
Update

Two Major Initiatives Announced in the US

On September 29, 1993, President Clinton announced a major effort to be undertaken by the three leading US car manufacturers, in cooperation with the National Laboratories, to develop a superior vehicle for the next century. The United States Council for Automotive Research (USCAR) has been formed with the following declaration of intent: to pursue development of a revolutionary class of efficient, environmentally friendly, commercially viable vehicle. One objective is to increase fuel efficiency three times from the present level to three litres of gasoline per 100 kilometres (80 miles per US gal.). This will be difficult to achieve as fuel efficiency in the US (in contrast to Canada — see *ESR* 5:1, p. 69) has not improved over the last eight years. This is not surprising since the real price of gasoline at the pump in the US is lower now than it was in 1973, even with the recent tax Federal increase. Nevertheless, over the past two decades, auto-makers have roughly doubled fuel economy in the US while at the same time reducing hydrocarbon

and carbon monoxide emissions by 96% and nitrogen oxides by 76%.

Though no new government money was provided for this effort, substantial sums are believed to be involved through redeployment from defence and other activities now underway in the Laboratories. This approach is a major departure from the policy of the past two administrations, which tended to take a more passive market-oriented position. Nearly half the oil consumed in the US is now imported and serious environmental problems, despite the improvements already made, continue to be experienced in some metropolitan areas, which suggests the present piecemeal approach may be approaching its limits.

In Canada, one promising option for the future is to produce methanol from biomass or other benign sources and use this convenient liquid to power electric vehicles equipped with on-board fuel cells.

Last October 19, President Clinton announced his Strategic Plan for meeting the commitment he made at the time of the Earth Day celebrations in April to limit greenhouse gas emissions to their 1990 level by 2000, as Canada has

also agreed to do. About \$1.9 billion dollars will be redirected from current research expenditures to help achieve this objective. Voluntary private/public partnerships involving 50 separate initiatives, touching every sector of the economy and signed at the time of the announcement, will be the primary means employed. The aim is to leverage the federal component with as much as \$60 billion worth of expenditures in the private sector.

The Plan is stated to be the most "aggressive and specific" effort yet mounted anywhere in this field and represents a new American determination to be the leader in the production of energy-efficient equipment and buildings. A team will be assembled in the White House to oversee progress. The underlying hope is to both create jobs and save money through the introduction of the energy-efficient technologies. A voluntary program of this kind, which is based upon redirected funds, needs no special legislative authority to be undertaken. However, some features, such as the proposal to offer employees of any company vouchers in place of free parking, may require some revisions to the tax code.

The US emits about 24% of the CO₂ released from fossil fuels

to the world atmosphere and some degree of success in that country would be an important step forward in dealing with this emerging problem. The Plan has been criticized since it provided for no mandatory increase in the fuel efficiency of the vehicle fleet; nor does it deal with the situation after 2000. The Secretary of Energy, Hazel O'Leary, when she replied to these points at the time of the announcement, said that because she expected success with the special initiative already announced, much more fuel-efficient cars should be ready for production by that date.

IEA Energy Technology Systems Analysis Programme

The International Energy Agency (IEA), with membership drawn from 23 OECD countries and the Commission of the European Union, has been active in R&D in the energy field since its inception in 1974. The Agency's Committee on R&D recognized the difficulties in establishing priorities in this field from the very beginning of its activities. To this end, the IEA Energy Technology Systems Analysis Project (ETSAP) was initiated in 1976 for the purpose of providing IEA with systems analysis capability to assist in establishing priorities for research, development and demonstration projects of its member countries.

In the first phase of this activity, two project teams of systems analysts drawn from 16 countries (including Canada) — one based at the Brookhaven National Laboratory (BNL) in the US and the other at Kernforschungsanlage Jülich (KFA) in Germany — developed the analytical tools for evaluating energy technologies within the context of national energy systems. These efforts

consisted of compiling the data characterizing the main candidate technologies, development of the MARKAL (for MARKET ALlocation) linear programming model to represent national energy systems, and formulation of the national energy system models using the MARKAL software. MARKAL configures an optimal mix of technologies so as to satisfy exogenous economic demands at the minimum total discounted system cost independently of past history. The result of these early efforts was the 1980 IEA report *A Group Strategy for Energy, Development, and Demonstration*. By this time a cadre of experienced energy systems analysts had formed who had a common framework for understanding and evaluating each other's energy systems, to the extent that MARKAL is now used in 30 countries around the world.

In the current efforts, 11 nations (including Canada) are cooperating to identify technologies and policies to reduce emissions of CO₂ and other greenhouse gases in a cost-effective manner under Annex IV of the ETSAP Implementing Agreement. A network of participants uses a common methodology to develop and exchange relevant technical data, including periodic reviews of each other's work. Outreach programs by the participants have promoted the same capability in a number of developing and transitional countries (China, Eastern Europe). The work is performed by analytical groups in each of the participating countries, many of which, like Canada, have been cooperating in this field since the start in 1976. The immediate aim of the current three-year program is to identify the technologies, practices, and processes that can control, reduce or prevent anthropogenic emissions of CO₂. Further work will extend the analysis to other greenhouse gases.

The MARKAL model portrays all aspects of the energy system which are largely responsible for anthropogenic emissions of greenhouse gases, including those released in the production, conversion, transportation and transmission of energy, and those occurring in end-use applications in the transportation, industrial, commercial, and residential sectors. Response strategies that are evaluated include fuel switching, emission controls, and energy conservation. By treating both costs and emissions in an integrated way in a variety of future development scenarios, the project identifies innovative, efficient, and state-of-the-art technologies. Since the effect of the level of greenhouse gas concentrations in the atmosphere is uncertain, a range of future hypothetical restrictions on greenhouse emissions may be examined to determine the changes necessary in the energy system. Alternatively, a range of policy measures, such as the introduction of a carbon tax, may be applied in the model to determine the best choice of energy technologies and resources in this changed situation.

The scenarios typically extend 45 years into the future into the period when the greenhouse question will be decided. Typical scenarios include those aimed at returning to the 1990 level of CO₂ emissions by the end of the present decade, those with further reductions keyed to the target set at the World Conference on the Changing Atmosphere (held in Toronto in 1988) of a 20% reduction relative to 1988 emissions by 2005, and those arising from the ongoing studies of the Intergovernmental Panel on Climate Change (IPCC). The individual models take into account national differences in starting points and approaches, economic structures and resource bases, available technologies, and other circumstances. To ensure global

benefits at the lowest possible cost, since the separate analyses use comparable methodologies, it is possible to identify the individual national emission restrictions with the same marginal cost. At this point, the joint costs will be minimized.

A major report is in preparation entitled 'Boundaries of Future Carbon Dioxide Emission Reduction in Eight Industrial Countries' which assesses the technological options for managing both demand and supply over the next three decades in order to reduce emissions of CO₂. The technological possibilities for stabilization and reduction of this greenhouse gas are defined in scenarios that include increases in population and economic activity. The results are reported in a coherent way in a series of what are becoming known as Hill Energy Maps.

In Canada, the MARKAL model has been used by the *Groupe d'études et de recherche en analyse des décisions* or GERAD (a joint research centre formed in Montreal by École des Hautes Études Commerciales, École Polytechnique and McGill University) to study the control of acid gases and CO₂ in Québec and Ontario. It has found that the goal of stabilization of CO₂ and reductions of up to 20% by 2005 are technologically feasible in Québec. However, the costs of reduction are higher in Québec than in Ontario because CO₂ emissions are relatively lower in Québec due to the higher existing level of electrification which is based upon hydraulic generation. Further reductions are thus more difficult and more costly to achieve. There is significant advantage in cooperation between the provinces. Copies of recent reports and papers are available from GERAD in both English and French. (See, for example, *ESR* 4:3, pp. 278-296.)

A MARKAL model is being built for Alberta and will be extended to the other western

provinces. This activity is conducted by the Alberta Research Council under contract to the Canadian Energy Research Institute (CERI), with financial support from the Government of Alberta and others. Since the model can now be used on computers of the PC class, it is expected that this valuable technique will be more widely used in the future.

For those interested in following this work at the international level, copies of the *IEA ETSAP Newsletter* can be obtained by writing to the Project Head, Dr. Tom Kram at the Netherlands Energy Research Foundation, PO Box 1, 1755 ZG Petten, The Netherlands (Fax: +31-2246-3338).

15th National Energy Forum

The 15th National Energy Forum of the Energy Council of Canada was held in Fredericton, NB, October 17-19, 1993, and hosted by New Brunswick Power and its President, Mr. Lin Titus. The theme of this meeting, attended by 175 delegates, was 'Energy's Role in Industrial Competitiveness.' It is becoming steadily more evident that the costs and benefits of investing in innovation, technology, environmental protection and the efficient use of energy will have a profound effect on the ability of Canadian industry to be competitive in the global market place.

The Chairman of the opening session, Mr. T.E. Newell, President of NOVA Corporation, noted that this type of forum, with suppliers meeting with consumers, did not happen as recently as 20 years ago, to everyone's detriment. One of the keynote speakers, Mr. Angus Bruneau of Newfoundland Power, observed that "reduced material throughput, recycling inventories,

more highly processed and more sophisticated materials, automation, robotics and the vital dependence on information systems all make the system more energy intensive and increase demand for reliable higher quality supplies at the lowest possible cost. Simultaneously, the environmental concerns and values that pervade our society move us toward thermodynamically efficient systems that result in the smallest environmental burden per unit of useful energy provided." The panel discussions are one of the major strengths of the Energy Forum and this year was no exception.

The presence of some 12 delegates from the ex-USSR and Eastern European countries provided an extra dimension to the forum. Though few of these countries outside of Russia itself possess the variety of energy options open to Canada, there are some interesting opportunities opening for international collaboration in technical fields in which Canada has traditionally been strong.

The next Energy Forum will be held in Montreal on October 23-25, 1994, with the theme 'Energy and Trade.' The next World Energy Congress will be in Tokyo, October 8-13, 1995. The Proceedings of the Fredericton meeting and information concerning the next Forum may be obtained by contacting the ECC at 400 - 30 Colonnade Road, Nepean, Ontario, K2E 7J6 (Fax:(613) 952-6470).

7th International Conference on Coal Science

The 7th International Conference on Coal Science was held at Banff, Alberta, September 12-17, 1993 under the auspices of the International Energy Agency (IEA) and was sponsored jointly by the Research Council of Alberta and Natural

Resources Canada. Speakers from 25 countries presented 321 papers.

The meeting was held at a time of conflicting signals for coal. The IEA had recently published its *World Energy Outlook* in which the evolution of markets were examined through 2010: the production of coal is expected to grow some 45% during this period, though most of this gain will occur in emerging Asian markets. Half of this growth is expected in just two countries: China and India. On the other hand, there is the possibility of restraints on production arising due to CO₂ stabilization policies and other environmental concerns.

Those attending the conference represented the scientific and technical side of the coal industry. There is a growing confidence that emissions other than CO₂ can now be controlled within acceptable limits by improvements to the combustion process and that even CO₂ emissions can be reduced significantly through increased efficiency in emerging processes for electricity generation. Nevertheless, the dilemma facing coal was clearly recognized by those at the conference: the technology to consume coal acceptably is in the hands of the developed countries, but most of the increase in output in the next decades will be in the developing world. The small, though noticeable involvement of the developing countries in the conference (including China which is now the largest producer and consumer of coal) was, however, a good sign.

Two features of the many scientific presentations are noted here as examples of the work of the conference. The first is how quickly the understanding of the formation of the nitrogen oxides in the combustion processes (varying levels of nitrogen are found in coal) has advanced in recent years, together with the instrumental

techniques for their measurement. The second is that progress in scientific understanding of the conversion of coal to liquid transportation fuels continues, despite the current low price of oil. This work has now advanced far enough to allow more reliable estimates of the cost of production of oil from coal. Though these estimated costs are now falling, they are still too high to warrant interest from the point of view of immediate production interest.

Since reserves of coal throughout the world are large and better distributed than those of the other fossil fuels, the conversion of coal to oil, in theory at least, places a cap on the international price of oil. From private discussions at this meeting, this cap is probably in the range of \$US 30-35/barrel at present, or more than double the present price on international markets.

A special two-session workshop was organized concerning the role of scientific research in addressing environmental challenges facing coal, a departure from past practice at this conference. In the first session, Professor D.J. Swaine of the University of Sydney in Australia was invited to examine the important question of trace elements found in coal. The major difficulties with these minor elements arise in the disposal and use of the byproducts of coal consumption. Those of greatest environmental interest are cadmium, chromium, mercury, arsenic and selenium. Professor Swain made the further point that modelling methods were limited in their ability to address this problem which, however, is generally manageable provided adequate precautions are taken.

In the second invited paper of the first session, Professor W.S. Fyfe of the University of Western Ontario examined the present state of the earth's environment. He

acknowledged that coal was one of the great energy sources — one which we as a people could not do without. He appealed for much more efficient processes and the development of means for eliminating or reducing direct emission of CO₂ and other acid gases to the atmosphere. A spirited general discussion followed his stimulating presentation.

In the second special session, representations of each of the IEA nations present outlined their priorities for coal research. As might be expected, most presentations were directed to preserving the presence of coal in its main market — the generation of electricity — through the development of more efficient processes with lower environmental impact. It was noteworthy, however, that no speaker dealt with the possibilities for the capture and sequestering of CO₂ or addressed the need for lower cost transportation methods to move coal more cheaply.

The two volumes of the Conference Proceedings (some 1275 pages) were prepared in advance of the meeting. Copies may be obtained at \$125 from Dr. T.D. Brown, Natural Resources Canada, Devon, Alberta, T0C 1E0 (Fax: (403) 987-8690). The 8th International Conference on Coal Science will be held in Oviedo, Spain, September 10-15, 1995. (Contact the Chairman: Dr. D. Jesus Pajares, Fax: 34-85-297662.)

New Reports Available

*Canada's Energy Outlook
1992-2020*

Natural Resources Canada has released its energy outlook to 2020, dated September 1993 and prepared by NRCAN's Energy Sector. This Working Paper provides a long-term

outlook for energy demand and supply in Canada, and for related greenhouse gas emissions. While not an official forecast, it is a considered view of the possible evolution of energy markets in Canada over the next three decades.

The authors emphasize that the projection is a reference scenario in that current government policies are held constant over the period under consideration. In this sense it is a business-as-usual projection against which proposed changes may be evaluated.

The report is rich in detail with many tables. Two sentences are especially noteworthy: "Additional measures will be required to attain the stabilization (of greenhouse gases) goal by the year 2000" and "Maintaining stabilization beyond 2000 would appear to pose a major challenge and require significant technological, structural and life style changes."

Catalogued as ISBN 0-662-20929-X, copies may be obtained from the Energy Sector, Natural Resources Canada, Ottawa, Ontario, K1A 0E4. (Fax: (613) 996-7837)

World Energy Outlook

The International Energy Agency has released its regular *World Energy Outlook* through to 2010. The Agency is made up of 23 member countries (including Canada) and the Commission of the European Union. The *Outlook* (ISBN 92-64-13904-4 in 72 pages) is an invaluable document available directly from the Agency or from OECD Distributors in member nations (\$US 28).

The Agency also began publication of the 'Energy Environment Update' in August of 1993. This periodical provides a summary of major developments in climate change policies throughout the world and also records trends in energy-related CO₂ emissions. It is available without

charge from the Agency, 2 rue André-Pascal, 75775 Paris Cedex 16 France (Fax: 33-1-45 24 90 04).

National Energy Board Report on Oil and Gas Resources in Canada's North

The National Energy Board has released a new report on oil and gas resources in Canada's north. Dated September 13, 1993, it includes a list of estimates for 22 discoveries, based upon analyses of 37 gas pools and six oil pools. This report is available from the Board on request at 311 Sixth Avenue S.W., Calgary, Alberta, T2P 3H2. (Fax: (403) 292-5503.)

Four Recent Reports on Greenhouse Gas Emissions

(1) CANADA'S NATIONAL REPORT ON ACTIONS TO MEET COMMITMENTS UNDER THE UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE

On September 22, 1993, then Environment Minister Pierre H. Vincent released a draft version of Canada's first national report on climate change. This well-documented report serves as an indicator of the present status of national efforts in this field. The Canadian commitment to the stabilization of CO₂ and other greenhouse gases at 1990 levels by the year 2000 is repeated. However, it is also observed that, "according to initial assessments, in the absence of any additional measures to reduce emissions, greenhouse gases could rise 10.6% above the 1990 levels by the year 2000."

Copies of the report may be obtained without charge from Environment Canada Ottawa, K1A 0H3, (Fax: (613) 996-3960).

(2) ROYAL SOCIETY REPORT ON CANADIAN OPTIONS FOR GREENHOUSE GAS EMISSIONS REDUCTION

Under its Climate Change Program, the Royal Society of Canada established a panel of eight well known energy experts under the Chairmanship of John B. Robinson, Director of the Sustainable Development Research Institute at the University of British Columbia, to report on Canadian options for greenhouse gas emissions reduction. (The group was referred to as the COGGER Panel). The Panel believes it would be both feasible and cost effective to stabilize emissions of greenhouse gases at their 1990 levels by 2000, and to reduce CO₂ emissions a further 20% by 2010, by increasing the efficiency with which energy is consumed and by switching away from carbon-intensive fuels. These experts believe there is a major strategic opportunity open to Canada, including opportunities in the export field, but that there must be more leadership to achieve these results.

The Panel conducted a critical assessment of several recent energy studies to arrive at their conclusions. The report is in two parts. In the first section, an assessment is made of "What's worth doing anyway?" whether or not there proves to be a need for aggressive action to reduce the emissions of greenhouse gases. The potential for improvements in energy efficiency is assessed in terms of the technical, economic, and achievable potential. These quantities are estimated and the measures required to move from one category to the other are identified.

Regarding the latter, the possible policy actions include:

- raising the costs of carbon-intensive fuels through the use of a carbon tax or tradeable permits for CO₂ emissions;
- elimination of implicit and explicit

policies that distort energy prices;

- regulations to set minimum efficiency standards for energy-using equipment and buildings, including building and home energy labelling systems, and development of appropriate urban planning requirements;
- development of comprehensive community-based building retrofit programs in cooperation with municipalities and local professional and citizen's groups;
- financial incentives to promote adoption of the most energy-efficient technologies;
- advertizing and information programs, including energy labelling, to promote energy efficiency; and
- support for ongoing R&D and demonstration projects on efficient energy end-use and production technologies and processes.

The second part of the report ("How to do more") deals with the situation if still more reductions are needed. The report concludes that to achieve further reductions in the long run, Canada must develop or acquire new technologies that reduce greenhouse gas emissions at reasonable cost. Since the potential for energy savings fall as efficiency increases, these reductions are more likely to be achieved by switching to non-fossil energy supplies such as hydroelectric, nuclear, wind, solar, geothermal, and so on.

The COGGER report is a useful addition to the literature on this increasingly difficult problem. Catalogued as Technical Report Series No. 03-1, it and its appendices are available separately from the Royal Society of Canada, PO Box 9734, Ottawa, Ontario, K1G 5J4 (ISSN 1188-9101) (Fax (613) 991-6996).

(3) RESEARCH NEEDS ASSESSMENT FOR THE CAPTURE, UTILIZATION AND DISPOSAL OF CO₂ FROM FOSSIL FUEL-FIRED POWER PLANTS

A major report has been prepared on this subject for the US Department of Energy by H. Herzog, E. Drake, and J. Tester of the Energy Laboratory of the Massachusetts Institute of Technology. This comprehensive document, prepared in two volumes (including an extensive bibliography), is an essential reference document for anyone directly concerned with this subject. Canadians active in the field have participated in the extensive peer review process. The report provides the best available indication of the current state-of-the-art in this field and clearly identifies the research that needs to be done to make the capture and sequestering of CO₂ a viable option.

The study found that direct capture and disposal (if large-scale disposal is demonstrated to be feasible) would likely increase the cost of electricity by a factor of two or more for the case of retrofits of current coal-fired power plants, and by 50% or more for the case of successful development of advanced, high efficiency power plants (such as those using the integrated gasification combined-cycle) that are specifically configured to integrate the capture of CO₂. Despite its completeness in most respects, the study did not include the possibilities for combination biomass/fossil fuel processes (due to the restricted terms of reference), nor did it deal with the subtle question of whether CO₂ should be disposed of or stored for recovery. The report can be obtained from the US Department of Energy, Washington, D.C., 20585 (Report DOE/ER-30194).

(4) REPORT ON CO₂ ABATEMENT IN THE NETHERLANDS

A comprehensive 62-page report entitled *CO₂ Abatement in the Netherlands* has been published by the Netherlands Energy Research Foundation (ECN). It is of special interest for two reasons: it follows the guidelines of the United Nations Environmental Program (UNEP) and, unlike corresponding Canadian studies, specifically includes options for the capture and sequestering of CO₂. The overall aim of Phase Two of the UNEP Project is to devise common approaches to national costing studies for the reduction of greenhouse gas emissions. This study presents the technical possibilities for CO₂ reduction in the Dutch energy system. This report is available from Netherlands Energy Research Foundation, PO Box 1, 1755 ZG Petten, The Netherlands, for 35 Dutch florins. (Fax: +31 2246 44 80)

Short Notes

- On October 21, 1993, the National Energy Board approved an application by TransCanada PipeLines Limited for the construction of new natural gas transmission facilities during 1994 and 1995. The cost of these facilities, which include 164.4 km of new pipeline loop, 129 megawatts of additional compression, and other supporting equipment, is estimated at \$397.3 million. The added capacity will total about two million cubic metres (70.6 million cubic feet) per day for new long haul service deliveries of which 943 thousand cubic metres (33.3 million cubic feet) per day would be used for domestic service and the remainder for new export services. There will also be a total of about six million cubic metres (212 million cubic feet) per day

of new short-haul firm service for export costumers.

- A two megawatt fuel cell, the largest ever, will be built in Santa Clara, California, by five California utilities, supported under programs of the Electric Power Research Institute and the US Department of Energy. The fuel will be natural gas. This unit is large enough to supply the electrical needs of 2000 average California homes.

- In October, the Government of the Ukraine voted to keep two reactors at the Chernobyl generating station operating and to investigate the possibility of restarting a third. It was the fourth unit at this complex which exploded with such devastating results in 1986. A shortage of electricity was given as the reason for this remarkable decision. Russia has agreed to resume the supply of nuclear fuel to this facility which had been interrupted for non-payment. Ironically, the energy position in the Ukraine has been made difficult by the need to pay for oil and gas imports from Russia at near market levels. Reactors that had been shut-down for safety reasons will also be restarted in Bulgaria and Armenia.

- A map sized 8½' by 11' (black and white) showing the location of the principal Canadian coal mines, the primary rail routes used for shipping coal and the coal ports is available without charge from The Coal Association of Canada, Suite 502, 205 Ninth Avenue S.E., Calgary, Alberta, T2G 0R3 (Fax: (403) 265-7604).

- Ballard Power Systems Inc. of North Vancouver has announced it has delivered for testing a fuel cell system designed to power vehicles with hydrogen to GIE PSA-Renault CEA, a joint venture

of Peugeot and Renault in Grenoble, France. The proton exchange membrane (PEM) technology developed by this company is a significant advance in the field of fuel cells. The French companies join a growing list of automotive companies testing this cell, including General Motors, Mazda, Mitsubishi and Nissan. The world's first fuel cell powered bus was recently demonstrated in Vancouver, Los Angeles and Sacramento.

- The Alberta Research Council has licensed its Aglofloat process to Mitsui Engineering and Shipbuilding Co. Ltd. The Japanese company plans to package the new process with its own flue gas desulphurization technology and offer the combined technology to countries around the world for the reduction of sulphur dioxide emissions. The prospects appear good in China, where coals are frequently high in pyrite. In 1987, the Council joined with the Electric Power Research Institute (EPRI) in the US to form a consortium of 18 industry and governmental organizations in Canada and the US in a pilot scale three-year \$6.1 million project. Proceeds of the new licensing agreement will be shared with EPRI. In the Aglofloat Process, light oil is added to fine coal to form agglomerates of coal. Conditions have been found to reject most of the free pyrite contained in the coal, thus lessening the load on the more expensive flue gas desulphurization stage when coals high in sulphur content are combusted.

- Two battery-driven Ford *Ecostar* pickups will be tested under service conditions in Toronto and Montreal using a sodium-sulphur battery developed by the ABB Group of companies in laboratories in

Switzerland and in Mississauga, Ontario. Ontario Hydro will test one of the trucks and the federal government the other. This battery system is smaller and lighter than conventional lead acid batteries and has an operating life three to five times longer. The trucks can run 150 km between charges. Charging time is seven hours from normal household electrical outlets. This power system must be kept hot to keep the sodium and sulphur liquid. Fourteen researchers have been working on the battery in Mississauga since 1973, assisted with \$5.8 million in research support from the federal government. In all, the ABB Group will be testing 100 of these battery-equipped pickups around the world.

- Interprovincial Pipe Line Systems, Inc. of Edmonton, operator of the world's longest oil pipeline, has bought controlling interest in Consumers Gas Company of Toronto for \$1.15 billion from British Gas of London. Consumers Gas is a major distributor of natural gas in Ontario, western Quebec and northern New York. The Interprovincial company believes the outlook for expansion in the gas field is brighter than that for oil.

- Transmountain Pipe Line Company Limited plans to increase the capacity of its line to Vancouver and Washington State by 6,000 cubic metres (38,000 barrels) of oil per day. The current capacity of the system is about 36,600 m³ (230,000 bbls) per day.

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