

Alberta's Competitive Electricity Marketplace Moves Forward

1.0 Introduction

As Canada's first, and to date only jurisdiction to embrace electricity competition, Alberta is forging a path of great interest. All eyes are on Alberta, including current and potential generators, investors, electricity wholesalers, retailers, and, of course, consumers. The guiding force for government policy in Alberta's electricity marketplace is the long-term interest of all market participants and consumers. From the outset, the government sought to shape a level playing field with open and fair competition, transparent regulation and accountable oversight by the appropriate regulator.

To kick-start the process, Alberta's wholesale market was opened to competition on January 1, 1996, the former Power Pool of Alberta operated an independent, fair, open and efficient market for the exchange of electricity and an independent system coordination centre to operate the electric system in a safe and reliable manner.

By 1998, major industry components included the Power Pool Council, Market Surveillance Administrator, Balancing Pool, and the Transmission Administrator.

Competition took hold in the electricity generation segment of the industry through an auction in the summer of 2000. The auction of power purchase arrangements (PPAs) introduced competition to more than 6,400 megawatts of power capacity built under regulation. By offering the rights to the power capacity from these plants to the open marketplace, competition was furthered without the forced divestiture of privately held assets.

The PPAs and auction were designed to reflect the objectives related to restructuring: establish a competitive marketplace and ensure that Albertans continue to benefit from generating units built under regulation. The PPAs took effect on January 2001, at the same time as retail service competition was launched for all consumers.

While electricity customers could choose a new provider, they could also decide to remain on a regulated rate option which was designed to ease the transition for consumers.

Competition in the wholesale market was making great strides. The market was responding to market signals such as supply and demand, and the market itself was exhibiting healthy signs including new and diverse generators, from natural gas combined cycle and cogeneration facilities to wind and biomass energy to large coal-fired generation. Market participation was increasing too, in both volume and diversity (Figure 1).

Evan Bahry, Executive Director of the Industrial Power Producers Society of Alberta (IPPSA), remarks, "IPPSA supported deregulation from the outset. We believed that competition would be good for the market, that we would see an increase in the number of retailers and a wider choice of electricity products. That has certainly happened - today's

by Submitted on behalf of Bill Kennedy,
AESO, Calgary, AB

Abstract

This article presents a look at Canada's first, and to date only jurisdiction to embrace electricity competition. Alberta's wholesale market was opened to competition on January 1, 1996. The past 7 years have seen further restructuring to establish a competitive marketplace. A new independent system operator began to take form as the AESO - the Alberta Electric System Operator in June 2003. The AESO is Canada's first competitive, customer-focused exchange for electricity.

Sommaire

Cet article dresse le portrait de la première, et à ce jour la seule, juridiction canadienne ayant permis la compétition dans le domaine de l'électricité. Le marché de gros de l'Alberta s'est ouvert à la compétition le 1er janvier 1996. Les 7 dernières années ont vu une restructuration qui a permis d'établir un marché compétitif. Un nouvel exploitant de réseau a pris forme en juin 2003, l'AESO qui est la première bourse de l'électricité au Canada orientée vers le consommateur.

wholesale electricity market in Alberta is very robust."

At the five-year mark, Alberta had seen about 2,800 megawatts of new generation added to the market, and the number of participants grew from about 50 to more than 200. Some things were working well, but was there room for improvement? That's the question Alberta Energy (the provincial department responsible for electricity) posed with its industry structure review.

In 2001, the department commissioned an independent consulting firm to prepare a report on the state of the industry, and to make recommendations for improvement. The review included comprehensive stakeholder input, through written submissions and interviews. The consultant also looked for best practices in other jurisdictions throughout the world. Other jurisdictions evaluated for their experiences and best practices included Ontario, the UK, New Zealand, Pennsylvania, Ohio, Texas, and the state of Victoria, Australia.

In March 2002 the consultant's report identified several factors affecting the performance of the wholesale market, including regulatory

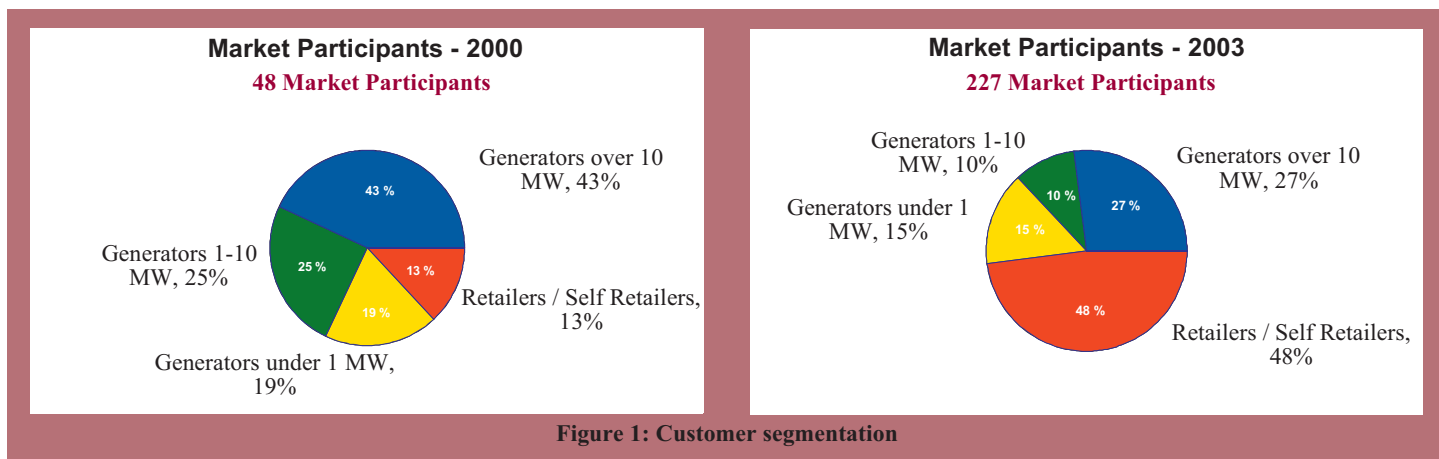


Figure 1: Customer segmentation

uncertainty, pool price determination and price uncertainty, unsold PPAs and market liquidity. Chief among these was regulatory uncertainty, which tended to keep new participants from entering the market, both in generation and transmission. The report noted that a successful, competitive wholesale market in Alberta would be contingent upon the availability of transmission capacity.

In addition, the review noted that significant synergies could be realized from combining the Power Pool with the Transmission Administrator into a single entity. The report found that division of functions between the former Power Pool and Transmission Administrator created operational concerns, such as differing objective-setting mechanisms (for-profit versus not-for-profit). In addition, stakeholder concerns included the need for continuous improvement in market design, system access, capital planning, and related matters. (As mentioned above, these concerns were expressed during the industry review; merging the functions was among the review's recommendations.)

These and other review findings all pointed to the need for an overhaul of the Electric Utilities Act (EUA) and an adjustment of the industry.

Amendments to the EUA were enacted on June 1, 2003. Highlights of the revised Act include:

- Further leveling the playing field in the electricity marketplace by moving the approval of tariffs for municipally owned utilities that offer competitive contracts to the Alberta Energy and Utilities Board (EUB).
- Expanding the responsibility of the Market Surveillance Administrator, which oversees market competition, ensuring Albertans benefit from competitiveness in the wholesale and retail markets.
- Introducing a more cost-efficient industry structure including a non-profit independent system operator to operate a competitive power pool, take responsibility for system control, and plan the transmission system.

That new independent system operator began to take form as the AESO - the Alberta Electric System Operator. John Tapics was appointed President and Chief Executive Officer in October 2002, and the executive team was announced in January 2003. The company completed a reorganization in February 2003, and the AESO was officially proclaimed by the new Act in June 2003 (Figure 2).

2.0 Introducing the AESO

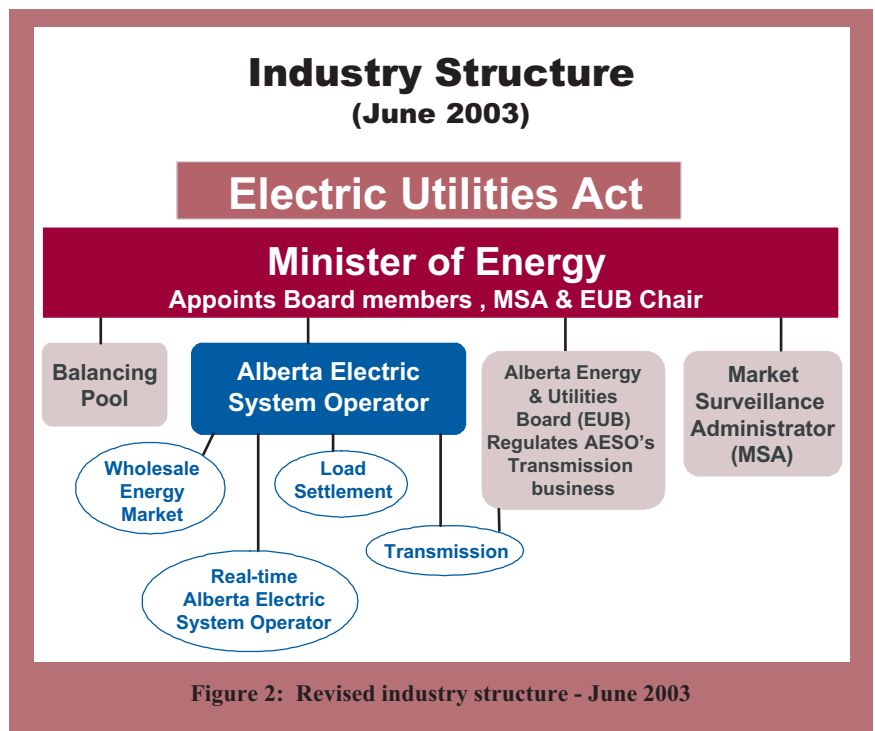
"Our new company, the AESO, brings together two former corporations, the Power Pool Council and the Transmission Administrator of Alberta," says President and CEO John Tapics.

The AESO is Canada's first competitive, customer-focused exchange for electricity. As an independent system operator, the AESO leads the safe, reliable and economic operation and planning of Alberta's interconnected power system and facilitates Alberta's hourly wholesale market, which (as of June 2003) has more than 200 participants and from about \$3 to \$5 billion in annual energy transactions. The company has an independent Board who provide governance and direction, with a strategy founded on balancing the diverse interests of stakeholders, while providing benefit for the overall industry stakeholder needs. The Alberta Energy and Utilities Board (EUB) provides regulatory oversight of the AESO's transmission planning responsibilities, and approves the AESO's transmission tariff.

The AESO's accountabilities include:

- Directing the operation of the provincial electric grid and coordinating the flow of electricity inside Alberta and on the interconnections with neighboring jurisdictions;
- Planning the transmission system and identifying the need for upgrades and additions to the transmission infrastructure; and
- Carrying out load settlement, the financial accounting to allocate the hourly electricity commodity costs to retailers.

"The AESO is building on what the industry has learned since 1996, we are not re-inventing the wheel. For that reason, we think the AESO can offer streamlining and efficiency to the Alberta electricity marketplace



in addition to optimizing years of expertise on both the market and transmission sides of the business."

3.0 A Closer Look: Transmission

In Alberta, transmission facilities are built, owned and maintained by investor-owned companies, and regulated by the Alberta Energy and Utilities Board (EUB). The AESO's costs of transmission planning, development and operations are recovered through a province-wide transmission tariff. Although the province's generation market has increased by about 25 per cent between the end of 1998 and 2002, the transmission infrastructure has seen no new significant expansions in more than 15 years - a situation not unlike other electricity markets throughout North America.

"Strategic transmission planning, to ensure adequate transmission capability, is among our top priorities," comments Tapics. To that end, the AESO recently received approval from the EUB for the need for a new transmission line to increase transfer capacity out of the Fort McMurray region in northeastern Alberta. When completed, this line will increase the area's transfer capability to about 610 MW from the current 370 MW. The project will also contribute to another AESO objective: reducing transmission line losses. "We estimate this new line will reduce losses by about 65,000 megawatt hours annually, which at a \$60 per megawatt hour AESO pool price translates into annual savings of about \$4 million," Tapics says, adding that the AESO is investigating other major transmission projects that will reduce congestion and losses.

Areas of focus are the Edmonton-Calgary corridor, the northwest section of the province, and the southwest region where about 500 MW of wind projects are keen to connect to the system. "We expect to have needs applications for both the Edmonton-Calgary corridor project and the southwest region filed with the EUB by the end of this year," Tapics adds. Estimated in-service dates would be range from 2006 to 2010 for the Edmonton-Calgary project and spring of 2005 for the transmission expansion in the southwest region of the province.

"We have also launched a study to develop a long-term transmission plan for Alberta as part of our business focus," Tapics says. A major conundrum facing electricity markets across North America is the long lead time required to site and construct transmission lines versus the shorter lead time required for some new generation, especially gas-fired generation.

"Our planning is aligned with the government of Alberta's proposed transmission development policy which requires transmission planning to be proactive and ahead of load growth and generation development."

At time of printing, the government had circulated its transmission development policy for industry comment and a regulation was expected to be finalized by year end.

“Generally we are supportive of the government's new proposed transmission development policy, it addresses several concerns we raised early this year with respect to the difference in lead time between generation and transmission projects and the potential to be proactive and at the same time prudent about transmission development. Our job is to implement the policy and we look forward to working with customers and stakeholders on plans for implementation.”

4.0 A Closer Look: System Control

Coordinating and directing the operation of Alberta's electricity market and integrated electric grid is one of the AESO's main objectives, but nothing could be accomplished without another of the AESO's key functions: system control.



The System Coordination Centre is the heart of Alberta's Interconnected Electric System. The SCC, which opened in early 1999, operates independently of market participants. The Centre features advanced technology, customized to meet the requirements of Alberta's competitive electricity market. It's staffed 24 hours a day 365 days a year by a team of 13 system controllers, whose combined expertise represents the best senior operators in the business.

System Controllers (e.g. Lane Belsher in the image on the left) are responsible for the real-time operation

of the Alberta Interconnected Electric System. They dispatch all electric power generation in Alberta through the SCC, schedule energy flow on the transmission interconnections with neighboring control areas and monitor and direct the operation of Alberta's electricity network to ensure safe, reliable and economic operations.

The System Coordination Centre relies on two essential information technology systems to provide the infrastructure for these operations: the Energy Management System and the Energy Trading System.

The Energy Management System (EMS) provides the centralized operations of the Alberta Interconnected Electric System; it's the 'engine' of the System Coordination Centre. On a 24-hour operation, it enables system controllers to perform real-time activities such as dispatching electricity to meet demand, and monitoring the status of the provincial electric system. It interfaces with other control centres and power plants across the province. Every few seconds, the system scans 150 points: generator outputs, interconnections flows and system frequency. About every 10 seconds, the system checks another 6,000 points, including voltages, line flows and switch points.

The Energy Trading System (ETS) receives energy supply offers and demand bids from market participants, receives metering data, provides market information to the AESO's Web site and performs settlement and billing. The ETS was one of North America's first secure Web-based energy trading systems. The company developed and introduced the ETS during a 12-month period to meet a target in-service date of August 2000.

5.0 Challenges

The 2002 industry review found that load settlement was a significant barrier that required resolution in order for competitive markets to continue to develop in the province.

Load settlement adds up the energy each meter uses for all 1.3 million customer sites in Alberta and allocates the appropriate hourly price. Energy is priced on an hourly basis and most meters in the province can't measure energy consumption on an hourly basis. Even if all customer sites had interval meters, which measure energy consumed for each hour, load settlement would still be needed for the AESO to calculate bills for retailers. The load settlement process ensures the aggregate power consumed by each retailer's customers is allocated to that retailer, and the total allocated to all retailers in each service area matches the energy flowing in.

Efficiency and streamlining are the AESO's goals for load settlement. Tapics says the AESO is considering the feasibility of a single, province-wide, centralized site registry that would offer consistent data standards, information exchange and compliance monitoring. The AESO is also assessing the cost-benefit of a centralized meter data repository.

Consumer education is another challenge facing the new company. “Consumer markets are responding to market forces as they should, but consumers are still uncertain,” comments Tapics. “Electricity is a commodity now and the price will naturally fluctuate, the same way all commodities do. At the AESO we want to contribute to raising awareness about the market to help inform consumers so they are able to make well-informed choices.”

6.0 Moving Forward

In Alberta, the journey to a competitive wholesale electricity market is unfolding positively. Indicators of success include the number and diversity of players, both in generation and as market participants. As of June 2003 there were approximately 240 participants, including small and independent power producers, retailers, self-retailers, marketers and consumers in fields as diverse as forestry, education, manufacturing and health care.

“The AESO's role has been clarified by the new Act, and their new mandate definitely offers opportunities for efficiency and improvement,” says Evan Bahry. “Still, there are lots of issues on the AESO's plate, in particular a dynamic debate about transmission expansion. It's going to be something of a baptism by fire, but they have good people in place, and a strong Board.”

Creating a competitive market is a complex and unpredictable process, but the mid-course review that created the AESO holds tremendous potential. “Alberta is in the global forefront,” says Tapics, “and I think we are one of the leaders in terms of facilitating innovative solutions, both on the technical and market sides of the business.”

“As Canada's first competitive, customer-focused exchange for electricity, we take a leadership role in planning and operating Alberta's electricity system safely, reliably, and at a reasonable cost,” Tapics concludes. “Our aim is to strike a balance between the diverse interests of customers, stakeholders and market participants. We are not going to build transmission lines, or implement market enhancements, before we have listened and discussed our plans with customers, stakeholders, and the public (see sidebars on next page).”

About the author

Bill Kennedy graduated in Electrical Engineering from the University of New Brunswick, Fredericton, in 1969. His education has been supplemented by graduate courses in power system engineering and management.



In 1970, he joined the Shawinigan Engineering Company, Montreal Quebec where his early experience consisted of work on the Nelson River HVDC transmission system in Manitoba. This was followed by experience on 400/500 kV transmission systems in Iran and Pakistan. During this time, he gained industrial experience in pulp and paper mills in Ontario, Newfoundland and the former Yugoslavia. His utility background consisted of employment with SaskPower in increasingly responsible positions from 1979 to 1995. From 1995 to 1998, he was self-employed as a consulting engineer. He is Principal Engineer with the Alberta Electric System Operator (AESO). He has been associated with the deregulated electric industry in Alberta since 1997.

Bill is a registered professional engineer in the provinces of Alberta, Saskatchewan and Manitoba. In 1998, he was elected a Fellow of the Engineering Institute of Canada. He is a Senior Member of the IEEE and the IEEE Region 7 Director-Elect for 2002 - 2003. He is a member of the Power Engineering and Industrial Application Societies and is active on the Power System Relaying Committee. He has published a dozen papers on protection related issues.

Countdown To AESO

1996

- New legislation - Electric Utilities Act (EUA)
- Wholesale market opens
- Independent System Controller/Power Pool Administrator appointed
- Affiliated Transmission Administrator (GridCo)

1997

- Independent Transmission Administrator appointed

1998

- EUA amended
- Wholesale Market Power/Power Purchase Arrangements/Balancing Pool
- Limited retail competition
- Market surveillance
- Transmission planning guidelines

2000

- Auction of Power Purchase Arrangements (PPAs)

2001

- Retail competition
- Market Achievement Plan auction of unsold PPAs
- Industry review of market structure

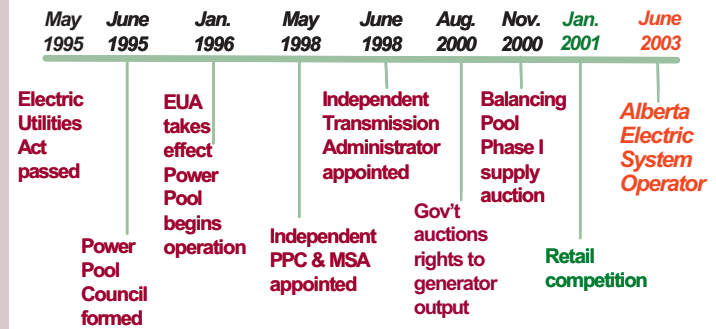
2002

- Second auction of unsold PPAs
- Review of industry structures completed
- Former Transmission Administrator merged with Power Pool
- Design of new independent system operator initiated

2003

- EUA amendment proclaimed
- AESO launched June 1

Market Evolution Timeline



Alberta Electricity Industry at a Glance

- More than 20,000 km transmission
- More than 550 substations
- Annual load factor 80 per cent
- Industrial load about 56 per cent of system load
- Transmission voltage levels of: 500 kV, 240kV, 138/144kV, 69/72kV
- More than 130 generating units
- 8,570 MW system peak
- 10,515 MW Alberta supply
- Approximately 240 participants
- Single control area of 660,000 km²
- The total demand for electricity in Alberta in 2002 was 54,328 gigawatt hours (including exports) down slightly from 54,674 in 2001.

IEEE Canada Awards

IEEE Canadian Foundation Scholarship Certificate Presentation held on October 9th, 2003, at the "IEEE Southern Alberta Section (SAS)/University of Calgary Student Branch" Mixer.

As shown in this photo:

IEEE Canada President Elect, Mr. Bill Kennedy (left) presented the ICF Scholarship Certificate to Ms. Christine Cook (right) from the University of Calgary.



The IEEE Canada Student Activities Committee is very pleased to announce the recipients of two prestigious awards granted by the IEEE for extraordinary Student Branch activities within the IEEE Region 7 (IEEE Canada).

George Armitage Outstanding Student Branch Award.

This award, supported by IEEE Canada, is given to recognize extraordinary Student Branch achievements by Student members engaged in activities conforming to IEEE objectives and purposes. For 2003, this award is granted to the **Carleton University IEEE Student Branch** for exceptional achievements in organizing professional and technical events that resulted in a significant increase in student membership. This award consists of a plaque and a cash prize of two hundred dollars (\$200).

IEEE Region 7 RAB Larry K. Wilson Regional Student Activities Award.

This award is to recognize annually the student most responsible for an extraordinary accomplishment associated with IEEE Student Activities in each Region. For 2003, this award is granted to **Kevin Yang Ma of the University of Waterloo** for an exceptional achievement by initiating, organizing and coordinating the Blackberry Programming Contest involving the IEEE Student Branches of the Kitchener-Waterloo Section, in partnership with Research in Motion Ltd. This award consists of a plaque and three years of free membership in the IEEE.

Dominic Rivard, Eng.

Region 7 (IEEE Canada) Regional Student Activities Coordinator

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