Update

Fossil Fuel Production Increased Substantially in 1994

The total value of mineral fuels produced in Canada (crude petroleum, natural gas, natural gas by-products, and coal) increased 9.3% from $23.2 billion in 1993 to $25.4 billion in 1994. All mineral fuels increased in value except natural gas liquids. The value of crude oil increased 5.7% to $11.7 billion in 1994 with production rising 4.5% to 101.8 million m^3 (640 million bbls). The value of natural gas increased 21.1% to $9.1 billion with production rising 7.9% to 139.0 billion m^3 (4.91 tcf). Natural gas exports to the US were 70.8 billion m^3 (2.5 tcf). Natural gas is now the largest net energy export in value terms. The value of coal increased 1.6% to $1.8 billion with production rising 5.6% to a new record of 72.9 million tonnes. The previous record of 71.1 million tonnes was achieved in 1991. The value for natural gas by-products, however, fell 3.0% to $2.77 billion though the production increased 4.6% to 31.5 million m^3 (198.1 million bbls).

Framework Convention on Climate Change

The first Conference of the Parties (COP) of the nations adhering to The Framework Convention on Climate Change (FCCC), negotiated under United Nations auspices in Rio de Janeiro in 1992, was held in Berlin from March 28 to April 7, 1995 now that the Convention has come into force. The Canadian delegation was led by the Deputy Prime Minister, the Hon. Sheila Copps. Frau Angela Merkel, the German Environment Minister and chairman of the conference, opened the meeting by expressing her regret that other countries were not as prepared as the European Union to take action to reduce emissions of greenhouse gases. Several non-governmental environmental organizations held peripheral sessions of their own concurrently with the main meeting.

The Canadian position at this meeting was difficult. This country will almost cetainly not meet the agreed target of stabilizing emissions at 1990 levels by 2000: according to econometric studies these are likely to be some 12-13% higher by that date. Canada shares this failure with about one-half of the OECD nations who have also made this commitment. Nevertheless, the Canadian official view was that attention should focus upon the post-2000 period with the object of keeping the agreement alive and vital as the best vehicle available to deal with this increasing troublesome problem at the international level.

Preliminary international discussions in preparation for the Berlin COP meeting gave ample warning that further negotiations will be difficult. Despite this country's own problems in

meeting the agreed target, Canada took the view that the existing commitments negotiated at Rio de Janeiro were inadequate to deal with this issue. The immediate objective was to involve more countries in policies to address this situation, especially those in the developing world who will be responsible for an increasing fraction of the world's emissions as time goes by. Canada also opposed an attempt by the OPEC group (aided by some extremist American lobby groups), to require unanimity before any action could be decided. European countries preferred decisions to be made by a two-thirds or three-quarters majority. In general, Canada supported the broad approach of the formulation of policies and measures to deal with the greenhouse gas problem as opposed to the setting of targets and timetables which were deemed to lead inevitably to disappointments.

Canadian industry was especially interested in the decision to proceed with the pilot phase in the field of Joint Implementation (JI). A register of projects is being prepared to list the activities of Canadian organizations such as Ontario Hydro and TransAlta Utilities which are already active in this field. Joint Implementation provides for means of reducing emissions in other countries where costs may be lower and for transfer of technology on agreed terms. US companies have a number of these projects underway. Germany, for its part, is stressing technical approaches to the control of greenhouse gas emissions. There are a number of outstanding issues to be resolved in the field of JI including: determining the value of the emissions saved; settling who should get credit for the savings, and the formulation of rules for trading emissions. A world scheme for trading greenhouse gas emissions might well arise. In general, Canadian industrial participants favour starting soon with the smaller and more manageable projects and determining the policies and practices required through experience. There was some disappointment that a system of emission credits will not apply to the initial pilot phase. Though originally opposed by most environmental groups as too 'easy' an option for the developed countries, there is now broad support for JI provided adequate safeguards are negotiated.

The next COP meeting will probably be held in Uruguay in October 1996. The federal government supported Toronto in a bid to be host for the Secretariat of the FCCC with a $5 million commitment to match that pledged by the city, but the decision was to locate this coordinating office in Bonn.

IEA Executive Director Visits Ottawa

Mr. Robert Priddle, who became Executive Director of the International Energy Agency on December 1, 1994, was recently in Ottawa for consultations with the Canadian government, following similar visits to Japan and the United States. On February 10th, he spoke informally to the energy community at a joint session organized by the International Association for Energy Economics, the Canadian Institute of Mining, Metallurgy and Petroleum, the Ottawa Economics Association, and the Energy Council of Canada. Mr. Priddle is a senior British civil servant of long standing with the Department of Trade and Industry, whose career has included a number of years as Deputy Secretary of the former Department of Energy in that country and a term as Chairman of the Governing Board of the Agency from 1991 to 1992. The Agency now includes 23 of the 25 OECD member countries, the most recent of which to join were Finland and France. Canada has been an active member since its inception in 1974.

In summarizing the current posture of the IEA, Mr. Priddle noted the extensive effort over the past several years to establish the new shared goals of the member countries. These shared goals incorporate a broadened concept of energy security to include aspects that need greater emphasis, such as the environmental dimension, and the free operation of markets and trade. He also noted the enhancement of outreach beyond the normal OECD-country membership.

Taking as his theme 'Energy Issues Facing the International Community over the Short and Medium Term,' Mr. Priddle emphasized the following points, noting the important IEA contribution in each case. (1) Good information helps the markets work efficiently. Here he referred to the importance of the IEA publications, including the monthly IEA Oil Market Bulletin. (2) The gap between producers and consumers must be bridged. In this connection, non-confrontational meetings are now held with OPEC on a regular basis. (3) There is a continuing need for market-oriented energy policies. (4) There is a major advantage in a collective

framework to deal with technological questions on a shared basis. (5) The IEA needs to be deeply involved in environmental questions, particularly the climate change issue, because of its importance from an energy viewpoint. While some countries, like Japan, stress technological solutions, others such as Canada and the US emphasize increasing energy efficiency, alternative energy and economic instruments. (6) There is a growing need to work with countries outside the Agency, particularly the emerging nations in Asia and the countries in transition in Eastern Europe. A major study dealing with the energy situation in Russia will be completed this year.

Energy security remains a concern for those countries heavily dependent upon imports and the political leaders in most countries feel they will be held responsible for disruptions, however unlikely this prospect at present. Nevertheless, there will be an increasing dependence upon oil from sources in the Middle East with the passage of time. Mr. Priddle also alluded to a possible conflict between policies directed at progressively liberalizing energy markets, and those in the areas of security of supply or reduction of greenhouse gases. In the latter field, he expressed interest in what can be achieved through voluntary arrangements within countries and Joint Implementation projects with developing countries.

In concluding, Mr. Priddle posed some thoughtful and stimulating questions bearing on the energy policy scene in Canada:

- How strong is the public concern relative to climate change? Is there a willingness to accept the real costs of achieving stabilization or reduction of emissions? Is there a willingness to accept the intervention of governments?
- Do markets take a too short-term view or governments too long a view? Who should fund R&D? Who should fund mega-projects?
- Is the current wave of restructuring completed in the industry? Will it result in feeble 'anorexic' companies that cannot flourish or reproduce?

The lively discussion period that followed Mr. Priddle's presentation provided a welcome opportunity for exchange of ideas on these and related issues.

Canadians on the staff of the Agency include Dr. R.G. Skinner, who is now retiring as Director of the Office of Long-Term Co-operation and Policy Analysis upon the completion of his term of service, Chief Economist Sean O'Dell, and Prof. Mel Kliman, formerly of McMaster University and past Editor of the *Energy Studies Review*. Some recent IEA reports are noted in the following section.

Progress in the Advanced Nuclear Technologies

Two fast breeder reactors went into service in 1994. In France, the Superphœnix Reactor, the world's largest breeder, was shut down four and a half years ago because of problems with its core cooling system. After many modifications, including those aimed at improved safety, the 1300MW facility was restarted at low power in August of 1994. Originally, the motivation for the development of the fast breeder reactor was concern about the adequacy of the world's uranium supply. In countries deficient in domestic uranium supplies, this class of reactor was also seen as a means of remaining more independent of these imports. Now the major concern is the growing world stockpiles of plutonium which may be converted to energy and less dangerous by-products in such units. Nevertheless, this reactor will only consume about 100 kg of plutonium a year which is small compared to France's current output of about 10 metric tonnes a year of this dangerous substance. The reactor will cost some $18 million per year to operate including studies of the 'burning' of plutonium. (Plutonium may also be converted in fission reactors of the CANDU type and studies of this possibility have been conducted by the US Department of Energy in cooperation with Ontario Hydro and Atomic Energy of Canada.)

In Japan, after nearly a quarter century of planning and construction, a breeder reactor named Monju went critical in April of 1994. This 280MW prototype reactor, named for the Buddist divinity of wisdom, was intended to give Japan some independence of energy supply. Now, in this country as well, the objective is to dispose of plutonium safely.

An interesting article in the April 1995 issue of Atlantic Monthly magazine by Jeff Wheelwright suggests the dangers of plutonium have been overstated. This author has examined the history of this new element since appreciable production began in 1944 in connection with the nuclear weapons program and claims the actual evidence does not justify its extremely hazardous reputation.

Progress also continues in the field of fusion. In November of 1994 at the Plasma Physics Laboratory in Princeton, NJ, the Tokamak Fusion Test Reactor generated 10.7 MW in a one-second burst of energy which was a world record. This achievement is seen as another major step forward in the development of this technology. (Source: *IEEE Spectrum)*

New Reports

New Assessment of US Potential for Oil and Gas

The US Geological Survey has released the first new assessment of the oil and gas resources of the US since 1989. This report is markedly more optimistic in tone than its predecessor and in broad terms, the potential for remaining oil and gas has been doubled. Nevertheless, the officially reported reserves have actually declined over the period as has the production of oil and no increase was estimated in the new review for fields yet to be discovered. Instead, most of the increase reported comes in the inferred reserves category. Advances in exploration and production techniques have increased the quantity of petroleum recoverable from essentially known fields but this additional quantity of oil may require higher prices to justify production. Many experts believe the oil production of the US will continue to decline but possibly at a slower rate than previously expected. The US currently imports about one-half its present oil requirements from various suppliers and imported 12% of its natural gas requirement from Canada in 1994. About 20% of its oil imports originate in the Middle East, a proportion expected to increase to 26% by 2000. Canada has had much the same experience and the production of oil from conventional resources remains higher than had been projected in the past. The capability to move this oil east by pipeline has recently been expanded but even this new capacity may prove insufficient. This additional oil production resulted in the reopening of the pipeline to Montreal.

The 1995 National Assessment of United States Oil and Gas Resources, catalogued as Circular 1118, is available (including a useful CD-ROM) from the US Geological Survey, Information Services, Box 25286, Federal Center, Denver, Colorado, 80225.

Special Issue of the Energy Journal devoted to the Changing World Petroleum Market

The *Energy Journal* of the International Association for Energy Economics has published a Special Issue entitled *The Changing World Petroleum Market*, dated 1994. There are 18 papers in this volume edited by Helmut J. Frank from such well-known experts in the field as M.A. Adelman, Peter Odell, Campbell Watkins, and John H. Lichtblau. There is a useful summary paper at the end of the volume by Edward W. Erickson who noted that the views of the different authors could be summarized into three hypotheses concerning future balances in the world petroleum markets. These hypotheses are overly condensed as follows: (1) from Adelman, who believes the Middle East and particularly the Persian Gulf countries will be the baseload source for low-cost supplies which will restrain world oil prices as far into the future as can be foreseen; (2) from Odell and Mitchell, who believe there is so much unexplored potential in areas not now major contributors to world oil flows that OPEC will never be in a controlling position in the future, especially that natural gas is steadily becoming more important around the world; and (3) from Dargay and Gately and from Dahl and Erdogan, who believe the rapid growth in demand in developing countries will soon swamp possible sources of supply. Two of these hypotheses are relatively benign and the other more troubling. This volume is recommended to all those interested in this field.

Report on Electric Vehicles

At the request of the Congress in the US, the General Accounting Office (GAO) issued a report in December 1994 entitled *Electric Vehicles: Likely Consequences of US and Other Nations' Programs and Policies* based on a study of development and commercialization programs for this class of vehicle in seven countries around the world. The report examines current barriers to the widespread use of electric vehicles, reviews the EV policies and programs of these countries, and assesses the national and regional effects of the widespread adoption of EVs from economic, energy, and environmental viewpoints. In this study, the analysis highlights the contrast in the potential market for EVs between the rather optimistic projections based upon what is technically possible and the less promising outlook based upon consumer-preference studies. This report has been criticized for factual errors concerning the sources of energy for electricity

generation and for its generally negative tone. Copies may be obtained without charge from the GAO, Washington, D.C. (Fax: (301) 258-4066).

The 12th International Electric Vehicle Symposium and Electric Vehicle Exposition was held December 3-7, 1994 in Anaheim, California, which was the largest meeting in the 25-year history of this group. The next meeting in this biannual series will be held in Osaka, Japan, October 13-16, 1996 under the auspices of the Japan Electric Vehicle Association and the Electric Vehicle Association Asia-Pacific. (Source: *IEEE Spectrum*)

Recent Reports Issued by the International Energy Agency

(1) *ELECTRICAL SUPPLY INDUSTRY: STRUCTURE, OWNERSHIP AND REGULATION IN THE OECD COUNTRIES*

This major report of 316 pages, catalogued as ISBN 92-64-14222-3 and issued in 1994, examines the evolution of structure, ownership and regulation of the electrical supply industry at a time when there is a fundamental shift in philosophy underway from the perception of this industry as an instrument of social policy operating with the obligation of maintaining a reliable power supply on fair terms to all to that of a business providing a multitude of electrical services to customers profitably. This report analyses these changes that are allowing power companies to respond to the needs of a more competitive, international power market together with the resulting implications for important policy objectives such as security of supply, increasing the efficiency of both supply and use of electrical energy, and providing more protection for the environment. In the first overview section of this report, the chapters deal with the structure of the industry, ownership and privatization, and forms of regulation. The second section deals with such policy matters as regulatory issues, choice of fuel and investment, security of supply, environmental policy, energy efficiency, pricing, and the new allocation of risks. The final section deals with the situation in individual OECD countries.

(2) *NATURAL GAS TRANSPORTATION: ORGANIZATION AND REGULATION*

This 344 page report, catalogued as ISBN 92-64-14097-2 and also issued in 1994, surveys the role of transportation in the emerging international gas market. It provides a description of how gas transportation is organized and regulated in three OECD regions, and it examines attempts to introduce competition in gas markets especially as related to the transportation link in the gas chain. Gas is several times more costly to transport through pipelines than oil on an energy basis and can only be shipped at sea in liquefied form in especially designed tankers or after conversion to some convenient liquid such as methanol. With the dependence on imports is growing in some major gas markets, the report examines issues pertaining to the transit of gas through third countries. It also deals with principles for setting transportation tariffs which have an important effect on promoting efficiency in this growing sector of the energy industry. The first section of the report provides an overview of the industry including an annex surveying developments in organization and regulation of gas transportation in central and eastern Europe. Successive chapters deal with the gas chain, economics of gas transportation, organizational aspects of gas transportation, regulation in the main countries including an annex dealing with the recent Canadian experience, and finally an examination of transportation tariffs. A series of annexes deal with the situation in individual countries with useful maps included of the existing and projected major pipelines.

(3) OCCASIONAL PAPERS

A number of occasional papers are also available in limited quantities from Dr. R.G. Skinner of the Agency including: (1) *Voluntary Approaches: An International Comparison*, background notes for a presentation to a Symposium on Energy Conservation by Long-Term Agreements held in Amsterdam, Jan. 26, 1995; (2) *The Evolving Global Regulatory Climate: An OECD Perspective*, presented at the Aspen Environmental Roundtable, Denver, Colorado, October 19-21, 1994; (3) *Geothermal Energy in a Changing Policy Environment*, dated 1994; (4) *Global Crude Oil Fundamentals*, background notes for a presentation to the 1994 Canadian Crude Oil Conference, Kananaskis, Alberta, September 15-16, 1994; and (5) *Carbon and Energy Taxes in OECD Countries' Background*, notes for a presentation to the Handelsblatt Conference held in Cologne, Germany, December 6-7, 1994. Two graphs are reproduced from the latter paper: Figure 1 illustrates the steadily lower carbon dioxide emissions predicted from OECD countries in successive studies conducted by the IEA

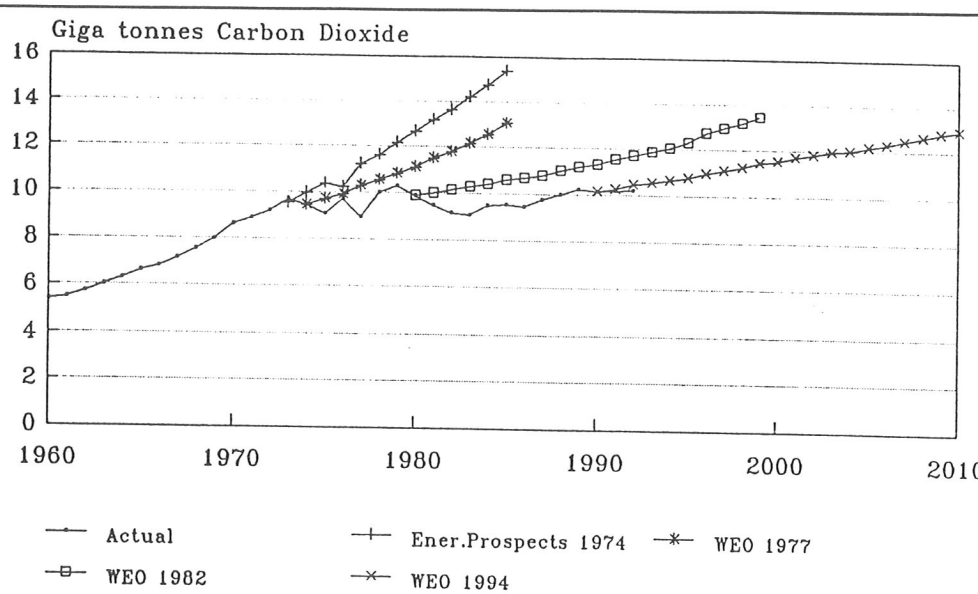

Figure 1: CO_2 Emissions from Energy Sources in OECD Countries–History and Projections

Source: Skinner, R.G., *Carbon and Energy Taxes in OECD Countries*

over the past two decades, and Figure 2 illustrates the perverse relationship existing in most OECD countries between the price of energy and the carbon content of the fuel involved.

IEA publications are marketed in Canada through the same distribution channel as those from the OECD (Renouf Publishing in Canada) or may be obtained by contacting OECD Publications, 2 rue André-Pascal, 75775 Paris, CEDEX 16, France.

Summary Report on Canadian Participation in the R&D Program of the International Energy Agency

The Office of Energy R&D of Natural Resources Canada has prepared an update summarizing Canadian participation in the R&D activities of the International Energy Agency by project, by countries participating, by Operating Agent, and by Canadian representative. A limited number of copies are available from OERD, Natural Resources Canada, 580 Booth Street, Ottawa, Ontario, K1A 0E4 (Fax: (613) 995-6146).

National Energy Board (NEB)

In January, the NEB released a draft report entitled *Unconnected Gas Supply Study, Phase I – Evaluation of Unconnected Reserves in Alberta* This study, prepared as one of a series focused on particular oil and gas supply issues in support of the Board's regulatory and advisory functions, concerns unconnected gas reserves in the Western Canada Sedimentary Basin. The first phase of this study has two components: first, an examination of the 59 largest unconnected pools (500 million m^3 or 17.65 billion cubic feet Initial Marketable Reserves) in Alberta: and second, a thorough examination of all unconnected pools (2,514 pools) in a selected area in the central region of that province. The results of the analysis indicate that 25% of the reserves in the largest unconnected pools should not be considered as remaining reserves due to economic factors. Additionally, 46% of the unconnected remaining established reserves in the central Alberta area should not be considered as reserves due largely to technical factors. Comments on this study are invited.

Copies of this report can be obtained from the NEB at 311 Sixth Ave. S.W., Calgary, Alberta, T2P 3H2 (Fax:(403) 292-5503).

Short Notes

• Researchers at the National Renewable Energy Laboratory of the US Department of Energy in Golden, Colorado, report the development of a genetically-altered bacterium capable of converting a wider range of sugars, including the pentose sugar xylose, to ethanol. Genetic tech-

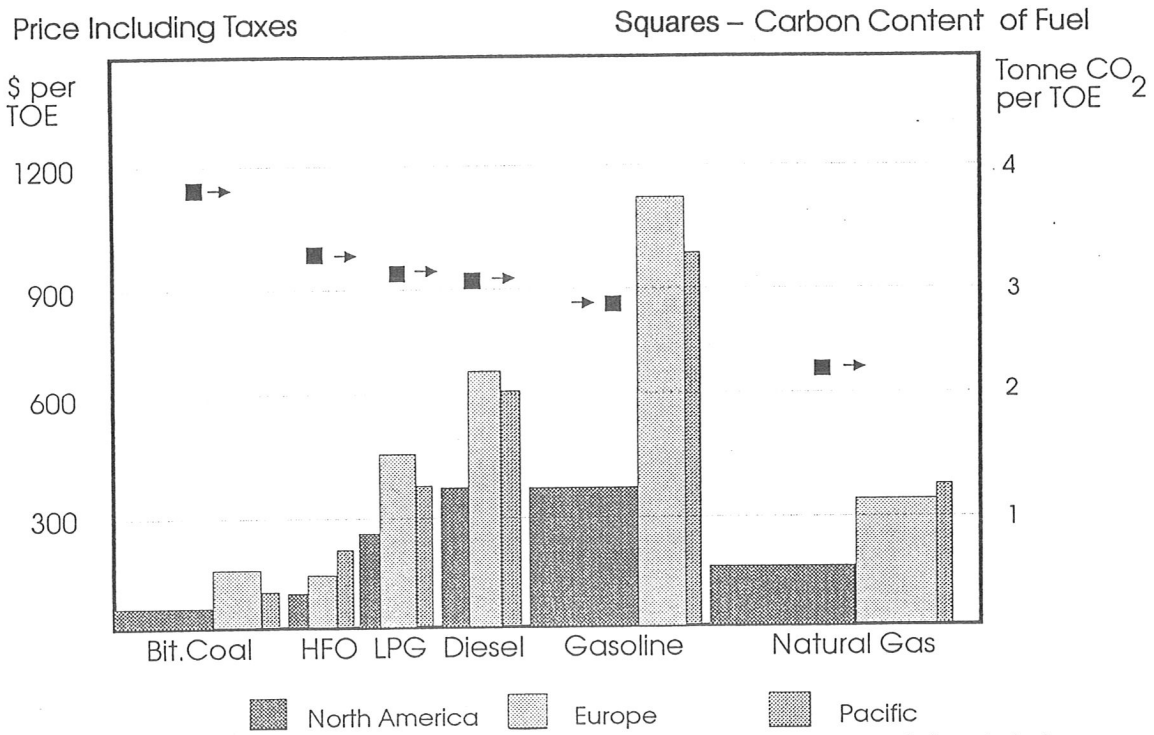

Figure 2: Carbon Price Topography–Fossil Fuel Prices by OECD Region

niques were used to incorporate these new capabilities into the bacteria strain called zymomonas mobilis. It is expected the production of ethanol will be increased up to 25% from a given feedstock resulting in a significant economic gain.

In Canada, R&D companies such as Iotech of Ottawa, Ontario, have been pursuing innovative studies of the conversion of cellulose to fermentable intermediates with the object of producing ethanol. On the conventional production side, a $43 million dollar facility is planned in Cornwall, Ontario, to produce ethanol from corn. The provincial government has now provided a $3 million grant for this project which is expected to be in operation by late 1996. The ethanol produced will be exempt from the current 14.7% provincial tax. This facility will have the potential to consume one-third of Eastern Ontario's entire corn crop of some 5 million bushels. A smaller installation is planned in the North Bay region to convert barley to ethanol with by-product feed for cattle. The current Federal policy is to allow favourable tax treatment for such regional facilities up to a limit of 1% of total gasoline consumption.

• Russia has agreed to finish one unit of two left unfinished at a nuclear power plant in Iran begun in 1974. The agreement also provides for the eventual completion of the other reactor and the construction of possibly two new units at this site. These reactors are located at Bushehr on the coast some 758 km (470 miles) south of Teheran and were heavily damaged during the 1980-88 Iran-Iraq war. This agreement has caused concern in nuclear non-proliferation circles. The US has been providing intelligence data concerning Iran's nuclear weapons plans in the hope of convincing the Russians to cancel this agreement. Despite high-level meetings with US officials in April, Russia has announced its intention of proceeding with this lucrative contract. Meanwhile, the Russian nuclear agency has questioned whether the Westinghouse Electric Corporation has sufficient technical data to finish work on two VVER-1000 reactors of Russian design located at Temelin in the Czech Republic. This contract is being financed with $317 million in loan guaran-

tees from the Export-Import Bank of the United States.

• The Tennessee Valley Authority has announced it will not complete three partly-built nuclear reactors, two in Scottsboro, Alabama, and one in Spring City, TN. Later this year it will be decide whether these units will be dismantled or converted for fossil fuel operation. (Source: *IEEE Spectrum)*

• Expanding coal production, especially in developing countries, is resulting in the deaths of some 11,000 people a year in mining accidents world-wide. The International Labor Organization, a UN agency in Geneva, states there are now up to a million serious accidents a year in the world's coal mines and that the industry is becoming more dangerous rather than less in some parts of the world.

• A new study will be undertaken of the development of the natural gas fields which were discovered off the coast of Nova Scotia some years ago. Mobil Oil Canada Properties and Shell Canada Ltd., both of Calgary, will lead a $1-million study to assess six fields known under the waters near Sable Island. Two pipeline companies, Westcoast Energy Inc. of Vancouver and Panhandle Eastern Corporation of Houston, will spend $3 million to assess a pipeline connection through New Brunswick to the existing distribution system north of Boston. In 1995, it is expected about 3,498 m^3 (22,000 bbls) of oil per day will be produced from two small reservoirs off Nova Scotia.

• Oil Developments: The American Petroleum Institute reported US oil imports as a fraction of requirements continued to rise in 1994. China has become a net oil importer. Gabon, a small West African oil producer, has announced its intention of leaving OPEC. Indonesia, another OPEC member, is widely believed to be approaching the point of having no surplus to export although natural gas exports in liquefied form from offshore fields are being pursued with the announcement (with the Exxon Corporation) of the development of the very large Natuna reservoir. A recent Central Intelligence Agency study suggests oil exports from Mexico will fall significantly in the next five years and will not generate enough cash flow to provide sufficient collateral for the $20 billion economic rescue package recently negotiated in late 1994.

• A conventional vehicle from one of the major car companies has been converted to electric operation at Hydro-Québec's IREQ Laboratory in an interesting way. The driving motors have been built into each of the four wheels with the propulsion power of each controlled individually by computer. The vehicle reclaims energy with a regenerative braking system. Normally the car is recharged at household voltages at night. A small gasoline-powered IC engine is used to generate electricity when the vehicle has gone beyond the range of its batteries. A major test program is underway. IREQ has also been active in the field of battery development.

• The National Research Council has commissioned a 4 MW cogeneration installation capable of meeting most of its electrical, heating and cooling needs. The cost of the installation was of the order of $6 million and the expected pay back period is 6-7 years.

• The Hon. Anne McLellan, Minister of Natural Resources Canada (NRCan), and David O'Brien, Chairman of the Canadian Association of Petroleum Producers (CAPP), on January 20, 1995 signed the first Memorandum of Understanding (MOU) on global climate change between the federal government and the energy industry. The MOU commits CAPP to work with NRCan to develop and promote the Voluntary Challenge and Registry Program which invites stakeholders to participate in and develop action plans to limit or reduce net greenhouse gas emissions. A registry will record the reductions achieved as a result of these commitments and plans. NRCan is seeking such voluntary agreements with other sectors of the industry and will work with associations and their members to develop industry information systems and fair and balanced reporting on progress.

The Minister has also appointed Mr. Kenneth Vollman as Vice-Chairman of the National Energy Board and Dr. Yves Giroux a member of the Atomic Energy Control Board.

• The first of 20 turbine/ generators began operation at the Yacyreta Dam located on the Parana River on the northeast border of Argentina in the fall of 1994. The remaining generators will come into service every 72 days until full output is reached in 1998. The estimated yearly output of 19,000 GWh amounts to about 40% of the current electrical demand of Argentina. This project, a joint venture with neighbouring Paraguay, includes a ship lock and a fish elevator. The environmental aspects of this large dam have been controversial. (Source: *IEEE The Institute*)

• Dr. Paul Freund, previously with British Petroleum, has been appointed Project Director of the

IEA Greenhouse Gas R&D Programme succeeding Mr. Ian C. Webster who has returned to Alberta after completing his term of office. This specialized IEA Programme, now in the second three-year phase of its existence, will be holding a conference entitled 'Greenhouse Gases: Mitigation Options' in London August 22-25, 1995. Information about this meeting, the regular news circular *Greenhouse Issues* which is available without charge and other publications, can be obtained from the IEA Greenhouse Gas R&D Programme, Coal Research Establishment, Stoke Orchard, Cheltenham, Gloucestershire, England, GL52 4RZ (Fax: +44 242 680758).

• The Business Council for Sustainable Development, consisting of a group of chief executive officers from corporations around the world, has established a task force on Joint Implementation and Greenhouse Gas Offsets. Led by Mr. Ken F. McCready of TransAlta Utilities of Calgary and Sr. Roberto de Andraca of CAP S.A. of Chile, this new group has three aims: (1) to provide the business perspective for the Joint Implementation debate, (2) to help shape the proposed modus operandi for Joint Implementation, and (3) to present policymakers with proposals for advancing the Joint Implementation agenda rapidly. The Business Council for Sustainable Development believes Joint Implementation is an important example of how an enabling governmental framework can create opportunities for new partnerships involving the private sector so as to bring significant developmental benefits through increased investment together with improved cooperation in the technological field leading to greater efficiency in the achievement of ecological goals.

• On February 15, 1995 Ontario Hydro announced it had adopted a comprehensive long-term strategy to reduce emissions of greenhouse gases. This strategy sets out two objectives: to reduce the carbon intensity emitted per unit of energy supplied to customers, and to stabilize and reduce net emissions of these gases over the next ten years. To achieve the first objective, Ontario Hydro will reduce the rate of emissions of greenhouse gases per unit of useful energy supplied (expressed in teragrams per terawatt-hour) by 5% by the year 2000 as compared to 1990. The second objective is to stabilize net emissions from Hydro operations at the 1990 baseline level by the year 2000, and to reduce emissions 10% by 2005. This target is equivalent to a reduction of 26% from the utility's emissions in 1988. These objectives will be met by pursuing activities in five areas: increasing supply-side energy efficiency; increasing end-use efficiency; additional supplies of renewable energy; establishing offsets for greenhouse gas emissions, and the development of innovative market approaches.

In 1994, TransAlta Corporation, whose generation in Alberta is strongly dependent upon coal, announced its intention to reduce its net greenhouse gas emissions to 1990 levels by 2000. The company's energy sales were 6.3% higher in 1994 than in 1993.

• Studies at the Los Alamos National Laboratory have raised the possibility that the planned underground repository for high-level atomic wastes in volcanic ground at Yucca Mountain in Nevada could, under specified conditions, erupt in a nuclear explosion thus scattering radioactivity into ground water or into the air. So far $1.7 billion has been spent on feasibility studies for this proposed facility. The crux of the argument is whether the surrounding rock could aid the start of a chain reaction by slowing down neutrons released from plutonium as it decays should this long-lived material gradually escape from the storage containers into the surroundings. (Plutonium 239 has a half-life of 24,360 years.) It appears difficult to answer this question with confidence one way or the other and thus these concerns must be regarded as a serious setback to the whole option of long-term underground storage. As an alternative, the plutonium could be processed in particle accelerators or even CANDU reactors to convert it into less harmful materials. Hearings related to the Canadian proposals for underground storage of nuclear wastes are just beginning and it appears the problem is much less likely to occur in the Canadian case, if at all, due to the lower rate of diffusion in repositories proposed in granite. (Source: New York Times)

• The Federal government is considering the conversion of many of its 39,000 vehicles to alternate fuels of one kind or another.

• Despite the withdrawal of the $2000 grant and other incentives at a time when electrical rates are rising and natural gas prices declining, interest remains high in heat pump systems based upon energy from the earth. This technique is probably the preferred option for heating and cooling houses and other smaller installations beyond the reach of the natural gas pipeline network. There are currently some 35,000 earth-based heat pump units in

the country including at 30 schools in Ontario. A useful recent paper reviewing Canadian progress in this field entitled *Using Canadian Advanced Earth Energy Heat Pumps to Provide Environmentally Sustainable Building Energy* by C.S.L. McNeil, T.K. Crawford and B. Eggertson was presented in June of 1995 to the Air and Waste Management Association in San Antonio, Texas. A limited number of copies may be obtained from C.S.L. McNeil at NRCan, 580 Booth Street Ottawa, K1A 0E4 (Fax: (613) 947-3157) and a video on this interesting subject may also be obtained on a loan basis.

• Imperial Oil has reported continuing developments at its very large Cold Lake heavy oil field in Alberta. Drilling has begun on the next phase which is a $240 million project aimed at increasing production to more than 19,873 m^3 (125,000 bbls) per day from the 1994 levels of 13,196 m^3 (83,000 bbls) per day. Heavy oil recovered from this field now accounts for 30% of Imperial's total production of liquid hydrocarbons.

• IPL Energy Inc. has reported positive results from changes in the regulatory practices governing their pipeline system, the world's longest crude oil pipeline. The company is now building upon the success of the 1994 negotiated toll settlement to establishing an incentive tolling methodology that would be the first in Canada. Under the new methodology, the provision of incentives to maximize capacity utilization and minimize costs would create an opportunity to earn more that the allowed rate of return otherwise established by the National Energy Board (NEB). Shippers would benefit through lower tolls arising from the ability to share in cost savings. The NEB is now considering this new procedure which is expected to streamline the regulatory process and increase efficiency.

• At the annual American Association for the Advancement of Science meeting held in Atlanta in February 1995, Dr. David Thomson, an expert in the new statistical procedures flowing from the rapid advance of information technology, stated flatly that 'changes in carbon dioxide resulting from human activities are causing large, and readily observable, changes in the average temperature and in the seasonal cycle.' This categorical, and controversial, statement follows from the strong correlations he has found between changes of the seasons and the rise in atmospheric carbon dioxide that has resulted from the burning of the fossil fuels.

• General Motors announced on April 5, 1995, its intention of proceeding with the $6 million next phase of its agreement with Ballard Systems of North Vancouver, BC for the development of hydrogen fuel cells for vehicles.

• The Canadian Energy Association's Liaison Group has been established under the umbrella of the Energy Council of Canada and is Chaired by Lin Titus (also Chairman of the EEC) to identify energy issues where joint action by the Associations is of common benefit, to exchange information on current Canadian and international energy matters, and to formulate plans for action. Membership in this coordinating group, which meets several times a year, is as follows with the respective Presidents identified in brackets: Canadian Association of Petroleum Producers (G.J. Protti); Canadian Electrical Association (H.R. Konow); Canadian Energy Pipeline Association (M.F. Kanik); Canadian Gas Association (G.W. Doucet); Canadian Nuclear Association (J.W. Richman), and The Coal Association of Canada (D.O. Downing).

• Engelhard Industries in New Jersey has announced a new technique for dealing with air pollution produced by both vehicles and other sources. A special platinum-based catalyst with the trade name PremAir is applied to the radiator of the car. When the car is driven, air passes over the radiator where the carbon monoxide present is converted to carbon dioxide and the ozone to oxygen. This clean-up effect may be greater than the emissions released out the tail-pipe, and consequently vehicles so equipped are being termed "negative emission" cars. The costs of this technique are thought to be between $500 and $1000 a vehicle. The procedure may be ready as soon as 1997 in time for the 1998 model year. The company believes this approach is cheaper than electric 'zero emission' cars or even the use of reformulated gasoline to reduce carbon monoxide emissions.

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