# Update

## Commons Bill to Encourage Energy Efficiency and Alternative Energy

Legislation was introduced into the House of Commons on October 29, 1991, to allow the Federal Government to set minimum energy efficiency standards on equipment, require the energy consumption labelling of equipment, and gather information on Canadian energy consumption and the use of alternative forms of energy. Under the Bill, the Department of Energy, Mines and Resources (EMR), in consultation with industry and the Provinces, will establish minimum energy efficiency regulations for specified equipment that is imported or traded between provinces, with the objective of removing the least energy-efficient equipment from the market. Regulations will be developed to set energy efficiency standards that are consistent across the country for such things as the full range of household appliances, including air conditioners, hot-water heaters, and furnaces. In addition, the familiar Energuide labels will be redesigned for easier use.

The Federal Government will establish a National Energy Use Data Base to monitor and evaluate progress towards stabilizing greenhouse gas emissions and to provide information to support the development of future initiatives. This database will also facilitate the exchange of information between the public, other stakeholders, and the Federal Government, and will include the development of end-use models to enhance the existing analytical capability in this field.

This new Bill has been prepared as part of the national *Green Plan*. Other initiatives in this program will be announced in the coming months. It is now clear that the direction of the Federal energy policy is firmly towards the encouragement of greater efficiency, not only to meet environmental objectives, but to meet industrial competitiveness goals as well. There is now a growing belief in Ottawa that those nations which assume a leadership role in the efficient application of energy will develop significant comparative advantage in the world trading arena over the coming decades.

The Government's initiatives have been supported by a report prepared earlier this year for EMR by the well-known firm of Peat Marwick Stevenson and Kellogg, in association with Marbek Resource Consultants, Torrie Smith Associates, and the WATSRF group of the University of Waterloo. The objectives of this comprehensive study were to: 1) estimate the remaining economically attractive energy savings potential in the Canadian economy from improved energy efficiency; 2) estimate the net environmental benefits of realizing the economical potential; and 3) identify some of the key market barriers impeding the commercialization of economically attractive energy efficient technologies.

While the study has identified important savings that can be achieved, perhaps its most important aspect is its contribution to the development of a standard methodology to apply to the analysis of energy efficiency options. A major effort was made to establish a common framework for use by others working on these problems to save time and effort by ensuring that all participants in this emerging field are 'speaking the same language.' Of particular interest are the definitions of the six energy use scenarios adopted by the Efficiency and Alternative Energy Branch which, in order of declining energy use, are: frozen average scenario; frozen marginal scenario; business as usual; financially attractive; economically attractive; and finally, technical potential. The definition of these scenarios has done much to clarify

and illuminate discussion on the subject of how to achieve energy savings through greater efficiency.

The report also deals at some length with the familiar barriers to reaching efficiency goals, such as market imperfections that inhibit the adoption of more efficient practices, and the private-social gap in decision-making. Copies of the study and its related documents and case studies are available from the Policy Development and Analysis Division, Efficiency and Alternative Energy Branch, Department of Energy, Mines and Resources, 580 Booth St, Room 1590, Ottawa, Ontario, K1A 0E4, Fax:(613)943-1590. The Department invites comments on this study.

## Meeting on Global Climate Change at Los Alamos National Laboratory

A meeting was held October 21-24, 1991, at the Los Alamos National Laboratory (LANL) to discuss global climate change and its mitigation through improved production and use of energy. This was the latest in a series on energy and the environment sponsored by the US National Laboratories. In July 1989, a conference organized by LANL, held in Santa Fe, concentrated on the links between technology and energy. A later meeting held at Oak Ridge National Laboratory on June 11-13, 1991, focused on technological options for a greenhouse-constrained society. As might be expected at a Laboratory so long associated with the technical aspects of defence, the environmental and energy challenge is increasingly being seen at LANL as the new national security issue. Meetings of this kind are important to develop a general consensus of the nature of the problem and the resulting research needed to address it.

There were two major purposes for the latest meeting. The first objective was to bring the climate modelling community in direct contact with those concerned with energy technology, and in this regard, the conference was an undoubted success. The meeting was perhaps less successful in its second major objective, which was to explore the possible institutional structures needed to deal with energy and global warming on both a national and international level. There was general agreement that changes will be required to effectively control this problem, and there was discussion of the need for a new institution, but one 'without walls,' to link all those concerned with the many aspects of this issue.

About 125 invited delegates attended from several countries, including the USSR, Japan (limited representation), and Canada (with a delegation of seven). Over 60 separate presentations, covering various aspects of climate change, were made, and extensive panel deliberations were held.

Climate modellers from the US, Europe, and Australia presented the status of their work. There was virtually unanimous agreement that the world will warm by at least 2°C by 2100, although some believe the warming will be more pronounced. Whether or not measurable warming has already occurred continues to be a matter of dispute, as is the urgency of dealing with this problem.

Attention is now shifting from a fixation on temperature alone to other effects, such as greater climate variability, changes in rainfall and wind patterns, and regional impacts. The Caspian Sea has suddenly started to rise and Russian climatologists believe this increase in level is due to a drop in evaporation caused by a change in wind patterns partly related to the greenhouse effect. Regions where the climate actually may be colder have been identified, as well as some 'winners.' For example, it appears that the populated eastern regions of Australia will be rainier (a good thing in that dry region) but the prospects for western Australia are still unclear.

It was surprising to learn how few actual climate modellers there are. It is obvious the climate modelling community is being stretched to its limit, and at least one person active in the field complained of the seven day weeks of continuous work he was called upon to do. While expanding this effort will cost some additional money, financing is not seen as the only constraint. Much more powerful computers will be needed, and these are expected to be available within the coming decade. LANL is a centre for massive parallel computing, which may be one of the reasons for its interest in this problem.

In the final analysis, talent may be the most important limiting factor. The easier modelling problems have been solved, and those that remain — dealing with more sophisticated aspects of cloud cover, and the influence of airborne aerosols in both clear air and in clouds, for example — will require much innovative and time-consuming work. It is essential to attract the best and the brightest to this work.

In the opinion of this writer, it may be several years, perhaps as

long as a decade, before much more is known about global warming. A well-known energy expert, Dr. T.B. Taylor, stated that in his view, the situation was inherently unknowable. The fundamental dilemma is whether to wait for better information or take 'no regrets' policy actions now. The sense of the meeting was that the latter course of action was preferable, and that a start should be made as soon as possible on those options that might be implemented with little or no cost to the economy.

Because of the large number of papers presented, only a few of those reporting material that is new (to this writer) will be referred to here. Dr. Serquei Kapitsa of the USSR focused upon the world population problem by deriving a new set of equations to describe what is happening. He made the important point that, based upon his equations, the world is now at what physicists call a 'singularity point,' and for this reason it is not possible to be very sure of projections. He urged great caution in this matter, and his views are not likely to be popular with conventional demographers.

Dr. R.A. Stokes of the National Renewable Energy Laboratory (formerly the Solar Energy Research Institute in Golden, Colorado, recently elevated to 'National Laboratory' status) noted that their most recent cost estimates for the production of ethanol from cellulose by enzymatic methods for use as a liquid fuel for vehicles were as low as US 60¢/gallon (1990 prices) (16¢/litre) to be demonstrated in the mid-90s. Even if this estimate were proven low by 50%, such a biomass option would become very important in a carbon-constrained world.

Dr. Amory Lovins, of the Rocky Mountain Institute, reiterated his frequent claim that the greenhouse gas problem can be dealt with at no cost by the adoption of aggressive efficiency measures, but he also presented an interesting account of how the two major California utilities were implementing innovative demand-side measures. Though few believe such savings are possible in both the extent and timing claimed, it was a measure of the recent change in attitudes that his presentation was received so well.

Progress in the use of the MARKAL linear programming model was reported in two papers. The first, by T. Kram *et al*, dealt with The Netherlands' national situation and concluded that a drastic reduction of carbon dioxide emissions is possible with existing technical options in the longer term, but that energy conservation is not sufficient by itself to reach stringent reduction targets.

An increasing role for electricity will continue under the requirement for reduced emissions. A paper prepared by Dr. J.G. Hollins (of Environment Canada) *et al*, which extended the same MARKAL studies internationally through the work of the IEA Energy Technology Systems Analysis Programme (ETSAP), had as its main conclusion that energy conservation and efficiency improvements are fundamental to reducing emissions, but that other measures are needed as well. Nuclear energy was found to play an important role in reducing carbon dioxide emissions in those countries where it is not too costly and is otherwise acceptable.

This latest Los Alamos meeting will no doubt be considered as an important milestone on the way to the management of the global climate warming problem. With indications of progress in such areas as energy extraction from hot dry rocks, new programs to improve the performance of batteries for personal vehicles, and the emerging biomass options, there was a sense of excitement in the discussions that has been absent from the energy scene for a decade or more.

The proceedings will be available from the American Institute of Physics in hard cover form in early 1992. It is anticipated that further meetings will be planned by the US National Laboratories to deal with various aspects of the global climate change problem as the situation unfolds.

## NEB Report on Canadian Energy Supply and Demand 1990-2020

At a press conference held in Calgary on September 16, 1991, the National Energy Board (NEB) released its comprehensive study: *Canadian Energy Supply and Demand 1990-2010*, dated June 1991. When the NEB adopted a market-based procedure for regulating natural gas exports in July 1987, it announced its intention to prepare the *Canadian Energy Supply and Demand* reports on a continuing, but unscheduled, basis as one component of its on-going monitoring activity.

In May 1990, the NEB announced that its staff would update the previous report, issued in September 1988, and an informal consultation process was initiated. Although formal submissions were not requested, any party interested in providing their

views was invited to do so. Two information packages were made available as a basis for public comment. The first, in May 1991, outlined preliminary views on assumptions, while the second, issued in the fall of that year, provided initial projections. Comments received were then made public, and two rounds of consultations followed: the first concerning methodology and assumptions employed, and the second focusing on preliminary projections. These extensive consultations encompassed governments, industry, and other interested parties in both Canada and the United States.

Rather than the two reference cases employed previously, the 1991 report uses a single projection termed the 'Control Case,' which is subjected to sensitivity tests. The NEB takes pains to state it "does not view the Control Case as a most likely projection," but it is difficult for the average reader to view it in any other way. A long-term economic growth rate of only 2.3% per year is assumed over the 20-year period, while the population growth rate is expected to average about 1% per year for the same period. Per capita economic growth is thus projected to be quite low in this study, which may unduly reflect the current general sense of pessimism about the nation's prospects. In 2020, the price of oil is taken as US $27/b (1990 dollars) in the Control Case, with the sensitivity range set at $20 to $35 (presumably for Sweet Light Crude traded on commodity exchanges).

There are two major innovations in the 1990 report. The first is a detailed analysis of the North American natural gas market, which is seen now as a single unit. Substantial real growth in gas prices, compared to their present very depressed levels, is expected over the study period. In the Control Case, Alberta field gate prices are projected to increase from CDN $1.40/GJ in 1992 to $4.20 in 2012, with the sensitivity range from $3.50 to $4.65. Canadian net exports of natural gas are expected to reach the range of 2.3 Tcf/y by 2007, and then fall slightly to 2.12 Tcf/y by 2012. This section of the report is likely to prove the most controversial.

The second innovation concerns the inclusion, for the first time, of estimates of gas emissions from the production and use of energy, including those gases linked to the greenhouse effect, acid rain deposition, and low-level atmospheric ozone levels. It is noteworthy that the NEB's projection of an average 1.1% annual growth in $CO_2$ emissions, while slightly below the assumed primary energy demand growth of 1.2%, is not consistent with the Government's policy, announced in the *Green Plan*, of stabilizing $CO_2$ emissions at their 1990 level by 2000. The NEB report thus infers that new policy measures will be needed to meet this goal.

Following an interim decline, the supply of crude oil and equivalent is expected to be some 16% higher in 2010 than in 1990. Additional supplies are projected from the frontier regions and from the heavy oil and bitumen of Alberta and Saskatchewan, thanks mainly to higher oil prices and decreasing costs from improving technology. These new sources will more than overcome the continuing fall in light oil production from the Western Canada Sedimentary Basin. Canada remains a net exporter of oil and its equivalent on an overall basis, but becomes a growing net importer of the lighter grades.

Electricity exports are expected to recover due to the return of more normal rainfall conditions and the improving performance of Canadian nuclear reactors, which are now experiencing a period of operational difficulties. The rate of growth of domestic demand for electrical energy is placed at a modest 1.5% per year from 1989 to 2010, which is sure to be controversial, but which is consistent with the very low projected growth in per capita GNP. Despite this low rate of growth, in part the result of the introduction of more aggressive demand-side management techniques, the NEB believes additional generating capacity will be needed from new coal, hydro, and nuclear facilities.

The NEB has also taken into account what it believes are achievable results in conservation and efficiency. Nevertheless, end-use demand is projected to increase from 7600 PJ in 1989 to 9800 PJ in 2010 for the Control Case — an average increase of 1.2% per year over the period, which is to be compared with the expected economic growth of 2.3% per year.

The 1991 report on *Canadian Energy Supply and Demand 1990-2010* is well-written, clear, and accompanied by a large number of graphs. The Appendices are extensive and easy to follow. The well-designed and comprehensive Table of Contents makes it easy to find what one is looking for. Future reports are likely to be prepared every two years. Copies of the report (ISBN 0-662-18956-6) may be obtained from the Board at their new headquarters in Calgary at 311-6th Avenue S.W., T2P 3H2, Tel: (403) 292-4800.

## Canada's National Report for UNCED Now Available

On August 30, 1991, the Hon. Jean Charest, Minister of the Environment, released *Canada's National Report*, prepared for the United Nations Conference on Environment and Development (UNCED'92) to be held in Rio de Janeiro, June 1-12, 1992. The production and use of energy, especially as it relates to global climatic change, ranks high on the list of concerns to be addressed at the conference.

The *Report* was prepared under the direction of a Steering Committee representing a very wide spectrum of those interested in this Conference. It contains valuable information on Canada's economy and environment over the past two decades, with much of the data as recent as 1990, and it summarizes, in convenient tabular form, the goals and targets already set out in the *Green Plan* announced on December 11, 1990.

In the energy field, the *Report* repeats the two major objectives that will most influence the energy economy over time: stabilization of carbon dioxide and other greenhouse gas emissions at 1990 levels by the year 2000, and a 50% reduction of sulphur dioxide emissions in eastern Canada by 1994 (including a cap on acid rain-related emissions in eastern Canada beyond 1994 and a national emission ceiling to be established by the year 2000).

The appendices of the *Report* are especially useful. There is a convenient list of relevant publications that may not be easily found in normal reference sources, as well as a list of contacts pertaining to the references cited and to the organizations that collaborated in the preparation of the *National Report*. Copies of *Canada's National Report* (ISBN 0-662-19035-1) may be obtained from the Enquiries Centre of Environment Canada, Ottawa, Ontario K1A 0H3, or by calling 1-800-668-6767.

More than 100 countries are preparing similar reports. Taken together, they should provide a global picture of the integration of development and environmental issues, and will constitute a valuable body of reference material in this field. With many of the delegations to the conference being led at the Ministerial level or higher, and with about 20,000 delegates expected in total, the Secretary-General, Maurice F. Strong (originally from Manitoba) expects this meeting to set the agenda for sustainable development well into the next century.

## World Methanol Conference Held in Canada

The World Methanol Conference held its yearly meeting for the first time in Canada at Vancouver, December 2-4, 1991. Twenty papers were presented in two days of well-attended sessions which attracted those interested in all aspects of the methanol industry. Canada is a major producer of methanol from natural gas, with three large installations in Alberta and British Columbia. Much of this production is exported to the US and Far Eastern markets.

Interest is growing in the use of methanol and its derivatives as a fuel for vehicles primarily for environmental reasons. At the moment, attention is centred on the markets for methyl tertiary butyl ether (MtBE), used for blending with gasoline. This additive decreases emissions of carbon monoxide from engine exhausts and also increases the octane level of the fuel blend, although emissions of aldehydes may be increased somewhat. Up to 15% MtBE may be added to the gasoline blend, and methanol is the preferred starting point for its production. A major facility being built near Edmonton, now to be jointly owned by Chevron and the Canadian affiliate of Finnish company Neste Oy, is expected to begin production in 1992 with a capacity of 12,500 barrels per day.

The immediate cause of the interest in MtBE arises from the provisions of the US Clean Air Act. Starting in November of 1992, all gasoline consumed in the 41 areas not in compliance with carbon monoxide emissions standards must contain 2.7% oxygen by weight in the winter period when conditions are at their worst. Also, reformulated gasoline must be supplied in the nine major metropolitan areas in that country with excessive ozone concentrations at ground level. Adding MtBE may be the most economic way of immediately complying with these new environmental regulations. If so, the demand for methanol will surely increase and Canadian producers are well placed to serve these emerging markets. Moreover, it is likely that similar regulations will be adopted in Canada before too long.

There is now a small but increasing direct use of methanol as a vehicle fuel in Canada and in some other countries, and there are a number of programs under way to encourage this applica-

tion. The Minister of Energy, Mines and Resources, the Hon. Jake Epp, in his speech to the Conference, emphasized his Department's commitment to continue to develop fuel methanol and other new alternative sources as an important part of Canada's future energy mix. He took advantage of this occasion to announce new initiatives in alternative transportation fuels technology and market development, as well as new research and development activities in this field under the umbrella of the *Green Plan*.

The EMR programs will encourage a number of flexible fuel vehicles (FFVs) to be built in the coming years. In these systems, a sensor is used to detect the blend of fuel supplied. The capacitance of the blend is measured and corrected for temperature and conductivity, and the resulting information is transferred electronically to the engine firing mechanism. The advent of FFVs will assist the market penetration of methanol because buyers will not be limited to a small number of methanol supply outlets during the early years of market development, nor will they be restricted to any one fuel blend.

Other matters discussed at the Conference centred on the expansion and de-bottlenecking of existing methanol plants. It is noteworthy that one of the cheapest ways of obtaining greater output from these facilities is to blend carbon dioxide into the natural gas feedstock to improve the carbon-to-hydrogen ratio in the methanol synthesis gas. This possibility may have implications for the control of carbon dioxide emissions to the atmosphere because such carbon in this gas, if captured from thermal power plants, will have already been used once for energy purposes.

The World Methanol Conference was preceeded by the IX International Symposium on Alcohol Fuels, which was held at Florence, Italy, on November 12-15, 1991. About 140 papers, including several from Canada, were presented, covering the whole spectrum of activities in alcohol fuels.

In one presentation, Dr. L. Vancea, of the Department of Energy, Mines and Resources, which serves as Operating Agent for Annex IV to which Canada and four other nations (Italy, Japan, Sweden, and the United States) now adhere, described the work of the International Energy Agency Implementing Agreement on Alternative Motor Fuels.

In another paper out of Annex, the findings of the first phase of a work program on the cost and availability of natural gas at remote locations were reported. The second phase is in progress and deals with the comparison of the transportation of natural gas, either as LNG, methanol, or middle distillate, to major market destinations. A further study will deal with the production of methanol from natural gas as compared to ethanol from biomass sources. Greenhouse gas emissions will be evaluated in these studies.

The Proceedings of the 1991 World Methanol Conference are available from Crocco and Associates, Inc. of Houston, Texas.

The Office of Energy R & D of the Department of Energy, Mines and Resources is now issuing a newsletter called *Transitions* dealing with the activities of the Alternative Transportation Fuels Task. The subjects covered include research and development on alternative fuels for vehicles, such as propane, natural gas, methanol, ethanol, and hydrogen. Contributions in this field are welcome. The newsletter, which will be published three times annually, may be obtained at no charge by contacting Dr. L. Vancea at the Office, 580 Booth Street, Ottawa, Ontario, K1A 0E4. Tel: (613) 995-6145, Fax: (613) 995-6146.

## Canada Remains the World's Leading Uranium Producer and Exporter

In 1990, Canada's uranium industry produced 8730 tonnes of uranium (tU), down sharply from the 11,300 tU level in 1989 due to mine closures in the Elliot Lake region of northern Ontario and some temporary shutdowns in Saskatchewan. Total shipments under all active export and domestic contracts approached 9500 tU, valued at about $870 million. Actual exports in 1990 were 8650 tU, somewhat below the 9400 tU in 1989, with the main markets continuing to be in the US, Japan, and Western Europe. Domestic reactor requirements were placed at 1900 tU, or about 22% of primary production.

The price has been steadily declining in recent years with the average for deliveries under export contracts at about CAN $71/kg. Employment in the industry declined again to less than 2500, compared with a recent peak level approaching 9000 in the mid-80s. Nevertheless, Canada has remained the world's leading supplier, accounting for 30% of the western world's output, which is somewhat less than the 33-34% range of previous years.

Despite the current market dif-

ficulties, the Athabasca Basin in northern Saskatchewan continues to attract exploration efforts for the discovery of high-grade, low-cost deposits. Though exploration expenditures totalled only $45 million in 1990, down sharply from $58 million in 1989, discoveries continued to be made and the potential for further finds is considered excellent. Known uranium resources recoverable from mineable ore increased to 583,000 tU from 544,000 tU in 1989.

## Power Smart

To encourage demand-side management by utilities, the Minister of Energy, Mines and Resources, the Hon. Jake Epp, signed an agreement on October 28, 1991 at the CANWEC Conference in Halifax, formalizing the Government's support of Power Smart Inc., an organization of utilities whose mission is to promote an energy efficiency ethic in Canada. Originally created by BC Hydro to assist in the development and delivery of demand-side management programs, it has grown over the past year to include many of Canada's major electric utilities, as well as some private sector and government members. At present, 15 member utilities in Canada and five in Czechoslovakia are using Power Smart programs. Again the objective is to provide both economic and environmental benefits.

## CANWEC Becomes the Energy Council of Canada

At the Canadian National Energy Forum held in Halifax October 28-29, 1991, one of a regular series sponsored by CANWEC (the Canadian Member Committee for the World Energy Council), the decision was made to rename this organization the Energy Council of Canada (ECC) to better represent its activities to the public. This year, the Forum, held every year or so, attracted some 150 senior energy officers and executives to discuss a program built around the theme "Energy: Society's Expectations - Are They Compatible?"

The first session of the Forum examined energy demand at three different levels — global, Canadian, and in the Atlantic Provinces. The second session explored demand from a sectoral viewpoint and concentrated on efficiency improvements and technological innovation. The third session concentrated on the challenges and constraints of meeting energy demand imposed by external factors. The factors considered were the attitudes of consumers, the availability of technical expertise, environmental constraints, and the complex field of energy regulation.

Four current challenges, discussed in the final session, emerged during the Forum: 1) providing better information to reduce the gap between energy industry projections and public expectations; 2) briefing governments on the complex linkages between energy and the environment, particularly in the preparations for the UNCED meeting in June 1992 (see above); 3) improving the mechanisms for anticipating and minimizing the impact of energy systems on the environment; and 4) promoting a common Federal/Provincial approach to the energy/environmental agenda.

Perhaps the most important continuing issue arising from the Forum was the answer found to its theme. The consensus of the meeting was that, at the present time, the expectations of society and the realities of the energy situation are not compatible. All the energy projections point to increased energy consumption in the industrialized world, and even more so in the developing world. Although hydro, other renewables, and nuclear can help, it seems inevitable that the main burden will fall upon the fossil fuels. This means greater carbon dioxide emissions, even though there is a perception among the public there will be a *reduction* in the release of this greenhouse gas. The Minister of Energy, Mines and Resources, the Hon. Jake Epp, set out three criteria for efforts to deal with this situation: firstly, he spoke of the need for participation (all Canadians need to be heard and to have access to the process of change); secondly, all will have to assume responsibility (participation will need to be followed by action and each citizen will have a role to play); and thirdly, it will be necessary to maintain and expand all the options available.

In July of this year, the ECC released a document entitled *Towards a Common Energy Future*. The purpose of this study was to identify a framework for the resolution of regional and global energy issues related to meeting the future energy needs of the peoples of the world community in a socially and environmentally ac-

ceptable manner. First commissioned at the Montreal meeting of the World Energy Congress in 1989, this report will be incorporated into a North American Regional component of the World Report to be debated at the Madrid Congress in September 1993.

The EEC report sets out Canada's energy options and an agenda for a credible pathway to the future. The important priorities identified were: 1) Energy Efficiency and Conservation; 2) Research and Technology; 3) Environmental Quality Control; 4) Resource Development and Production; 5) Nuclear Energy; 6) Renewable Energy; 7) Coal; 8) Oil Sands and Heavy Oil; 9) Alternative Energy; and 10) Public Information. The EEC hopes that this report will assist Canadians in reaching a better understanding of their energy heritage, and to appreciate its importance in the international marketplace.

The proceedings of the Halifax Forum ($30 + GST) and the report *Towards a Common Energy Future* ($10 incl. GST) are available from the ECC office at 130 Albert Street, Suite 305, Ottawa, K1P 5G4. The next Forum organized by the ECC will be held in Victoria, BC, May 10-12, 1992, with the theme to be 'Efficiency, Environment, and Trade.' This will be the last meeting prior to the 15th World Energy Congress, September 20-25, 1992, in Madrid (those wishing to attend the Madrid Congress should contact the EEC office in Ottawa).

## Short Notes

- At the joint European Torus experimental fusion reactor in England, a major milestone was achieved recently when scientists twice reproduced the energy-generating process of fusion. The experiment produced the equivalent of more than one megawatt of electricity by merging particles of tritium and deuterium. Since both substances can be supplied in sufficient quantities as required (deuterium is extracted from water and tritium can be made in the reactor), the dream of an inexhaustible supply of clean energy is now one step closer, although it may be as long as fifty years before commercial fusion reactors can be built.
- The South Coast Air Quality Management District is the California agency responsible for monitoring and developing policy options for dealing with the severe air conditions now experienced in the Los Angeles Basin and nearby regions. The steps taken to deal with these problems often anticipate actions taken later elsewhere, and for this reason the activities of the SCAQMD are followed closely by many energy and environmental experts. The 1992 subscription list of publications and reports of this agency is now available and can be obtained from SCAQMD, P.O. Box 4932, Diamond Bar, CA, USA 91765-4182.
- Texas Instruments and Southern California Edison have developed a new type of photovoltaic cell that uses thousands of silicon spheres embedded into aluminum foil to convert sunlight into electricity. The spheres are made from low-purity silicon at significantly lower cost. Each four-inch cell will contain 17,000 spheres which are bonded to the aluminum through the application of heat and pressure. By applying an insulating material and another sheet of aluminum, each individual cell becomes a photosensitive junction.
- Statistics Canada has issued a publication titled *Human Activity and the Environment* which is billed as a source book on Canada's people, economy, and the environment. It includes 152 tables of data, 80 charts, and 37 maps designed to offer the relevant statistics at a glance. It is available from StatsCan Publications, Ottawa, Ontario, K1A 0T6 ($35 + $2.45 GST).

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