Alberta Electric System Operator's (AESO) Considerations on Energy Transition

Recent Discussion Papers (conclusions of both have become more immediate and continue to grow in magnitude)

1. Reliability Requirements Roadmap March 2023
2. AESO Net Zero Pathways Report June 2022

Renewable Development in Alberta (Pace of development continues to accelerate)

1. Large volumes of solar/wind/storage installed and permitted
    a. 4900 MW installed
    b. 3900 MW under construction
    c. 3000 MW regulatory approval and 23,000 MW announced
    d. Peak load in province is 12,000 MW
2. Reasons for large renewable development
    a. One of few jurisdictions in North America where you keep ownership of environmental attributes (credits, offsets, capacity value etc)
    b. Environmental attributes can be used for own purposes (can effectively export attribute value for compliance requirements outside of Alberta)
    c. Reasonable permit access
    d. Can execute project without government owned monopoly interference

Cost Realities of Energy Transition

1. Repowering the system to comply (as best we can) with clean electricity standards will add approximately $50 billion in new costs to enter system over next 20 years (AESO Net Zero Pathways Report).
2. Reliability costs - will need to develop new reliability service products to ensure capacity available on peak days and high renewable generation days and to guarantee grid stability. No estimate on reliability costs at this time.
3. As capacity factors of thermal generation fleet drops - risk that they shut due to poor economics.
4. Transmission costs increasing per MWh delivered due to more generation on system (renewable and thermal reliability backstop), diverse locations of generators requiring more transmission, and low load factor of renewable generation. May be somewhat offset as electricity demand increases.
5. Zero Congestion policy creates costly obligation when capacity factors of generation (renewable and thermal) are dropping as the system changes.
6. Ineffective generation development siting signals combined with load pays and zero-congestion obligation is driving inefficient outcomes from a transmission development perspective and allocating that cost fully to load.
7. The prohibition of Non-Wires Alternatives is now mis-placed. This was put in place at a time when NWA were largely limited to generation/TMR. Battery storage has changed the realities of this approach.

8. AESO does not have a good estimate of the need to rebuild the distribution system to accommodate increased distribution demand.
9. Allocation of transmission costs are currently 100% to load
    a. Load pays all firming services and transmission.
    b. Many of the new renewable developments are built for ownership of the environmental attributes (offsets/credits or TIER, cap & trade credits, renewable capacity, RPS credits, net zero books) and not for the energy.
    c. Are consumers willing to pay the transmission for generation that is built for environmental attribute value that may not flow through to the consumers (i.e. value exported)?

Energy Only Market

1. Out of market payments can compromise the fidelity of the energy only market price signal. Payments for environmental attributes (subsidies, credits, carbon tax on thermal, RPS payments, etc) can create uncertainty for thermal generation development.
2. Price becoming more volatile; higher highs and lower lows. System flexibility is falling, creating supply/ramping challenges in the intra-day time frame.
3. Price volatility/ unpredictability make investment decisions more challenging for merchant generators.
4. A concern that energy only price signal is not providing incentives for reliable generation (both in the short term and the longer term). There may be an argument for a greater degree of central resource planning than currently is done with energy only market.
5. Growing sentiment in industry that change is inevitable in the power market design. AESO is hearing this clearly from many (most) market participants.

AESO Concern - Pace of change

1. Traditional generation provides system resilience attributes that renewable generation does not. Thermal generation tends to provide system strength in frequency and voltage whereas renewables tend to rely on system strength.
2. Many technical issues need to be addressed with larger amounts of renewables in system (see Reliability Requirements Roadmap).
3. There is a growing recognition that the quantum of change required to meet Net-zero type goals creates a low probability of an affordable, reliable, and decarbonized outcome
4. Much of the concern is anchored in the pace required (12 years is now a very short time before 2035). Policy uncertainty, regulatory requirements, technology commercialization and cost curve limitations, supply chain risks, etc. are all working to create a very challenging outcome.
5. Driving toward a goal that is going to create an unacceptable reliability or cost outcome is sub-optimal if a more thoughtful approach can deliver the desired outcomes later with more certainty and lower cost.