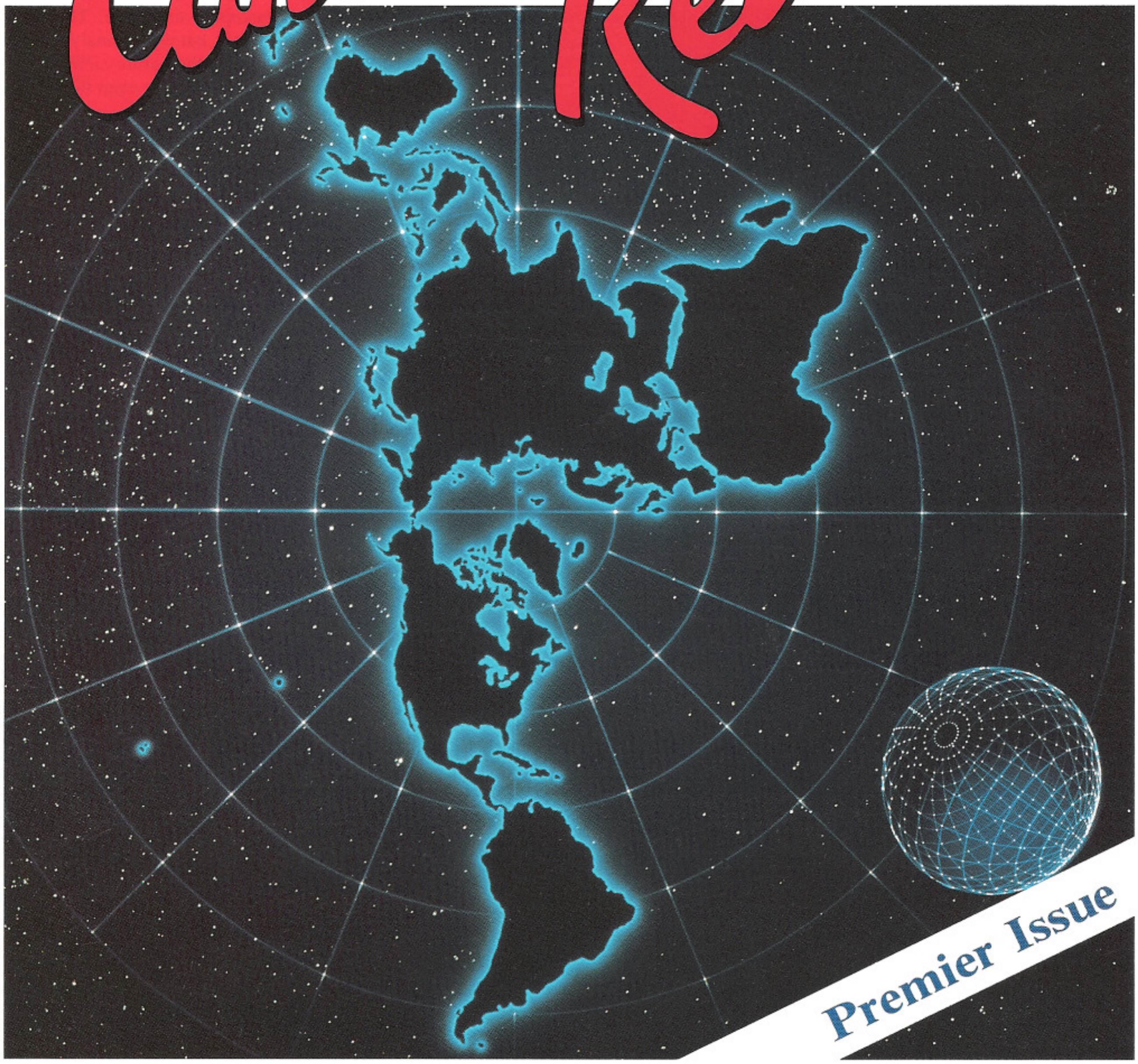
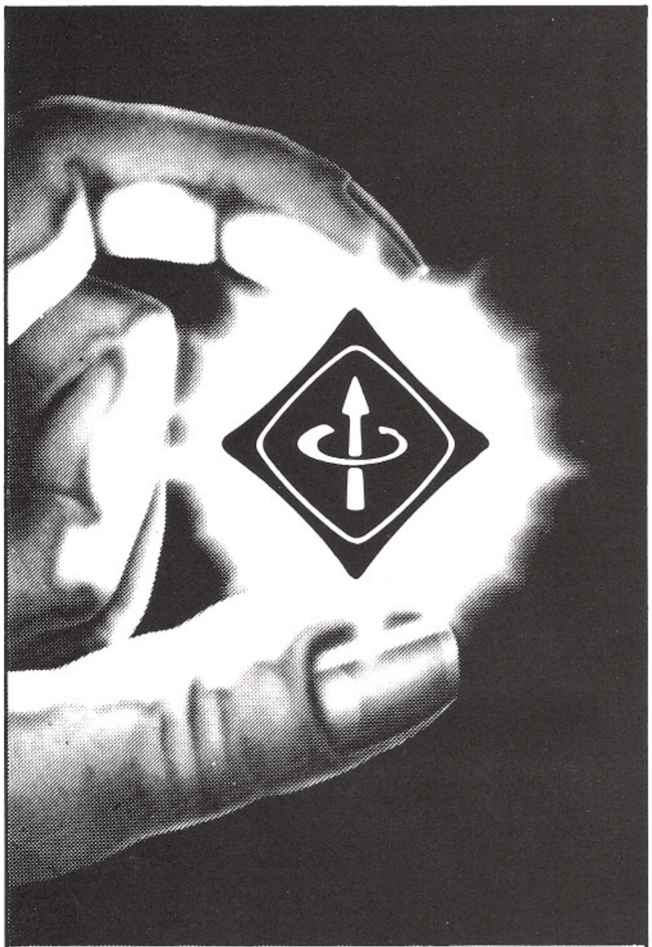
September 1988

IEEE Canadian Review



Premier Issue

The Institute of Electrical and Electronics Engineers Inc.



IEEE Canadian Review General Information

The *IEEE Canadian Review* is issued quarterly - in March, June, September and December. The *IEEE Canadian Review's* principal objective is to project an **image** of the Canadian electrical, electronics, communications and computer engineering professions and their associated academic and business communities, to :

(i) Canadian members of IEEE;

(ii) Canadian members of the profession and community who are non-members of IEEE;

(iii) the associated academic (i.e. universities, colleges, secondary schools, etc.), government and business communities in Canada.

In this context, the *IEEE Canadian Review* will also serve as a forum to express views on issues of broad interest to the above. These issues may be of a purely technological nature or not, but will be analysed on the basis of their anticipated impact on engineers or their profession, the augmented academic, business and industrial community or even the community at large.

To ensure, on one hand, that the *IEEE Canadian Review* have the desired breadth of issues and, on the other hand, that the required depth of analysis be achieved, five Associate Editors are responsible for identifying these issues and screening the articles submitted to the *IEEE Canadian Review* according to the following general themes:

1- National affairs
2- International affairs
3- Technology
4- Industry scene
5- Education

Advertising Policy

It is the policy or the *IEEE Canadian Review* to reduce production costs by inviting reputed organizations to place corporate-type advertising in the *Review*.

Circulation

The circulation of *IEEE Canadian Review* is the entire membership of IEEE in Canada, that is, 15000 readers.

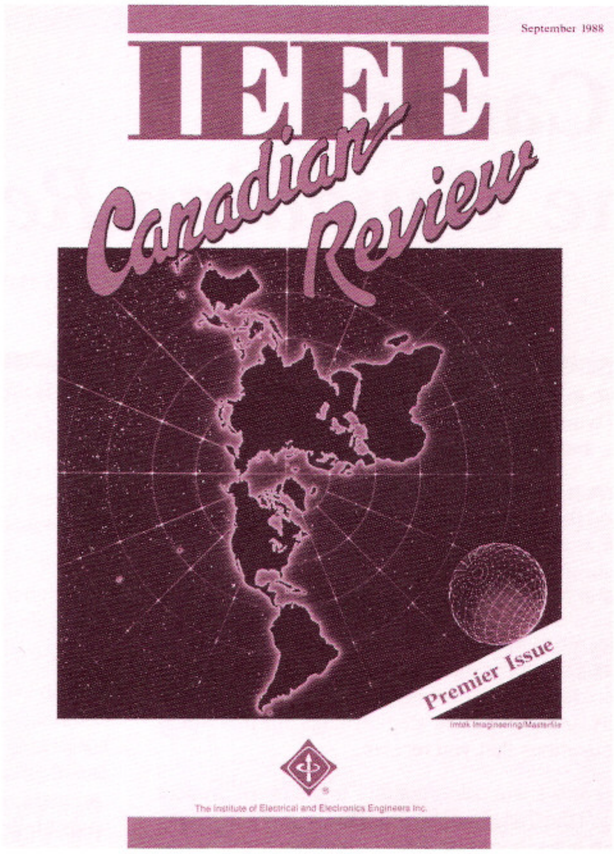
Rates and Mechanical Requirements

For information regarding rates and mechanical requirements, please contact Mrs. Pam Woodrow, Manager of Member Services, IEEE Canada, at (416) 881-1930 or write to her attention, IEEE Canada, 7061 Yonge St., Thornhill Ont. L3T 2A6 Canada.

Information for Authors

Authors are invited to contribute to the *IEEE Canadian Review*. To this end, please contact the appropriate Associate Editor or IEEE Canada at telephone (416) 881-1930 or write to *IEEE Canadian Review* ,7061 Yonge St., Thornhill Ont. L3T 2A6 Canada.

- The Managing Editor



IEEE Canada membership passed the 15 thousand mark at the end of 1987 while the Institute total is now approaching 300 thousand worldwide.

CONTENTS

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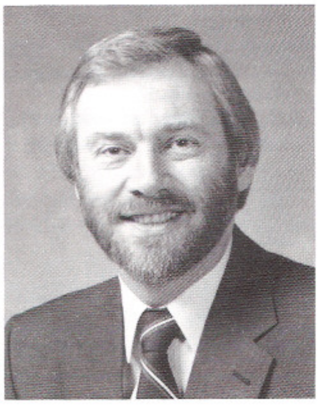
IEEE Canada and the *Canadian Review*

by Dr. Robert T.H. Alden
Director, IEEE Canada



Since this is the first issue of this new publication, and my first opportunity to write to all Canadian IEEE members as your Regional Director, I would like to share some observations about our Region with you, and introduce our new Region publication.

I am pleased to report to you that our Region is alive and well. Our Region membership passed the 15 thousand mark at the end of last year, while the Institute total is now approaching 300 thousand. You have an enthusiastic Region Committee, 20 active Sections, over 40 dynamic Student Branches, and a highly effective Region office.

Many of you will remember receiving NEWS7 three or four times per year as a Region-wide newsletter. With the increasing quality and number of Section newsletters, we decided to build on this strength, feed information to local groups more rapidly, and create a new Region magazine that would complement the other publications that you receive.

NEWS7 is now a one page newsletter sent monthly to Sections, Student Branches, and Committees of the Canadian Region. This is an efficient way to get information out quickly to about 150 IEEE volunteers for their immediate use, and allows for incorporation in Section newsletters. Please don't hesitate to send any items you would like published to our IEEE Canada office.

The *Canadian Review* replaces NEWS7 as the quarterly publication mailed to all IEEE members in Canada. I hope that you will find it informative and a pleasant reminder of your membership in IEEE and our Region, and also that you will enjoy this and future issues.

This year is being marked as the twenty-fifth anniversary of the IEEE and the Region structure as we know it today. IEEE was formed in 1963 by the merger of the two predecessor Institutes, AIEE (American Institute of Electrical Engineers) and IRE (Institute of Radio Engineers). Each Region has been given a commemorative Region banner to display at meetings and conferences. Region 8 (Europe, the Middle East and Africa) is celebrating its anniversary this October in Munich, West Germany with a special Region 8 committee meeting with the IEEE Executive Committee (and, I am told, suitable amounts of "Octoberfest" rituals).

The launching of the *Canadian Review* is, in one sense, a culmination of "25 plus" years of development within this Region. It seems appropriate that a brief review of our history should appear in this first issue.

IEEE Canada was born with the creation of the Toronto Section of the AIEE in 1903. In 1926, the Canadian Section of the IRE was formed. Both of these related but separate groups flourished, expanded their activities, and resulted in the creation of Region 7 of the IEEE when the 1963 merger of the two Institutes occurred. The creation of the Region office in 1972, located just north of metro Toronto in Thornhill, and the development of the three Canadian Councils (West, Central, and East) resulted from increased activities and the need for local coordination of Canadian efforts.

Due to the vision and energy of George Armitage, the first Region office manager, Student Branches and Section-based educational and technical activities flourished and enhanced the awareness of the Canadian aspects of our Region, which has become known as the Canadian Region of the Institute of Electrical and Electronics Engineers Inc., or IEEE Canada for short. Those of you who know George will be pleased to learn that IEEE is acknowledging his signal contributions in the form of a new award to recognize outstanding student branches.

We in our Region have already helped to celebrate the IEEE centennial in 1984 with our centennial book "Electricity the Magic Medium", edited by Harry Prevey of the Toronto Section (some copies are still available from our IEEE Canada office). We also organized, at the request of the Engineering Institute of Canada, the electrical portion of the Canadian Engineering Centennial celebrations in Montreal in 1987. We have just completed a 20 minute video on "Technology Transfer through Licensing". This was a joint venture with the Licensing Executives Society that involved Guy Houle, a senior volunteer officer with that Society and also a long standing member of the Montreal Section of IEEE.

We have a long heritage in the IEEE family, and there is a strong sense of loyalty to IEEE and an appreciation of the technical quality of its activities. It is with this background that we approach our new Region flagship publication.

The *Canadian Review*, as currently envisaged, will generally contain about three articles per issue, designed to be of interest to a broad range of Canadian IEEE members and others of like mind. The objective is to complement the "explanation of technology" articles that are the mainstay of "Spectrum" with articles that describe engineering projects and challenges, or that explore related fields of interest in a Canadian perspective. The Managing Editor, Richard J. Marceau, is in the process of developing a network of volunteer Associate Editors, who will seek and review articles on a wide range of topics such as national and international affairs, the industry scene, technology, education, etc.

I invite your contributions and participation, and urge any interested potential authors to contact our Associate Editors.

In addition to these major articles, the *Canadian Review* will contain information about activities and people in the IEEE Canadian Region. We expect that this type of content will evolve in response to you the reader. Please let us know your needs, interests, and comments, by contacting our IEEE Canada office.

I close by extending my personal thanks to all of the dedicated volunteers and staff who contribute so much time and talent to our Region. I would also like to recognize the friendship, good will, and assistance that is ever present from the IEEE Headquarters and Service Centre, and from the numerous volunteers from other Regions as well.

Free Trade and Electricity

Canada has an export opportunity if it can economically displace existing oil- or gas-fired units.

by Mitchell P. Rothman
Chief Economist, Ontario Hydro
Toronto, Ontario

The impact, positive or negative?

By providing a more stable trade climate generally, by removing some irritants and impediments and by preventing the imposition of others, the FTA will have a positive effect on the amount of long-term firm power and energy sales to the United States that will benefit both countries, as international trade should.

Le bilan: positif ou négatif?

Grâce à l' accord sur le libre-échange, la mise sur pied d'un climat commercial stable, l'élimination "d'irritants" et de barrières traditionnelles et le freinage de la création de nouveaux obstacles devraient augmenter les ventes fermes de puissance et d'énergie à long terme, bénéficiant aux deux pays.

In the last ten years, electricity trade between the United States and Canada has gone from a roughly balanced seasonal interchange to Canada's present position as a major net exporter of power. This change elicited some political reaction in the United States,primarily in the form of a coalition opposed to the further expansion of such trade, claiming both that it posed a potential threat to US economic security and that Canadian electricity producers had various unfair advantages by reason of their public ownership[1].

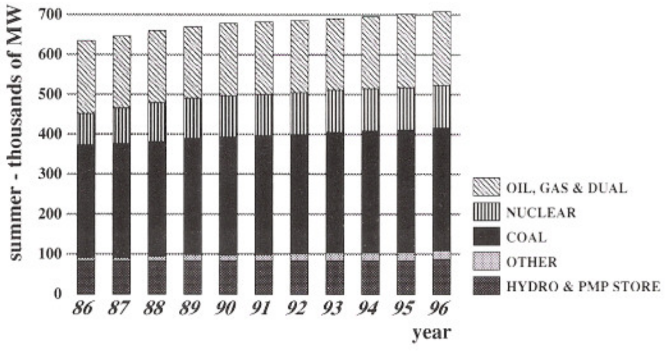
In light of this challenge, when looking at the future of electricity trade, analysts differentiated between the prospects for two types of traded electricity.[2]

Short-term exports from Canada seemed likely to continue. They depend only on the relative levels of demand and short-term marginal generation costs in the two countries. This trade dispatches the cheapest generation sources to be used first. Whenever the marginal generation capacity in one country uses a cheaper fuel than the marginal generation in an interconnected utility, electricity will be traded and the cheaper fuel will displace the dearer. In such trade, hydraulic sources will displace any fuel; nuclear sources will displace any fossil fuel; and coal will displace oil. Because many utilities in the states bordering Canada, especially in the Northeast, will frequently have oil-fired generation capacity operating at the margin, and because neighbouring Canadian utilities will have either hydraulic, nuclear, or coal at the margin at least some of the time, short-term electricity trade will continue to be profitable. Because it is priced in a way that renders the protectionist arguments invalid, the Free Trade Agreement (FTA) is unlikely to affect it either way.

For longer-term trade the story is quite different. There are numerous risks inherent in long-term power contracts. These contracts would have to cover the construction and operating costs of new generation facilities. With the long lead time in construction, and the long lives of the facilities, both US buyers and Canadian sellers can be expected to want a clear statement of how the risks are to be shared before they would sign contracts. So development of long-term sales could be slow in the absence of a mechanism for these issues. Further, the protectionist arguments are aimed directly at such sales.

CHART 1

Actual and Projected Installed Generating Capacity by Fuel (1987-1996 forecast)



Even so, new long-term sales have developed rapidly. The government of Quebec has made the construction of a second phase of hydraulic generation facilities on its northern rivers flowing into James Bay a major priority. Accordingly, it has negotiated and announced some major increases in long-term export sales contracts, and the start-up of the James Bay II project.

Given all this activity, how will the FTA affect these electricity trade prospects?

Of course, it is not possible to be certain of the effects of the FTA. Its language is to be translated into implementing legislation, which will then be subject to litigation on both sides of the border. So, although the position of the principal negotiators on both sides, at least with respect to energy, is clear, the ultimate resolution of the effect of the FTA will have to await experience of it in operation. Therefore, although they are reasonably well informed through reading and personal contact, the opinions on the effect of the FTA expressed here must be considered to be those of the author.

FTA Provisions and Electricity Trade

Before starting on the impacts, it would be useful to lay out some background information. First, we will briefly examine the provisions of the FTA that relate to electricity, and indicate how, if at all, they change the current position. Second, we will consider in more detail the underlying economics of the electricity trade. Finally, these two put together will suggest conclusions about the impact of the FTA on this trade.

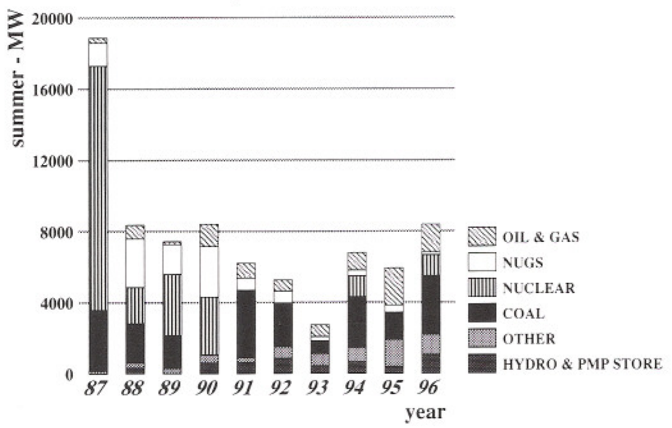
Electricity is included in the FTA by being defined as an energy good. This follows North American practice, and clarifies the status of electricity but does not follow the practice of the General Agreement on Tariffs and Trade (GATT). Also, some specific statements in the Agreement relate to electricity trade.

The general intent of the FTA in the area of energy, as in other areas, is to reduce all tariffs to zero and to reduce the ability of the respective governments to impose or maintain new tariff or Non-Tariff Barriers (NTB's). In energy trade, the barriers to be prohibited include restrictions on exports as well as restrictions on imports.

As it is for other goods, the FTA's treatment of energy is generally modelled on the GATT. Conditions added to GATT treatment relate to the possible imposition of export taxes, export price floors, and quantitative export restrictions. The FTA provides for consultation in the event that a regulatory action taken by one country is felt to discriminate against the energy goods of the other. (This would preclude unilateral actions like Federal Energy Regulatory Commission Ruling 256, for example). The FTA also

CHART 2

Generating Capacity Expected Additions



limits the national security argument for import restrictions to the actual energy needs of the military establishment.

Two measures relate specifically to electricity trade. The US agrees to have the Bonneville Power Administration give British Columbia Hydro access to its interties on the same terms as other utilities from outside the Pacific Northwest. Canada agrees to drop its third price test for power exports, which stated that the export price had to be close to that of the price of replacement energy. The surplus test, which Canada's National Energy Board had administered for electricity and gas exports, is left intact but subject to other provisions of the Agreement.

However, the Agreement will have other impacts on electricity trade. That their direction is not completely clear is seen from the fact that two major electricity-exporting provinces, Quebec and Manitoba, have taken opposite positions on the FTA, with Quebec a strong supporter. This partly reflects their overall political philosophies, as well as their economic self-interest, but is indicative of the different readings given to the FTA.

Underlying Conditions of Trade

It would be informative here to review the conditions underlying electricity trade between the two countries. In the recent past, US electrical utilities have planned very few new generation facilities. This was due to several factors: a period of chronic excess capacity; the surge of non-utility generation spurred by the US Public Utilities Regulatory Policy Act (PURPA) legislation; the general economic climate; and the reactions of regulators to companies that did build. Utility executives learned that to build a new plant was to bet the company, because regulators would disallow its costs if they decided that the plant was not needed at the time it was finished.

For most of the 1970's and early 1980's, this approach was fine. The existing generation facilities could more than meet the demand, even if they did have to use some expensive fuel to do it. Legislatures helped, federally with the PURPA legislation and locally with various state regulations requiring utilities to pursue conservation.

However, since the recession of 1981-82, the North American economy has gone through one of its longest unbroken postwar expansion periods, producing a corresponding increase in demand for electricity. It now begins to look as if the United States will collectively begin to run short of electric power by the mid-1990's. That time is within the planning horizon of electric utilities, so they must begin thinking about it. Right now there is more than enough generation capacity to meet peak demand with an adequate reserve margin. But demand is forecast to grow by about 2% per year, about twice the 1.1% growth rate of capacity, so that reserves will be on the border of inadequacy by 1996.[3]

Chart 1 shows the existing and planned generation mix in the United States. Chart 2 shows how that additional capacity will be fueled. The chart includes both Seabrook and Shoreham, because the reporting utilities expected to bring them into service at the time the survey was taken. As usual, a lot of new nuclear capacity is expected to come into service in the first forecast year. Many utilities have plants that they always plan to have operating next year.

Whenever that overhang is absorbed, coal will fuel most new capacity in the United States. However, there is also a significant number of oil- or gas-fired generation additions. Further, much of the non-utility generation, or NUG, is planned to be gas-fired.

Chart 3 shows the results in terms of the balance between demand and supply at peak. In the first years, there is no problem: existing capacity can easily meet the load, with an adequate reserve. However, in the later years, the reserve margins become disturbingly thin. Further, Chart 4 shows that about one-eighth of total electricity in the United States will still be generated by high-cost fossil sources, oil or gas.

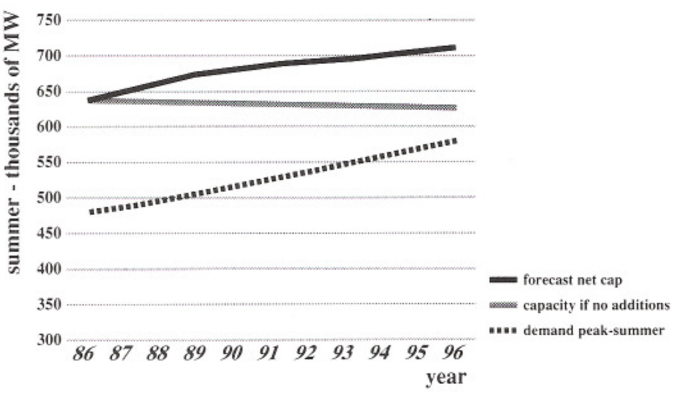
In summary, demand growth in the United States clearly requires some additional capacity to maintain an adequate reserve margin. The North American Electric Reliability Council (NERC) has warned that several events could reduce the margins of reliability below acceptable levels: failure of the non-utility generators to produce as much electricity as they now plan; imposition of tougher emission standard for fossil plants; failure to get operating licenses for new nuclear stations; removal of licenses for existing nuclear stations; or stronger than expected load growth.[4]

So, at least some new generation is needed. The question on electricity trade therefore comes down to who has the cheaper sources of new generation potential. And even if no net additions are needed, Canada has an export opportunity if it can economically displace existing oil- or gas-fired units.

Canada clearly has that potential. A recent study by the US Department of Energy, using Canadian models, showed that new Canadian hydraulic generation would be cheaper than new US generation, even if the alleged subsidies received by Canadian utilities were removed.[5] This study compared costs for US coal-fired generation in New England, Minnesota and California under medium and high oil price cases. The costs for Canadian

CHART 3

U.S. Demand & Capacity at Summer Peak



export power included estimated transmission costs. The study concluded that 80 to 90 per cent of potential Canadian hydropower would be cheaper than power from US coal-fired plants.

So there is a ready market in the United States for untapped Canadian hydro-electric generation potential. How will the treatment of electricity under the FTA affect the development of that potential?

Effects of FTA on Barriers to Trade

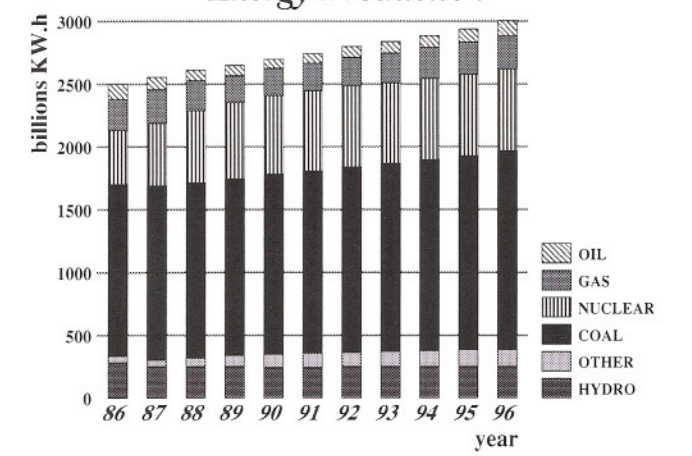
To start with, the effect of the FTA on tariffs is nil, and on NTB's almost nil, because there are no tariff and few non-tariff barriers to remove. So its effect on long-term electricity trade might also be expected to be very small. However, it will be just as important to have the rules firmly set as it would be to remove barriers. As noted earlier, one of the major barriers to increased long-term contracts is the presence of high risk. Some of this is regulatory risk, on both sides of the border. By reducing this risk, the effect of the FTA could be a significant boost to electricity trade.

The specific mentions of electricity are all intended to improve trade. Access to the Pacific Northwest Intertie has long been an issue for British Columbia. Last year's large drop in electricity exports from BC to the United States was mostly due to problems of intertie access. The provision in the FTA helps that specific problem. More importantly, perhaps, it shows that the negotiators took the opportunity to remove a trade irritant that was within the direct power of the contracting parties. Most observers think that this was also meant to lead the way in removing trade barriers that discriminate by national origin.

Another specific mention of electricity was to Canada's third export price test. The National Energy Board (NEB) of Canada administers three price tests for the export of electricity. The first test ensures that the price recovers all costs, including environmental costs, incurred in Canada; the second tests that the price is not below that available to other Canadians, and the last tests whether the price is materially below that of alternative fuels available in the export market. In the FTA, Canada agreed to drop the last test, which by implication leaves the other two intact.

CHART 4

Fuel Used for Electric Energy Production



The effect of dropping the third price test will be minimal at most. The test was hard to administer, and Ontario Hydro had asked that it be abandoned. It does not appear to have affected decisions in actual contracts.

There have been suggestions that the FTA will affect the other price tests, along with the surplus test. In effect, the NEB has administered the second price test and the surplus test with a first-offer mechanism. To get an export license, a Canadian utility must first offer the same electricity on the same terms to other Canadian utilities. The NEB recently denied Hydro Quebec an export license because it had not made that offer. Ontario Hydro has supported the use of the first offer test, because it is a net purchaser of power from Quebec.

But under the FTA, if the NEB were to deny an export license on the grounds that the power is not surplus to Canadian needs, based solely on the existence of a shortage or possible shortage in Canada, that could involve the consultation, inquiry and sanction provisions. So it does appear possible that the operation of the FTA will upset the operation of the first two price tests. However, the best information the author has is that the negotiators intended to leave these tests intact.

One thing the FTA is unlikely to do is remove barriers caused by interprovincial disputes. One of Canada's best undeveloped hydroelectric sites is in Labrador, part of the province of Newfoundland. However, electricity produced from this site for export would have to travel through the province of Quebec, which has its own northern resources to develop. So development of this site will await interprovincial agreements, which could take some time.

Effect of FTA on Regulatory Actions

Given that government policy impediments to electricity trade are likely to be regulatory, the question of the impact of the FTA turns on how it affects regulation. Does it reduce the regulatory freedom of the state governments and regulators? Does it limit the ability to introduce new regulations? Does it create a more secure environment for long-term contracts? Last year, this author suggested that an international treaty might be necessary to ensure that the terms of a long-term contract would not be changed by governments on either side.[6] The FTA is an international agreement; can it help guarantee contracts? Will it reduce uncertainty, or will it, at least in the short run, create additional uncertainty?

The answer is that the Free Trade Agreement does reduce uncertainty for both the buyer and the seller. It does this by reducing the likelihood that governments will interfere in the negotiation or operation of contracts between electrical utilities and their export customers.

By reducing one of the major barriers to long-term sales, it should increase their number.

Since electricity is under provincial jurisdiction, and only the federal governments are parties to the Agreement, how does it cover government action at all levels? The answer is that actionable steps by a junior government must ultimately be compensated for by the signatory governments. The mechanism is the consultation provisions, which can be invoked when one party thinks that the regulatory actions of the other would "directly result in discrimination against its energy goods or its persons inconsistent with the principles of this Agreement",[7] in the language of the Agreement itself. These consultations would involve all the governments concerned. If the consultations fail, the matter would be referred to the Canada-United States Trade Commission. The Commission will arbitrate the dispute and determine compensation or remedial action. If the offending Party fails to take that action, then the other Party is entitled to "suspend application of equivalent benefits of this Agreement".[8]

The Commission can set remedies for the actions of governments; it cannot force policy changes. Even if the offender is a lower-level government, it is the federal governments as parties to the Agreement who agree that they could be subject to the "equivalent" retaliation. Of course, we could expect the federal governments will likely try to induce lower-level governments to comply with the Agreement, to avoid such consequences.

Electricity and the Sharing Provisions

Some people have suggested that the treatment of electricity as an energy commodity brings new uncertainties about the operation of the provisions dealing with the declaration of a shortage. One country may (under certain provisions of the GATT) declare a shortage and impose restrictions on the export of a good. But when it does so, it must also restrict domestic use, and it must guarantee to its trading partner at least its historical share of the available supply of that good.

This provision would apply to electricity through the mechanism just described. That is, if there were an established export relationship, and exports were cut off because a government had indicated a shortage and wanted to retain the electricity for domestic use, the consultation provisions would be triggered. The intention is that national governments would have to compensate for any discriminatory cutoff of exports.

These provisions would not apply if the cutoff occurred for technical reasons during an emergency, or if it resulted from the application of the contract terms. They would only apply if the electrical utilities cut off export customers, but not domestic customers, who were being served under similar contracts.

For a firm power exporting province like Quebec, Manitoba, or New Brunswick, this sharing arrangement reinforces their contractual commitments. Firm electricity export agreements imply that the export customer must get treatment similar to the domestic system in times of shortage.

It has been suggested that the power sharing provisions would make exporters more reluctant to sell firm power, because it limits their ability to protect their domestic system from shortages. However, for customers to treat imported power as part of the capacity of their systems, the sellers must commit themselves to deliver it. To make its sale, the exporting utility must be able to convince its firm-power customers that it will give them equal priority, if that is written into the contract. The sharing provisions of the FTA do not go that far, but they do help increase the credibility of the assurances that the selling utility must make in any case. Therefore, their effect on the likelihood of concluding these contracts is likely to be small, but positive.

Other Effects on Trade

In addition to the sharing provisions, the FTA intends to provide more certainty and stability in electricity as in other trade areas. It is harder to make certain kinds of protectionist arguments under the FTA. The consultation and notice provisions make any restrictive trade move against Canada less likely, because they ensure that the entire political process of competing interest groups will take place. Special interests on either side cannot quietly obtain legislation or regulatory decisions that satisfy only themselves. Finally, if the negotiations on subsidy definition are ultimately successful, the FTA will help increase certainty in long-term contract situations.

Similarly, the FTA assures US buyers that Canada will not impose an arbitrary and discriminatory export tax on electricity. Canada can still impose taxes on electricity, but they can be placed on exports only to the same extent as they are on domestic consumption.

In summary, then, the FTA has enhanced the prospects for electricity exports from Canada to the United States. There is plenty of potential demand for Canadian electricity from south of the border. By removing some irritants and impediments, preventing the imposition of others, and generally providing a more stable trade climate, the Agreement will have a positive effect on the amount of long-term firm power and energy sales. That will benefit both countries, as international trade should.

Footnotes

1. Ad Hoc Coalition on International Electric Power Trade, *"Imports of Canadian Electrical Power - A Growing Concern,"* Cleveland, Ohio, March, 1981.
2. Mitchell Rothman, *"Exporting Blue Gold: Long-Term Electricity Sales in North America,"* presented at the International Research Center for Energy and Economic Development, Boulder, Colorado, April 21, 1987.
3. North American Electric Reliability Council, *"1987 Reliability Assessment,"* September, 1987, pg. 26.
4. *Ibid.*, Pg. 27.
5. Jeffrey Skeer, *"The Public and Private Costs of Canadian Power in World Energy Markets: Coping with Instability"*, Proceedings of Ninth International Conference of the International Association of Energy Economists, Calgary, Alberta, July, 1987.
6. M. Rothman, *op. cit.*
7. *Canada-US Free Trade Agreement*, Article 905.
8. *Ibid.*, Article 1806.

High-Tech: High Hopes?

Saleable property, royalties and licenses: sound preparation is the key to success.

by Guy Houle
Swabey, Mitchell, Houle, Marcoux & Sher
Montreal, Québec

With the advent of high-tech, industrialized countries are becoming more and more innovative to try and maintain a dominant position in various technological sectors. Developing countries have also realized that to move forward, or at least to maintain their trade position, they must acquire technology to modernize and expand their industrial production facilities in order to gain a competitive edge on the international marketplace. However, many companies are reluctant to export or license technology and to do business with countries where their rights cannot be protected and are sometimes pirated.

To have exclusive rights for newly developed technologies, it is necessary for countries to have adequate laws to protect new developments. Intellectual property laws must keep up with new technologies and adapt to changes. The United States and Japan have been leaders in the development of high-tech and also in the reform of intellectual property laws to provide exclusive rights for new technologies. Hence, in the last decade we have seen new laws in the United States and other developed countries to protect computer programs, computer chips, life forms in biotechnology, and rights to prevent unauthorized retransmission of information beamed by satellites.

Canada Takes a Giant Step to Protect New Technologies

In recent years the Canadian Government has taken the initiative to modernize its intellectual property laws to keep up with developed countries and has enacted legislation to prevent new technologies from being illegally copied. The new Patent Act was amended to bring us closer to our main trading partners and the amendments are presently coming into force. A new Copyright Act was very recently passed with provisions for the protection of computer programs. Discussion papers and Government Bills have also been drafted to provide computer chip protection, trade secret protection, and property rights to prevent illegal retransmission of information beamed from satellites.

It is important to have such protection to provide exclusive property rights to innovators so that they can police, license or sell their innovations. Canada is quickly "catching-up" with the United States, Japan, and the European Community. We are also in the process of forming a new trading block through a Free Trade Agreement with the United States. The European Community has surely provided the example that it can work. We should look forward to becoming more competitive on foreign markets and with our southern partner, and we should attract more foreign investments into Canada. In trade circles it has been said that the next decade will be known as the "The Roaring 90s". We should see a substantial increase in licensing-"in" and licensing-"out" of technology.

Research and development must be accelerated and government assistance is required at all levels, and particularly in our university research facilities. There is a large pool of engineering know-how that can be stimulated and developed with the proper incentives. High-tech innovation stems principally from research and development by the scientific community, and the electronics and electrical engineers are playing a major role. We find electronics in most new technology. Engineers should have a fair understanding of intellectual property rights so that they will be prepared to use these rights as business instruments. There is much to gain by innovation, and one must have a fair understanding of what it can provide in return, be it financial, promotional, expansion, credibility, or otherwise.

Technology transfer through licensing...

Licensing is a fast growing method of selling or leasing new innovations and more intellectual property owners are turning to this contractual instrument to effect such transfer.

Engineers should have a basic understanding of intellectual property so that they can identify what is saleable property. They should also have a basic understanding of the licensing process so that they can be well prepared before undertaking to license proprietary rights. The license should establish a "win/win" situation for both sides to prosper, and under such conditions other joint ventures usually result.

Les licenses et le transfert de la technologie ...

La licence est une façon de vendre ou de louer de nouvelles innovations et l'on note que plusieurs propriétaires de propriété intellectuelle se tournent vers cet instrument contractuel pour effectuer des transferts. La rémunération peut se faire sous forme de paiements forfaitaires ou de redevances, ou les deux.

Les ingénieurs devraient avoir une compréhension générale de la propriété intellectuelle de façon à pouvoir identifier une propriété qui se vend. Ils devraient aussi posséder une notion de base de la technique de licence de façon à ne pas être pris de court lorsque vient le temps de licencier des droits de propriété. La licence doit établir une situation de gain pour faire prospérer les deux parties ce qui peut mener à d'autres entreprises conjointes.

Saleable Property

Developing countries are knocking on our doors wanting to buy technology to keep pace. We have a lot of technology and new products to sell. But do we need patents to sell technology? The answer is "yes and no". There are many forms of intellectual property rights other than the patent. Property may be a copyright for a computer program; it may be a trade secret in the manufacturing or assembly of a component or machine; it may be know-how acquired during the development or the marketing of new technology; it may be the mask for the chip; it may include a trademark; it may also include a design (aesthetic features) of a piece of equipment or device. All of these are property rights protectable in one form or another here and/or abroad. These exclusive rights prevent others from unlawful use and permit its owner to sell or lease (license) them for valuable monetary considerations, if he elects to commercialize it that way. This sale or lease is usually done through a contract commonly known as a "license". The buyer (the licensee) may be granted an exclusive or a non-exclusive right to the property for its manufacture, use or sale and in a designated territory and, more important by its owner, for license remunerations. The payments are commonly identified as "royalties" and often include a "front end" payment upon the execution of an exclusive license agreement.

How to Determine Front End Payments and Royalties

Why should a front end payment be requested when selling or when licensing technology, and how much should it be? Front end payments are usually requested when a potential licensee desires an "exclusive" license for the technology. An exclusive license precludes the owner of the technology from licensing or selling the technology to anyone else in a given territory and may also preclude the owner from commercializing in that territory. This is one reason for a front end payment. Another reason for requesting a front end payment is that monies have been spent to develop the new technology or product, and this would include, of course, all types of costs, such as material costs, salaries and overhead, legal costs, market surveys, drawings, manuals, etc., which are usually made available to the licensee, thus saving him considerable monies. Remember that if the licensee had to develop a competing technology or product, he would have had to spend at least that amount of money. Also, the licensee can get on the marketplace very quickly through a license and realize profits that he would otherwise not have realized had he been spending time developing a competing technology himself.

The above are all valid reasons for requesting front end payments, but it is sometimes difficult to obtain these from a potential licensee. You must have a well planned negotiation strategy to convince the licensee to pay this license fee, but the above-mentioned reasons are hard to dispute. You can also offer the potential licensee a refund of a certain percentage of the front end payment from your cash flow, but as a reduction from on-going royalty payments - that is to say, the licensee would deduct, say 50%, from the royalties payable to the licensor until he has repaid himself the agreed "advance". Such a plan also provides a stimulant for the licensee to commercialize the technology as quickly as possible to recapture the agreed portion or all of the front end payment.

But what if the potential licensee does not want to pay any front end money at all, and you feel he is the right licensee to commercialize your technology? In such a situation, an alternative is to increase the royalty payment and also to increase the performance requirement by the licensee. In the license agreement, a clause would stipulate that the licensee would be obliged to pay to the licensor a minimum payment for the commercialization in each year under the agreement. Usually in the first few years the licensor is more lenient, as the new technology needs to be introduced and accepted on the marketplace, and this is usually costly and unpredictable. However, during subsequent years this performance is adjusted and stabilizes to a fixed figure.

The Royalty

What is a fair royalty? A fair royalty is determined by many factors. One factor is the strength of the intellectual property protection. If the protection is strong, then one can demand a higher royalty than if the protection is weak. If the protection is weak, competitors may easily circumvent the protection and introduce a competitive technology or product. Therefore, the risk is higher for the licensee.

A royalty is usually in the range of 2% to about 15% of the manufacturer's wholesale price. Yes, that is a broad range and there are many reasons for this. In certain circumstances where the profitability is high, say in the order of 50% to 100%, then it is usually preferable to negotiate a high royalty calculated on a percentage of the anticipated profits of the licensee. Royalty payments should, however, not be based on "profits", as profits are uncertain numbers. A monetary payment type royalty should be indexed to an inflation index or to the increase in the wholesale price of the technology or product and adjusted on a year-to-year basis. With the percentage royalty approach this adjustment is made automatically as the price is adjusted.

How Do I Find a Licensee?

Now that you have some property to license and have a fair idea of its value, and have taken steps to protect it, you must find a licensee.However, your work is not finished. Before starting to locate a licensee, you must have a sound "business plan" to propose to him. The business plan is a prospectus-like brochure which briefly describes your technology in sufficient detail to enable a prospective licensee or buyer of your technology to determine what the technology is, and explain clearly the novel features of it over existing competitive technologies on the market-place. A photograph of the product, machine, process, etc., also helps the potential licensee to visualize what it looks like or what it could look like. If the technology is not developed in a form for commercialization, then drawings illustrating it and its packaging the way you see it in its final form would help. You may also wish to consider making a "home-type" video to demonstrate your technology, and this video can be made available to interested parties upon request.

The business plan should include cost figures for the manufacture of the technology and projections showing the profitability to the owner. It may be difficult to determine what the production costs may be, and if that is the case, then comparison figures should be used. If there is proprietary know-how or trade secrets, then this should be mentioned in the business plan but not revealed. Only a brief description should be given to maintain this know-how or trade secret confidential. You should also list all of the intellectual protection you have, or have applied for, and others available to you. In order to present realistic proforma projections, it is of course essential to determine what sales potential exists for your technology, and this can be estimated by doing preliminary market surveys. There are many private marketing companies or research groups that can do simple market studies for you. A detailed market study can be very costly, but here it is not necessary to have extensive and expensive studies made. Assumptions based on capturing a certain percentage of a known existing market may be sufficient. If you are already commercializing the new technology in your market and seeking a foreign licensee, then you have all the statistics you need to demonstrate the market and profitability of your commercialization.

The business plan should also contain a description of your company and/ or yourself. A description of the type of licensee or buyer you are seeking should also be included. A large company licensee may be more difficult to negotiate an agreement with because of his experience, but you may nevertheless wish to acquire such a licensee because he has a large and diversified product line, and because he has a track record and is usually financially sound. On the other hand, a smaller company is usually more eager to grow and typically has a smaller product line so that he may consider your new technology as a valuable added asset. It may be easier to negotiate an agreement with him and obtain larger payments, but the risks may be higher. So, you should consider all potential licensees for your new technology.

A Sound Preparation Is the Key To Success

The license agreement is a specialized-type contract which is usually negotiated by a team of individuals including the technology owner and a licensing specialist who is usually a person with a technical background and is knowledgeable of intellectual property laws. It is recommended to seek proper advice once you are preparing yourself to embark on a licensing venture and it is best to consult a specialist early in the game so that you can plan your licensing program and protect your property well in advance. During negotiations, you must make quick decisions and fast adjustment, and you must reach an agreement which is a "win/win" situation. Both parties must benefit from licensing for it to be successful; otherwise, the venture may be destined for many problems and a short life. Remember that once you have secured a business partner through a license, you may both benefit from other "spin-off" joint ventures, be it in the form of enhancing your product line through import, and/or exporting products from your line or referrals. Through the licensing process you have knocked on several doors, and by doing so you have made yourself and/or your company known to others both domestically and in foreign markets. In short, you have broadened your business contacts. It usually pays off down the road!

New IEEE Education Video

Recently IEEE Canada through a joint venture with the Licensing Executives Society (U.S.A./Canada) Inc. produced an educational film on "Technology Transfer". The purpose of this film is to provide a basic understanding of "licensing" to engineers, innovators and to the small and medium size business executives.The video is presently available through the IEEE Canada office in Toronto.

The licensing game is not easy to play and requires much investment in time and expertise. There are many obstacles along the way, but careful planning and well prepared strategies usually pay off.

Performance des disjoncteurs SF_6 aux très basses températures

De nouveaux essais semblent indiquer que leur pouvoir de coupure dépend de la pression de vapeur du gaz SF_6 et non seulement de la densité.

par Michel Landry
et Guy St-Jean
IREQ, Varennes, Québec
et Robert Jeanjean, Cegelec Industrie Inc., Laprairie, Québec

La technologie des disjoncteurs SF_6 progresse...

On poursuit toujours l'étude de l'influence des basses températures sur la tenue diélectrique et le pouvoir de coupure de disjoncteurs SF_6 à simple pression du type à auto-soufflage. Des essais réalisés, pour une gamme de température comprise entre -50°C et 20°C, semblent indiquer que la baisse de performance de ces appareils aux basses températures est liée non pas uniquement à la densité du gaz mais aussi à la température du gaz et que l'influence de ces deux facteurs est exprimée par la pression du gaz dans la chambre de coupure. De plus, des résultats d'essais montrent que les gouttelettes de SF_6 liquide condensées sur les contacts d'un disjoncteur ou sur ses pièces attenantes ne semblent pas dégrader la tenue diélectrique de son espace inter-contacts.

Advancing SF_6 Breaker Technology...

Researchers are presently studyingthe influence of low temperatures on the dielectric withstand and the breaking capacity of puffer-type SF_6 circuit breakers. In a range of temperatures from -50°C to 20°C, tests suggest that the decrease in performance at lower temperatures is related not only to the gas density but also, and principally, to the real pressure of the gas in the interruption chamber, which in fact takes account of both the gas density and its temperature. Test results also indicate that drops of liquid SF_6 that condense on the breaker contacts or adjacent parts do not seem to jeopardize the dielectric withstand of the inter-contact gap.

À cause de l'excellente rigidité diélectrique du gaz SF_6 et du pouvoir de coupure exceptionnellement élevé de ce gaz, les disjoncteurs utilisant ce médium de coupure remplacent progressivement les disjoncteurs à air comprimé et à l'huile sur les réseaux de transport. D'autre part, pour la province de Québec, les ressources hydrauliques à proximité des grands centres de consommation situés généralement au sud sont, depuis plusieurs années, toutes exploitées. Les nouveaux et futurs grands centres de génération seront donc construits au nord où le matériel électrique pourra être soumis à des températures de fonctionnement très basses durant la période hivernale. Afin de connaître les performances réelles des disjoncteurs au SF_6 aux très basses températures, il faut comprendre le comportement de ce gaz et connaître sa courbe de liquéfaction en fonction de la température.

Dans un volume constant et hermétique, une baisse de température du gaz SF_6 provoque une diminution de la pression interne du volume suivant une courbe à densité constante jusqu'à un point où le gaz se liquéfie. Ceci fera fortement réduire le pouvoir de coupure du disjoncteur et sa tenue diélectrique. La croyance la plus répandue concernant l'influence de la température sur la tenue diélectrique de disjoncteurs SF_6 est que cette tenue dépend uniquement de la densité du gaz à l'intérieur de l'appareil. En supposant l'appareil étanche et pour une densité donnée de remplissage, la tenue diélectrique serait alors constante pour toute température au-dessus de la température de liquéfaction. Toutefois, les essais effectués par différents auteurs qui appuient cette hypothèse ont été réalisés sur des enceintes de développement en l'absence de manoeuvres de contacts ou de soufflage de gaz. L'absence de facilités pour réaliser des essais sous grand froid sur appareil véritable n'avait pas permis d'éprouver cette théorie.

Afin d'explorer davantage l'influence des basses températures sur la tenue diélectrique et le pouvoir de coupure des disjoncteurs SF_6, des enceintes réfrigérantes ont été construites. Elles permettent d'essayer en vraie grandeur une chambre de coupure de disjoncteurs SF_6 à haute tension qui doit être installée dans une cellule d'essai conçue pour supporter de puissantes explostions. Trois types d'essais s'imposent:

-essais diélectriques statiques, c'est-à-dire qu'une onde de tension est appliquée entre les contacts ouverts de l'appareil;

-essais diélectriques dynamiques, c'est-à-dire qu'on applique la même onde de tension alors que les contacts de l'appareil sont en mouvement d'ouverture;

-essais de coupure de courants de court-circuit. Les résultats de tels essais permettent d'identifier le paramètre principal qui influence à la fois la tenue diélectrique interne entre contacts ouverts et le pouvoir de coupure d'un disjoncteur au gaz SF_6.

Comportement du gaz SF_6 aux basses températures

La figure 1 présente la courbe de liquéfaction (en trait gras) de l'hexafluorure de soufre (SF_6) en fonction de sa température et identifie les régions liquides et gazeuses. Dans la région gazeuse, cette même figure donne aussi la variation linéaire de la pression du gaz SF_6 en fonction de la température pour des densités de 40 et 20 g/1, valeurs couramment utilisées pour les disjoncteurs à haute tension. En effet, ces densités correspondent à des températures respectives de liquéfaction de -32°C et -50°C qui sont définies comme températures minimales d'opération des disjoncteurs dans certains pays. Pour comprendre la réduction de pression avec la température du gaz, prenons le cas d'une densité de 40 g/1 à une pression de 6 bars à 20°C (point 1, Fig. 1) qui réduit d'une façon constante, selon la loi des gaz, jusqu'à une pression de 4,6 bars lorsque la température atteint -32° C. Par contre lorsque la température baisse davantage (à partir du point 2), la baisse de pression est fortement accentuée à cause de la liquéfaction d'une importante partie du gaz pour atteindre 2,3 bars à -50° C (point 3). À cette température de -50° C, la pression du gaz SF_6 ne sera que la moitié (2,3/4,6) de celle à -32° C et produira ainsi une réduction quasi proportionnelle des performances d'isolation électrique et de coupure.

La relation pression versus température indique qu'il sera impossible d'avoir une pression de gaz SF_6 supérieure à 2,3 bars à -50° C et que cette limitation est fondamentale.

La courbe à densité constante de gaz de 20 g/l indique que la pression de ce gaz sera de 3,1 bars à 20° C (point 3 vers le point 4) et n'était que de 2,3 bars à -50°C. Donc, une densité constante de gaz n'égale pas une pression constante. Cette dualité, densité-pression, pose un dilemme parce que les normes sur le comportement électrique de l'appareillage spécifient que le comportement électrique des gaz utilisés n'est fonction que de la densité du gaz et est donc indépendant de la température. Ainsi, à une densité de 20 g/l, le comportement des gaz isolants à 20° C serait le même qu'à -50° C bien que le rapport des pressions soit de 1,35 (= 3, 1/2,3) (Fig. 1).

Afin d'établir si les essais à température ambiante doivent reproduire la densité ou la pression observées aux basses températures, des programmes exhaustifs d'essai ont été entrepris sur disjoncteurs en vraie grandeur et avec des installations très spéciales et dédiées à cet effet.

Réalisation d'enceintes réfrigérantes

Afin de réaliser des essais de coupure sous grand froid, la possibilité de refroidir la chambre de coupure dans une chambre climatique, puis de la transporter dans une cellule d'essai est rapidement exclue pour des raisons de sécurité et de conditionnement thermique.

Des enceintes thermiquement et diélectriquement isolantes ont donc été construites. Une telle enceinte coiffe la chambre de coupure et sa colonne support.

Cette enceinte peut être composée de deux parois concentriques entre lesquelles de la mousse polyuréthane à haut pouvoir isolant calorifique est injectée. Le principe de l'enceinte réfrigérante est de faire circuler de l'air refroidi par un agent extérieur. Un système de ventilation comprenant un ventilateur, un injecteur de type à CO_2 liquide et une canalisation appropriée permettent de réaliser un circuit fermé comme le montre le schéma de la figure 2. Une sonde thermostatique associée à un relai commande typiquement l'injection de CO_2 liquide et permet de maintenir une température constante à l'intérieur de l'enceinte. Des ouvertures calfeutrées sur le dessus et par le côté permettent d'amener la tension d'essai sans créer de fuites thermiques appréciables.

La figure 3 montre l'enceinte isolante d'une chambre de coupure de 245 kV, qui est partiellement enlevée pour inspection visuelle après essais au laboratoire Grande puissance de l'IREQ. La descente en température d'une telle enceinte prend quelques 12 heures de 20°C à -50°C et permet d'atteindre des températures aussi basses que -70°C. Une telle enceinte réfrigérante doit être isolée diélectriquement pour les plus hautes tensions d'essais anticipées du disjoncteur à essayer et pour les contraintes associées aux essais de coupure les plus sévères.

Conclusion

Les essais diélectriques statiques et dynamiques ainsi que des essais de coupure dans l'enceinte réfrigérante ont mis en évidence les points suivants:

-À densité constante de gaz, la tenue diélectrique et le pouvoir de coupure d'un disjoncteur semblent diminuer aux basses températures. Pour une maquette étudiée entre 20° C et -50° C, cette baisse est d'environ 16% pour la tenue diélectrique et 12% pour le pouvoir de coupure de l'appareil. Par extrapolation, un appareil ayant un pouvoir maximal de coupure de 44 kA à -50° C pourrait couper 50 kA à 20° C. Ainsi ces résultats expérimentaux révèlent que le comportement électrique du gaz SF_6 est fonction à la fois de sa densité et de sa température et qu'il semble faux de prétendre qu'il est exclusivement dépendant de la densité tel que proposé par les normes d'essais internationales.

Il semble plutôt en effet que la pression de vapeur du gaz, intégrant les paramètres densité et température, est le paramètre principal qui régit à la fois la tenue diélectrique de l'espace inter-contacts du disjoncteur et son pouvoir de coupure. À cause de l'auto-soufflage produit par le cylindre de compression d'un tel disjoncteur, le pouvoir de coupure est lié davantage à la pression de remplissage de ce dernier plutôt qu'à la densité initiale de remplissage. Il est vraisemblable que tous les appareils du type à auto-soufflage suivent cette règle et que des essais de coupure à 20°C peuvent simuler des essais aux basses températures à la condition que la pression statique soit ajustée à la pression maximale de vapeur de gaz observée aux basses températures.

-Il a aussi été observé que la présence de gouttelettes de SF_6 condensées sur les contacts d'un disjoncteur et sur sa buse de soufflage ne semble pas affecter significativement la tenue diélectrique et le pouvoir de coupure de l'appareil.

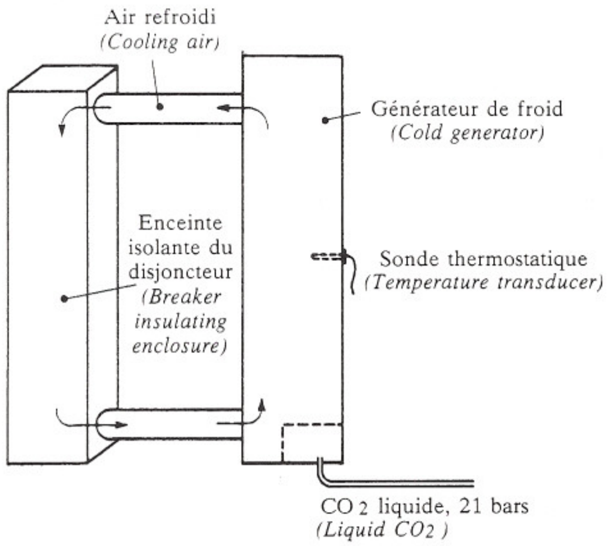


Figure 2 - Schéma de principe du générateur de froid pour les essais diélectriques et de coupure aux basses températures.
(Cold-generator scheme for low-temperature dielectric and current breaking tests.)

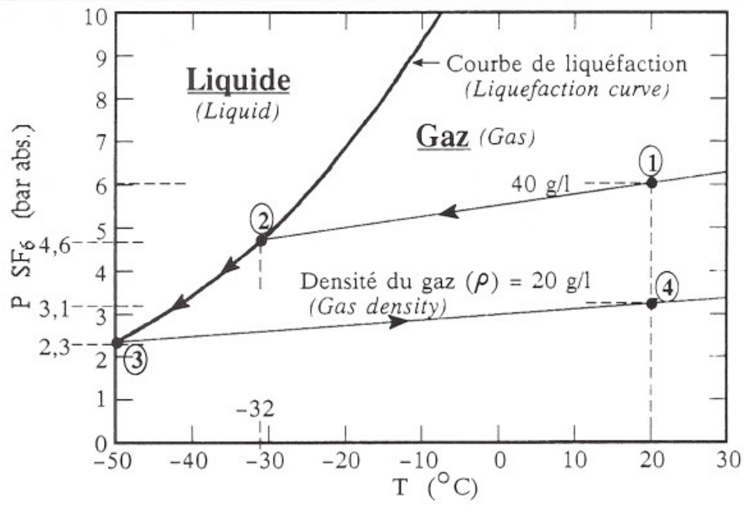


Figure 1 - Variation de la pression et de la densité du gaz SF_6 en fonction de la température.
(Variation of SF_6 gas pressure and density as a function of the temperature.)

Figure 3 (Page 12) - Enceinte isolante, d'une chambre de coupure de 245 kV, qui est partiellement enlevée pour inspection visuelle après essais au laboratoire Grande puissance de l'IREQ.

(Full size insulating enclosure, for a 245-kV breaker, partially removed for visual inspection after tests at IREQ's High Power Laboratory.)

IEEE Standards

These standards are available from IEEE Canada and IEEE members enjoy a significant discount off list prices. The 1988 Complete Listing of IEEE Standards is also available. It has a new format and the standards are listed according to the Societies, standards or co-ordinating committees that produced them. Fax or phone your order or enquiry to IEEE Canada, we can provide fast turn-around without customs or other import delays.

Two new standards in the 488 "family" have just been published.

488.1 Standard Digital Interface for Programmable Instrumentation - a new name and some minor revisions to the very successful 1978 488 standard.

List Price - IEEE Std. 488.1 $30.00 US

488.2 concentrates on solving several of the formatting and protocol issues that the original 488 left open. Using 488.2 the device designer has a basis for implementing message-level protocols rather than starting from the byte-level of 488.1. A complete logical model of the I/0 control, including handling message terminators, GET and Device Clear, is presented.

List Price - IEEE Std. 488.2 $52.00 US

Celebration

Robert C. Poulter celebrated his 88th birthday on July 12, 1988. He joined the IRE in 1924 as an Associate Member, became a Member in 1937, a Senior Member in 1943 and a Life Senior of IEEE in 1965.

Mr. Poulter has had a very interesting career working initially with public utilities, and then becoming a senior editor with Maclean Hunter Publishing in their business section.

In the middle 60's Mr. Poulter became the Director of Education at Radio College of Canada, in charge of the Technical Programme until his retirement. Since his so called "retirement", Mr. Poulter has been busy helping small business organizations and keeping up his keen interest in horticulture. To continue his thirst for more knowledge, Mr. Poulter's plans include a cruise to the Far East in November.

Best wishes were conveyed to Mr. Poulter on his birthday by IEEE Canada.

It is interesting to note that in the early days of the IRE and AIEE, age statistics were not necessarily recorded and in fact details on members' birthdates in the early 1900's are rather sketchy, so much so that we do not know who our most senior members are.

We would like to compile a list of these early members - please write to IEEE Canada with details of members in your Section who were born around the turn of the century.

Student Paper Competition

Winners in the Central Canada Council are as follows:

Life Member Award:

Michael M. Kisel; Ryerson Polytechnical Inst.

Hackbusch Award:

Christopher Bachalo; University of Windsor

Palin Award

John M. Ranpelt; Radio College of Canada

These Students will be presenting their papers at the 1988 Programmable Control Conference to be held October 12-13 at the Toronto International Centre.

1988 McNaughton Award

Rudi de Buda is the winner of the 1988 IEEE Canada McNaughton Gold Medal.

This medal is the Region's most prestigious award, honouring the name of General Andrew G. L. McNaughton. His contributions to the engineering profession in Canada have been of such importance that we are proud to present this medal in his honour to outstanding Canadian engineers in recognition of their contributions to the profession.

Rudi de Buda, Ph. D., P. Eng., graduated from the University of Vienna in 1949 and came to Canada in 1951. He spent the next 30 years working at General Electric Canada, latterly as a Senior Engineer - Mathematical Analysis in the Communications Systems and Services Dept. His assignments included analog control computer design for nuclear reactors, including CANDU, studies on MIT radars and the invention and development of the Fast FSK modulation/demodulation system and its self-synchronization. He officially retired from GEC in 1985.

However, in 1970 Dr. de Buda joined McMaster University as a part-time Professor in the Electrical Engineering Dept. and a member of the Communications Research Laboratory, his main interest being the theory and application of signal processing and lattice codes as well as sampling theory.

Dr. de Buda became a member of IEEE in 1970, a Senior Member in 1971 and a Fellow in 1986. He has been involved with the organization of the CEC and IEECE Conferences in Toronto since the early 60's and was General Chairman of the International Electrical and Electronics Conference and Exposition in 1973. He became Chairman of the Board of IEEC Inc. in 1975 and has served as a Director since that time, more particularly as Chairman of the Committee on the Use of Reserve Funds (CURF). These surplus conference funds are used to promote IEEE Student Activities in the form of McNaughton Learning Resource Centres and Scholarships.

As the holder of 14 patents, and the author or co-author of 43 publications, three of which were produced in collaboration with his son, Peter, Dr. de Buda has made an outstanding contribution in his specialized field.

In his spare time, when not pursuing the efficiency of digital modulation techniques, Rudi studies the lattices of chessboards and history, which is just as well since one part of the presentation of the McNaughton Award is the three volume biography of Gen. McNaughton.

We congratulate Dr. de Buda on his outstanding achievements.

About the IEEE

The Institute of Electrical and Electronics Engineers, Inc. (IEEE), with headquarters in New York, is a transnational organization with 300,000 members in 137 countries. The world's largest engineering society, its objectives are technical, professional and societal.

The IEEE's technical objectives center on advancing the theory and practice of electrical, electronics, communications and computer engineering and computer science. To meet these objectives, it sponsors conferences and meetings, publishes a wide range of professional papers and provides educational programs. In addition, the Institute works to advance the professional standing of its members. It also has a mandate to enhance the quality of life for all people through the application of its technologies, and to promote a better understanding of the influence of these technologies on the public welfare.

Today, the IEEE is a leading authority in areas ranging from aerospace, computers and communications to biomedical technology, electric power and consumer electronics. When it began its second century in 1984, it rededicated itself to Innovation, Excellence, the Exchange of information and the quest for improved Education. In so doing, it underscores the initials IEEE.

IEEE Canada is the Canadian entity of this transnational organization, with approximately fifteen thousand members. The Canadian Region is divided into twenty Sections, each centered in a Canadian city, from Victoria, B.C., in the west, to St. John's, Newfoundland, in the east. For information on whom to contact in your area, the many IEEE products and services available, or how to join IEEE, write, phone, or fax our IEEE Canada office.

Attention all IEEE Canada Members

The upcoming election, for which you have likely received your ballot, is an important one for us as we will be electing our future Region Director.

However, we in the Canadian Region need to be concerned about this year's vote and **should cast our ballot** for at least two good additional reasons.

a) One of the candidates for President-Elect, **Irwin Feerst,** has stated that if he is elected , he will set about making IEEE a United States entity with **no international membership.** If you value your IEEE membership, you should register your feeling by ballot.

b) One of the candidates for Executive Vice President is former IEEE Canada Director W.S. Read who is currently on the Board of Directors as IEEE Secretary. We need a transnational representative on the Executive Committee and Board of Directors in 1989 to support Director Alden in the final year of his term.

Whatever your position, the Editorial Committee urges you to complete your ballot and submit it before the deadline. It's important.

The Managing Editor

MicroMouse Montreal International

The MicroMouse Montreal International Event, the first MicroMouse contest of its kind in Canada, sponsored by IEEE Montreal and jointly established by Salon Education Science Technologie and Hydro-Québec will be held at the Olympic Vélodrome of Montreal.

A whole week where people can see MicroMice.

From October 13 to 19 we will have

- Demonstrations, explanations, mini-competitions
- Qualifying runs on October 18, 1988
- The competition on October 19, 1988

For information:

Michel Fortier, Chairman, IEEE Montreal, Tel.: (514) 765-7822,

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