A REPORT BY [Canada]
THE SECTOR TASK FORCE ON

THE CANADIAN PETROCHEMICAL INDUSTRY

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REPORT OF

THE CONSULTATIVE TASK FORCE

ON

PETROCHEMICALS

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THE PETROCHEMICAL INDUSTRY CONSULTATIVE TASK FORCE

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REPORT OF THE CONSULTATIVE TASK FORCE ON PETROCHEMICALS

INTRODUCTION

The Consultative Task Force on Petrochemicals is one of 23 task forces established as a result of the First Ministers' Conference in February 1978. The First Ministers agreed that the task forces would "seek the active involvement of the private sector, business and labour in federal/provincial discussions on specific development programs tailored to the particular requirements of each manufacturing sector."

The petrochemical industry has been characterized by rapidly improving technology and an above-average annual growth rate in volume of eight per cent. The industry is capital intensive with a 1976 gross investment per employee of $200,000, compared to $70,000 per employee for total manufacturing. It employs a high proportion of professionals and skilled workers. Its research and development expenditures historically have been among the highest of all manufacturing sectors.

The industry adds significant value to oil and natural gas raw materials by upgrading them into highly sophisticated petrochemical products. These, in turn, are the building blocks for many other key industry sectors, including synthetic fibres, textiles and apparel, plastics processing, rubber products, paints, inks and plywood.

In 1976, the industry's shipments totalled $1.3 billion. Exports that year were valued at $200 million while imports reached $600 million. Eight companies supply approximately 70 per cent of the value of shipments.

The petrochemical industry has been called the "invisible industry" because its products are not familiar to the public. Nevertheless, petrochemicals are everywhere. A study by the Ontario Economic Council demonstrated that steel and industrial chemicals are the two most pervasive industrial products. The strategic importance of a national petrochemical industry became very clear in 1974 when, due to international shortages, foreign manufacturers were unable to supply their Canadian customers. Automotive antifreeze was in short supply; automotive assembly lines were shut down due to a lack of plastic parts; a plant to manufacture expanded polystyrene used in insulation was unable to operate; and special arrangements were required to maintain production of certain pharmaceuticals. Adequate capacity did not exist in Canada to supply domestic requirements.

It is ironic that Japan and Germany, two nations with very limited oil and natural gas resources, the raw materials for the petrochemical industry, have recognized the strategic importance of the industry and have become major factors in international petrochemical markets while Canada, for a variety of reasons, has exported the unprocessed resources and imported the petrochemicals with a value of five to ten times the value of the hydrocarbons used in their production.

In 1979, the industry will complete an investment program amounting to approximately $2.5 billion. This investment will provide capacity to increase production in 1980 to more than twice the 1975 level. Replacement of imports and an increase in exports following from this new production could lead to a significant reduction in the Canadian petrochemical trade deficit.

However, major environmental changes have occurred since the commitment was made to this nearly-completed investment program. Petrochemical growth rates have slowed markedly; utilization of capacity is low in several parts of the world; product prices have failed to rise to offset ever-escalating feedstock costs; construction costs have soared beyond historical projections; and profit margins currently, and for the foreseeable future, are inadequate to recover invested capital. There is urgent concern within the industry that failure to achieve profitable utilization of existing and soon-to-be commissioned facilities will jeopardize future petrochemical investment in Canada in the 1980's.

To a major extent, the future health of the Canadian petrochemical industry depends on the performance of its customer or downstream industries. In turn, the health of these industries is dependent on their internationally competitive position and on the strength of the domestic petrochemical industry. While the direct employment in the petrochemical industry is approximately 11,000, the employment in those downstream industries is at least 20 times that number.

OBJECTIVES

The objective of the Task Force has been to formulate recommendations leading:

- initially to an industry with an adequate level of profitability at international costs; and

- subsequently to an industry which would be in a position to utilize Canada's strong hydrocarbon resource base to achieve a continuing, positive balance of trade in petrochemicals.

ISSUES AND RECOMMENDATIONS

Following is a list of issues considered by the Task Force to impact on the ability of the sector to achieve the stated objectives.

A. Cost Competitiveness

1. Initial Cost of Facilities and Working Capital

   a) Construction Productivity
   b) Canada-U.S. Construction Labour Compensation Differentials
   c) Material Costs

2. Feedstocks and Energy Costs

3. Taxation Environment

   a) Tax Structure
   b) Inflation Accounting

B. Capacity Utilization and Marketing

1. Trade Initiatives

2. Development of Canadian Downstream Industries

C. Role of Government

1. Regulatory Environment

2. Competition Policy

3. Orderly Growth

4. Other Measures

The industry is diverse in component company structure. There are companies whose sole business activity is the manufacture and marketing of petrochemicals. Other companies are integrated from petroleum and natural gas production through petrochemical feedstocks to petrochemicals and derivatives. There is further diversity in location and business environment with production complexes centred in Montreal and Sarnia and under construction in Alberta.

It follows that generalized recommendations to improve the performance of the industry cannot be uniformly beneficial to all of these diverse interests. Differing positions noted in this

report for the most part are reflections of varying environments, structures and locations of the companies represented. Although most of the issues are of common concern, assessment of priority is not always uniform.

A number of these elements have been examined in isolation and a recommendation formulated on the basis of the impact of the single measure on the industry. However, the Task Force believes that no single measure can bring the Canadian industry to a competitive position and that a package of measures is required. The report concludes with an assessment of the impact which implementation of the recommended measures would have on the petrochemical industry.

A. Cost Competitiveness

1. Initial Cost of Facilities and Working Capital

The major element of cost disadvantage the Canadian industry faces in comparison with its major competition, the industry on the United States Gulf Coast, is the cost of new facilities. It is estimated that the initial cost of petrochemical plants is approximately 20 per cent higher in Sarnia and 25 per cent higher in Alberta and Montreal. This influences the ongoing costs of production, and hence the return on investment, through the direct relationship of depreciation, insurance, interest charges, property taxes and to a less direct extent, maintenance expense.

The initial costs of a new petrochemical plant are typically made up of:

Construction Labour	30 to 35 per cent
Materials	40 to 55 per cent
Engineering and Supervision	10 to 16 per cent

Although labour-related expenses represent only one-third of the total cost of new plants, they account for two-thirds of the difference in costs between Canadian and U.S. Gulf Coast sites.

While the reduction in the value of the Canadian dollar provides a temporary offset, the Task Force believes this effect is transient. If the dollar remains at 90 cents U.S. over a period of time, Canadian costs will adjust to eliminate the advantage.

Unless this initial investment cost differential can be corrected or counter-balanced, the probability of major new investment in the industry during the next 10 years is low.

From 15 to 25 per cent of the cost difference is due to climatic conditions. The colder Canadian climate requires deeper foundations, more insulation and heating equipment and leads to lower labour productivity during winter construction. The balance of the cost difference relates to the relative skill in management of construction sites, labour wages, fringe benefits, work practices, productivity differentials, material cost differentials and to interest costs.

In Canada, major construction activity in the petrochemical industry is rarely continuous. This is in contrast with the situation on the U.S. Gulf Coast. As a consequence, large, skilled labour forces must usually be assembled in Canada for each major construction project. The local labour pool is normally not large enough and tradesmen must be brought in from other parts of the province, other provinces and other countries. Because of the reluctance of construction workers to move to a new location, in part due to the availability of unemployment insurance, it has been necessary to provide a considerably greater package of wages and fringe benefits than is necessary on the Gulf Coast.

This lack of competition within the skilled construction labour community has also led to work practices which reduce productivity at the construction site. Again, this is in contrast with the situation on the U.S. Gulf Coast where considerable competition exists and where a high proportion of petrochemical construction is done by non-union tradesmen.

Consideration of the following issues is essential if the initial cost of facilities and working capital is to be reduced.

a) Construction Productivity

If Canada is to expect and encourage new investments, investors must be assured that the construction industry is as stable and efficient as its counterpart in the U.S. The investors must have reasonable assurance that projects will not be prolonged by work practices which lead to unexpected cost escalation.

The Petrochemical Task Force:

i) Endorses the recommendations of the Consultative Task Force on the Construction Industry with respect to construction productivity, labour education and mobility.

The Oil Chemical and Atomic Workers International Union (O.C.A.W.) representative added that provincial governments should establish uniform qualifications and standards and work towards interchangeability of workers between provinces.

ii) Recommends that governments as major users of construction services become more active in Owner-Client Councils, and that such Councils should become more involved in matters such as the following:

- Forecasting of labour supply and demand
- Training programs for construction management, supervisors and foremen
- Training programs for construction trades
- Advising on labour legislation as it affects construction
- Improving communications among labour, contractors, government and owners, as well as the public
- Counselling on the organization for and the process followed in construction labour relations
- Assessing matters concerned with productivity and efficiency in the construction industry

iii) Recommends that the industry improve site management and construction planning through more effective training and education programs for construction supervision.

b) Canada-U.S. Construction Labour Compensation Differentials

Wages in the construction industry in Canada increased 72.6 per cent over the period 1973 to 1977 to reach an average of $9.77 per hour*. In the U.S. the wage increase in construction was 26.2 per cent over this period to reach an average of $8.04 per hour in 1977**.

When fringe benefits are added to the base wage rates, the differentials between Canadian construction labour costs and those on the U.S. Gulf Coast become even larger. A Department of Industry, Trade and Commerce study, developed from industry data, indicated that a typical "charge-out rate" (the all inclusive cost of wages and fringe benefits including an allowance for contractors' overhead and profit) for skilled tradesmen in Sarnia in 1976 was 29 per cent greater than the equivalent rate at a unionized site on the U.S. Gulf Coast and 100 per cent higher than an equivalent rate at a non-unionized site. It was estimated that 50 per cent of the petrochemical construction in 1976 on the U.S. Gulf Coast was done by non-union labour. Among the factors contributing to this differential in addition to basic wages and fringes are the journeyman to apprentice ratio, allowances for travel time and travel cost and costs of construction camps.

* "Employment Earnings and Hours", Statistics Canada Catalogue No. 72-002

** "Employment and Payrolls" Table C-1, Vol. 25, No. 3, U.S.A.

The Task Force believes that in the long term, correction of construction wage rates and labour practices differentials should be achieved through collective bargaining in a competitive environment to be established by governments.

The O.C.A.W. representative noted that the comparison of total compensation rates between Canada and the U.S. must take into account the levels of taxation and the costs of goods and services in both countries.

The Petrochemical Task Force recommends that:

i) The Federal Government publicize construction labour compensation in Canada and the U.S. in order to increase public awareness of the degree to which Canada is non-competitive.

ii) Public Service wages and benefits be related to those of the private sector as described in the proposed amendments of the Public Service Staff Relations Act (Bill C-28).

iii) The right to strike in essential services be limited. Such strikes have a disproportionate effect on the economy in terms of disrupting the effective conduct of business. Because of their effect on the economy, these strikes have the potential to lead to wage settlements that are unreasonable. Furthermore, such settlements become the standards against which other organizations establish demands and measure their success in bargaining. The Task Force recognizes the difficulty in defining essential services but endorses the definition and practice as contained in the Alberta Labour Act. These strikes are defined as those in which unreasonable hardship is being caused or is likely to be caused to persons who are not parties to the dispute. It is recognized that withdrawal of the right to strike carries with it an obligation to ensure that wages and benefits in these sectors are kept in line with those of non-essential industries.

The O.C.A.W. representative did not support the recommendation to limit the right to strike in essential services but did allow that the "wealth consuming elements of society" should be a part of a strategy wherein their wages and benefits could be tied to those of the private sector. He added that unions should not bear the brunt of government inadequacies at the bargaining table.

c) Material Costs

The Task Force recognizes the need to protect and develop the Canadian metal fabricating and machinery manufacturing industries. However, in those cases where process equipment is not available in Canada, either due to the absence of manufacturers or the heavy loading of manufacturing capacity, imports of such equipment should be eligible for duty remission under the Machinery Program administered by the Department of Industry, Trade and Commerce. At present, the Machinery Program appears to exclude process equipment.

The Petrochemical Task Force recommends that:

i) Process equipment be made eligible for duty remission under the Machinery Program administered by the Department of Industry, Trade and Commerce.

ii) Federal and provincial sales tax on material and equipment used in the construction of manufacturing facilities be remitted.

2. Feedstocks and Energy Costs

The cost of oil and natural gas feedstocks and energy represents approximately 50 per cent of the cost of manufacturing the primary petrochemical "building blocks" such as ethylene. These "building block" products are the basis for manufacturing other petrochemicals. Because of this, the relative cost of crude oil and natural gas in Canada compared with the U.S. is critical to the future investment in these core plants in

Canada. While Canada appears at the present time to have a small cost advantage as a result of Canadian energy policy, this is probably not the case in the petrochemical industry. The industry on the U.S. Gulf Coast has historically used natural gas liquids, such as ethane and propane, as feedstocks. A small and diminishing number of long-term contracts for feedstock supply written before the change in energy pricing in 1973 are still in effect and on average give the U.S. industry feedstock costs at least equivalent to the Canadian industry.

One objective of the Federal Government's energy policy is to allow Canadian crude oil prices to rise towards international levels and to adjust gas prices to an appropriate competitive relationship with oil prices. However, under the terms of the June 1977 Federal-Alberta crude oil pricing agreement, which is applicable through June 1979, the Chicago average oil price sets a ceiling on the price of Canadian crude oil, expressed at Toronto and adjusted for quality and currency exchange rates.

If the price of Canadian crude oil at Toronto reaches the Chicago average price, eastern Canadian petrochemical producers would be at a disadvantage of approximately 40 cents/barrel compared with petrochemical producers on the U.S. Gulf Coast.

In view of Canada's intrinsic competitive disadvantage versus U.S. industry and this country's relatively strong energy resource position there are grounds to suggest that energy costs for use by Canadian manufacturers should be lower than U.S. costs. It is recognized that governments would have to forego revenue if energy costs to Canadian manufacturers are held below international levels. However, the consequent development of competitive manufacturing industries in Canada could be expected to more than offset such a revenue loss. Indeed, a strong manufacturing sector is required to help pay for future resource development.

The Petrochemical Task Force recommends that:

i) Canada should take an aggressive, growth-oriented approach to the use of its relatively strong energy supply position to develop internationally competitive, high value-added secondary manufacturing industries in Canada.

ii) An immediate joint industry/government study should be made of the implications of a lower than average U.S. cost for oil and gas for Canadian manufacturing industries. In particular, this should apply to those industries which convert these resources to other products rather than burning them.

iii) As a minimum position, the Canadian government should ensure that the cost of feedstocks and energy used in the manufacture of petrochemicals does not exceed the costs on the U.S. Gulf Coast. This comparison should be related to the prevailing price of crude oil delivered to Toronto, including all levies, and the average price of crude oil at the U.S. Gulf Coast. At no time should the cost of natural gas used for the production of petrochemicals exceed the equivalent cost of crude oil on an energy basis measured at Toronto city gate.

iv) Provision of energy and feedstock costs to the manufacturing sector or the petrochemical sector at U.S. Gulf Coast equivalency or below should be achieved by the reduction of governments' take and not at the expense of funds available for private sector energy development.

v) A data base for monitoring the prices of feedstocks and energy on an ongoing basis should be established and agreed upon by the petrochemical industry and the Federal Government.

vi) Excess petroleum refining capacity in eastern Canada severely limits the market for hydrocarbon by-products co-produced by the petrochemical industry located in Quebec and Ontario. Certain petroleum companies in co-operation with the Canadian government are currently seeking U.S. domestic status for Canadian refineries so as to utilize this excess capacity to economically supply a growing U.S. demand.

The Task Force supports this joint approach by the Canadian government and the Canadian petroleum industry. It is recommended that negotiations be extended to include domestic refineries processing Canadian crude oil.

The O.C.A.W. representative opposes any export of Canada's indigenous resources.

3. Taxation Environment

a) Tax Structure

- Tax Structure - Existing Companies

Implementation of the recommendations outlined above for construction labour costs and productivity, construction material costs and feedstock and energy costs could lead to a significant reduction in the international competitive disadvantage confronting the Canadian petrochemical industry. However, these corrections will not be accomplished in the short term. In addition, because of differences in climate and structural differences between the Canadian labour market and that of Canada's major competitors, the cost of new facilities in Canada would be higher than those in the U.S. even if the construction labour cost differential could be totally eliminated.

Until the construction labour cost disadvantage can be corrected, the measures recommended below are required to offset the labour cost disadvantage and the ongoing structural disadvantage. These measures will be of assistance primarily to existing companies with adequate income to utilize capital cost allowances and investment tax credits.

The Petrochemical Task Force recommends that:

i) The 50 per cent capital cost allowance for process equipment should be continued indefinitely.

ii) An investment tax credit of 15 per cent should be implemented to replace the existing investment tax credit of five to ten per cent at least until the cost disadvantages subject to correction can be reduced.

iii) The investment base used for the calculation of capital cost allowances should not be reduced by the amount of the investment tax credit.

iv) Companies should be allowed to carry forward any unused portion of the investment tax credit until totally used.

- Tax Structure - New Companies

The magnitude of investment required for world scale petrochemical facilities relative to the size of Canadian petrochemical companies has made it necessary on occasion to form joint ventures for the purpose of investment. Because of the complexity in allocating capital cost allowances, take or pay contracts and of many other aspects, the joint ventures may be incorporated as new companies (e.g. Petrosar). In addition, there has been one recent example of the incorporation of a new company (Alberta Gas Ethylene Ltd.) for a major investment in ethylene facilities in which the owner was a single corporation. It is anticipated that, in the future, additional joint ventures may well be formed to facilitate new investment.

In some of these cases, the companies have insufficient or no income available against which capital cost allowances can be charged. Capital outlays on these projects commence as much as five years prior to the commencement of production. During this time, an existing company could be earning tax savings by applying capital cost allowances against an income stream. The inability to do this may place a large investor at a considerable disadvantage and may discourage needed new investment. Some measure of relief has been found through such innovative financing approaches as

the use of income debentures and preferred shares. These instruments assist in offsetting the higher cost of debt in Canada.

The Task Force recommends that:

i) The existing methods available to assist a new company with its initial financing problems such as income debentures and preferred shares be maintained.

ii) A study be carried out to determine an equitable method whereby the benefits of capital cost allowances and investment tax credits available to existing companies could be made available to new companies.

The Task Force emphasizes its belief that the principle of rewarding excellence or success should be maintained and that if such a method is implemented, it should not confer an advantage on new companies over existing companies.

The O.C.A.W. representative maintained that governments should secure equity participation in return for increased tax advantages provided to companies.

b) Inflation Accounting

Historical cost financial statements do not reflect the effects of inflation on business since no provision is made for capital maintenance. In order for a business to maintain its earnings capability, it must replace assets consumed, including inventories and fixed assets. In times of inflation, the replacement cost is substantially higher than the historic cost shown in traditional financial statements. If this cost differential is not provided for, there is, in fact, an erosion of shareholders' equity. The differential becomes a non-realizable profit which is subject to income tax under current legislation and represents a transfer of real wealth from business to government.

The Task Force recommends that:

i) The impact of inflation on the ongoing operation of a business be recognized for tax purposes by allowing a capital maintenance adjustment to income in arriving at taxable income. The capital maintenance adjustment would be the sum of:

- an inventory adjustment, being the difference between the cost of goods sold as recorded in the accounts and the cost of replacing those goods at the time of sale as determined by applying a general price index; and

- a capital cost allowance adjustment, being the difference between the accumulated capital cost allowance based on historical cost and the accumulated capital cost allowance based on replacement cost determined using the Gross National Expenditure Implicit Price Index.

B. Capacity Utilization and Marketing

Between 1974 and 1980, the Canadian petrochemical industry will have invested approximately $2.5 billion in Quebec, Ontario and Alberta. At the time this investment was committed, the Canadian and international markets were growing at rates in excess of 10 per cent/year. Since 1974, growth rates in consumption have fallen. Because of this, the ability to utilize this new capacity in domestic and export markets has been hampered. When the investments were committed, the investors foresaw an acceptable level of capacity utilization through

- reduction in the share of the domestic market supplied by imports
- development of new end uses for the products
- greater participation in export markets.

The Task Force believes that two avenues to increase the operating rate should be pursued: trade initiatives and development of downstream industries.

1. Trade Initiatives

The Task Force recommends that:

i) With the expectation that governments, industry and labour will react in a positive manner to those recommendations in this report which would lead to a competitive environment in Canada relative to the U.S., the Federal Government negotiate a bilateral free trade agreement with the U.S. for a limited group of petrochemicals listed below, using as appropriate the export of additional quantities of natural gas as bargaining leverage. The agreement should become effective as soon as possible and should be subject to the following conditions:

a) Those companies which account for a majority of the existing Canadian capacity for any product will have agreed to inclusion of the product on the list before bilateral free trade commences.

b) Those companies producing the select list of products must agree to the set of safeguards to be put in place. In this regard, one of the safeguards which should be examined would be an agreement which would terminate at the end of 1985, with tariffs returning to post-Tokyo Round agreed levels, subject to review by governments and industry during 1984.

List of Products

Ethylene dichloride
Ethylene glycol
Ethylene oxide
Methanol
Polyethylene, High Density
Polyethylene, Low Density
Polyvinyl chloride
Propylene tetramer
Styrene
Vinyl chloride monomer

The Task Force member representing Alberta Gas Ethylene Company Limited believes that after provision for safeguards has been agreed, an initiative towards a bilateral free trade agreement should include all of the products listed above.

The O.C.A.W. representative did not support a bilateral free trade initiative. It was his view that this approach could serve to undermine Canada's position at the current GATT negotiations.

ii) In view of the build-up of petrochemical capacity under government ownership in a number of foreign countries, the Department of National Revenue should be alert to dumping of petrochemicals in Canada and should automatically assume dumping when it can be proved that products entering Canada have been exported at less than full production cost in the country of origin.

2. Development of Canadian Downstream Industries

The major domestic markets for petrochemical producers are the following industries - rubber processing, plastics processing, paint and coatings and synthetic fibres, textiles and apparel. If these downstream industries could increase their share of the Canadian market, there would not likely be a major surplus of Canadian petrochemicals in the 1980's. For example, 30 per cent ($600 million) of the domestic market for plastics products is supplied by imported materials. In addition, the Canadian markets for electrical appliances, automobiles, automotive parts and other manufactured items containing a high value of plastics components are also supplied to a major extent from foreign sources. Similar situations exist in rubber products, paints and coatings and synthetic fibres, textiles and apparel.

There is an enormous potential to improve Canada's trade balance and increase employment through import replacement alone. The following table provides an estimate of the magnitude of this potential in 1976.

	Million Dollars 1976		
	Imports	Exports	Trade Deficit
Rubber Products	354	189	165
Plastics Products (Estimated)	640	120	520
Synthetic Fibres, Textiles and Apparel (Estimated)	405	22*	383
Paints and Varnish (SIC-375)	53	5	48
Petrochemicals (Estimated)	600	200	400
Totals	2,052	536	1,516

* Figures on synthetics available for primary textiles only.

There is a synergistic relationship between the petrochemical industry and the downstream industries. Without a strong competitive petrochemical industry, it is virtually impossible for the downstream industries to be internationally competitive and to fully develop with any assurance of long-term stability. Without strong domestic downstream industries the Canadian petrochemical industry will not fully develop.

The Task Force recommends that:

i) To stimulate the upgrading of Canadian resources, tariffs should be staged to give more protection to higher value-added products.

ii) The Federal Government should support recommendations of the Task Forces on Plastics Processing and Synthetic Textiles and Clothing with respect to the current GATT negotiations.

iii) In designing programs following from sectoral strategies, governments must recognize the need for viability of the whole chain of processing industries involved in upgrading hydrocarbons to finished products. Measures implemented in any individual sector of the chain should not be counter-productive in any other sector.

C. Role of Government

1. Regulatory Environment

Any assessment of the international competitiveness of a company, industry sector or national economy in the 1970's must weigh the cost and impact of the regulatory environment in which it operates. This is particularly relevant to the petrochemical industry. Over the past ten years, the industry has been disproportionately affected by the rapid growth and proliferation of both direct and indirect regulation, particularly in the areas of environmental quality, occupational health and safety.

The cost of regulation takes many forms, including direct investments, increased reporting requirements and a variety of consequences resulting from apprehension with respect to future operating restrictions. While the costs of existing regulation on the economy or on specific segments of industry have not been comprehensively examined in Canada, a study recently commissioned by the Economic Council of Canada should contribute to our understanding of the extent of this impact. The results of this study are anticipated with great interest by the industry.

Similar studies carried out in the U.S. serve to illustrate the basis of concern that currently prevails in the private sector in Canada. One study indicates that the

estimated annual cost per person of federal regulations in that country amounts to about $500 for every man, woman or child, or some $93 billion*. More than $60 billion of this burden falls on the private sector. Assuming an equal level of regulation in Canada and the U.S., the annual cost to Canadian industry would be $6.0 billion. There is no assurance that this level of expenditure would be justified by an objective socio-economic analysis. Consequently, the Task Force strongly supports the recent Federal Government initiative that new federal regulations pertaining to "Health, Safety and Fairness" be subjected to a socio-economic impact analysis which will be available for public scrutiny prior to implementation.

The Task Force recommends that:

i) The Federal Government extend the socio-economic impact analysis principle to existing federal regulations and that provincial governments adopt this principle.

ii) Guidelines and regulations established by governments with respect to the hazards of chemicals be based on scientifically-supported and practically obtainable data.

iii) Such regulations and guidelines be established only after consultation with the industry and labour.

2. Competition Policy

The Canadian market and the financial capacity of Canadian petrochemical companies are small relative to the size and cost of world-scale facilities which are required if the industry is to be internationally competitive. These conditions lead to the need to be able to consider joint ventures for some of the new world-scale facilities. There could also be a need for specialization or rationalization agreements whereby production would be concentrated in the facilities of one producer.

The Task Force has examined Bill C-13 and is concerned that it appears to present barriers to rationalization by:

- permitting intervention by the authorities into the private sector based upon principles so generally stated, and with so few limitations, that the result will be uncertainty and confusion as to how to comply with the legislation;

- failing to recognize the necessity for industrial operations to achieve the highest possible degree of efficiency;

- focussing more on issues between the consumer and the producer than on the competitive position of Canada's industry versus that of other countries.

The Canadian Chemical Producers' Association submitted a brief to the Minister of Consumer and Corporate Affairs in March 1978 with proposed amendments to Bill C-13. Because of the technical nature of these amendments, it is not practical to repeat them in this paper.

The Task Force recommends that:

i) The Federal Government adopt the amendments to Bill C-13 outlined by the Canadian Chemical Producers' Association in its brief of March 28, 1978 to the Minister of Consumer and Corporate Affairs.

3. Orderly Growth

A number of factors have the potential to inhibit the orderly growth of the Canadian

* "The Regulatory Revolution", First Chicago World Report, First Chicago Corporation, January/February, 1978.

petrochemical industry. These include the scale of operations required relative to the size of the Canadian market, the influence of overcapacity in foreign countries which leads to periodic thrusts to market surplus products in Canada and competition among governments in Canada including the possible use of subsidies, to attract investment in petrochemicals.

While these circumstances might appear to suggest a need for greater involvement by governments in the planning of new investment for the petrochemical industry, the industry would not welcome such a development; neither, it is believed would most governments. However, there is a role for governments to play in monitoring significant market changes and investment plans and consulting informally with the industry to attempt to prevent wasteful investment.

The international competitive environment underlines the importance of developing the existing three petrochemical centres of Montreal, Sarnia and Alberta to their maximum efficiency by concentrating synergistic new petrochemical investment at these sites.

The Task Force recommends that:

i) Consultation between governments and the industry be continued on an informal basis to monitor significant changes in market development and investment plans; to avoid intergovernmental conflicts with respect to such development and plans and to assess the effects of macro-economic and framework policies on the performance of the industry.

The O.C.A.W. representative maintained that there should be more direct involvement of governments in the planning process.

ii) The Federal Government continue its policy that investment in key petrochemicals should not be subsidized and that provincial governments support this policy. The policy should apply to those petrochemical products listed in Appendix II of the "Profile of the Canadian Petrochemical Industry" plus petrochemicals of a similar nature not now manufactured in Canada.

4. Other Measures

Governments may further assist in the development of secondary industry in Canada through the following measures.

The Task Force recommends that:

i) Further nationalization or direct government participation be limited or eliminated in areas where the private sector has clearly demonstrated its ability to effectively perform in the public interest (e.g. resource nationalization).

The O.C.A.W. representative was of the view that because much of Canada's petrochemical industry is affiliated with international organizations, governments, through Crown Corporations, should set the tone and direction the industry should take.

ii) The level of public expenditure as a proportion of gross national product be reduced.

IMPACT OF RECOMMENDATIONS

Reflecting the objectives of the Task Force, the description of the impact is divided into three sections as follows:

A. Impact of Recommendations on Existing and Committed Investment

B. Impact of Recommendations Leading to a Competitive Environment for New Investment

C. Impact of Recommendations Leading to a Competitive Advantage for New Investment

A. Impact of Recommendations on Existing and Committed Investment

The 1976 return on total net assets after deduction of interest expense (ROA) for the Canadian petrochemical industry was estimated at 2.9 per cent*. Equivalent data for the U.S. petrochemical industry could not be obtained from any public source. For comparison purposes, the return on net assets after provision for interest expense for the overall U.S. chemical industry was 6.7 per cent in 1976**. The performance of the U.S. petrochemical industry is believed to be better than that of the overall U.S. chemical industry.

The impact of the recommendations is outlined in the following table.

Estimated Impact of Recommendations for 1980
Expressed in Terms of 1976 Profitability

Recommendation	Value of Measure 1980 Pretax Profit	Value of Measure 1976 After Tax Profit	Effect of Change on 1976 ROA
Inflation Accounting	-	$20 million	+ 1.2%
Feedstock Pricing per $/B Reduction in Canadian Cost Relative to U.S. Cost	$45 million at capacity	$11.6 million	+ 0.7%
The Export of Surplus Refinery Products		Unable to evaluate	
Reduction in Regulatory Costs by 10%	-	$4.8 million	+ 0.3%
Bilateral Free Trade		Unable to evaluate	
Total Impact of Recommendations Evaluated			+ 2.2%

Thus, implementation of those measures for which estimates can be made would have improved the performance of the industry from 2.9 per cent return on assets to 5.1 per cent. Clearly, these measures would not achieve the desired competitive performance for existing and committed investment. It follows that overall competitive performance must be sought by ensuring that new investment will be fully competitive.

The following further explains the above table.

1. Inflation Accounting

Adoption of the recommendations will increase the after tax profit of the petrochemical industry. Applied to 1976 profits, the increase would have amounted to approximately $20 million and improved the return on gross assets from 3.5 per cent to 4.2 per cent.

2. Feedstocks and Energy Costs

In general, Canadian prices for petrochemical products are based on the prevailing prices in the U.S. Therefore, increases in input costs which only apply to Canadian producers usually cannot be recovered by an increase in product prices. Thus, changes in the relative cost of feedstocks and energy in Canada and the U.S. have a direct effect on the profitability of the Canadian petrochemical industry.

* 1976 Petrochemical Sector Update, the Canadian Chemical Producers' Association.

** U.S. Federal Trade Commission and Securities Exchange Commission data reported in "Outlook for Chemical Industry Profits 1975 through 1977". November 22, 1974, First Boston Research (Updated June 1978).

For each $1/barrel reduction in the relative cost of Canadian feedstocks and energy, the Canadian petrochemical industry will have reduced costs of roughly $45 million per year at 1980 capacity, assuming the cost increase is applied to natural gas and natural gas liquids as well as to crude oil.

Since it is anticipated that the industry will be operating at less than full capacity for the next several years, the full effect of a reduction in feedstock costs may not be possible. However, if the Canadian feedstock cost is reduced relative to the U.S. Gulf Coast, it would follow that Canadian producers could be competitive over a larger geographical area and increase capacity utilization.

3. The Export of Surplus Refinery Products

Excess refining capacity in eastern Canada is currently depressing market prices for petrochemical co-produced fuel oil products. As a result, petrochemical feedstocks produced from crude oil are at a further cost disadvantage compared to the U.S. Implementation of the recommendation would allow the export of the surplus and could provide a significant improvement in the profitability of those portions of the petrochemical industry using liquid feedstocks. However, it is not possible to quantify the impact until agreement is reached between Canada and the U.S.

4. The Regulatory Environment

The cost of government regulation in the U.S. has been estimated at $93 billion. Assuming one-tenth of this amount, the cost to the Canadian economy would be $9.3 billion. According to the statistical up-date of the Canadian Chemical Producers' Association, petrochemical consumption in Canada was equal to approximately one per cent of Canadian GNP. Conservatively assuming the petrochemical industry bears a proportionate level of regulatory costs, the burden to this industry would be $93 million per year. A 10 per cent reduction would therefore reduce such costs to the petrochemical industry by $9 million per year.

5. Bilateral Free Trade

A bilateral free trade agreement for the list of products shown would allow Canadian producers to be competitive in a larger geographical region in North America and increase exports. In addition, removal of U.S. import duties would increase the net returns to Canadian exporters.

However, a bilateral free trade agreement could have a negative impact as well. Removal of the Canadian duty would result in the reduction of prices for those products in Canada that are currently reflecting a portion of Canadian duty and could lead to U.S. companies taking a larger share of the Canadian market.

No evaluation of the impact has been possible because of the speculative nature of the outcome.

B. Impact of Recommendations Leading to a Competitive Environment for New Investment

As mentioned earlier in the report, it is unlikely that major new investment decisions will be made in the petrochemical industry until the early 1980's. At that time, those decisions will depend on the existence of an environment in Canada which will allow the Canadian industry to install new facilities with assurance that its profitability will be equivalent to similar investments on the U.S. Gulf Coast.

In order to compare the profitability of future investment in Canada with that on the U.S. Gulf Coast, the Task Force developed an investment model based on the Canadian Chemical Producers' Association Competitiveness Study. The parameters of this model are described in Appendix I. The model allows calculation of a discounted cash flow return on investment for a project on the U.S. Gulf Coast and an identical project in Canada. Using this model, the Task Force estimated the impact of packages of measures on the profitability of an investment

project. The results are shown in the following table.

Effect of a Package of Measures on the Relative Profitability of Canadian and U.S. Gulf Coast Petrochemical Investment

	U.S. Gulf Coast Base Case	Canadian Base Case	Improved Canadian Environment Case I	Case II	Case III	Case IV
Initial Cost of Facilities Indexed to U.S. Gulf Coast = 1	1.0	1.22	1.22	1.17	1.17	1.17
Domestic Selling Price Indexed to U.S. = 1	1.0	1.0	1.05	1.0	1.0	1.05*
Feedstock Costs Indexed to U.S. Gulf Coast = 1	1.0	1.05	1.0	1.05	1.0	1.0
DCF Return With Current Investment Tax Credit	19.0	14.4	17.6	15.6	16.5	18.9
Investment Tax Credit Required to Equalize Canadian and U.S. DCF Return						
a) Capital Base Not Reduced	-	17	7	12	10	4
b) Capital Base Reduced	-	19	11	18	15	5

* A domestic selling price of 1.05 assumes that Canadian producers can reflect a portion of the import duty in domestic selling prices.

There are various packages of measures which could lead to a more competitive environment for new petrochemical investment in Canada relative to the U.S. Gulf Coast. One possible package, assuming that both Canadian and U.S. installations can take immediate advantage of all available corporate tax incentives, would include:

- measures leading to a reduction of five percentage points in the relative cost of new facilities as described in the report.
- feedstock and energy parity with the U.S. Gulf Coast.
- a 15 per cent investment tax credit with the capital base reduced.

Acknowledging that the assumptions made in this hypothetical model are simplified, such a package of measures could assist the Canadian petrochemical industry to achieve the high scenario performance described in "The Profile of the Canadian Petrochemical Industry", attached. This would imply production valued at $4 billion/year in 1990 and an approximate balance in international trade in this sector.

The following tables illustrate the sensitivity of the return on investment to changes in the individual variables.

1. New Companies

	Base Case U.S. Gulf Coast	Base Case Canada
DCF Return		
- existing companies	19.0	14.4
- new companies		11.8

The distinction indicated above between new companies and existing companies is on the following premise. Existing companies can take immediate advantage of all corporate tax incentives. New companies can take advantage of these tax incentives only as earnings from the new facility permit.

2. Initial Cost of Facilities

	Base Case U.S. Gulf Coast	Base Case Canada	Canada Reduced Relative Cost
Initial Cost of Facilities Indexed to U.S. Gulf Coast = 1	1.00	1.22	1.17
DCF Return - existing companies, %	19.0	14.4	15.6

The indicated reduction of five percentage points could flow from some of the near term measures described in the body of the report.

3. Petrochemical Feedstock and Energy Costs

	Base Case U.S. Gulf Coast	Base Case Canada	Effect of Feedstock Cost Reduction	
Feedstock and Energy Costs Indexed to U.S. Gulf Coast = 1	1.0	1.05	1.0	0.95
DCF Return - existing companies, %	19.0	14.4	15.2	16.0

The Canadian feedstock cost index of 1.05 indicates equivalence to Chicago pricing. The Canadian feedstock cost index of 0.95 indicates an advantage of five per cent below U.S. Gulf Coast costs.

C. Impact of Recommendations Leading to a Competitive Advantage for New Investment

A package of Measures Leading to a Competitive Advantage

	U.S. Gulf Coast Base Case	Canadian Base Case	Improved Canadian Cases Case I	Case II
Initial Cost of Facilities Indexed to U.S. Gulf Coast = 1	1.0	1.22	1.17	1.17
Domestic Selling Price Indexed to U.S. Gulf Coast = 1	1.0	1.0	1.05	1.0
Feedstock Costs Indexed to U.S. Gulf Coast = 1	1.0	1.05	0.95	0.95
Investment Tax Credit, %	10	5	15	20
DCF Return, % - existing companies	19.0	14.4	22.4	21.4

The above table illustrates two possible packages of measures which would give the Canadian industry an advantage over the U.S. industry. These packages include:

Case I	Case II
- A reduction of five percentage points in the cost of new Canadian facilities	- A reduction of five percentage points in the cost of new Canadian facilities
- A five per cent advantage on feedstock and energy costs relative to the U.S. Gulf Coast	- A five per cent advantage on feedstock and energy costs relative to the U.S. Gulf Coast
- The ability to sustain Canadian selling prices five per cent above U.S. selling prices	- Canadian selling prices equivalent to U.S. selling prices
- An investment tax credit of 15 per cent with the capital base reduced	- An investment tax credit of 20 per cent with the capital base reduced

It should again be noted that the improved Canadian cases if calculated for a new company would show somewhat lower profitability than the U.S. facility. However, the Task Force has also recommended that measures be sought to allow new companies to offset their inability to take advantage of capital cost allowances and the investment tax credit.

Under these conditions, the Canadian industry might be able to invest in new facilities at an earlier stage of Canadian market development and have the ability to sell a higher proportion of production in export markets and to achieve an ongoing positive trade balance.

APPENDIX I

PETROCHEMICAL TASK FORCE

COMPETITIVENESS MODEL

This model was derived by building upon the "Canadian Chemical Producers' Association Competitiveness Study" model.

For Canadian projects, the model distinguishes between existing companies which are assumed to be able to take maximum advantage of taxation allowances during construction and early years of operations and new companies, which apply these taxation allowances as sufficient income is generated. It was assumed that analysis of projects in the U.S. Gulf Coast apply equally to new and existing U.S. chemical companies i.e. capital cost allowances not applied until after project start up.

The model allows total sales revenue to be proportioned between domestic and foreign sales, whily applying the respective distribution costs, duties and, if desired, a discount factor to foreign sales to reflect lower international selling prices. The Canadian and U.S. markets are respectively treated as domestic or foreign in relation to the project location. The exchange rate of the Canadian dollar can be changed and applied to foreign sales revenue for a Canadian project.

Fixed capital investment for Canadian projects recognizes the capital cost disadvantage factor. Working capital is assumed to be 20 per cent of fixed capital in all cases. The equity to debt ratio and the interest rate on the respective debt funding can be chosen at any desired values. No allowance was made for repayment of borrowed funds. The cost of maintenance, insurance and local taxes was assumed to be constant at six per cent of fixed capital, but the value can be set at any level.

Feedstock and fuel related costs, although variable, were assumed to be 25 per cent of the sales for the U.S. Gulf Coast base case in line with the CCPA model. These costs were considered to be five per cent higher for the typical Canadian plant. Other operating costs were assumed to be constant and independent of location.

Capital expenditures were respectively proportioned to 30, 60 and 10 per cent to the years, two years prior to, one year prior to and year of start up. Interest charges, capital cost allowances and investment tax credits, where applicable, were taken or charged in the year of capital expenditures.

By choosing a range of values, the sensitivity of project profitability was determined for each parameter. The internal discounted cash flow return on investment (DCF ROI) was utilized as the yardstick of profitability.

It is emphasized that the model was structured to provide a comparison of Canadian and U.S. projects. It does not provide a complete analysis of an isolated project. The results of the analysis were found to be comparable with the CCPA study.

The parameters of the model are described in the attached table.

PETROCHEMICAL TASK FORCE COMPETITIVENESS MODEL
BASE CASE - RELATIVE COSTS IN CANADA AND U.S.

Location	Canada	U.S. Gulf Coast
Company	existing	existing
Exchange Rate	1	1
Fixed Capital	122	100.0
Working Capital (20% of fixed capital)	24.4	20.0
Total Capital	146.4	120.0
% equity	50	50
% debt	50	50
Repayment of Debt	no provision	no provision
Interest Rate	9.5*	8.0*
Total Sales Before Price Adjustment	80	80
Export Sales		
Year 1	40%	20%
Year 2	35%	16%
Year 3	30%	12%
Year 4	25%	8%
Years 5 to 10	20%	5%
Export Selling Price Reduction**	15%	15%
Feedstock	21	20
Feedstock Costs as % of Sales	26.25%	25%
Maintenance as % of Fixed Capital	6%	6%
Other Operating Cost	15	15
Distribution Cost Factor		
Domestic	5	5
Export	10	7.5
Duty Estimated post-MTN level	6%	7%
Investment Tax Credit	5%	10%
Investment Tax Credit Deducted from Capital from Capital Cost Allowance Pool	Yes	No
Proportion of Assets to which Investment Tax Credit Applies	95	95
Capital Cost Allowance (% of Fixed Assets)	84%-50%*** straight-line 15%-7% diminishing balance 1%-land 100%	90%-depreciated over 9 years, double declining method 1st 2 years, switching to sum of years digit method in third year. 9%-2.2% straight line 1%-land 100%
Income Tax Rate	43%	50%
Residual Value of Assets	Nil	Nil

* Interest rate differential is charged against total debt in Canadian cases.

** Export selling price net of import duties but before deduction of transportation charges is 15% below U.S. and Canadian Domestic selling price.

*** 84% of fixed assets are depreciated on a 50% straight-line basis.

The following profile of the Canadian Petrochemical Industry was developed by the Sector Task Force on the Canadian Petrochemical Industry from a profile prepared by the federal Department of Industry, Trade and Commerce.

SECTOR PROFILE

THE CANADIAN PETROCHEMICAL INDUSTRY

THE CANADIAN PETROCHEMICAL INDUSTRY

DEFINITION

Petrochemicals are derived from crude oil and natural gas. The products include the primary petrochemicals such as ethylene, propylene and benzene, along with the derivatives of the primary petrochemicals: (1) plastic resins (e.g., polyethylene), (2) synthetic rubber and latex, and (3) industrial petrochemicals (e.g., styrene). Plastic products (e.g., plastic piping), rubber products (e.g., tires), and formulated products (e.g., detergents) are not considered to be petrochemicals.

CONSUMPTION, PRODUCTION AND TRADE BALANCE-PATTERN AND OUTLOOK

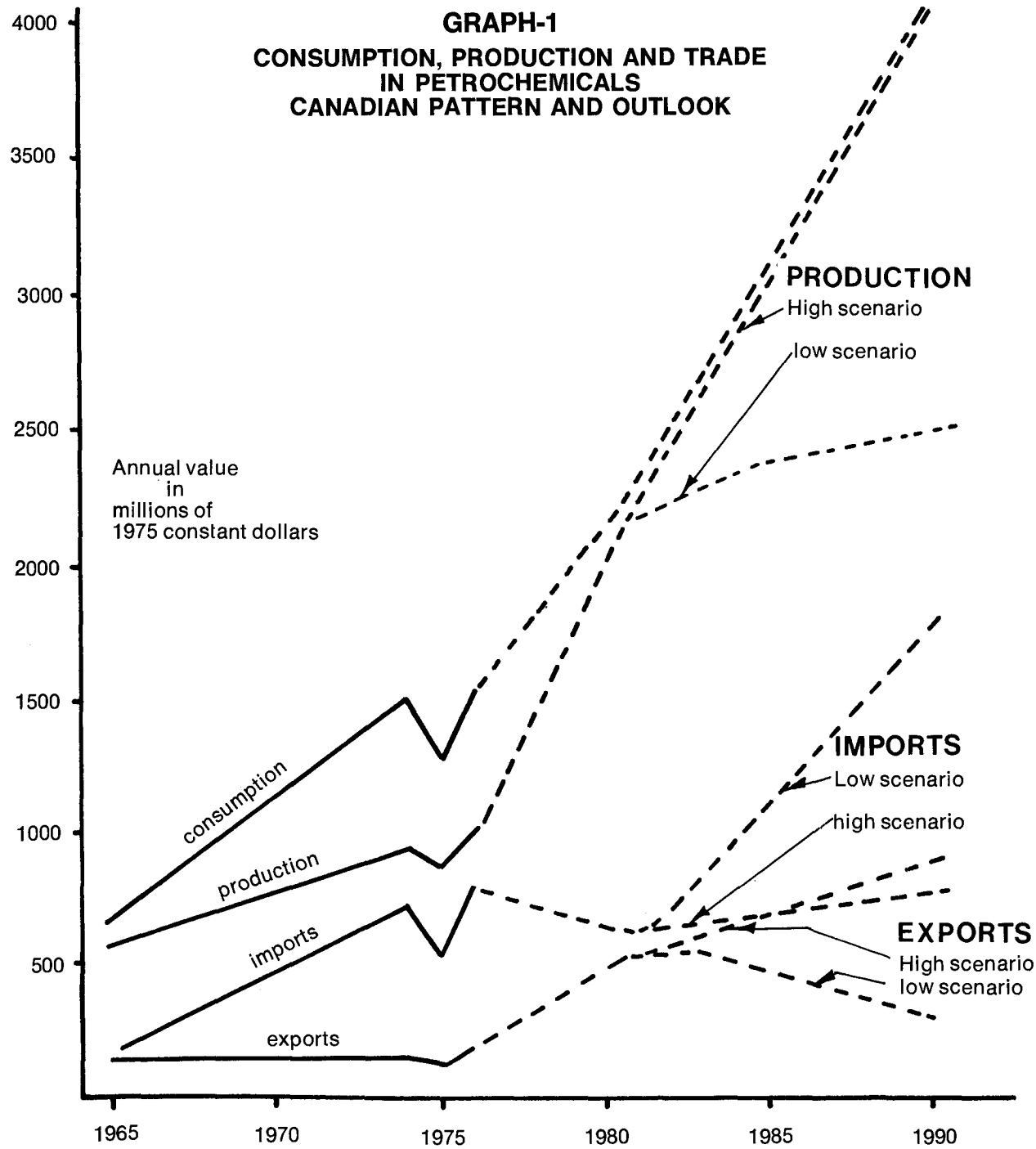
As illustrated in graph 1, production over the 1965-1974 period, due to stagnation of investment, increased only about one-half as fast as did domestic consumption. Trade went from a relatively balanced position to a deficit of more than $500 million/year*. As a result of the more than $2 billion in facilities being built now, by 1980 it is expected that production will about equal domestic consumption and the trade deficit will be reduced to some $100 million.

By the end of the 1980s, consumption, growing annually at a rate of about seven per cent, is expected to reach $4 billion/year. However, the corresponding production level in Canada by that time is uncertain. Growth in Canadian production will depend largely upon the overall investment climate in Canada, and two scenarios can be envisaged;

(a) *Low scenario* – Should the present investment climate continue, capacity increases would come mostly from expansion of existing facilities. Production by the end of the 1980s, would be only about $2.5 billion/year, imports would have climbed to about $1.8 billion, and exports would have declined to $300 million resulting in a trade deficit of some $1.5 billion.

(b) *High scenario* – Should the investment climate improve however, major new facilities could be built in Québec, Ontario and Alberta. In this instance, production by 1990 would be expected to reach the $4 billion/year level and trade would be roughly in balance with both imports and exports in the order of $800-900 million.

* All dollar values are in terms of 1975 constant dollars.


GRAPH-1
CONSUMPTION, PRODUCTION AND TRADE
IN PETROCHEMICALS
CANADIAN PATTERN AND OUTLOOK
4000
3500
3000
2500
2000
1500
1000
500
Annual value
in
millions of
1975 constant dollars
PRODUCTION
High scenario
low scenario
IMPORTS
Low scenario
high scenario
EXPORTS
High scenario
low scenario
consumption
production
imports
exports
1965
1970
1975
1980
1985
1990

STRUCTURE OF THE INDUSTRY

General

The largest producers in Canada, as measured by their estimated share of the total value of petrochemical shipments, are:

Company	*Major Ownership*	*% of Total Shipments* 1975	1980	*Major Plant Sites*
Polysar Limited	Canadian	16	13	Sarnia, Ontario
Dow Chemical of Canada, Limited	U.S.	14	18	Sarnia, Ontario Edmonton, Alberta
Du Pont of Canada Limited	U.S.	13	10	Maitland, Ontario Sarnia, Ontario
Petrosar Limited	Canadian	Nil	9	Sarnia, Ontario
Esso Chemical Canada	U.S.	11	6	Sarnia, Ontario
Gulf Canada Limited	U.S.	8	5	Montréal, Quebec
Union Carbide of Canada Limited	U.S.	7	5	Montréal, Quebec Sarnia (1980 only)
Alberta Gas Ethylene Company Ltd.	Canadian	Nil	5	Joffre, Alberta
Total		69	71	

INDUSTRY CHARACTERISTICS

(a) Petrochemicals are closely inter-related with one plant's output frequently being the raw material for another. For example, the primary petrochemicals are the source of a large number of secondary petrochemical derivatives, many of which are further upgraded to additional petrochemical products.

(b) Production is scale sensitive. The size of world-scale plants increased greatly from the mid-1950s until the early 1970s. For example, the typical world-scale ethylene plant increased from 200-300 million lbs/year to 1.0-1.2 billion lbs/year resulting in production costs being halved. However, the size of most new plants has now stabilized because of escalating construction costs and the increased importance of feedstock cost. It should be noted that the Canadian market can support world scale facilities for relatively few products and for these, only one to three plants.

(c) Petrochemical facilities tend to be built in large complexes because of product inter-relationships and plant scale characteristics. These complexes provide economies, inter alia, from infrastructure and from pipeline networks for movement of both feedstocks and products.

(d) The industry is extremely capital intensive. In 1975, total gross investment in Canada was estimated at about $200,000 per employee, more than four times the average for all manufacturing. Productivity, measured in terms of value added per employee, has been about twice as high, historically, as the manufacturing average.

(e) Traditionally, Canada has imported products until domestic demand could absorb the output from new capacity. The large capacity of new world-scale plants will usually exceed the unsatisfied domestic demand at the time it comes on stream. In order to reach an acceptable operating level a portion of the production has to be exported.

(f) Employment in the industry has grown by approximately 14 per cent since 1970 to a 1976 level of 10,673 of which 1,897 are university graduates. Further increases in employment will occur as new plants come into production. However, as large-scale facilities are installed, and as chemical prices increase, the proportion of employees to sales revenue declines. In 1970, this ratio was $50,000 of sales per employee; in 1976 this ratio was approximately $125M of sales per employee.

(g) The petrochemical industry is important in the national economy in that certain sectors are directly dependent upon it for raw materials (e.g. textiles must have ethylene glycol to produce polyester fibres), and others are indirectly dependent upon it (e.g. the automotive industry is a large user of moulded or

extruded plastic parts which in turn are produced from plastic resins). Conversely, the health of these downstream industries is extremely important to the petrochemical industry. Without them the petrochemical industry would not exist. A number of these industries in Canada are currently not internationally competitive and the high level of imports of products produced by these industry sectors has a direct impact on the petrochemical industry.

(h) The profitability of the industry has been unsatisfactory. For the nine-year period ending in 1973, after-tax profits as a return on net investment averaged 2.9 per cent. In 1974, the after-tax return increased to 7.2 per cent as a result of higher world prices and advantageous Canadian feedstock costs. However, in 1975, it dropped to 4.8 per cent and declined again in 1976. In reviewing profitability, the impact of inflation on operating profit should be taken into account. Historical methods of cost accounting result in depreciation expenses being undervalued and do not reflect the higher cost of replacing inventory. In 1974, the net effect of using historical methods of cost accounting was estimated to be a 20 per cent overstatement of taxable profits.

COMPETITIVE FACTORS

Considering all factors of production as well as the total mix of plants currently in operation and those under construction in both Canada and the United States in 1976, it was estimated that the Canadian industry, in 1976, was at an average competitive disadvantage of at least 10 per cent. The recent downward movement in the value of the Canadian dollar has certainly provided a significant offset to this cost disadvantage. The offset has not been complete, however, owing to the higher costs of imported machinery and equipment which form a significant portion of the total capital employed in Canadian plants.

Production Costs

The two major components of production costs are raw materials and capital-related costs as illustrated in the following typical ethylene cost breakdown:

Component	*Per Cent of Full Cost*
raw materials	50
capital related costs	40
labour	2
other	8
Total	100

The raw materials for the petrochemical industry are crude oil fractions such as naphtha, and natural gas liquids such as ethane. Although feedstock pricing is complex, the major determining factor is the price of crude oil and the related price of natural gas. Any increase in the price of Canadian crude oil relative to the average price in the United States would have a serious impact on the competitive position of the Canadian petrochemical industry.

With respect to capital costs, as indicated by the following table, there is generally a significant disadvantage to building a petrochemical plant in Canada compared with the U.S. Gulf Coast.

Location	*Capital Cost Index*	
	Range	*Typical*
U.S. Gulf Coast	0.90-1.20	1.00
Ontario (Sarnia area)	1.15-1.40	1.20
Quebec (Montréal area)		1.25
Alberta		1.25

Factors which play a major role in the lower level of plant construction costs on the U.S. Gulf Coast include:

(1) Lower labour costs resulting partially from construction of a significant number of plants at "open-shop" (non-unionized) sites on the Gulf Coast.

(2) The extensive infrastructure, including specialized services, that have developed around the existing complexes on the Gulf Coast.

(3) Less severe winters requiring fewer building enclosures, shallower foundations and less insulation and heating.

(4) Greater skill in the management of construction sites due to the higher level of construction activity.

Factors contributing to the differences in cost among the three Canadian geographic areas, and to the ranges within each area, include the degree of existing infrastructure, distance of new plant sites from large population areas, climatic conditions, labour relations and the availability of trained and experienced personnel.

The estimated contribution of each of the three traditional construction cost inputs to the higher Canadian indices are:

Cost Input	*Net Per cent Increase in Total Plant Construction Cost Compared to Average Gulf Coast*	
	Range	*Typical*
Labour related	10-32	14
Material related	2-7	4
Engineering and Supervision	1-4	2
Total		20

Although labour-related costs represent only about one-third of the cost of a new plant, they account for some two-thirds of the total Canadian cost disadvantage. The combination of wage rates and basic fringe benefits adds about eight per cent to the cost of a project in Sarnia compared to the average cost of Gulf Coast projects. Other labour-related costs including (1) additional fringe benefits such as overtime, hazard pay and daily travel or living expenses, (2) extra labour costs associated with climatic conditions, and (3) costs such as equipment rental and direct field supervision, in total, add an additional six per cent.

Material and equipment related costs represent about one-half of the total capital costs in both Canada and the U.S. However, they account for only about one-fifth of the higher costs associated with building a plant in Canada.

It should be noted that by 1980, some 50 per cent of Canadian production will still come from older and less-than-world-scale plants. Escalating capital costs for new plants have improved the relative economics of these older plants, and as a result, it is no longer expected that they will be phased out. Instead, in many instances, they will have lower unit production costs than their newer counterparts.

The foregoing data on fixed capital costs are based on extensive specific information obtained from chemical and engineering companies actively engaged in building petrochemical plants in Canada and on the U.S. Gulf Coast. In addition, other sources, such as contractors' associations were contacted. The above information is considered the best available and most current at this time.

Taxation

Because of lower corporate tax rates and higher capital cost allowances in Canada than in the U.S., there is a potential Canadian taxation advantage sufficient to offset a capital cost disadvantage of up to 11 per cent provided the company earns enough profit to take full advantage of the allowance in the year it is available. In practice, this has not been generally possible either because of the sheer magnitude of investments relative to ongoing profits by existing companies, or because new companies have been incorporated. Another factor which reduces the Canadian taxation advantage where debt financing is involved is the higher interest rates in Canada. Because of these factors, the potential Canadian taxation advantage can be nullified.

World supply/demand situation

Plants currently are being built in all petrochemical producing areas of the world to supply a forecast demand that was based on historic growth rates and which in some cases was unduly influenced by the high apparent demand in the 1973/1974 period. However, there was essentially no growth in world demand between 1974 and 1976 and the average annual growth from 1977 forward is now forecast to be significantly lower than that experienced through the 1960s and early 1970s. As a result, a world surplus of petrochemicals is expected into the mid 1980s.

To illustrate the extent of surplus petrochemical capacity, the European Council of Chemical Manufacturers Federations has indicated that ethylene capacity utilization in Western Europe will be approximately 71 per cent in 1980. In the United States, according to a study conducted by the Stanford Research Institute, ethylene capacity utilization will be 69 per cent in 1981. For the overall Canadian petrochemeical industry, The Canadian Chemical Producers' Association forecast in early 1978 that

operating rates would be approximately 60 per cent of capacity in 1980, if current trends in consumption and trade continue. However, if Canadian consumption continues to grow at 1976 rates and if the trade deficit were reduced to one-half of the current proportion of consumption, the Canadian industry overall would operate at 80 per cent of capacity. To a major extent, surplus Canadian petrochemical capacity could be utilized if the internationally competitive position of downstream industries such as plastics processing were improved. For example, approximately 30 per cent of the Canadian market for products of the plastics processing industry is supplied by imports.

As a result of the international oversupply, imports or the threat of imports will continue to exert considerable pressure upon the Canadian industry and Canadian producers will face strong competition in export markets.

The Canadian industry has expressed concern with the increasing participation of foreign governments in their national petrochemical industries and the effects this participation has on international capacity where its installation is guided by considerations of employment and foreign exchange earnings criteria.

Tariffs and non-tariff barriers (NTB's)

Tariffs and NTB's play an important role in the world movement of petrochemicals, particularly the derivative petrochemicals which constitute the bulk of the world trade. Canada has relied traditionally on tariffs to provide protection for its petrochemical industry rather than on the combination of tariffs and NTB's used by some of its trading partners. It is argued by the industry that, considering existing cost disadvantages associated with new plants, a reduction in Canadian tariffs in the Tokyo Round of GATT negotiations may discourage further petrochemical investment unless there are some corresponding offsets in such areas as feedstock costs or taxation.

It should be noted, however, that while the Canadian petrochemical industry has aimed primarily at satisfying domestic demand, improved access to foreign markets is of increasing interest, particularly in the scope it provides for high capacity utilization of world scale plants. Canadian companies will attempt to export, often through corporate channels, at least to the extent that the domestic market cannot absorb all of the output.

Number and location of producing complexes

The Canadian petrochemical industry has primarily developed around three areas – Montréal, Sarnia and Edmonton. By 1980, the Sarnia complex will account for about 48 per cent of the total plant capacity and the Edmonton and Montréal complexes each some 17-18 per cent. Some two-thirds of the remaining capacity will be in Alberta and most of the rest will be in Ontario. The three petrochemical areas are still in need of additional investment in order to achieve the maximum efficiencies available to a large complex.

For the primary petrochemicals and their derivatives (as defined on Page 1) it is desirable that future investment in the petrochemical industry be centred around these three areas to avoid fragmentation of the industry and in order to allow the industry to achieve greater efficiencies through use of the existing infrastructure and through reduction of the transportation costs of intermediates.

Transportation costs

The ability to move petrochemicals effectively and economically within the country is important to the development of the downstream industries upon which a viable petrochemical industry depends. More efficient and economical transportation of these petrochemicals also could aid in regional development of more labour-intensive industries based on these petrochemical products.

The Canadian petrochemical industry is at a disadvantage relative to the U.S. industry with respect to transportation costs. Because the U.S. industry is located close to ocean ports and has access to an extensive inland waterway, rail and road transportation rates to U.S. domestic markets are based on water transportation competition. In addition, for export shipments transportation costs do not include a long rail haul to reach the ocean port as is frequently the case in Canada.

PETROCHEMICAL POLICY FRAMEWORK

In recognition of the importance of this industry sector and the factors which influence its development, the federal government in early 1974 announced the following elements of a national petrochemical policy framework:

Balanced Growth – Continued growth of the Québec and Ontario complexes plus the development of a strong petrochemical complex in Alberta.

Secure Supplies of Feedstocks at Competitive Prices – Access, equal to that of other domestic industrial users, to supplies of crude oil and natural gas feedstocks at prices fully competitive with those of producing centres in other countries, particularly the United States.

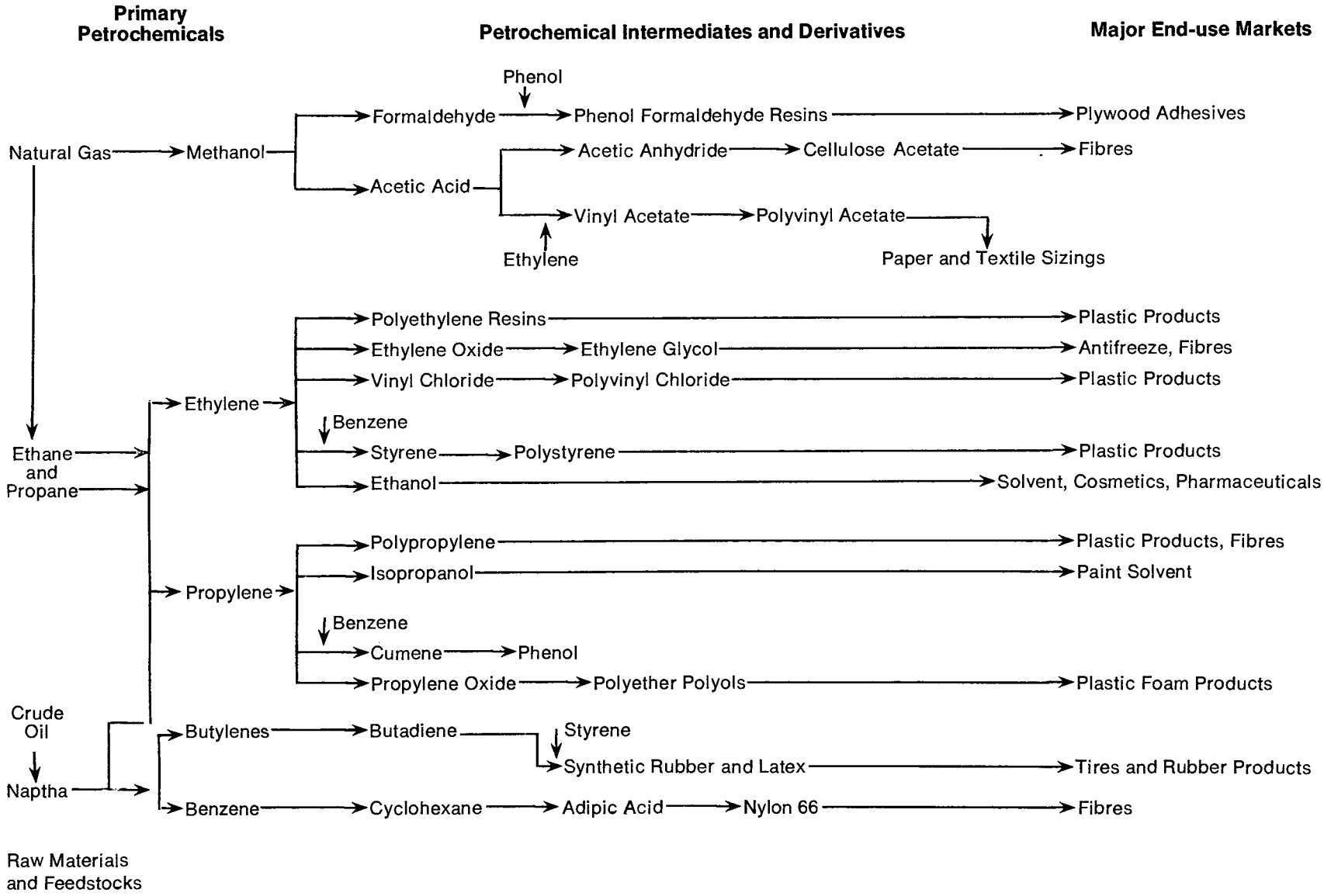
Maximum Upgrading in Canada – Exports should be considered only if they do not interfere with maximum upgrading in Canada, if a significant proportion of the output of each plant is upgraded into derivatives in Canada, and if such exports are surplus to Canadian requirements.

Improved Access to Foreign Markets – Because of the size of world-scale plants relative to the size of the domestic market, improved access to foreign markets should be pursued. (This objective is being pursued in current GATT negotiations.)

Orderly Growth – New plants should be large enough to be internationally competitive, but at the same time companies should not add new facilities that would result in serious overcapacity. To assist in achieving orderly growth, new petrochemical investment should be made without subsidies.

APPENDIX I

RELATIONSHIP BETWEEN SELECTED PETROCHEMICAL PRODUCTS

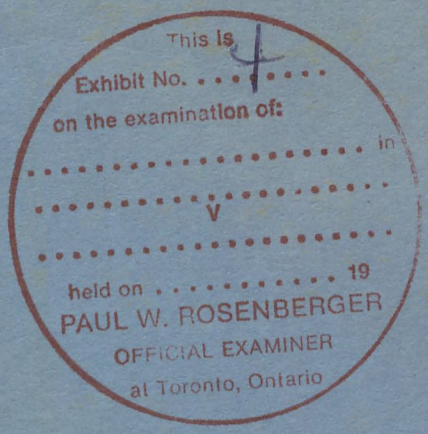


Appendix II
Canadian and U.S. Most Favoured Nation
Customs Tariffs for Selected Petrochemical Products

Product	*Canadian Tariff*	*U.S. Tariff*	*U.S. Ad Valorem Equiv.*
Ethylene	Free	Free	Free
Propylene	Free	Free	Free
Butylene	Free	Free	Free
Heptene	15%	5%	5%
for resin mfg.	Free	5%	5%
Nonene	15%	5%	5%
for resin mfg.	Free	5%	5%
Tetra-Propylene	15%	5%	5%
for resin mfg.	Free	5%	5%
Benzene	Free	Free	Free
Toluene	Free	Free	Free
Xylene	Free	Free	Free
Cyclohexane	15%	1.7¢/lb + 12.5%	24.5%
for resin mfg.	Free	1.7¢/lb + 12.5%	24.5%
Ethyl-Benzene	15%	1.7¢/lb + 12.5%	36.7%
for resin mfg.	Free	1.7¢/lb + 12.5%	36.7%
Cumene	15%	Free	Free
for resin mfg.	Free	Free	Free
Caprolactam	15%	1.5¢/lb + 10%	13%
for resin mfg.	Free	1.5¢/lb + 10%	13%
Methanol (non fuel)	10%	7.6¢/U.S. Gal.	14%
Ethanol (non potable)	33¢/I.G. (20%)	3¢/U.S. Gal.	2.7%
Isopropyl Alcohol	15%	1.5¢/lb	9.5%
N-Butanol	15%	1.2¢/lb	5.7%
Secondary Butyl Alc.	15%	1.2¢/lb	5.2%
for manufacture of MEK	Free	1.2¢/lb	5.2%
2-Ethyl Hexanol	15%	5%	5%
Methyl Isobutyl Carbinol	15%	1.5¢/lb	5%
Ethylene Oxide	15%	1.5¢/lb + 7%	12%
Ethylene Glycol	10%	1.5¢/lb + 7.5%	13%
Propylene Oxide	15%	1.5¢/lb + 7%	12.5%
Propylene Glycol	15%	1.5¢/lb + 7.5%	12.5%
Hexylene Glycol	15%	1.5¢/lb + 7.5%	11%
Polyethylene Glycol	15%	1.5¢/lb + 7.5%	12.8%
Acetone,			
non Benzenoid origin	15%	4%	4%
Benzenoid origin	15%	1.7¢/lb + 12.5%	22.5%
Di-Acetone Alcohol	15%	5%	5%
Methyl Ethyl Ketone	15%	4%	4%
Methyl Isobutyl Ketone	15%	4%	4%
Acetic Acid	15%	0.265¢/lb	1.5%
Acetic Anhydride	15%	0.75¢/lb	2.8%
Ethanolamines	15%	1.5¢/lb + 7.5%	11.5%
Glycol Ethers	15%	1.5¢/lb + 7.5%	12%
Carbon Tetrachloride	15%	0.32¢/lb	2.4%
Chloroform	15%	2¢/lb	9.5%
Perchloroethylene	15%	4.5%	4.5%
Trichloroethane	15%	6%	6%
Trichloroethylene	15%	6%	6%
Ethylene Dichloride	15%	1.5¢/lb + 7.5%	21%
Methyl Chloride	15%	1.5¢/lb + 7.5%	17.5%

Product	Canadian Tariff	U.S. Tariff	U.S. Ad Valorem Equiv.
Ethyl Chloride	15%	6¢/lb	43%
Methylene Chloride	15%	5%	5%
Phenol (coal tar)	15%	1.5¢/lb + 8.5%	14.5%
(synthetic)	15%	1.7¢/lb + 12.5%	22.8%
Phthalic Anhydride	12.5%	1.2¢/lb + 7%	11.6%
Benzoic Acid	15%	1.7¢/lb + 12.5%	17.7%
Adipic Acid	15%	1.7¢/lb + 12.5%	16.2%
Pentaerythritol	15%	5%	5%
Maleic Anhydride,			
Benzenoid orig.	15%	1.7¢/lb + 12.5%	17.1%
Non Benzenoid Origin	15%	6%	6%
Adiponitrile	15%	5%	5%
Hexa-Methylene Diamine	15%	1.7¢/lb + 12.5%	14.5%
Dimethyl-Terephthalate	Free	1.7¢/lb + 12.5%	21.1%
Vinyl Chloride Monomer	15%	1.25¢/lb + 6%	14%
for resin mfg.	Free	1.25¢/lb + 6%	14%
Styrene Monomer	15%	1.4¢/lb + 9%	16.8%
Acrylonitrile	15%	1.25¢/lb + 6%	10.2%
for resin mfg.	Free	1.25¢/lb + 6%	10.2%
Polyethylene Resins	10%	1.3¢/lb + 10%	14%
Polypropylene Resins	10%	1.3¢/lb + 10%	14%
Polyisobutylene	10%	1.3¢/lb + 10%	15%
Polyvinyl Chloride Resins	10%	1.25¢/lb + 6%	9%
Polyvinyl Acetate Emulsions	10%	0.6¢/lb + 3%	5.7%
Polystyrene Resins	10%	1.4¢/lb + 9%	14%
Acrylic Emulsions	7.5%	1.3¢/lb + 10%	12.6%
Styrene Acrylonitrile Resins	10%	1.4¢/lb + 9%	12.1%
ABS (Acrylonitrile-			
Butydiene-Styrene) Resins	10%	1.4¢/lb + 9%	11.5%
Polyamide (non Benzenoid)			
Resins	10%	1.3¢/lb + 10%	11%
Polycaprolactam (Nylon Type)			
Resins	7.5%	1.4¢/lb + 9%	10%
Nylon 66	10%	1.4¢/lb + 9%	10%
Latex (Synthetic)	Free	3%	3%
SBR Rubber	2.5%	3%	3%
Acrylonitrile-Butadiene			
Rubber	2.5%	3%	3%
Butyl Rubber	2.5%	3%	3%
Polybutadiene Rubber	2.5%	3%	3%
Polyisoprene Rubber	2.5%	3%	3%

Note: U.S. Ad Valorem equivalents are based on Spring 1978 prices.



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