

# Backgrounder

## About the AESO

- The Alberta Electric System Operator (AESO) acts in the public interest of Albertans and has no financial interest or investment of any kind in the power industry.
- The AESO is mandated under the Government of Alberta's Transmission Regulation to ensure a robust transmission system that provides reliable service to Albertans, attracts new generation, supports merchant or independent transmission projects, encourages investment in Alberta and facilitates a competitive energy marketplace.
- Alberta's quality of life and economic well-being, especially the maintenance and creation of jobs, depends on an adequate and reliable supply of electricity to all Albertans, now and well into the future.
- The law obligates the AESO to operate in the public interest. The AESO considers minimization of land impacts, forecasted load growth, efficiency, technical performance, scalability and expandability, operational performance and cost when determining whether something is in the public interest. The AESO also considers government policy.
- The AESO's transmission planning processes are purposefully staged and flexible to accommodate changes in the load forecast.
- The AESO manages Alberta's electricity grid on a 24/7 basis to ensure reliable power is available to meet the needs of all Albertans.
- The AESO plans the provincial transmission system, including all its interconnections with neighbouring provinces, to ensure this important infrastructure keeps pace with the growing demand for power.

## Edmonton to Calgary Transmission System Reinforcements

- Two high voltage direct current lines between Edmonton and Calgary are required to address issues with reliability, maximize efficiency, accommodate long term growth and lead investment decisions.
- Increased demand for electricity in southern and central Alberta is stressing the existing 240 kV system.
- The lines between Edmonton and Calgary will facilitate access between renewable generation zones and the market to transport large quantities of electricity when the wind is blowing or when high river flows occur at hydro plants.
- The need for reinforcement between Edmonton and Calgary was originally identified in 2002 by the Transmission Administrator. The AESO was created in 2003, absorbing the responsibilities of the Transmission Administrator and the Power Pool.
- The Edmonton to Calgary transmission system reinforcement was estimated to cost approximately \$3.135 B (in 2008 dollars) as per the AESO's 2009 Long-term Transmission System Plan. The most up-to-date costs are included in the Facilities Applications filed by the Transmission Facility Owners.

## High Voltage Direct Current Transmission (HVDC)

- The two main types of electricity are alternating current (AC) and direct current (DC). The difference between AC and DC systems is how the power moves through the lines. With an alternating current the flow of power reverses direction 60 times per second, but with direct current, power only moves in one direction.
- Two high voltage direct current (HVDC) lines between Edmonton and Calgary are required to address issues with reliability, maximize efficiency, accommodate long-term growth and lead generation decisions.
- In addition to strengthening the overall transmission system, DC lines between Edmonton and Calgary will facilitate access between renewable energy generation zones and the market.
- DC lines offer the benefit of ‘scalability’ – meaning the amount of power a line can transmit can be increased by adding equipment at each end of the line. This allows for a staged approach and decreases the need to build more power lines in the future when demand for power increases.
  - The implementation of the two high voltage direct current (HVDC) lines will be staged. Initially, 2000 MW of capacity will be added to the grid, with the capability of increasing to a total of 4000 MW.
- HVDC transmission facilities do not exist in Alberta, but are in operation in many parts of the world. The first DC transmission line was built in the 1950s and today there are more than 100 lines in operation. Examples include:
  - Quebec-New England Interconnection installed in the early 1990s
  - Alberta Saskatchewan Interconnection installed in 1989
  - Vancouver Island Interconnection installed in the late 1970s
  - Nelson River, Manitoba installed in the 1970s
  - Bay Cable, San Francisco, commissioned in 2010
  - Neptune, New Jersey, commissioned in 2007
  - Cross Sound, New York, commissioned in 2002

## Forecasting

- The AESO considers a variety of economic scenarios to help forecast future demand for electricity and the generation we anticipate will be available to meet that demand. The AESO then uses this information to identify the best solutions to strengthen the electricity grid.
- The AESO takes a prudent, practical and flexible approach to forecasting growth on the provincial electricity system, avoiding excessively optimistic forecasts that could lead to overbuilding, and overly pessimistic forecasts that may discourage investment.
- Transmission planning is an ongoing process and changes in economics, industrial projects and customer connection requests are continuously monitored to assess their impact on forecasting.
- The AESO integrates data from multiple sources like the Conference Board of Canada, the Canadian Energy Research Institute (CERI) and the Canadian Association of Petroleum Producers to determine where the demand for electricity will grow, where and how much generation is required to meet that demand, and what additional transmission infrastructure will be required.

## Facts about the Electricity System

- We need transmission infrastructure in place ahead of electricity demand so investment, market access and economic development are not compromised.
- A large part of deciding whether to locate or expand a business or industry in Alberta is based on being reasonably certain of access to an adequate supply of electricity.
- The backbone of the province's transmission grid hasn't seen a major investment in more than 20 years. Yet, over that same period, Alberta's GDP has risen 295%, from \$70 billion to nearly \$278 billion (not adjusted for inflation), the population has increased 43 per cent, from 2.5 million to 3.6 million, and our average demand for electricity grew 84%, from 4,559 MW to 8,402 MW.
- Alberta's export of power has been less than 1 per cent of the power produced in Alberta. Imports served nearly 5 per cent of total load in 2011, an increase over previous years.
- Alberta has been a net importer of electricity since 2002.
- Transmission capacity has not kept pace with generation development in the last decade and, as a result, generation is curtailed in many parts of the province.
- In Alberta, because generation resources are often located far from where the demand is, we depend on transmission lines to carry electricity from where it is produced to where it is needed.
- Transmission investment is needed to reliably serve the expanding demand, reduce transmission congestion and related congestion costs and facilitate a competitive market.
- It takes on average anywhere from 3 to 5 years to build transmission once the need has been identified. Alberta presently has about 26,000 kilometres of transmission lines.
- Demand for power increased 80 per cent over the past 20 years (5,894MW – 10,609 MW) with the peak demand growth forecasted to average 3.3 per cent per year for the next 10 years and 2.5 per cent per year for the next 20 years.
- The AESO's forecasts suggest that over the next 20 years more than 11,000 MW of new generation is needed to ensure we have enough power to meet the needs of Albertans. (Current generating capacity: 13,888 MW)
- Approximately 5,700 MW of generation is required over the next 10 years (by 2022) to support a reliable electricity system.
- The cost of transmission is in direct correlation to the use of the transmission system. The highest users pay the highest costs for building new transmission.
- Alberta consumers pay for existing transmission and transmission upgrades and expansions according to their use of the transmission system. Transmission costs in Alberta are split in the following ways:
  - Industrial 61%
  - Commercial 19%
  - Residential 16%
  - Farms 4%