New Electricity: Generation, Pricing, Wheeling & Regulation

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NEW ELECTRICITY: GENERATION, PRICING, WHEELING & REGULATION

David W. Drinkwater†

INTRODUCTION

Good morning. I am going to talk about quite a few things, each of which could take up a whole discussion, so I am going to present the material I have from a reasonably high level and do it from the perspective of a Canadian power generation company.

We had a discussion about this in the early panel, so I do not need to spend too much time talking about it, but the theme here is that the energy trade between the United States and Canada is already very significant and is becoming more so; I think that this phenomenon is going to be equally true in the electric power business. The United States gets nine percent of its oil and 18 percent of its natural gas from Canada, but imports only one percent of its electricity.¹ Now, that may sound like a relatively small number; there is certainly room for growth. Indeed, in the context of electricity, one percent can be very significant, because you are constantly trying to balance supply and demand in the electricity business. You cannot store it; you have to consume it when you produce it, and if you do not produce enough, you get blackouts. So, in fact, that one percent is quite a significant number when you are trying to deal with shortages of supply in the United States.

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Figure 1. Total Canadian Electricity Production

In addition to the potential consequence of that one percent, there are certain regions of the country where that one percent is even more significant. When they were having difficulties in California, British Columbia provided much of the state’s electricity. In the same way, Manitoba is a very significant source for the Midwest, and Québec for New England. Therefore, even though there is a prospect for some growth, Canadian electricity sources are very important for the U.S. today and will only become ever so much more so in the future.

NORTH AMERICAN ELECTRICITY DEREGULATION (OR RE-REGULATION)

My view is that electricity deregulation is a bit of a misnomer; we are not deregulating in the truest sense, and I mean that in two ways. First, it is simply a significant rereregulation; a different group of entities have been created. In fact, in California, they had the California Public Utilities Commission, but then they added about six other different bodies regulating aspects of the industry.² It is true that this rearrangement was opening up aspects to competition, but to call it deregulation, in my view, would not be entirely accurate.

² Some of these bodies included the Low Income Governing Board, the California Elec-
The other reason why I do not think that deregulation is happening in the truest sense is that we have not passed through to the retail level the true cost of power. Even in the states that have a deregulated energy market, there was usually some form of interim arrangement to fix prices at a reasonably low rate for a period of time, in part to offset the stranded cost requirements for that jurisdiction. Until we are able to pass to consumers the true cost of power at the time they are using it, we are not going to, in my view, get any of the potential benefits that deregulation would bring.

The situation in California was something that could have easily been avoided. We had a similar power shortage problem in Canada when we first opened the market in Alberta. Ontario is trying very hard not to have that problem when we open our markets up to competition in a couple weeks. You hear a lot of discussion about Enron being part of the problem in terms of deregulation. I think it would be incorrect to characterize the Enron disaster as a deregulation problem. In my view, the Enron debacle, which was clearly a disaster, had very little to do with deregulation; it had much more to do with bad accounting, bad investments, bad corporate governance and many other bad things.
Most would have thought that, by 2002, most of the states would have gone through the deregulation of their electricity industry. Because of California, however, there has been a slight hesitation on the part of the other states. If you look at some of the states in the Midwest and Southwest, including California, that were thinking of going back completely from their deregulation model, the pace has clearly slowed given what would have been predicted just two years ago. Compare Figures 2 & 3.
Having said that, the region in which my company is involved - around the Great Lakes (Michigan, Ohio, Pennsylvania, etc.) - has embraced deregulation, and continues to go forward with it. So, deregulation has already happened in significant portions of the United States, and I do not think that we are going to be able to get the toothpaste back in that tube.

DEREGULATION IN CANADA

Alberta, as indicated, was the first jurisdiction in Canada to open up to a deregulated market. On May 1, we are going to deregulate in Ontario. This deregulation will be structured so that prices will pass directly to the consumers, and they will then have the opportunity to go from a variable-price spot market every hour that gets passed through at the end of each month to entering into contracts to get fixed prices from various retailers. If the consumer does nothing, he or she will have a variable price passed through to them. There are arrangements to have transitional price protection, but a portion of the consumer’s bill will be charged at whatever prices are cleared during each hour of the market.
Other provinces have not embraced deregulation to quite the same extent, mostly due to the already low cost of power in that jurisdiction. See Figure 4. Both Quebec and British Columbia have what are called “open markets” at the wholesale level, but they are in no hurry to open up the retail level because they have some of the cheapest power anywhere in the world. That, unfortunately, was not the case in Ontario, in part because we overspent on our nuclear fleet. Because of the high prices for electricity there, the lower prices that deregulation will bring has certainly been embraced by most of the people in the province.

THE CONSTRUCTION OF NEW GENERATION

The number of generating plant completions during the 1990s was relatively low for a variety of reasons. Since the economy of the early 1990s was not as robust, there were not many commitments made to build new plants; these things take a long time between the time that the commitments are made to the time they are actually built. See Figure 5. I think, in addition, there was a fairly significant degree of regulatory uncertainty in the early 1990s, which caused many companies to defer decisions to build.
In addition, there is the issue of site selection, which is a huge challenge in terms of getting power plants built. Nevertheless, we did see a boom in power plant construction in jurisdictions like Texas and New England, which went from having a shortage of energy supply to a surplus in a very short period of time.\(^7\) We are now in a building bust in certain parts of the United States, as a very significant percentage of generating capacity construction has been cancelled, and more will be terminated. I think there was a small amount of wishful thinking when it came to price expectations. Last May, when the first heat wave hit Texas, the state simply adjusted its supply/demand balance; while everyone assumed the wholesale electricity prices in Texas would rise, they were surprised when prices remained relatively stable.

Suddenly, people started to realize that the power generation field is really a supply-and-demand equation; it is a commodity-type business. All of the people who rushed into a power generation investment venture or the stock market, thinking that this was the next high-tech boom found out, yes, it was the next high-tech boom! The bad news is that people in some areas of the U.S. think that they have enough generating capacity and are not willing to invest in any more. It is true that there are parts of the United States that are going to have significant supply problems this summer, but I believe that if

we do not continue to build, we will have significant supply problems in
other parts of the U.S. over the next few years.

DISTRIBUTED GENERATION

One of the issues that I think is very interesting is the extent that supply
problems can be solved by distributed generation.

It is very difficult to get a conventional-type of power plant built. It is
also very difficult, if not impossible, to get new power lines put in place.
However, everyone is hoping, somehow, that distributed generation will be a
significant part of the solution.

The challenge is to get all of these new forms of power generation online.
It is not as if we have to find a way to make them work; fuel cells have been
around for 150 years. The problem is making them commercially feasible.
People are prepared to pay some premium for a form of renewable energy or
less environmentally destructive form of energy, but not the amount of
money it would take to make it viable. Right now, I think, most people will
think of fuel cells as a niche type of generation as opposed to a major re-
placement of conventional generation. I do not think we are going to get
where we would like to be without better incentives to get alternative, newer
power generation forms to be more commonly used. Having said that, the
largest source of power generation growth in North America last year was
wind.

In the years 2000-2001, the price of natural gas fluctuated very dramati-
cally. While it has come back down in price, it still fluctuates. In the last six
months, the price of natural gas has been under $2 per thousand cubic feet,
and it is over $3/TCF today. People who study the volatility of commodities
once said that gas was the most volatile, but new studies indicate that the
price of electricity is in the order of 30 times more volatile than gas. See
Figure 6.

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8 See R.J. Ignelzi, It Isn’t Easy Being Green: Renewable Energy Now a Much Costlier
com/news/reports/powertothepeople/power2.html; Bill Eggerton, One in Three Americans

9 Wind is the fastest-growing power source in the world. See, e.g., Ontario Power Gen-
July 29, 2002).

10 See Anne Ku, Coping With Volatility, GLOBAL ENERGY BUS., Sept./Oct. 2000, available
at http://www.platts.com/business/issues/0009/0009geb_volatility.shtml (last visited July 29,
2002).
It is a daunting challenge to deal with the pricing issue, and part of the problem is in the precise matching of supply and demand; if they do not match, the system can collapse and blackouts occur. You cannot store excess capacity. Furthermore, when the price of one of the key electricity-generating fuels fluctuates, it becomes very difficult to manage the price of electricity.

The other interesting dynamic in my view is that, while it is true that gas is the fuel of choice for new generation, I do not think coal is going to go away. It is a fuel that has declined in price, and the reality is there is 250 years of coal supply in the United States. Two years ago, virtually all the new generation built on the map was gas-based, but today we have several new coal facilities that are being proposed. I think that coal is going to be an inevitable part of the energy mix equation for many years to come.

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Figure 7 shows only the high-level, 375,000-kW transmission grid in the United States going into Canada. (Of course, if you put on this chart every transmission line in the United States, you would not be able to see anything.) What is interesting about this chart is that there are portions of these connections that are not that robust. If you look at the Midwest, for example, there is quite a weak link between the western and eastern systems in the United States. These systems were not built to serve other regions besides the ones in which they were originally constructed; as a result, in 1965, the Canadians actually shut down the entire northeastern United States.\footnote{\textit{E.g., TMLP History}, at http://www.tmlp.com/elec/history3.htm (last visited July 29, 2002).} Because of these power failures, many regional power companies came together to form the North American Electric Reliability Council (NERC), a group of organizations that attempt to control, from a reliability point of view, the flow of power in North America. See Figure 8.
Much to NERC's annoyance, the transmission infrastructure was simply not designed to transfer large amounts of power back and forth across the border. However, the idea of taking some of the existing subsets and turning it into a larger, regional transmission organization has been proposed. This would eliminate some of the costs; unlike when you mail a letter and you pay the postage stamp at the outset, when we transmit power from Ontario to Florida (which we can do), we have to pay the varying transmission costs through all the various regions. One of the greatest challenges will be getting rid of these intermediate rates; the other challenge will be to make the transmission system more robust.

Another one of the challenges with electricity is that, like emissions, it does not go where you want it to go. In fact, if you wanted to send power from here to Detroit, it might, in fact, go east instead of west or might go through Canada and come into Detroit from our connection on the other side of the border.
Figure 9. Ontario’s Electricity Interconnections

Figure 9 shows the interconnections that exist between Ontario and the United States today, the most significant of which are into Michigan and New York, and that link between Ontario and Michigan where power sometimes goes from Ohio and back into Canada and into Michigan. There is a proposal to place a new transmission line under Lake Erie from Ontario to the U.S. A Canadian group is proposing to run a line from a coal-fired plant in Nanticoke, Ontario to Ashtabula, Ohio and into Pennsylvania. This power line would have power predominantly flowing from Canada into the U.S., but it would work to bring power in the other direction as well. This is a so-called “merchant” line, wherein a couple of the Canadian transmission companies would go into a joint venture and finance it through private equity, as opposed to amortizing the cost of the line into someone’s base rate. It remains to be seen whether or not this project will actually be built.

Figure 10 shows some of the problems that have resulted due to inaction.

If you look at the right-hand side of this chart, you see the decrease in investment on transmission over the years, and you see on the left what is called “Request for Transmission Loading Relief.” When the wires get too loaded with power (this usually happens when the weather is hot), they have a system for reducing the load so that the wires do not overheat. You can see that the number of requests have increased dramatically as a result of the need to move power around to where it is needed. It is interesting, given the fact that we have talked about power plants being difficult to site: the head of Constellation Energy told me that, in the 27 years of working in the Maryland/Baltimore region, he was unsuccessful in getting one transmission line approved. I thought that might simply be the particular challenges of the Maryland-Washington-Baltimore area, but I subsequently had a similar discussion with another senior person at Southern California Edison who said that siting was his area of responsibility, and in 25 years in California, he was unable to get any transmission lines built. People just do not want to have them in their backyard.

ENVIRONMENTAL ISSUES

I will show you a bit about just how the different regional fuel mixes can create challenges for dealing with environmental and related issues.
Figure 11. Electricity Fuel Mix in the U.S. and Canada

![Electricity Fuel Mix Diagram]

Figure 11 shows the fuel mix for electricity between Canada and the United States. As you can clearly see, over 50 percent of the electricity in the United States is generated by coal,\(^\text{14}\) and almost two-thirds of the electricity in Canada is hydro-based.\(^\text{15}\)

Figure 12. Fuel Mix in the Great Lakes Region

![Great Lakes Fuel Mix Map]

If we look at this on a more regional basis, it is quite interesting. See Figure 12. If we look at Hydro Quebec, you see that it generates almost 100 percent of its electricity from hydroelectric facilities. There is significant hydroelectric generation in Ontario, but both fossil fuels and nuclear are a larger component of our generation mix than hydroelectricity. If you look at the New York Power pool, you will see that it is somewhat similar to On-

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\(^{15}\) About 64% of all electricity generated in Canada is hydro-based. Hydroelectric Strategy: CEA Fact Sheet, at http://www.canelect.ca/connections_online/this_week/hydrofactsheet.htm (last visited July 29, 2002).
Ontario. New York state does have significant hydroelectric generation, but it also has significant nuclear and, because of access to the eastern seaboard, fossil-fuel generation. In the region (ECAR) that encompasses Ohio, Kentucky and West Virginia, you see that its generation is predominantly coal-based.

So, when you are trying to come up with environmental rules in a region, say, around the Great Lakes, it becomes very challenging when you look at the reality of the different fuel sources. In terms of fuel security and fuel costs, it will be very difficult to convince people to embrace rules that a fully hydro-based jurisdiction might find easier to follow.

We had the discussion about whether or not you recognize sources of contaminants as coming from Canada to the United States or vice versa. We know that pollutants that originate in Ohio go through Ontario, and some of what we in Ontario produce ends up in New England. We now have rules in Ontario for emission credits for both NOx and SOx that will allow us to take steps to reduce our emissions in Ohio and get credit for it in terms of our production in Ontario. We would thus receive credits for action we take in Ohio relative to our production capability in the province of Ontario.

**ISSUES TO CONSIDER**

Here are just a few issues to leave you with, perhaps to prompt some discussion.

Has electricity deregulation worked in North America? My view is, how can anyone possibly tell? We have not arrived at that point yet; some people say we never will. I think that electricity producers must pass prices through to customers using real-time metering, so we can encourage the demand side to manage their consumption. There will be environmental benefits to such a program. Thus, we have not really gone as far as we need to go.

We have talked about ensuring that generation is available when we need it. There is much more work that needs to be done on getting distributed generation so that it can play a more significant role.

Price volatility is very difficult to manage, and I think the reality is, even if prices did reflect true supply and demand, the public would just not accept prices for electricity along the lines that we saw in California. Will we be able to get the seamless, North American transmission system that we want? Perhaps, but I think it is going to take us a lot longer than we anticipate. I am less worried about the Canada/U.S. element of that than I am the federal-state issue. I think that FERC chairman Pat Wood’s biggest challenge right now is the fact that the U.S. states, which have exercised jurisdiction over the elements of their electricity system, are very reluctant to give the power over to the federal government. For this reason, I am more pessimistic about the
ability of FERC to get the various states on their side than I am between Canada and the United States.

I am happy to try and answer friendly questions.
Canada/US Law Institute Conference
New Electricity: Generation, Pricing, Wheeling & Regulation
April 20, 2002

David Drinkwater
EVP Law & Corp. Development

Outline

• Canada-U.S. Energy Trade
  • Deregulation
  • Generation
  • Pricing
  • Transmission
  • Environment
  • Issues to Consider
Energy Trade

- Energy trade between Canada and U.S. is significant and growing

- High level of integration that is increasing through actions such as deregulation

- Canada can/must play an important role in North American energy policies

Canada's role in US Energy

US Consumption from Canada

Oil 9%
Gas 18%
Electricity 1%
Outline

- Canada-U.S. Energy Trade
  - Deregulation
  - Generation
  - Pricing
  - Transmission
  - Environment
  - Issues to Consider
North American Electricity Deregulation

- Deregulation is really "re-regulation"
- California and Enron notwithstanding, electricity restructuring is ongoing in many jurisdictions... albeit more cautiously
- By May 1, 2002 about 50% of Canadian retail customers will be able to choose their electricity supplier

US Restructuring as of July 2000

Source: Energy Information Administration
Outline

- Canada-U.S. Energy Trade
- Deregulation
- Generation
  - Pricing
  - Transmission
  - Environment
- Issues to Consider

N.A. Generation Project Status

<table>
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<th>Year</th>
<th>Proposed/Under Development</th>
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<td>2004</td>
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Source: RDI and Energy Insight
U.S. Generation: To Build or Not to Build

- 18% of announced generation (91,000 MW) cancelled or postponed in 2001 -- twice as much as in 2000

- Rationale: supply/demand forecasts, lower electricity prices, credit rating issues...etc.

- Yet some regions are short generation -- i.e., parts of New York State

Canadian Generation: 2002-2012

- Over 20,000 MW new capacity proposed

  - Ontario 6,300 MW
  - Alberta 4,400 MW
  - Newfoundland & Labrador 4,000 MW
  - British Columbia 3,000 MW
  - Quebec 2,600 MW
  - Other Provinces 500 MW
### Economics of Distributed Generation

- **Installed cost US $/kW**
  - Current installed cost: 
  - Expected installed cost with mass production

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<td>Stirling engines</td>
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<td>Fuel cells</td>
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<tr>
<td>Wind turbines</td>
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### Outline

- Canada-U.S. Energy Trade
- Deregulation
- Generation
  - Pricing
- Transmission
- Environment
- Issues to Consider
**Volatile Electricity & Gas Prices**

- **Gas**
- **Electricity**

**Increasing Coal Prices**

- **Downward price pressure**
  - Mining technology
  - Open access rail
  - Climate change
  - Gas substitution

- **Upward price pressure**
  - Strong demand
  - Need for new mines
  - High gas prices
  - Industry concentration

Source: RDI
Outline

- Canada-U.S. Energy Trade
- Deregulation
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N.A. Electricity Transmission System
Ontario's Interconnections

Manitoba 190 MW ↔ 269 MW
150 MW

Quebec 1,406 MW ↔ 567 MW
1,250 MW
20 MW

Ontario

100 MW

New York

2,100 MW

Michigan 300 MW ↔ 150 MW
2,400 MW ↔ 1,600 MW

Source: EIA, April 2002

Increasing Congestion; Decreasing Investment

Transmission Congestion 1996-2000
Requests for transmission loading relief


Transmission Investment 1976-2000
Billions of 1997 dollars per year


Source: Edison Electric Institute
Outline

- Canada-U.S. Energy Trade
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- Issues to Consider

Deregulation and Energy Trade & the Environment

- Economic growth a critical priority
- Environmental protection also a critical priority
- The electricity market has:
  - competing priorities between federal and provincial/state jurisdictions & between international jurisdictions
  - different regional fuel-mixes, but emissions and electricity don't respect geographic boundaries
  - environmental regulations that are not yet harmonized
Electricity Fuel Mix

U.S.A.

- Hydro/Other Renewables: 9%
- Gas/Oil: 18%
- Coal: 52%

Canada

- Hydro/Other Renewables: 62%
- Gas/Oil: 7%
- Coal: 19%
- Nuclear: 12%

Source: CEA

Fuel Mix in the Great Lakes Region

[Map showing fuel mix in the Great Lakes Region with various pie charts indicating different energy sources for each region.]
Outline

- Canada-U.S. Energy Trade
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- Generation
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- Transmission
- Environment

Issues to Consider

- Has electricity deregulation worked in North America?
- How can we ensure new generation as and when needed?
- What role can distributed generation play?
- Can we effectively manage price volatility?
- Are high prices sustainable even if they reflect supply/demand?
- Is it possible to have a truly seamless N.A. transmission system?
- Is a standard market design possible or desirable...and how can regional differences be accommodated?
- How can jurisdictions cooperate to achieve efficient & reliable electricity market?