THE SUBMISSION OF THE CHEMICAL INDUSTRY TASK FORCE

ON

ENERGY CONSERVATION

CHEMICAL INDUSTRY REPORT ON ENERGY CONSERVATION 1972 – 1980

TO THE

MINISTER OF ENERGY, MINES AND RESOURCES

AND THE

MINISTER OF INDUSTRY, TRADE & COMMERCE

AT THE SECOND CONFERENCE ON ENERGY CONSERVATION

MARCH 24, 1976

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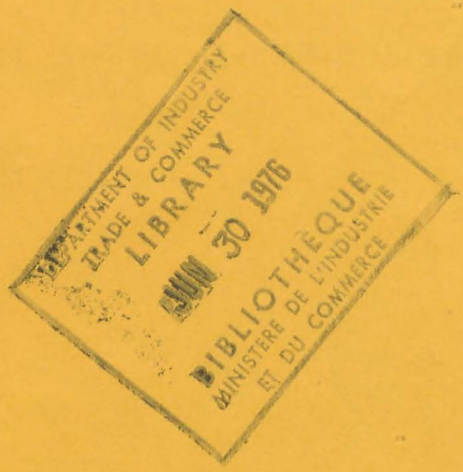


The Chemical Industry Task Force for Energy Conservation is composed of representatives from:

Canadian Fertilizer Institute
350 Sparks Street, Ottawa K1R 7S8

The Canadian Chemical Producers' Association
Suite 505, 350 Sparks Street,
Ottawa K1R 7S8

The Rubber Association of Canada
100 University Ave., Toronto M5J 1V6

BACKGROUND

As an outcome of the Ministers' Energy Conservation Conference held on May 23, 1975 industry and government agreed to work together to develop conservation programs on an industry sector basis. The purpose of this report is to describe the voluntary energy conservation program which has been developed by the chemical sector to cover the period to 1980 and to provide some suggestions for the period beyond.

The chemical industry recognizes the need for a coordinated national program of energy conservation and management in Canada and, in this regard, will lend energetic support to responsible energy conservation efforts to assist in achieving Canada's goals as expeditiously and economically as possible.

Historically, the conservation of energy within the chemical industry has been a high priority item because of the energy intensive nature of industrial chemical production and the relative importance of energy expenditures in the industry's total cost structure. Chemical manufacturing operations depend heavily on the use of energy as a fuel as well as a feedstock or raw material which is consumed directly in the process. The main sources of energy utilized by the industry are natural gas, oil and electric power. Individual companies within the industry have been involved for many years in internal energy conservation programs and energy related process improvement systems. Effective conservation measures have been and will continue to be necessary in order to achieve the level of costs required for survival and growth in the competitive business system. As the key factors of cost and availability become increasingly critical, the incentives to do a better job become even more persuasive.

TASK FORCE ORGANIZATION

At the May conference, it was agreed that the industry programs could best operate through the established industry associations. By June of 1975, a sector task force identified as the "Chemical Industry Task Force for Energy Conservation" had been established to develop a detailed industry program. The Task Force organization consists of a steering committee and a technical working group composed of representatives from member companies of the three major industry associations (Canadian Chemical Producers' Association, Canadian Fertilizer Institute, and The Rubber Association of Canada) and liaison members from the Departments of Energy, Mines and Resources and Industry, Trade & Commerce. A list of the members of the steering committee and the technical working group is attached as Appendix I.

INDUSTRY PARTICIPATION

The high degree of participation and commitment on the manufacturing part of the chemical industry sector is evidenced by the following:

Number of companies in chemical industry sector	75
Number of companies participating in voluntary program	71

Participation in the program represents 95 per cent of the chemical industry sector membership and, more significantly, involves manufacturing activities which account for close to 100 per cent of the total fuel energy consumed by the companies within the sector. This, in turn, accounts for some 15 per cent of all industrial energy used in Canada. A list of the participating companies is attached as Appendix II.

PROGRAM TO 1980

1. To commit to a voluntary program requiring a substantial reduction in the quantity of energy consumption per unit of production.

2. To establish and implement a regular system of reporting accomplishments against the identified goal.

3. To promote the broadest possible adoption of best available conservation practices by communicating and disseminating appropriate conservation data and information among all sector companies.

4. To encourage participation and involvement by those chemical companies who are not members of the three industry associations.

5. To aid in the stimulation of energy awareness and thus further broaden the participation in the national energy conservation effort by informing the general public of the industry's commitment and achievement.

Beyond the date of the Second Conference the Task Force will examine its role in relation to liaison with the government, seminar activities, joint studies and public relations activities.

SECTOR GOAL

A sector goal has been established to reflect the conservation of energy used by the industry as a fuel. The initial overall target of the chemical sector is to reduce the consumption of energy per unit of production by 17 per cent by 1980 using 1972 as the base year for comparison purposes. Achieving this goal in 1980 will result in annual savings of some 66×10^{12} BTU, equivalent to the energy content of 11×10^{6} barrels of crude oil per year. By way of example, this is approximately equivalent to the saving of enough energy to heat all of the homes in Metropolitan Toronto for one year.

This goal is based on a weighted average of the estimates of the reductions considered achievable by each of the 71 companies participating in the sector program. To establish the goal, each participant determined the volume of production and the quantity of energy consumed in the base year 1972. In addition, individual companies forecast the corresponding quantities of production and related energy to be consumed in the year 1980. From this data, the percentage reduction in energy consumption per unit of production was calculated for 1980 as compared to 1972. The individual inputs were collated by the industry associations, weighted on the basis of the amount of energy used in 1972 and finally consolidated into a sector goal.

Approximately one-third of the forecast energy savings are expected to result from energy waste elimination. The remainder of the savings is divided equally between the increased efficiency of energy usage inherent in the industry's continuing program of process improvements and the savings accruing from capital projects to provide new or modernized facilities.

The goal is also based on certain assumptions relative to the economic scenario expected to apply during the time period indicated. These assumptions provided by the Department of Industry, Trade & Commerce are listed in Appendix III.

The goal will be attained by each company making a concentrated effort to further improve energy conservation in all aspects of its operations. These efforts will require:

- full commitment and endorsement by senior company officials to make all employees aware of the need for energy conservation coupled with a determination to ensure that its practice becomes an everyday way of life with each of them;

- installation of additional energy measuring devices in their operations for control purposes and for the identification of areas requiring special and priority attention;

- increased and continuing emphasis on improved operating and process control systems;

- that, where they can be economically justified, improved facilities leading to more efficient usage of energy will be installed;

- innovations in the technology of both existing industrial processes and processes to be used for new installations.

REPORTING METHODOLOGY

A measuring and reporting system has been established to provide participating companies with a uniform procedure for the calculation of energy usage statistics and for the reporting through their respective associations of their

individual progress towards the industry goal. This system is based on that pioneered and developed by the Manufacturing Chemists Association in the U.S. The detailed procedure, which has been modified slightly for use in Canada, is attached as Appendix IV. Highlights of the procedure which exclude energy used as a feedstock or raw material are as follows:

- Energy consumption expressed as BTU per pound of product;
- Establishment of 1972 as base year;
- Production and energy input definitions;
- Reporting period 1972-1980;
- Proposed reporting forms.

The procedure requires submission by the industry of a consolidated semi-annual report which will show the progress over the previous twelve months as compared to 1972. The first report will cover the period of July 1, 1975 to June 30, 1976 inclusive, and will be submitted to the Office of Energy Conservation, Department of Energy, Mines and Resources on September 1, 1976.

SEMINAR ACTIVITIES

Major undertakings of the Task Force so far have included arrangements for two separate energy conservation seminars.

The objective of the first seminar, which was held in Toronto on October 28, 1975 was to familiarize as many chemical sector companies as possible with the work the Task Force was doing in the development of an industry program and to obtain increased participation from sector companies. The seminar was attended by 63 delegates representing 49 companies.

A second seminar, which has been expanded to a three day program will emphasize the technical aspects of energy conservation and is scheduled to be held in Toronto on May 18, 19 and 20, 1976. The purpose of this seminar is to provide a forum for the exchange of information between members of individual companies in order to improve the overall effectiveness of the industry's conservation efforts. The format will devote one day to the organization and management of an in-plant energy conservation program and two days to specific areas of concern such as efficiency of steam generation; selection and operation of steam traps; heating, ventilation and air conditioning systems; energy distribution and conservation opportunities in plant and process design activities.

A third similar seminar is also planned to be held in the fall of 1976 in western Canada. The program will be technical in nature and oriented to the needs of the type of chemical operations carried out in that part of the country.

CONSTRAINTS AND OPPORTUNITIES

In the process of establishing the energy conservation objectives appropriate for individual companies within the chemical industry sector, the potential improvements in the efficiency of energy consumption have been referenced to an economic scenario Appendix III. This is a projection which assumes no substantial changes in the ways in which business operates and no substantial changes in the extent and form of government intervention in business. The goal will be achievable if economic and operational conditions, which are beyond the control of the industry, materialize as forecast:

- national and international economic conditions provide the necessary demand for operating the industry at forecast rates of capacity;
- feedstock costs retain their present relationship to the energy costs;
- environmental protection standards require no greater usage of energy;
- savings from energy conservation related investment will accrue to the investor and will constitute an adequate return;
- feedstocks, feed mixes and raw materials are available as forecast;
- feedstock costs and energy costs retain their present relationships to costs of construction; and last;
- production requirements reflect the forecast patterns of product mix.

Although some of the major energy savings will eventually come from changes in the ways the chemical industry operates its facilities and the technologies it uses, it would be misleading to suggest that many such major changes could be effected in the relatively short time span between now and 1980.

Significant expenditures for equipment and the effects on costs of changes in operating procedures to conserve energy will have to be economically justified. It is considered essential and vital that any increased operating costs associated with energy savings devices be passed through as allowable costs under the Anti-Inflation Act regulations without undue argument or delay and, beyond this, that any financial savings resulting from such installations accrue to the investor to provide economic justification for the project. Appropriate incentives, such as fast write-offs and tax credits, could result in increased energy conservation in the forecast period and could lead to additional savings over and above the stated industry goal of 17% by ensuring the allocation and supply of sufficient capital resources to energy conservation projects. Similar incentives have made an important contribution to the environmental protection program over the past few years. Further achievement by use of these kinds of incentives could readily improve the target by one or two per cent and could save additional energy equivalent to that necessary to heat all of the homes in the City of Kingston for one year.

PROGRAM BEYOND 1980

The program and organization to achieve energy conservation through 1980 is a response to the world energy crisis. The chemical sector is confident that the energy conservation program it has established and the competitive market place in which it operates will result in the achievement of its 1980 energy conservation goal.

The need for efficient energy use in line with overall objectives of Canada will continue for the foreseeable future. However, the more fundamental changes aimed at improving energy utilization require major capital commitments, many new facilities, the development of new technology and cannot be in place before the eighties. In the continuing need to conserve energy and control its consumption, the chemical sector is prepared to play its part, both individually and collectively, in these ongoing programs aimed at the longer term.

Several major additional factors will become increasingly important:

- Increasing energy costs are an incentive for the industry to provide new chemical processes and operations, including electric power generation facilities which can be economically justified. These facilities will have greatly reduced energy requirements per unit of output and the reduced costs resulting from these energy conservation measures will be a competitive force in the market place;

- The use of more plentiful energy sources such as coal, nuclear or hydroelectric power must play an important part of our total effort to conserve the more scarce oil and gas energy sources for more critical end uses. The building of new facilities and conversion of older facilities to use the alternates will continue into 1980 and beyond. The relative costs and availability of these alternate energy sources versus rapidly escalating costs of energy from oil and gas should provide adequate financial incentive for the massive investment involved;

- In addition to energy consumed in fuel applications, the chemical sector also uses substantial quantities of oil and gas as direct feedstocks to manufacture petrochemicals. The processing of these energy feedstocks to finished chemicals represents a high degree of upgrading of Canada's natural resources. It is possible in a chemical sense to build chemicals from other feedstocks such as coal or limestone but, in the great majority of cases, the technology either does not exist or has not been developed far enough to be economically attractive at this time. Over the longer

term enough research effort must be devoted in Canada to permit the use of these alternative sources of feedstock.

The development of these three general areas is of great importance to Canada's future energy balance. However, the complexities of the market place, technological development, location, and the different products involved, do not lend themselves to an overall industry wide program. It is our belief that the response of individual companies to these challenges will be very positive but will inevitably vary greatly dependent upon the nature of each company's business.

It may be that government assistance will be necessary for success in these areas of basic research and that tax or grant incentives will have to be designed to encourage such developments.

It is also likely that some parts of these challenges may be larger than any individual company might undertake on the basis of its own resources. In this case, groups of involved companies, perhaps working together with government, can organize to attack these and other areas which can be identified.

The opportunities to achieve substantial reductions in energy consumption in the longer run should not necessarily be limited to those technological areas which are exclusively under the control of the chemical industry. It is important to make reference to other general but external conditions which should not be overlooked because of their possible effect on the industry's conservation capability. For instance, the single most wasteful use of fossil fuel and nuclear energy in Canada is in the generation of electric power which is thermally inefficient because of the relatively large amount of heat lost in the cooling water effluent. The formation of a national grid could ensure that we use all of the hydroelectric power available before we use the non-replaceable fossil fuels. Further integration of power and steam generating facilities in areas of high chemical and other processing concentration could ensure the recovery and use of the large quantities of low quality heat presently available but not used in the generation of electric power. Another area of major concern is the continuing encouragement in the use of natural gas for domestic and commercial fuel applications. This is unquestionably another large natural gas consumer sector area which deserves examination and evaluation.

Finally, a clearly defined and consistent national energy policy, providing for the coordination of a country wide program of energy conservation, is required for effective planning in the chemical industry. While maintaining the competitiveness of Canadian industry, it is essential that such a policy be based on careful consideration of the many facets involved such as conservation of natural resources, environmental protection and availability of manpower and risk capital.

APPENDIX I

MEMBERS OF CHEMICAL INDUSTRY TASK FORCE FOR ENERGY CONSERVATION

Name	Company or Organization	Committee*
J.F. Bristol Manager, Product Distribution & Planning	Dow Chemical of Canada Limited	T.W.G.
R. Brown Executive Vice President	Firestone Canada Limited	S.C.
N.B. Campbell Energy Coordinator	B.F. Goodrich Canada Limited	T.W.G.
W.L. Canniff Technical Director	Canadian Chemical Producers Association	S.C./T.W.G.
J. Chantraine Vice President	Brockville Chemical Industries Limited	T.W.G.
A.G. Darimont Energy Coordinator	Esso Chemical Canada	T.W.G.
J.H. Douglas Manager of Energy Resources	Dow Chemical of Canada Limited	T.W.G.
J.E. Fletcher Manager, Operations	Cominco Ltd.	T.W.G.
G. Foster Manager, Planning & Energy	BASF Canada Limited	T.W.G.
A. Horrax Assistant to Executive Vice President	Firestone Canada Limited	T.W.G.
J. Hay Vice President Manufacturing	Dow Chemical of Canada Limited	S.C.
Jack Jagt Director, Administrative Services	Rubber Association of Canada	S.C./T.W.G.
Arie Jansen Assistant to Executive Vice President	Reichhold Chemicals Limited	T.W.G.
B.C. Kaulback Manager, Energy Conservation	Canadian Industries Limited	T.W.G. (Secretary)
W.N. Kissick Vice President	Union Carbide Canada Limited	S.C.
W.J. Mandry President	Canadian Industries Limited	S.C. (Chairman)

Name	Company or Organization	Committee*
W.A. Martin Vice President Production	Uniroyal Limited	S.C.
A.G. Moreton President	Esso Chemical Canada	S.C.
J.C. Munro Project Analyst	Allied Chemical Canada Limited	T.W.G.
R.W. Neal President	Canadian Fertilizer Institute	S.C./T.W.G.
K.F. Nielsen Chief Executive Officer	Western Cooperative Fertilizers Limited	S.C.
A. Oliver Manager, Engineering Services	Sherritt Gordon Mines Limited	T.W.G.
G.H. Pelletier Plant Manager	St. Lawrence Fertilizers Ltd./Noranda Group	T.W.G.
H.L.C. Reynolds Staff Engineer	Shell Canada Limited	T.W.G.
G.T. Richards Manager, Energy Utilization	Du Pont of Canada Limited	T.W.G.
N.W. Smith Manager, Engineering Services	Uniroyal Limited	T.W.G.
H.M. Sochan Manager, Energy Engineering and Conservation	Polysar Limited	T.W.G.
M.S. Scott Manager Chemical Products	Noranda Mines Limited	S.C.
B.L. Turvolgyi Vice President Marketing	Du Pont of Canada Limited	S.C.
S.J. Viron Manager of Manufacturing, Chemicals	Cyanamid of Canada Limited	T.W.G. (Chairman)
R.R. Williams Staff Engineer	Canadian Occidental Petroleum Limited	T.W.G.
C.A. Wolf Coordinator, Energy Affairs	Union Carbide Canada Limited	T.W.G.

* S.C. Steering Committee
T.W.G. Technical Working Group

Liaison Members	Company or Organization
J.M. Belanger General Director Chemicals Branch	Industry, Trade & Commerce
E.R. Lauer Special Projects Division Chemicals Branch	Industry, Trade & Commerce
Yvonne Van Ruskenveld Office of Energy Conservation	Energy Mines & Resources

APPENDIX II

LIST OF COMPANIES PARTICIPATING IN CHEMICAL INDUSTRY SECTOR ENERGY CONSERVATION PROGRAM

Alberta Gas Chemicals Ltd.
Alcan Smelters and Chemicals, Ltd.
Allied Chemical Canada, Ltd.
Alfred Lambert Inc. (Acton)
American Biltrite (Canada) Ltd.
Ashland Oil Canada Limited
Armour Industrial Chemicals Ltd.
Atlas Chemical Industries Canada Ltd.
BASF Canada Ltd.
Bate Chemical Company Limited
Becker Industries of Canada Limited
H.L. Blachford Limited
Bombardier Ltd. Rockland Division
Borden Chemical Company (Canada) Limited
Borg-Warner Chemicals, Borg-Warner (Canada) Limited
Brockville Chemical Industries Limited
Canada Chrome & Chemicals Limited
Canadian Hoechst Limited
Canadian Industries Limited
Canadian Occidental Petroleum Ltd.
Canadian Titanium Pigments Limited
Carlew Chemicals Limited
Celanese Canada Limited
Ciba-Geigy Canada Limited
Cominco Ltd.
Commercial Alcohols Limited
Cyanamid of Canada Limited
Dayco (Canada) Ltd.
Dayton Tire Canada Ltd.
Diamond Shamrock Canada Limited
Dominion Colour Corporation Limited
Domtar Chemicals Limited
Dow Chemical of Canada Limited
Du Pont of Canada Limited
Emery Industries Limited
Erco Industries Limited
Esso Chemical Canada
Ethyl Corporation of Canada Limited
Firestone Canada Ltd.
FMC of Canada Limited
Garlock of Canada Ltd.
Gates Rubber of Canada Ltd.
B.F. Goodrich Canada Ltd.
Goodyear Canada Inc.
Gulf Oil Canada Limited
Hercules Canada Limited
International Minerals & Chemical Corp. (Canada) Limited
M & T Products of Canada Limited
Mansfield-Denman General Ltd.
Mallinckrodt Canada Ltd.
Monsanto Canada Limited
National Silicates Limited
Noranda Mines Limited
Nuodex Canada Limited
Polysar Limited
Record Chemical Company Inc.
Reichhold Chemicals Limited
Rohm and Haas Canada Limited
Seiberling Rubber Co. of Canada Ltd.
Shell Canada Limited
Sherritt Gordon Mines Limited
Simplot Chemical Co. Ltd.
Stanchem, a Div. of PPG Industries Canada Limited
Tioxide of Canada Limited
Trent Rubber Services Ltd.
Union Carbide Canada Limited
Uniroyal Chemical
Uniroyal Limited
Virchem of Canada Limited
Western Co-operative Fertilizers Limited
Witco Chemical Canada Limited

ASSUMPTIONS TO UNDERLIE INDUSTRY SECTOR CONSERVATION GOALS

1. In the period 1975-1985, general economic growth (constant dollar GNP) will advance at about 5% per year, down from the recent historical rate (1963-1972) of about 5.7% per year. No prolonged economic contraction (depression) is assumed, but short-term economic swings will continue to occur. Inflation will average between 6 and 8% per year.

2. Present environmental regulations and controls will be maintained.

3. The general attitude and cooperation of operating labour towards in-plant conservation measures will gradually reflect the cumulative effects of the public awareness programs of governments and commerce.

4. Only moderate levels of government incentives for energy conservation will be made available.

5. The availability of major forms of energy will be:

   Oil - adequate to meet demand, assuming that imports are available;

   Natural Gas - constraint on new uses and possible restricted availability in the period 1977 through 1983;

   Electric power - adequate to meet demand.

6. Energy prices will increase roughly as follows:

   Oil - to world levels by 1978 (probably about $12.00/bbl.) then 6-8% per year through 1985;

   Natural gas - will increase more rapidly until it reaches parity on an energy equivalent basis with oil;

   Electricty - prices will roughly double by 1980, and rise about 10% per year thereafter.

MEASURING AND REPORTING SYSTEM FOR THE INDUSTRY ENERGY CONSERVATION PROGRAM PREPARED BY THE CHEMICAL INDUSTRY TASK FORCE ON ENERGY CONSERVATION

To fulfill a request by the government for a reporting system to measure the voluntary commitments by industry for a reduction in the rate of energy consumption, an industry task force has adapted a procedure developed by the Manufacturing Chemists Association. A single consolidated report in the format of Form I attached, will be issued for the three industry associations represented in the chemical sector. The procedure herein is to be used by an individual company in compiling its data for completion of Form I for their Association. These individual company reports of Forms I and II will be destroyed promptly after consolidation by each association office and no individual data will be retained except in company files. Responsibility for validity and consistency of company data and the interpretation of this procedure as it translates into the energy conservation objective rests with the reporting company only. Since all calculations for the preparation of an individual company's report remain with that company, it is recommended that the method given herein be followed as uniformly as possible so that the data can be aggregated in an industry report with reasonable validity. The degree of internal calculation detail is left to the discretion of individual companies recognizing that it will be tailored to their own management philosophy and objectives. However, it should be sufficiently flexible to accommodate change as more sophisticated procedures are developed in that company.

A. DEFINITIONS OF TERMS

1. Production - Finished Product(s) - Pounds Produced

NOTE: When used consistently, either Alternate I or Alternate II below is acceptable as a definition and will give valid results for consolidation of data.

Alternate I. Weight in pounds of manufactured product(s) produced for sale, export, or consumption outside of the Manufacturing Location; it is intended under this definition:

(a) To exclude product transferred between departments within a Manufacturing Location. Intermediate or raw materials which are produced on-site, and consumed at the Manufacturing Location where produced, carry forward their utility BTU into the finished product, but not their feedstock BTU, except as noted in 2.a.(1), 2.a.(3), and 2.b.(1).

(b) To include products shipped to other Manufacturing Locations for further processing or warehousing.

(c) To include goods ready for sale whether shipped or not.

Alternate II. Weight in pounds of manufactured product(s) as produced, whether used as an intermediate or a raw material for further processing at the same location, or shipped for sale, export, etc., or held in inventory.

Refer to Figure I for example of these alternates.

2. Energy Inputs - Energy Consumption - Energy Charged

a. Includes:

(1) The HHV (High Heating Value) as BTU of all fuels used for their calorific value, such as for steam generation, electricity generation, process heating and cooling, space heating and cooling, stationary engine or turbine drives, incineration, etc.

(2) Purchased non-fuel forms of energy, such as steam at its actual enthalpy value (adjusted for boiler efficiency, or

estimated if not known) or electric power at the approximate average fuel consumption rate of 10,000 BTU/Kwh.

NOTE: It is recognized that charging purchased electric power at its fuel-consuming energy equivalent, rather than its theoretical value, appears inconsistent with the principle of accounting for only those energy conversions over which the reporting company has control. However, on the rationale that saving purchased electricity does, in fact, save the fuel equivalent, that the amount of purchased electricity used by the chemical industry is large, and especially that the waste of fuel involved in utility-type (condensing) power generation is proportionately large, it is generally accepted that the charging base is justified.

(3) i. Energy from sources other than those defined in (1) and (2) above such as, primarily, fuels recovered from feedstocks as reaction by-products, or steam or electricity generated from exothermic feedstock reactions, which energy physically becomes part of the total energy balance of the Manufacturing Location. These by-product energies should be charged in at appropriate values (HHV for fuels, enthalpy at appropriate efficiency for steam, etc.)

NOTE: In effect, this is an exception to the exclusion of feedstock energy stated in b.(1) below, but only to the extent that such energy is released and identified in the operation.

ii. If the by-product is generated and then consumed within one process and does not affect other Finished Product energy balances, it need not be accounted for, since discontinuance of that operation would not require an increase in purchased energies to compensate for by-product energy no longer available. (Refer to Figure 11).

If significant investment is made to recover by-product energy from materials which were treated as waste in the Base Period, energy so recovered is a valid contribution to conservation, in which case it is not charged as an energy input, but has the effect of reducing purchased energies required.

b. Excludes:

(1) Feedstocks, raw materials, and intermediates purchased or transferred from other Manufacturing Locations. Except where a by-product is used for its calorific value from any such feedstock, raw material or intermediate, and used at the Manufacturing Location, it is treated as noted in 2.a.(3) i. above;

(2) Lubricants, Greases, etc.;

(3) Diesel, gasoline, and other fuels as may be used in motor vehicles and transportation equipment generally.

Other conversion norms are tabulated in Section 4 of the NBS Handbook 115, but are not considered as a part of these definitions. This book is "Energy Conservation Program Guide for Industry and Commerce" published by U.S. National Bureau of Standards.

3. Feedstocks

Materials which are converted, wholly or in part, into products chemically or physically distinct from the feedstocks; which products are intended for sale directly or for further conversion into other salable products.

4. Manufacturing Location

All of the chemical producing and supporting or related production facilities, including any office, research, engineering or other integrally managed units in a given geographic locale. Utilities used in supporting facilities e.g. office buildings, research labs, etc. can be allocated to one product, prorated or kept separate at a company's discretion

or in accordance with their accounting practice.

NOTE: Whether certain facilities are chemically related, such as metals plants or mining operations integrated with chemical operations, and therefore to be included in this reporting, is discretionary based on company practice. Unit relationships should be maintained consistent from period to period or appropriate adjustments made to the base. Similarly the number of manufacturing locations any company chooses to regard as separate entities within a geographical area is discretionary, within the limits of the definition or production, and without double-counting of energy inputs or energy reductions. Some companies hold membership in more than one trade association and manufacture products that might be optionally reported through one or another such association. Those companies should report consistently through only one such association without duplication.

B. CALCULATION PROCEDURES

1. The Base Period for measuring achievement is the calendar year 1972. In an exceptional case where a company does not have sufficient data to validly use 1972 as a base year, then the first subsequent year with valid data prior to the first reporting period is to be used as the base year.

2. Each reporting company determines its Base Rate of energy consumption in BTU per pound of Production for each significant product (or group of products) at each Manufacturing Location for the Base Period. Each of these is called the Base Rate for that product at the location and doesn't change through time. Total Energy Input to the product divided by the total Pounds Produced for the Base Period determines that Base Rate.

3. Reporting will be semi annually (at mid and end of calendar year) for the preceding twelve month period. Current production (in pounds) of each of the products manufactured in the Base Year, 1972 is determined at each Manufacturing Location. These are totalled for the company and reported on Line (I) of Form I.

4. Similarly, Current Reporting Period Energy inputs are determined at each location, but it is not necessary to do this on a product-by-product basis for periods after the Base Period. Energy Inputs on the aggregate at each location for all products manufactured during the Base Period and on the aggregate for the company are adequate. The company aggregate is reported on Line (II) of Form I. There may be energy consumption at a Manufacturing Location which is not normally distributed to products (lighting, heating, air-conditioning of shops, offices, yards, etc.). Accounting procedure for this type input is optional. As suggestions, it may be categorized as "General" and shown separately as a "bottom line" addition to consumption without attendant production, or it may be arbitrarily distributed to products proportionate to metered energy uses.

The intent is that all Energy Inputs, as defined, be accounted for at each Manufacturing Location so that there is a balance around each such location and each company. Inclusion of General Office, or Headquarters Facilities, is optional by company according to its proximity to a Manufacturing Location. Most companies will not include company headquarters where they are unrelated to any specific Manufacturing Location.

5. Current Production in pounds for each product in the current period, multiplied by the Base Rate energy consumption for that product at that location establishes the Comparison Base Period Equivalent for each product at each Location. The company total is reported on Line (III) of Form I.

6. The sum of all the Comparison Base Period Equivalents Inputs for the company, compared to the total

Current Period Energy Inputs, establishes company conservation performance. The quantity by which the Current Period Inputs are smaller represents the energy conservation that has been effected on a weighted average, product-mix adjusted basis. The difference divided by the comparison base period equivalent inputs is the decimal equivalent of the percentage reduction. This is Line (VI) of Form I.

7. (a) As new products, consuming significant energy quantities, are added to a Manufacturing Location after the Base Period, the respective energy consumption in BTU's and production in pounds for the first full reporting period of operation are added to the Base Period as an adjustment. Each current Period then and thereafter would include the actual values for the new products produced and the energy that would have been used at the Base Rate established in the first full reporting period as described in B-3 above.

   If a new facility replaces an existing one for the same product the Base Period data for this product is not changed. Therefore, if it is more energy efficient the reduction becomes an energy conservation savings.

   Generally, the first full reporting period is to establish the Base Equivalent to the 1972 base for products not existing in 1972 at a given location.

   (b) Where start-up periods involve non-productive consumption of significant quantities of energy, that quantity may be subtracted, as an adjustment, from total Inputs for that reporting period, suitably flagged and justified as to the reason.

   NOTE: Without such adjustment, relatively small operations might show unjustifiably high conservation achievement in later years which would not properly relate to steady-state manufacturing performance.

   Similarily, where a new production unit is in operation prior to the first full reporting period, and the first full reporting period is used to establish the Base Period data for that production, the Energy Inputs used prior to that first full reporting period may be subtracted as an adjustment, along with the partial corresponding production in preparing the previous twelve month report, or may be included without Base Period adjustment. Such options should be guided by the significance of the impact on the final results.

   (c) As alternates of 7 (a) above, the Base Period adjustment for new facilities for established products may derive from:

   1. Base Rate accumulated in the first period of operation and deemed to be representative, even though it be less than a full reporting period, or

   2. Base Rate data from production of such product(s) at other locations which the new operation supplants or supplements with improved conservation techniques.

8. Any significant increase in energy consumption caused by Federal, Provincial or Municipal regulations not in effect in 1972, require adjustment of the current period to compensate. This is accomplished by identifying the cause and making a simple reduction of the total current period energy inputs by the amount of the identified increase. This amount of the reduction is Line (IV), the reduced amount is Line (V) of Form I. A percentage reduction from Base Period is calculated using the total inputs reduced by these amounts similar to the calculation in 6. above. This is Line (VII) of Form I.

   NOTE: Government or control agency regulations that signifi-

cantly effect energy consumption totals such as environmental or health protection standards invoked or issued since the base year, will probably fall in the following areas of additional fuel to complete incineration, decreased boiler efficiency because of smoke or dust abatement, electrical or steam requirements for mandatory ventilation, cooling, filtration, reprocessing, evaporation etc. These additional energy inputs directly related to increased controls are to be converted to equivalent BTU's and the Period Total Energy adjusted as shown in example.

9. The total Purchased Energy Source quantities, identified as to form (Coal, Electricity, Natural Gas, etc.) are listed separately as a company total on Form II.

10. Refer to Sample Calculation attached for an example of an internal company summary.

NOTE: In forms I and II an individual report may require modification to the power of 10 in the multiple so that the quantity preceding it is a whole number and the number of places used in the whole number should reflect the degree of accuracy in arriving at the reported value.

(COMPANY)

ENERGY CONSERVATION REPORT

FOR TWELVE MONTH REPORTING PERIOD_____ 197___ TO _____ 197___

Current Period Total Production _____ $\times 10^6$ LBS (I)

Current Period Total Energy Inputs _____ $\times 10^6$ BTU (II)

Comparison 1972 Base Period Energy Consumption _____ $\times 10^6$ BTU (III)

Current Period Total Energy Consumed To Meet Regulatory Requirements Not In Effect in 1972 _____ $\times 10^6$ BTU (IV)

Total Energy Inputs Less Regulatory Requirements _____ $\times 10^6$ BTU (V)

Percent Reduction in Energy Consumption Rate *With* Regulatory Requirements Included _____ % (VI)

$$\frac{III - II}{III} \times 100\% = VI$$

Percent Reduction in Energy Consumption Rate *Without* Regulatory Requirements Included _____ % (VII)

$$\frac{III - V}{III} \times 100\% = VII$$

COMMENTS:

_____
Submitted by

_____
Date

Form I

_____

(COMPANY)

Purchased Energy Sources by Type

(as consumed and included in Energy Inputs on Form I)

for Twelve Month Reporting Period_____, 197___TO_____, 197___

Natural Gas, SCF _____ × 10^x

Distillate Fuel Oil, Imp. Gals. _____ × 10^x

Residual Fuel Oil, Imp. Gals. _____ × 10^x

Coal, Tons _____ × 10^x

Electric Power, KWH _____ × 10^x

Steam Lbs. _____ × 10^x

Other _____ × 10^x

Other _____ × 10^x

Comments:

_____
Submitted by

_____
Date

Form II

DEFINITIONS OF FUEL OIL

Distillate Fuel Oil means any fuel oil, gas oil, topped crude oil, or other petroleum oils (except refined petroleum wax) derived by refining or processing crude oils or unfinished oils at whatever type of plant such refining or processing may occur, which has a boiling range at atmospheric pressure which falls completely or in part between 550 and 1200 degrees Fahrenheit.

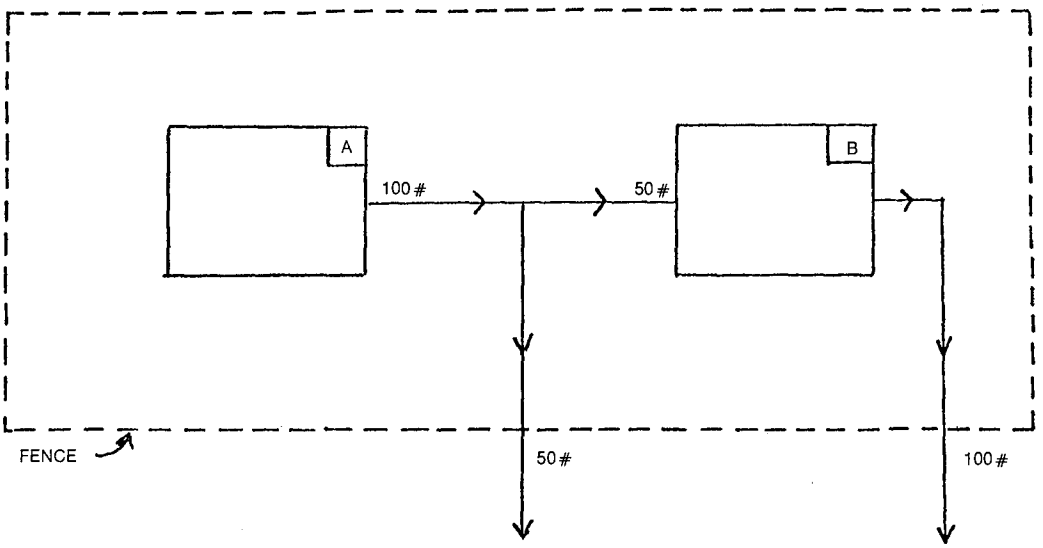
Residual Fuel Oil means the fuel oil commonly known as:

A. Number 4, 5, and 6 fuel oil

B. Bunker C

C. Navy Special Fuel Oil

D. Crude oil, when burned as fuel oil and all other fuel oils which have a 50% boiling point over 700 degrees Fahrenheit in the ASTM D-86 Standard Distillation Test.



ALTERNATE I	POUNDS PRODUCED
PRODUCT A	50
PRODUCT B	100
TOTAL	150

ALTERNATE II	POUNDS PRODUCED
PRODUCT A	100
PRODUCT B	100
TOTAL	200

FIGURE I

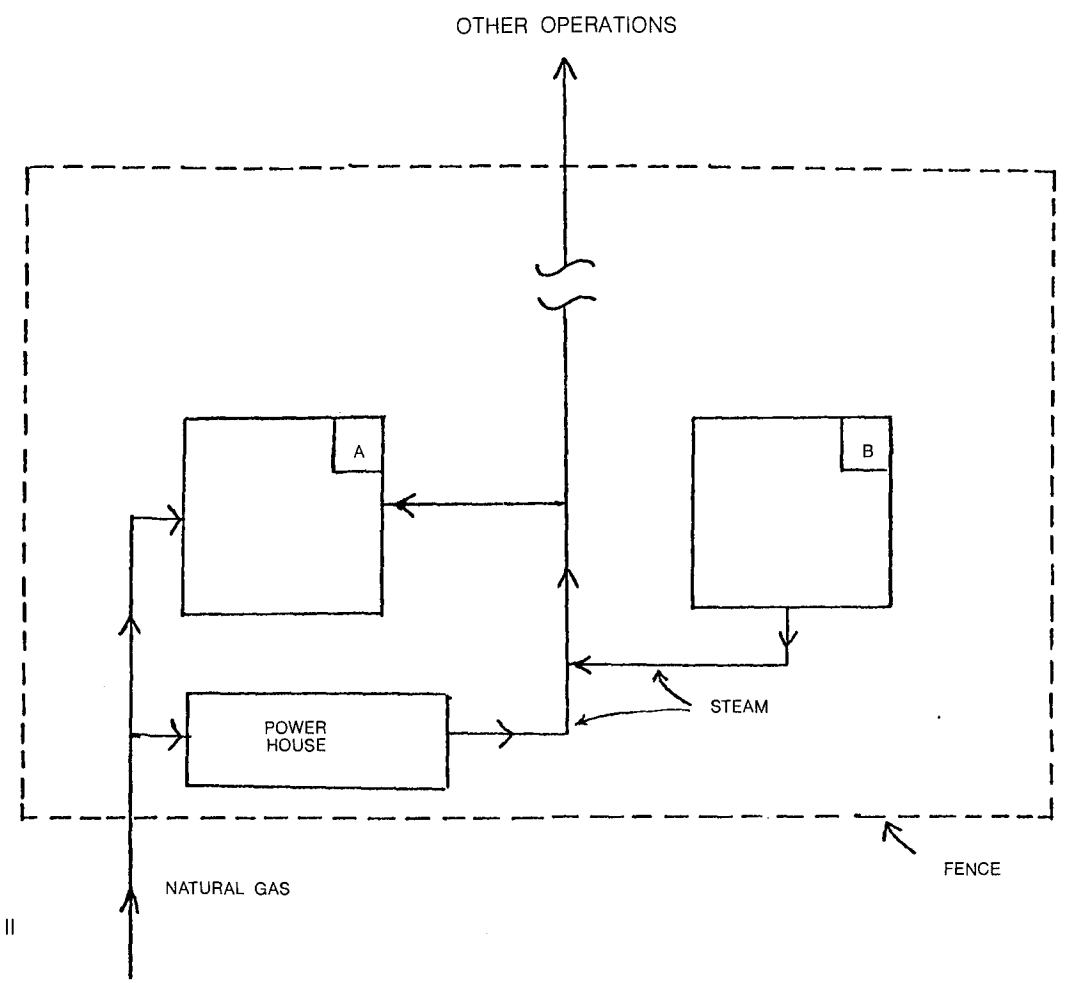


FIGURE II

SAMPLE CALCULATION FOR INTERNAL COMPANY DEVELOPMENT OF DATA FOR FORM I

ENERGY SUMMARY

	1972 BASE PERIOD			CURRENT PERIOD		
	Period Total-Production	Period Total-Energy Inputs	Base Rate Consumpt.	Period Total-Production	Period Total-Energy Inputs	Comparison Base Period Equivalent Inputs
Patriot Chemical Co.	10^6 LBS.	10^6 BTU	BTU/LB.	10^6 LBS.	10^6 BTU	10^6 BTU
Mfg. Location X						
PRODUCT A.	200	10,000	50	300		15,000
PRODUCT B.	10,000	30,000	3	12,000		36,000
PRODUCT C.	2,000	20,000	10	3,000		30,000
PRODUCT D.	3,000	60,000	20	6,000		120,000
	15,200	120,000		21,300	185,000	201,000
Mfg. Location Y						
PRODUCT A.	500	20,000	40	800		32,000
PRODUCT B.	15,000	45,000	3	18,000		54,000
PRODUCT E.	5,000	10,000	2	7,000		14,000
PRODUCT F.	500	10,000	20	1,000		20,000
	21,000	85,000		26,800	98,000	120,000
Adjustments						
New Products.						
PRODUCT G. (1973)	1,000	10,000	10	1,500		15,000
PRODUCT H. (1974)	1,000	5,000	5	1,000		5,000
	2,000	15,000		2,500	16,000	20,000
			TOTAL	50,600 (I)	299,000 (II)	341,000 (III)

GOVERNMENT REGULATION

Stack Gas Scrubber — Consumes 1MM BTU/T Coal Burned	7,000
Air Condition & Ventilate — Reduce Product Vapor in Work Areas	1,000
	8,000 (IV)
TOTAL LESS GOVERNMENT REGULATION	291,000 (V)

Company: Net Conservation Percent

$$\frac{III - II}{III} \times 100 = 12.3\% \text{ Saving (VI)}$$

$$\frac{III - V}{III} \times 100 = 14.7\% \text{ Saving, without Government Regulations (VII)}$$