining utility rebates (e.g., insulation rebates) and
- When part of a grant program such as the New York State program, where the State funded half of investment in energy efficient equipment.

Several representatives emphasized that the current corporate rule of thumb on payback was that payback must occur within a year. Four or five years ago, payback was expected within two or three years, but the difficult economic situation had changed that. Now, energy efficiency, alone, is likely to be ruled out as a reason for investment, unless there is something like the rebate program available.

Representatives appeared to agree with the statement of one representative that the investment decisions are prioritized according to whether (1) the decision is mandatory; (2) the measure will increase business; or (3) business would disappear, if the action is not taken. The issue, he emphasized, was "profit margin." There is only limited capital available for discretionary items; the total pool of available capital has been reduced over the past few years because of the poor economy.

The industry had been affected by several significant changes since the early eighties. Changes cited were:

- Competition
- Consolidation
- Off-shore influence
- Consumer attitudes (fresh food is now preferred over frozen or canned food).

In response to a question on whether these changes could be documented, representatives suggested checking brokerage house data and the Institute for Food Distribution.

Several representatives pointed out that there has been little change in the types of equipment used in the industry. Preparation equipment is very similar to what it used to be—albeit "a little shinier and perhaps more state-of-the-art." The primary changes in equipment have occurred in better insulation and

in the use of continuous rather than batch processes. Also, in the frozen food industry, research showed that blanching could be achieved safely at lower temperatures that had formerly been used. However, the major source of improvement now comes from improved plant layout and use of people.

Costs and Benefits of the CE-189 Program

Several representatives were familiar with the previous CE-189 program. Effort required for data collection was cited as the major disadvantage. According to one representative, compiling the data took approximately one week per year for each of the six divisions within his corporation, representing a total time requirement of between 4 to 6 weeks to produce the annual corporate report.

The primary benefit of the program was an increased awareness of energy use within the individual plants. Competition between facilities within a corporation was stimulated because managers now had information on energy use readily available under the program.

One representative stated that staff continued to check on energy efficiency; specifically, he reported that a boiler engineer was available to check on 13 factories. Other representatives noted, however, that whereas differences in energy efficiency were examined year by year when industry operated under CE-189, energy efficiency typically is now checked according to "gut feeling." Consequently, there was no informed way to examine whether one was doing better or worse, or to decide what to do about it. One representative commented that he compiled data and determined that no one in the company was aware of differences in efficiency—since the program stopped, he believed that industry "was kidding themselves" and that they needed to continue to compile and analyze numbers.

Issues Related to the CE-189 Program

Most corporations reported through associations in the CE-189 program because of confidentiality issues. One representative stated that his company reported individually and had not encountered any problems. Direct reporting would not be a problem in the future, provided that individual factory data were kept secret. He reported that the company had aggregated data at the corporate level for 40 factories (at the four-digit SIC level), all of which had very different product lines.

Efficiency, for this company, was measured per pound of product. He acknowledged that this was difficult to do because of the variation in products and processes—he thought that they had done it by factory and then at the corporate level. In response to our request, he agreed to send in details of how they had accumulated the data.

Possible Approaches to Improving Efficiency

None of the representatives expressed support for a government program. However, as one person stated: "Heaven forbid another program, *but*, if one were to be established, the closer it is to a useful business management tool, the more useful it would be."

One representative noted that targets did help, especially in increasing awareness of upper management. However, he added that it is always a struggle to increase efficiency because of the long payback involved and there is always competition for cash. Overall, he believed that it was a "toss-up" whether voluntary targets would help.

Another person observed that his company currently did not have any monitoring program in place and that he, personally, could see opportunities for energy efficiency. He believed that if management could actually see that there was more benefit than cost, something might be done to improve efficiency. Another representative stated that he had been told that energy use does not get the priority and attention that is needed. He reported that most managers in his company realized that energy was a fundamental problem, but did not know *how* to do anything about it: "Our factory engineers are smart, but upper management does not look at it."

When asked whether formalizing the process would help, several representatives observed that it might be helpful to show *how* industry is not using energy efficiently—to provide a set of guidelines against which they could measure themselves. However, they also pointed out that it would be difficult to identify appropriate benchmarks for the food industry because of the variation that exists.

The basic problem, they reiterated, was one of balancing the cost of energy against other factors: "It all boils down to cost and competition for the available pool of resources."

COSTS AND BENEFITS OF INDUSTRIAL REPORTING AND VOLUNTARY TARGETS FOR ENERGY EFFICIENCY

Participants (from NFPA, Environmental Policy Committee):

David Adrion	The Dial Corporation
Osman Aly	Campbell Soup Company
Charles Bennett	Nabisco Foods Group
Jackie Bogard	Del Monte Foods
Steve Harrison	Bush Brothers & Company
Stan Iwanicki	Curtis Burns Foods
Donald Kirk	Heinz USA
Nancy Levenson	Tropicana Products, Inc.
John Rotruck	P&G
Edward Taylor	Coca-Cola Foods
Denny Vaughn	The Pillsbury Company
Romer Wilsek	Kraft General Foods
Terry Zeh	Comstock Michigan Fruit

Pharmaceutical Manufacturers Association
July 19, 1993, 10:00 a.m.

Energy Use

Even though energy cost per unit of product is less than one percent, each of the twelve companies represented at the meeting has in place a very intensive energy management program. Corporations collect energy data, and employ energy staff, usually within engineering, specifically devoted to energy efficiency. Companies may also set energy goals. At Abbott Laboratories, for example, an energy goal is established by the chairman of the board, and progress towards this goal is measured by decreases in Btu per unit of production. Measures undertaken by the companies include relighting, cogeneration, and energy audits when proposing a capital construction project of more than \$20,000.

Company representatives cited three major reasons for this level of attention: 1) continuation of practices established in the 1970s; 2) phenomenal pressures on the operating budget to zero out all inflationary forces; and 3) need for reinvestment of savings in research and development (R&D).

Because of these long-standing efforts to improve energy efficiency, company members estimate only a 10 percent gain in energy efficiency of the industry remains, and at considerable capital cost. In addition, environmental regulations place a floor on energy consumption, and the FDA regulates manufacturing processes and requires validation of all process changes to ensure the product will not be adversely effected. A current example is an ongoing effort to switch to a freeze dried process to meet the coming CFC phaseout. A company instituting this change estimates it will take nine months to revalidate the process by FDA. In general, a period of 8 to 18 months exists in between a plant being built and the beginning of production, which cuts into the available life of a patent with which a company makes its profits.

Environmental and energy goals frequently work at cross-purposes. In the instance of the CFC regulations, for example, the drop-in substitutes for freon in refrigerants will result in decreased energy efficiency, at least in the short-term.

Costs and Benefits of, Issues Related to CE-189

The Pharmaceutical Manufacturers Association served as a third party reporter for its member companies under CE-189. A representative familiar with CE-189 stated that he could not think of a single benefit for pharmaceutical companies that participated. While this individual could not precisely estimate the labor hours required to participate in the program, he acknowledged that the reporting effort required considerable staff time. The representatives felt that the time required to fill out the MECS form is similar to that for CE-189, although the CE-189 program covered more plants and more time was spent validating and justifying the numbers.

A major concern about a new program is that the pharmaceutical manufacturers should be treated separately from the chemical industry. The Association strongly suggests that industries be broken out by four-digit, as opposed to two-digit, SIC codes. The Association and member company representatives felt that the two-digit code is too aggregated to effectively track or influence energy efficiency.

Units of measurement also may pose a problem. Energy efficiency measures of most value are specific to the companies, and may be altogether different. An additional concern is whether the data required by the reporting format would necessitate installation of end-use metering equipment.

Decision-Making

In general, energy investments pose less risk than new product investments. As noted earlier, every dollar saved through energy efficiency is reinvested in R&D. Demand-side management can help sway investment decisions in energy efficiency improvements by decreasing the payback period on those investments. In instances where DSM projects are not applicable, energy efficiency opportunities are often too expensive to pursue. A related point is that pharmaceutical manufacturers are seeking to build strategic partnerships with utilities, and an exclusive focus on energy efficiency may be counterproductive to that effort.

Information sharing takes place in a number of forums sponsored by the Association, including workshops (energy, CFCs), and its annual meeting (engineering, technology development). Energy efficiency information is shared with clients, such as hospitals, and with suppliers. A separate organization, the

International Association of Pharmaceutical Engineers, works more directly with manufacturers.

Possible Approaches to Improving Energy Efficiency

The member companies and the Association itself favor an energy tax credit or investment tax credit to boost energy efficiency within industry. The grant program that was contained in Section 131(a) of the Energy Policy Act of 1992 was not worthwhile for this industry. Companies already conduct extensive energy training on their own. One representative noted that they had recently spent \$225,000 of their own funds at a single location for training. The representatives candidly pointed out that the cost of applying for the grants in the program might exceed the grant award.

Participants from the Pharmaceutical Manufacturers Association

Anthony Accatatta	Schering Plough Corp.
Mostate Elmorsi	Boehringer Ingelheim Pharmaceuticals, Inc.
Jeffery Heend	Merck Company, Inc.
Joe Hunt	Burroughs Welcome
Russel Madeen	Bristol Myers-Squibb
Henry Molise	The Upjohn Company
Don Mudd	Marion Merrell Dow Inc.
Al Musur	Abbott Laboratories
Marle Ocken	Searle
Tom Savage	Pharmaceutical Manufacturers Assn.
Ron Slember	Sandos, Inc.
Joseph Sullivan	Rhone-Poulenc Rorer
Wayne Washington	Bristol Myers Squibb

Primary Glass Manufacturers Council

(Conference Call)

June 4, 1993, 10:00 a.m. EDT

Primary Glass Manufacturers Council Relatively New Organization

Following introductory remarks by Judith Bradbury, Bill Birch with PGMC provided background on the association. PGMC was formed about a year and a half ago, with a primary concern of how energy regulations would influence the fenestration industry. PGMC is now looking at other areas in addition to energy regulations, especially through its involvement in the National Fenestration Council.

Discussion of Costs and Benefits of CE-189

A PGMC member participating in the call, Jim Kamon representing Ford Motor Company's Glass Division, discussed Ford's participation in the CE-189 program. Ford and other industry members submitted information through a third party, to ensure confidentiality of the data.

One cost of the CE-189 program was labor hours spent compiling data. Kamon estimates that Ford spent 40 hours at each plant (i.e., multiplied by the number of plants) to gather data, write the report, and obtain management approval. The Glass Division at Ford spent 80 hours to consolidate and format the materials coming in from its various plants and to get approval through the glass division level. Another 40 hours were required to prepare the background review materials and obtain final approval at the corporate level. At an average \$50 per hour staff rate, the cost equivalency was thereby \$15,000 to \$20,000 for each annual report.

Each of the company representatives individually expressed an opinion that CE-189 presented an additional reporting burden while providing little if any benefit, because each corporation already had energy tracking efforts in place prior to the program's inception. At Ford, for example, energy expenditures have been included in the reporting format for the budget for years; when energy prices began to rise as a result of the oil embargo, the energy consumption data was pulled out of the budget process and began to be tracked by Btu and Kwh instead of dollars.

Current Energy Efficiency Data Tracking

Furthermore, the conference call participants mentioned that their companies continue to gather energy efficiency information and participate in regular reviews, as often as on a monthly basis in some companies. Energy efficiency is specifically addressed in these reviews.

In most instances, management pays greater attention to the cost side as opposed to the efficiency side of the data presented. At least one company reviews energy performance semi-annually without basing performance on cost, but rather on consumption targets for each operating unit.

Management is attentive to energy efficiency because energy is a major cost of flat glass production, estimated at 20-25 percent of the finished glass product. All of the companies have staff who focus on procurement of energy, as probably the most direct area where they can best control the cost. One company reported that they no longer buy natural gas from the local distributor, but instead buy on the spot market because it is cheaper. The corporations perceive that the proposed Btu tax is the biggest threat facing the industry; this tax would cost millions of dollars to each corporation. Importers to the U.S. will not have to pay this same burden.

Information collected includes energy used to produce float glass, and energy used in fabrication processes. One company breaks the data down into more discrete processes of float production such as melting. A measure used is therms per ton per melt.

One company added that as it continues to reduce staff due to the sluggish economy, it is also cutting its own internal energy efficiency reports.

PNL requested blank energy efficiency reporting/tracking forms currently in use from any of the firms willing to provide these.

Energy Efficiency Information Used Internally

The energy efficiency information gathered is used internally to achieve continuous improvement. No real average energy intensity exists across the industry, and it is therefore difficult to compare performance with other corporations. If companies benchmark, they compare similar plants. This type of comparison can be difficult because a wide discrepancy exists even from tank

to tank based on the refractory used, the insulation, the design of the furnace, and the age of the furnace (7 to 10 year life span).

When asked whether energy efficiency data were used for investment decisions, the response was that investments had other economic drivers, and that energy efficiency was not really a factor. Reporting did not create any additional emphasis on energy efficiency investments. To force an energy expenditure, elevating energy efficiency as a priority over normal business decisions, would be detrimental. Capital investments to rebuild tanks and add new construction must have certain "deltas," or percentage improvements, which must be met. If an investment in energy improvements won't meet the delta, it drops in priority relative to other investments.

Examples of energy efficiency improvements include switching from centralized steam to direct gas firing to heat the plant. Smaller steam generation saves energy costs and reduces head count. There are also operational things which can be done that will make the furnace more efficient.

Little Information Sharing Among Companies

The primary glass manufacturing industry is very small and very competitive, presenting a strong disincentive to information-sharing about energy improvements. A more likely scenario is that a technological improvement such as an oxygen booth or furnace redesign will be made available to all corporations within the industry simultaneously. The company that implements the technology first will be determined by which one happens to be going through a rebuild when the innovation is announced. If a company is spending millions to rebuild a furnace, the capital investment will accommodate the most energy efficient technology available.

The companies expressed limited interest in a means to share information about "best practices." Most companies have undertaken their own studies on identifying best practices; oftentimes questions are raised on the value added of these internal research studies.

If a best-practice study were done, it would have to be conducted by someone who knows the industry to be of real value. It is perceived that such a study would require participation by individual plants (i.e., as "studies"). Even if done confidentially, such studies may not get corporate support. As a small group, it is difficult to preserve confidentiality. If study were detailed, for

example if it referenced design criteria or techniques of operation, knowledgeable individuals could deduce which company was being described.

A divergent opinion in the group was that the companies all have common costs, for example, the costs to run a float tank. The individual felt that this type of information might be shared without affecting competitive advantage.

Industry Reps Question Premise of Fall-Off in Efficiency

In response to PNL's explanation of why a new program might be proposed—that nationally industry has experienced a real drop-off on the rate of efficiency improvements—the industry representatives questioned the premise of a fall-off in energy efficiency. They suggested energy efficiency ought to be looked at in terms of the overall economy and production volume. They also pointed out that energy used to be a very cheap product, and that cost increases were the source of past dramatic gains in energy efficiency.

An industry representative mentioned an Office of Technology Assessment (OTA) study which found that an increase in energy prices today would not be a major driver for energy efficiency. A strong economy would be at least as, if not more, effective in encouraging energy efficiency improvements.

Opinions on New Program

The representatives felt that a third party representative would be required to ensure effective participation in a new program.

They also suggested that the data provided for MECs be relied upon to supply information for purposes of any new program. Such reporting programs are onerous and add unnecessary burdens to reporting corporations.

The general opinion expressed was that if a new program were proposed, it ought not force them to do anything more than what they are already doing. Companies should be allowed to set their own energy efficiency targets, for example.

About the Workshop

PGMC expressed interest in attending the workshop. The Council specifically requested an abstract of the report to be discussed at the workshop in advance, to allow them to select the most appropriate individual to attend.

COSTS AND BENEFITS OF INDUSTRIAL REPORTING AND VOLUNTARY TARGETS FOR ENERGY EFFICIENCY

PGMC Members Participating in the Call:

William J. Birch and Jim Benny	PGMC
John Lipzinger and Ron McMasters	AFG Industries, Inc.
Jim Kaman	Ford Motor Company Glass Division
Anna Kalil	Guardian Industries Corporation
Bruce Wyre	Libbey-Owens-Ford Company
Susan Coos	PPG Industries, Inc.

**Refractories Institute
Represented by Charles Marvin
June 15, 1993, 9:00 a.m.**

About The Refractories Institute and the Industry

The Refractories Institute represents 90 percent of the manufacturing capacity in the refractories industry. Refractory materials line the furnaces and ovens used in high-temperature manufacturing, and are continually consumed as the equipment is used. Refractory materials comprised a \$2 billion dollar industry in 1990, and \$1.93 billion in 1992. The Refractories Institute anticipates that the industry will experience another small drop in 1993. Most refractory plants are privately or foreign owned.

Refractories are a "hidden industry," providing the means to produce steel, glass, cement, petroleum, etc. As such, it is a demand-driven industry. Higher demand for steel, for example, means higher demand for refractory materials. In turn, whatever impacts the refractory industry affects the operation of every high-temperature industry in the United States.

Increased demands for refractory materials are offset by efficiency improvements in the high-temperature industries. The advent of continuous casting in the steel industry, for example, has reduced the number of heating processes used in that industry, consequently reducing the demand for refractory materials. Coupled with other advancements in the steel industry, the demand for refractories used in steel production has declined from 255 pounds per ton of steel produced to 10 or less pounds over the past 20 years or so.

Raw materials constitute 50 percent of refractories' cost of doing business; the remainder is attributed to labor, energy, and transportation.

Carnegie-Mellon is conducting a study on the relationship of refractories to other industries, and its contribution to GNP. This report will provide additional background.

Costs and Benefits of CE-189

Mr. Marvin has been with the Refractories Institute since 1980, and was involved with CE-189. Participating corporations reported through the Institute.

The accounting burden was a major cost to the corporations, although the Institute did not track labor hours required to fulfill CE-189 requirements.

Additionally, the targets established under CE-189 were not useful to the Institute or its members, largely because the targets did not reflect an understanding of the industry. Costs to comply with environmental and other regulations and filling out government forms take away from the available capital pool for investments in energy efficiency improvements.

Energy Efficiency Opportunities for the Refractories Industry

The refractories industry has become more efficient in production, although opportunities for energy efficiency still exist in some places. Industry has probably achieved all of the savings that are possible out of the kilns. The industry has also greatly improved the efficiency of calciners. Improvements in electrical efficiency (e.g., motors) are capital intensive, and the return on investment takes long to amortize.

The Institute discontinued tracking energy consumption of the industry after the CE-189 program ended; however, some individual companies do continue the practice. For single companies, energy tracking consists of watching the utility bills. Companies cannot afford to have a single person devoted to energy efficiency. In larger companies (five to 12 plants), tracking is likely to be the responsibility of a chief engineer or vice president of manufacturing; in smaller companies, the chief executive officer or chief financial officer will most likely assume this responsibility. All company presidents are fully aware of their energy costs and strive to keep these costs as low as possible.

Refractory products have not changed that much over time. There are a limited number of materials that can withstand 3,000-5,000 degree heat. Calculating efficiency improvements relative to the base year was thus not as great a problem for refractories as for industries characterized by significant product changes.

Mr. Marvin indicated that the greatest threat to energy efficiency and the viability of the industry itself is EPA's current study about the impacts of banning the use of ceramic fiber refractory materials. Carminic fibers have produced some tumors in test animals. Ongoing parallel epidemiological studies of present and former RCF workers have failed to provide the existence of any clinically adverse health effects associated with RCF exposure. The

RCF Coalition is continuing to perform these studies. Fibers are not a danger once the furnace is constructed. A ban of these materials would greatly increase energy consumption due to the inferior insulation characteristics of substitute materials.

Level of Information Sharing Among Industry Members

Industry representatives readily share information through informal discussions at various meetings. The Institute sponsors a board meeting each March; a members' meeting is also held annually, this year in May. A third meeting on world competitiveness in refractories is scheduled for October. Energy conservation and manufacturing technology will be major topics in the program.

Management Focus on Energy Efficiency

Cost issues are the primary factor that focus management's attention on energy efficiency. There are prudent investments which the industry could make, but lack of capital is the real problem. Companies recognize they would benefit from bulldozing old plants to rebuild them with improved lay-outs. Unfortunately, they cannot afford to implement these types of improvements.

The industry is selling refractories at early 1980 prices because its customers are unwilling to bear price increases. Steel manufacturers, for example, will not accept pass-on costs such as those which would result from the proposed Btu tax.

The use of clay-based refractories is on the decline. Clay materials cannot withstand the extreme heat used in many industries today and have therefore lost much market share. Raw material costs, labor, energy transportation are all increasing. The corporate goal is to keep the slope of the increase as flat as possible. Manufacturing costs are tracked by product line in the industry.

Mr. Marvin noted that the Energy Policy Act of 1992 allows for cost-sharing research, but the corporations don't have the capital to do cost sharing. Research and development is more likely to occur through partnerships and joint ventures with foreign companies. Technologies are frequently introduced into the United States through joint ventures. It is unclear whether refractories overseas are less energy intensive than their U.S. counterparts.

Because of the partnerships formed with foreign companies, U.S. companies are aware of the technologies available and in use overseas. There is also a fair

amount of information sharing at international meetings. There is currently a conference scheduled in Sao Paulo, Brazil, in November, at which 30 countries will be represented. Energy use will be one of the topics discussed at the meeting.

Steel Manufacturers Association
Phone conversation with Peter Wleczorowski
July 12, 1993, 10:00 a.m.

Structure of the Industry

The Steel manufacturers Association (SMA) is a trade group consisting of 55 member companies, the majority of which are in the United States, with others in Canada and Mexico. The SMA members comprise the "minimill" industry, primarily bar, structural steel and flat plate producers who use electric furnaces to melt scrap metal. The minimill industry distinguishes itself from the integrated steel industry (represented by the American Iron and Steel Institute) and the specialty steel makers who produce stainless and other special quality steel. The minimill industry is currently undergoing a change in its competitive position, responding to increasing demand for high-quality scrap by adopting new processes such as direct reduced iron.

Energy Use

Most of the SMA members would surpass the 1 trillion Btu threshold established by CE-189. Currently the electric furnace producers use approximately 5 million Btus of energy per ton of steel produced. Looking across the electric furnace sector of the industry, the average production of steel is approximately 500,000 tons per plant, and a total of 37 million tons of raw steel are produced per year by the industry in electric furnaces. This amount is equivalent to 38 percent of total U.S. steel production. Energy comprises about 15 to 20 percent of the final production cost.

The industry is highly automated, and energy efficiency upgrades are made in the rapid replacement of technology. The typical life-cycle of a furnace in the industry is only 10 years. Furnaces are rebuilt using the best available technology, accompanied by the latest process controls (e.g., to adjust the amount of electric power to the furnace and to maximize energy conservation in the furnace).

Costs and Benefits of the CE-189 Program

Twelve of 40 member companies contacted by the Association responded to the questions outlined in the Federal Register announcement. Sheffield Steel is the only company which reported corporate experience with the CE-189 program, though this experience is indirect; Sheffield was part of Armco at the

time, and Armco took responsibility for CE-189 reporting. Most member companies are relatively young, and those that are older have experienced high turnover rates, were merged with other companies since CE-189, or both. Therefore, responses did not cover issues of costs and benefits of the CE-189 program.

Issues Related to CE-189 Program

The respondents stated that awareness of energy efficiency performance was already high in the steel industry. The companies carefully monitor energy use and continually work with electric utilities to reduce energy consumption.

The respondents believed that a program such as CE-189 would place a significant and counterproductive burden on their operations, particularly in terms of unnecessary paperwork and "extensive record-keeping schemes." One respondent did say that reporting on per-ton usage would be less of a problem, in that the data is already being collected for internal use; were a program established, data collection should accommodate the commonalities in what companies are already doing vis-a-vis information gathering.

On the whole, however, members were opposed to mandatory reporting requirements and voluntary targets. They felt that establishment of voluntary targets would not achieve the goal of improving energy efficiency. The respondents also felt that voluntary targets represented an overregulation of the industry, and were fundamentally opposed on the grounds that the economic incentive to maximize efficiency of energy utilization and to control and reduce energy costs is already in electric furnace production.

Concerning information sharing, the SMA has a committee called the Plant Operations Division which meets semi-annually. In this forum, member companies discuss solutions to problems relating to efficiency of overall operations, including energy use. Information sharing is historically more open in this industry than perhaps others because there is a tradition of information sharing to solve problems, due to the fact that steelmaking technology is fungible and readily available from equipment vendors or through licensing agreements.

Possible Approaches to Improving Energy Efficiency

Regarding alternatives to reporting requirements and static targets, the respondents indicated that incentives already exist from market competition, but

that rewards and recognition for energy savings would be welcome. Low interest loans for energy efficient equipment, and demand-side management programs. Worker recognition is also popular, though rewards are for total production cost reduction or increased efficiency. They also cautioned that alternative measures should focus on energy management. Reducing energy consumption helps, but it is better to reduce energy intensity per unit of production as opposed to total energy consumption.

The industry relies on utilities, equipment vendors and power trade associations as their main sources of information concerning energy efficiency opportunities and technologies. An example cited is the Center for Materials Production, funded by the Electric Power Research Institute and housed at Carnegie Mellon University. Steel industry representatives attend the Center's meetings and participate in ongoing research. Less attention is paid to government sources of information.

Respondents from the Steel Manufacturers Association

Bill E. Ferguson	Arkansas Steel Associates
Libor Rostik	Chaparral Steel Company
Luis Nieves	Florida Steel Company
James Schultz	North Star Steel
Jerry Richartz	Oregon Steel Mills
B.W. Proft	Sheffied Steel
Michael S. Peters	Structural Metals Inc. (SMI)

Additional company member representatives were contacted by the Steel Manufacturers Association, and their opinions are encompassed by the narrative as well.

D.4. Summary of Industry Consultation Workshop, September 8, 1993

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WORKSHOP SUMMARY

OVERVIEW

This summary discusses the Industry Consultation Workshop concerning Section 131(c) of the Energy Policy Act of 1992. The workshop was conducted by the U.S. Department of Energy (DOE) on Wednesday, September 8, 1993, from 8:00 a.m. to 4:30 p.m. at the Hyatt Regency hotel in Arlington, Virginia. A total of 15 industry representatives participated. The list of industry participants is shown in Attachment A.¹

Purpose of the Workshop

The workshop had two purposes:

- Review industry perspectives expressed in the consultations held during June and July 1993, and
- Obtain industry input on a variety of energy reporting and targets options. These options could range from traditional approaches, such as the former Industrial Energy Efficiency Improvement Program (commonly termed the CE-189 program), to voluntary, incentive-driven alternatives.

Background

The workshop represented one component of a study, mandated by the Energy Policy Act, to evaluate the costs and benefits of establishing mandatory energy efficiency reporting requirements and voluntary energy efficiency improvement targets for energy-intensive industries. The three major components of the study include (1) a review of the public record on the CE-189 program and on the hearings conducted at the outset and during changes in reporting forms for the Manufacturing Energy Consumption Survey (MECS), (2) a quantitative analysis of the impact on energy savings of the CE-189 program, and (3) industry consultations.

Industry consultations included three phases. The first consultation phase began on May 3, 1993 with a Federal Register announcement of an opportunity for industry representatives and other interested parties to submit written

¹Association representatives and Federal Register Notice respondents who received notice of the workshops are listed in Attachment B. Methods used to identify potential participants are outlined in the introduction to the attachment.

comments on a number of topics relevant to assessing the costs and benefits of the CE-189 program, and opinions on other possible reporting and targets options. During the second phase, DOE met with individual industry associations in a series of meetings held from May through July. This workshop was the final phase in the consultation process. Industry input from all three phases of the consultation will be incorporated into the final report which DOE will submit to Congress in February 1994.

Workshop Proceedings

DOE assured workshop participants that the agency was not seeking consensus and welcomed expression of different opinions and perspectives during the workshop. As shown in the attached Agenda (Attachment C), the workshop comprised two plenary sessions and three concurrent breakout sessions. The sessions included:

- A DOE presentation on the agency's role and goals in conducting the study for the Report to Congress required under Section 131(c); and presentations by Pacific Northwest Laboratory (PNL) on preliminary findings from the individual DOE/industry meetings and the quantitative analysis of the former CE-189 program.
- Working group sessions in which industry participants were divided into three groups to discuss the advantages and disadvantages of various attributes of possible reporting and targets options. As a guide to the discussion, participants were given a list of three categories of attributes, entitled Participation, Reporting, and Targets, each of which was further subdivided into specific features or characteristics (see Attachment D).
- A three-part plenary session that began with reports and general discussion of the working group deliberations. Participants were given an opportunity to discuss non-reporting options for improving energy efficiency and their views on the role of reporting and targets programs in improving energy efficiency in industry.

A complete transcript of the plenary sessions is available in the public record.² This summary highlights (1) observations from the individual DOE and industry meetings and preliminary findings from the quantitative analysis and

²The transcript is available in the Department of Energy Freedom of Information Reading Room 1L-190, 1000 Independence Avenue, SW, Washington, D.C. 20585. The reading room is open from 9:00 a.m. to 5:00 p.m. Monday through Friday except for holidays.

(2) industry perspectives on reporting and targets, as reported by participants during the plenary sessions and also during the breakout groups.

SUMMARY OF FINDINGS TO DATE

PNL summarized observations from the individual DOE/industry meetings, conducted during the second phase of the consultation process, and the preliminary findings from the quantitative analysis of the CE-189 Program.

PNL reported some primary findings that had emerged from the industry consultations:

- Industry is diverse. Diversity extends across industries, across corporations within industries, and even across establishments within a corporation.
- Two types of barriers prevent further pursuit of efficiency opportunities: economic barriers and information barriers.
- Economic barriers were the most frequently reported by the industry.³ Examples are failure of investments to meet the required payback; uncertainty about the remaining life of an investment; the risk of investing in unproven technologies; and limitation on available funds.
- Some information barriers were also reported by industry representatives. An example is lack of timely information about opportunities that exist.
- Industry representatives discussed with us the value of industry-sponsored energy committee meetings, seminars, and workshops. However, because of the diversity that exists, no one type of information satisfies all needs or is useful in all situations, nor can information contribute to increased efficiency if the economic justification is not present.

PNL then presented preliminary findings from a statistical evaluation of the CE-189 program that attempted to determine whether the program had any effect on energy efficiency improvements for industry. The statistical work was organized in three phases, at varying levels of causal linkages between the program and the effects.

- In the weakest test, PNL looked at each industry's energy efficiency improvement as it might have occurred directly after the program went into

³A key conclusion gleaned from these discussions was that energy efficiency had to be viewed in the context of total factor productivity.

effect and when the program ended in 1985.⁴ Based on this very weak test, no direct impact from the program could be found.

- Many factors may influence energy efficiency, but one of the very important other variables is the price of energy. The analysis was performed a second time, taking into account the effect of changes in energy prices. Again, this test is weak because of the possible effect of many other factors. Again, no direct program impact was found.
- The final analysis took into account other factors⁵ in order to identify any independent program effects. Again, at this level—which represents the strongest of tests—no direct program impact was found.

Despite the lack of statistical evidence that industrial reporting and voluntary targets programs may affect energy intensity, the CE-189 program may, in fact, have had some benefit in stimulating energy efficiency improvements in the context of total factor productivity. Qualitative evidence that some benefit may result is shown by the current existence of voluntary programs that were established after termination of the CE-189 program. The key question, addressed by participants in the workshop breakout discussions, is what characteristics of reporting and targets programs may stimulate energy efficiency improvement in the context of total factor productivity improvements.

INDUSTRY PERSPECTIVES ON REPORTING AND TARGETS

In general, industry representatives expressed appreciation for the opportunity to participate in the consultation process and their wish to participate in policy development. Without exception, however, they were opposed to mandatory reporting and to the establishment of voluntary targets. One working group, for example, emphasized that “Our bottom line to this whole approach is that this was an idea whose time had passed and should stay in the past.”

Representatives also emphasized that industry's goal is overall efficiency, i.e., the cost of the product to the customer, and that energy is just one factor in

⁴For energy-intensive industry, the program was initiated in 1976; in 1980, the program was raised to include all of industry.

⁵These factors include shifts among industries and shifts in the end-uses of energy. It was not possible to include product shifts because of inadequate data.

product cost. One representative, observing that energy is not always the primary consideration, commented that sometimes another innovation, by chance, yields energy savings. Another representative cited instances where attempts to reduce overall production costs may actually increase energy use. He also noted that attempts to reduce labor costs, which are a major factor for some industries, would lead to layoffs yet could increase energy efficiency.

This section discusses some of the specific issues raised by industry concerning the establishment of such programs under the following headings: (1) mandatory reporting, (2) participation, (3) information value, (4) targets, and (5) other DOE roles that could encourage energy efficiency.

Mandatory Reporting Programs

Industry representatives cited a variety of factors as the bases for their strong opposition to mandatory reporting programs.

Many workshop attendees questioned the purpose of mandatory reporting and expressed concern about the costs incurred by industry. They did not believe that government assistance in compiling data was of value to them, did not see a need for such programs when there is no energy shortage, and did not see the value of information gathering for government purposes. Several pointed out that information was already gathered through MECS. They were concerned that any new and additional information would simply "disappear into a black hole," as had, reportedly, the CE-189 information.

In general, workshop attendees emphasized that industry made all of the "easy" changes in terms of energy use ten years ago and that, in terms of savings, they were at the point of diminishing returns. Increasing awareness through reporting programs was not necessary because CEOs in industries where energy is a major cost of production already view energy efficiency as important and are very serious about reducing energy costs. The real issue in today's business environment is availability of capital.

Workshop attendees frequently mentioned the diversity of industry as a primary barrier to the success of this type of program. Diversity in factors such as geographical location, age of the facility, and labor intensity lead to extreme difficulty in designing programs that work well in different industries and different facilities. Energy efficiency must be measured in a myriad of ways—and this can be true even for two plants in the same company. Thus, standard

reporting is difficult and effective analysis of the data is almost impossible. Looking at energy efficiency out of context cannot reflect the full picture.

Several workshop attendees pointed to other difficulties that arise in implementing mandatory reporting programs. These include the loss of important details such as how energy efficiency is treated in situations where industries burn wastes such as used tires or solid waste that would otherwise require disposal. Other difficulties that distort the picture include the "black" programs operated by defense contractors, where not all data can be reported for a company or industry.

Participation

Workshop attendees emphasized that energy consumption is irrelevant as an indicator of which companies should be covered by mandatory reporting and voluntary targets programs. Several observed that if eligibility criteria were established for reporting programs, they should be linked to the types of product produced and that the definition of energy intensity should be changed to energy use per unit of output. Others questioned why manufacturing industries were the focus of government programs and why supplies and transportation industries such as airlines were not included.

Although some workshop attendees were prepared to consider a strictly voluntary reporting program, others expressed concern that such participation could still be very arduous and costly. A particular concern regarding voluntary programs was the perception that they tend to convert into mandatory programs over time.

Many representatives discounted the value of incentives such as public relations benefits that have been cited as reasons for program participation. They noted that these types of incentives can backfire. For example, questions may be raised about why the industry has not been energy efficient all along; or firms that have already undertaken efforts to become efficient may show up relatively badly, since their big gains will have been obtained prior to the start of the program.

Essentially, the value of recognition for participants appears to depend on the image of the company in the public eye. Companies that deal directly with the retail consumer may be the most likely to find public recognition an incentive for program participation.

Information Value

All workshop attendees questioned the value of information produced by the previous CE-189 program and several expressed the view that many of the energy efficiency improvements measured in that program were due to factors other than the program. Primary factors were closure of old, inefficient plants and increased energy costs that created a market incentive to reduce energy consumption and made energy efficiency improvements viable. They noted that efficiency measures have to be product-specific to have any meaning and emphasized that, in order to protect confidentiality, the data must be aggregated; the problem is that once this has been done, the data become meaningless to industry.

A major problem with information is that different people within a company view numbers differently, depending on their position in the firm. For example, accountants, controllers, plant managers, and CEOs all have differing perspectives and financial assumptions. The plant manager does not have control over costs. Information barriers do exist in companies; to be effective, energy efficiency information must be couched in terms that the economic/financial decision makers can relate to.

Attendees repeatedly emphasized that information must be useful to industry. As discussed in the following sections, some attendees suggested that there might be a role for national and international benchmarks or technology studies that illustrate the state of the art; many attendees favored technology transfer as the key to improving energy efficiency and reported that DOE could play a valuable role as an information clearinghouse. They expressed a strong preference for information sharing among a network of professionals about how to implement energy efficiency projects and programs, as opposed to reporting programs that produced "meaningless data."

Many workshop attendees questioned the value of the data that the government collected in the CE-189 program. Their viewpoint was that the Federal government moves too slowly to be able to provide information that is timely and useful to industry. They commented also that data prepared for a government format has no net benefit to industry. Others expressed concern about the release of confidential, proprietary information, questioning in particular the wisdom of government collecting and freely disseminating information about U.S. companies in the current world competitive environment.

Targets

Many workshop attendees were strongly opposed to targets. In the words of one industry representative: "No targets should be established by anyone. We would fight targets more than anything else." A key reason among the several that were advanced for strong opposition to targets was the variation among and within industries and the associated difficulty in establishing measurability. Questions that would need to be resolved include the following:

- How can targets be established (i.e., against what baseline)?
- How can distinctions be made among different processes?
- When the mix of products is changing every year, how can energy use be measured and compared?
- How can factors that affect energy use, such as plant openings, plant closings, and recessions, be taken into account?

Workshop attendees also emphasized that targets are meaningless at an aggregate level and perhaps at lower levels also. They observed that any good manager or accountant could meet targets if he or she knows how to manipulate data. For example, if industries develop their own targets, they will simply select ones that they know they can meet. The information is thus of questionable use and may be a waste of government time and resources.

A final, unanimously voiced reason for opposing the establishment of targets is that they provide no incentive for energy efficiency. Incentives for industry are economic and are internal to each company.

Representatives from some industries commented that process-oriented targets could be helpful if used as a benchmarking tool, especially if used for internal, goal-setting purposes. Others, however, held different opinions. In their view, diversity, for example geographic and topographic characteristics and age and structure of the plant, prevented benchmarking from plant to plant. One representative commented that his industry attempts to solve this problem by paying for studies that organize industry data by quartile, so that a given company, with its raw numbers, can see how it stacks up on energy consumption per unit of product or other criteria of interest (e.g., operating and maintenance expenses or labor productivity).

Other DOE Roles That Could Encourage Energy Efficiency

Workshop attendees emphasized that there were more effective ways for DOE to encourage energy efficiency than mandatory reporting and voluntary targets. As discussed below, effective approaches include prioritizing and seeking to amend Federal regulations that impact energy consumption; facilitating information flow; enhancing access to low-interest loans for small and medium-sized manufacturers; undertaking demonstration projects; and supporting the institution of tax incentives.

A frequent comment by industry is that other Federal agencies set onerous requirements that may result in increased energy consumption. One representative, for example, commented that industry is frequently caught between energy and environmental requirements related to the Clean Air Act, ethanol emissions, or carbon dioxide. Another representative, for whom transportation constitutes a major product cost, cited examples of the effect of near-term changes. Examples included desulfurization of over-the-road diesel, which will increase energy consumption to between four and five percent, and reformulated gasoline, required by 1996, which could drive energy consumption up 20 percent.

Yet another industry participant reported that it is more efficient to limit production than to buy environmental equipment. This is particularly likely to arise in situations where plants are located in Clean Air Act attainment zones where customers are located. From industry's perspective, non-attainment expenditures are "money down a hole"—a fixed cost, which industry must meet, sometimes at the cost of reducing staff. Workshop attendees recommended that other agencies should be required to consider energy efficiency in their actions and requirements and that an appropriate role for DOE is to take the lead in developing some type of priority system.

Workshop attendees identified several regulatory changes that could lead to improved energy efficiency. Examples cited include allowing industries to purchase well-head gas; encouraging Public Utility Commissions to sponsor Demand Side Management programs; and allowing open access to gas transmission pipelines.

Workshop attendees also emphasized that technology transfer is the most important key to improving energy efficiency. Information exchange activities such as networking contacts, telephone numbers, and publications such as the

NASA Tech Briefs that spread the word about Federal technology developments are more valuable approaches to adopt. Workshop attendees reported that industry needs information on best practices rather than "meaningless" data compiled in reporting programs. They identified several ways in which DOE could play a key role in facilitating information flow, which, in turn, would facilitate adoption of energy efficient methods and technologies. For example, DOE could identify, catalogue, and facilitate industry access to DOE and Defense Department information and to available information on energy efficiency approaches used by industry. Several representatives cited the example set by the State of Washington in establishing the Energy Information Hotline, a computer network that facilitates information sharing among industries.

Other ways in which DOE could facilitate information flow include gathering and analyzing information from abroad; sponsoring the production of a university-level textbook containing generic information on efficiency opportunities in industry; and facilitating the formation of public/private partnerships. For example, gathering and analyzing competitive information on foreign practices or performing the translation of foreign materials and converting information into comparable units would be helpful to industry. Information on topics such as high-efficiency motors and energy recovery systems could be included in textbooks used for training future manufacturing plant engineers. Finally, government could play a valuable role in facilitating public/private partnerships, collecting specific data on individual companies for this purpose.

Several representatives reported that small and medium-sized companies were in special need of assistance in implementing energy-efficient methods. Enhanced access to low-interest loans in the form of grants or revolving funds was suggested as useful government-sponsored ways to address these needs.

Demonstration of energy-efficient technologies was viewed by some representatives as a particularly appropriate role for DOE. These persons cited the Clean Coal program as an example of a valuable government initiative. They commented that the identification of instances where industry has integrated a new technology into an existing process (i.e., without disrupting the process) would be especially beneficial.

Finally, tax incentives such as energy tax credits were cited as important ways in which government could encourage energy efficiency in industry. A par-

particular advantage of tax incentives is that they are available to companies of any size and also can apply to any size of investment, thus meeting the diverse needs of industry. Representatives reported that companies may have trouble in funding investments from expense rather than capital funds. They stated that funding retrofit types of investment from expense funds, which is a common approach, results in the investments being viewed as high annual expenditures which are low in productivity; under these circumstances a payback of only one or two years is required. Tax regulations may be an effective means of changing the classification of investments so that they can be undertaken as capital investments that permit a longer payback period.

ATTACHMENT A: List of Industry Participants

Lori Anderson, Society of the Plastics Industry
Pete Burke, Rohm & Haas Company
Chris Cording, AFG Industries
Rob Crolus, Portland Cement Association
John deRuyter, DuPont
Anne Giesecke, American Bakers Association
John Hendricks, Boeing Company
Cammie Hussey, American Petroleum Institute
Joe Johnson, Amoco Oil Company
Karl Johnson, Fertilizer Institute
Bill Lewandowski, Aerospace Industries Association
Tony Martocci, Bethlehem Steel Corp.
Charles Marvin, Refractories Institute
Ron Planting, American Petroleum Institute
Douglas Trerice, USX-U.S. Steel Group

**ATTACHMENT B: Association Representatives and Federal Register
Notice Respondents Who Received Notification of Workshop**

Potential participants for the workshop were identified through two methods and were invited to attend the workshop, both verbally and in writing:

- Persons who responded to a Federal Register Notice, published on May 3, 1993. The Notice invited industries, corporations, and other interested parties to submit written comments and suggestions on topics relevant to the Report to Congress.
- Contact with trade associations for industries that had participated in the former CE-189 program. Consultation with these groups provided additional contacts and the names of representatives to attend the workshops.

Bill Lewandowski
Assistant Vice President for Operations
Aerospace Industries Association
of America

Gordon Fry
Director of Federal and State Relations
Aluminum Association

Anne Giesecke
Vice President of Environmental Affairs
American Bakers Association

Jeremy Metz
American Forest and Paper Association

Robert Eppich
American Foundrymen's Society

Bob Garfield
American Frozen Foods Association

Bruce A. Steiner, Jr.
Vice President, Environment and Energy
American Iron and Steel Institute

Deb Atwood
Vice President, Environmental Affairs
American Meat Institute

Cammie Hussey
American Petroleum Institute

Joe Johnson
Coordinator, Energy Planning
Amoco Oil Company

Trey Mayfield
Regulatory Analyst
Can Manufacturers Institute

Thomas Parker, Jr.
Associate Director for Energy
Chemical Manufacturers Association

Lynn Smith
Manager of Public Policy
Computer and Business Equipment
Manufacturers Association

Don Witas
Construction Industry
Manufacturers Association

William B. Marx, President
Council of Industrial Boiler Owners

John Crowley
Director, Engineering and Safety Programs
Equipment Manufacturers Institute

Karl Johnson
The Fertilizer Institute

Roger Fries
Government and Technical
Affairs Director
Glass Packaging Institute

Sherwin Gardner
Grocery Manufacturers of America

Susan Hogg
National Association of Manufacturers

Karen Mogan
Director, Environmental Affairs
National Food Processors Assn.

Ed Egan
Manager of Technical Services
National Glass Association

Thomas White
Associate Vice President for
Manufacturing and Quality Control
Pharmaceutical Manufacturers Association

Bill Toal
Chief Economist
Portland Cement Association

Bill Birch
Primary Glass Manufacturers Council

Charles Marvin
The Refractories Institute

Lori Anderson
Society of the Plastics Industry

James F. Collins
President
Steel Manufacturers Association

**ATTACHMENT C: AGENDA
Industry Consultation Workshop
Energy Policy Act, Section 131(c)**

8:00	Welcome, introductions, review agenda: Lisa Stevenson
8:15	Role, goals of the U.S. Department of Energy: Jeff Dowd
8:30	What has been learned from interviews and quantitative analysis: Bruce Kinzey and Joe Roop
9:15	Discussion
9:45	Instruction for working groups: Lisa Stevenson
10:00	Break
10:15	Working group sessions
12:15	Lunch break
1:30	Plenary session: reports on working group results and discussion
3:00	Break
3:15	Plenary session: non-reporting options for improving energy efficiency in energy intensive industry
4:00	Plenary session: the role of reporting and targets programs in improving energy efficiency in energy intensive industry
4:30	Adjourn

**ATTACHMENT D: Features of Reporting Options
for Working Group Discussion:**

PARTICIPATION

Incentives

- Doing the right thing
- PR benefits
- Energy and \$ savings

Eligibility

- Industry basis—energy intensive
- Corporations above a consumption threshold
- All corporations above a specific size
- All corporations
- Establishment level

Method of Enrollment

- Voluntary
- Mandatory

Coverage

- By establishment
- By corporation

Compliance

- Regulatory
- Contractual

REPORTING

Subject Information

- Measures taken to increase efficiency, within:
 - a) the reporting corporation itself

b) other corporations

- Efficiency improvement information:
 - a) percent efficiency change compared to a baseline
 - b) identification of efficiency opportunities
- Other performance-based information

Frequency

- Annually
- Bi- or triennially
- Other

Reporting Entity

- Corporation
- Establishment
- No individual reporting

Audience

- DOE
- Energy efficiency forum
- Other industries and general public
- Trade associations

Information Handling

- Third parties, e.g., trade associations, A&E firms
- DOE
- Census Bureau

Level of detail

- two-digit SIC
- 3- or four-digit
- Process level

TARGETS

Established by

- Government
- Industries, e.g., trade associations
- Individual participants

Breadth

- Industry-wide
- Corporation-wide
- Establishment-wide
- Process level

Means of Measuring Progress

- Calculation of energy consumed in baseline:
 - a) specific year, e.g., 1990
 - b) year immediately prior to reporting year
- Aggregate calculation performed by DOE, e.g., EIA

Efficiency measures

- Energy consumption per constant dollar value of shipments
- Not specified, but instead selected by reporting entity

MEANS OF RECOGNITION FOR PARTICIPANTS

Publicity

- Federal awards program
- Program logo for corporate use
- Other

APPENDIX E.

INDUSTRY VIEWPOINTS AND SUGGESTIONS ON NONREPORTING ALTERNATIVES FOR ENCOURAGING ENERGY EFFICIENCY

During the course of the study reported in this document, industry representatives suggested many nonreporting alternatives through which Federal action could stimulate industrial energy efficiency improvements. While alternatives to reporting and targets were not specifically requested by Section 131(c) of EPACT, these industry viewpoints and suggestions are summarized in this appendix.

Although Federal efforts already exist in some of these areas, the comments from industry suggest that continuing or enhancing these ongoing efforts could provide additional benefits. Industry viewpoints are documented in this appendix without judgment or without the benefit of further analysis.

Continue Federal Efforts To Facilitate the Flow of Technology-Transfer Information

Barriers impeding access to information still exist to different extents in various industries and corporations. New technology developments sometimes occur rapidly; corporate staff may be simply unable to keep up with everything that might pertain to their industries. In other cases, staff may have a misperception or be uncertain about the economics or reliability of a particular opportunity.

One type of information industry representatives reported to be valuable in addressing these barriers is information about successful implementation of energy efficiency technologies. Such information helps establish confidence in the economics and reliability of the technologies. Particularly useful, several industry representatives noted, are contacts who have hands-on experience in actually implementing technologies in the application of interest. These people are able to directly answer questions about problems encountered and solutions employed.

During the industry consultation workshop held on September 8, 1993, many industry representatives cited *NASA Tech Briefs*, published by the National Aeronautics and Space Administration (NASA), as an example of a

very useful form of information dissemination. This publication provides short, but fairly detailed, descriptions of technology developments under way and allows a quick perusal of many different technology opportunities.

Continue Federal Efforts To Increase Demonstration Programs and Public-Private Partnerships

Industry is frequently unwilling to gamble with unproven technologies. The Federal Government helps to reduce this uncertainty through efforts to participate in the development and demonstration of these technologies. As noted previously, an important followup to such efforts is ensuring that the word gets out through wide dissemination of information. The Federal Government already undertakes significant efforts in this area; this suggestion is included as support for ongoing efforts and a recommendation for their continuance, rather than a request for new action.

Continue Federal Efforts To Increase the Priority of Energy Efficiency Across the Federal Government

Some industry representatives felt that Federal agencies are sometimes inconsistent in the level of priority given to energy efficiency. They believed that if Federal procurement actions had more emphasis on efficiency requirements, the effect on the substantial market that the U.S. Government represents could ripple throughout the economy. For example, if energy efficiency became an important selection criteria for awarding Department of Defense or other Federal contracts, corporations would strive for the efficiency improvement opportunities that would enable them to compete for those contracts. Efficient technologies and processes implemented for work on Federal projects would eventually, perhaps quickly, penetrate other areas of these corporations and ultimately spread to the larger community, if proven to be cost-effective.

Reconcile Environmental and Other Federal Regulations With Energy-Efficiency Goals

Industry representatives frequently noted that some Federal regulations may have an adverse impact on energy efficiency. The most common of these were reported to be regulations imposed by the Environmental Protection Agency (EPA). While not necessarily disputing their value, industry representatives noted that compliance with these regulations often requires additional energy consumption, sometimes in significant quantities. Other Federal regulations (for example, occupational health and safety and product sanitation) were also mentioned in the context of often requiring additional energy consumption. Industry representatives reported that the additional levels of energy required to meet such regulations appear to be rarely considered in the formulation of those regulations. One suggestion made was that EPA, for example, might be required to file an "energy impact statement" when proposing new regulations, similar to the way other Federal agencies and private-sector organizations are required to file environmental impact statements when proposing new facilities. Such a requirement would acknowledge energy and environmental tradeoffs and perhaps encourage greater consideration of energy efficiency when formulating "best available (energy or environmental) technology" recommendations.

Encourage Regulatory Changes That Facilitate Energy Efficiency

A number of industry representatives felt that, in some cases, Federal, State, and local regulations hamper efficiency improvement opportunities. The regulatory structure surrounding natural gas transmission was cited as one such case. Increased use of natural gas in numerous situations is hindered by Federal and non-Federal requirements that complicate its purchase and transfer. For example, the inability of corporations to use utility pipelines to transfer natural gas among facilities in some cases eliminates natural gas as an energy option. Or, if a particular corporation purchases more than a threshold amount, the corporation itself falls into a "distributor" category and is subject to an additional slate of Federal regulations. These types of factors discourage the use of natural gas along with its concomitant efficiency opportunities and accompa-

nying environmental benefits. Industry representatives felt that easier purchase of natural gas from the wellhead supplier, for example, would facilitate and encourage use of natural gas.

Another regulatory area where the Federal Government could play a role is in helping to establish consistency across States and regions in the structure of demand-side management programs and utility regulation. Corporations with facilities in many States find it difficult to set up a uniform corporate policy with regard to demand-side management because the programs are vastly different in different parts of the country. A number of industry representatives felt that some States or regions downplay or even discourage energy efficiency programs through their regulatory policies. Such situations are responsible for some of the differences in efficiency performance that exist among facilities within a single corporation.

Further examination and elimination of remaining regulatory barriers could prove fruitful in encouraging additional efficiency improvements in energy-intensive industries.

Provide Economic Incentives

Industry representatives frequently reported that anticipated payback on proposed efficiency measures often does not meet the corporate investment hurdle rate. Particularly in difficult economic times and in highly competitive environments, corporations must carefully plan investments to maximize their return. Numerous investment opportunities are available for an individual corporation at any given moment (including both efficiency and non-efficiency measures); these frequently compete for a limited supply of investment capital. Many of the non-efficiency investments offer a higher return and hence are selected over efficiency investments. This is particularly true when energy prices are low. Some method of improving the cost-effectiveness of many energy efficiency investments is necessary before those investments can compete with non-efficiency alternatives. Tax incentives were frequently mentioned as one such method, because they are available to all corporations and all efficiency investments, whether large or small. Measures like tax credits or accelerated depreciation on efficiency investments were mentioned in virtually all of the consultation meetings held with industry.

Industry representatives strongly expressed the opinion that economics are the bottom line in the private sector, and energy efficiency measures must be economically justifiable from a company's perspective before it will invest. Efforts to encourage improved energy efficiency in industry will, at best, be only partially effective if economic barriers are not sufficiently addressed.

Design Federal Programs To Encourage Overall Productivity Improvement Rather Than Focus on Energy Efficiency in Isolation

Industry representatives felt that the Federal Government should encourage overall productivity improvements rather than energy efficiency alone. Driven predominantly by customer and market demands, industry organizes a wide variety of production inputs—including energy—in the most cost-efficient manner available. However, singling out any individual input—such as energy—for improvement without concern for the larger picture of the operating environment of industry can distort business investment decisionmaking.

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