SEATTLE CITY LIGHT AS A MARKET PARTICIPANT

NWHA FALL REGIONAL WORKSHOP | REINVIGORATING HYDROPOWER

Josh Walter | October 10, 2019
SEATTLE CITY LIGHT

- 10th Largest Public Power Electric Utility
- Large Hydro Generator (~2000Mw)
- High Growth Urban Area
- Uncertain Electrical Load Growth
- Changing Customer Expectations
  - EV, Solar, and Clean Generation
  - Non-Wire Alternatives (Batteries and other DERs)
  - Improved Customer Experience
### GENERAL INFORMATION

<table>
<thead>
<tr>
<th>Category</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service Area Population</td>
<td>906,595</td>
</tr>
<tr>
<td>Service Area Size</td>
<td>131.31 sq. mi.</td>
</tr>
<tr>
<td>Personnel (full-time equivalent positions)</td>
<td>1,771</td>
</tr>
<tr>
<td>Major Substations</td>
<td>16</td>
</tr>
<tr>
<td>Unit Substations</td>
<td>1</td>
</tr>
<tr>
<td>Commercial and Industrial Power Transformers</td>
<td>56</td>
</tr>
<tr>
<td>Distribution Circuit Miles</td>
<td>2334.6</td>
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<tr>
<td>Network Distribution Circuit Miles*</td>
<td>309</td>
</tr>
<tr>
<td>Meters</td>
<td>460,609</td>
</tr>
</tbody>
</table>

*Includes the downtown business district, First Hill and the University District.

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**SERVICE AREA AND SUBSTATIONS**

[Map of Seattle City Light service area and substations with labels for various substations and city districts.]

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**THE NATION’S GREEUEST UTILITY | 3**

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**Seattle City Light**
Seattle City Light serves over 460,000 customers in Seattle and eight adjacent jurisdictions.
2017 SOURCES OF POWER
(IN PERCENT MEGAWATT-HOURS)

**GENERATED**
- Boundary
- Skagit
- Cedar Falls & South Fork Tolt

**TREATY**
- BC Hydro

**PURCHASED**
- BPA
- Other
WESTERN EIM & FUTURE MARKET PARTICIPATION
WESTERN ENERGY IMBALANCE MARKET (EIM)

- EIM is a Real-Time Market that finds the lowest cost energy to serve real-time customer demand across a wide geographic footprint.

- A well-designed electricity market is built on a foundation of resource adequacy and has features that:
  - Provide for intra-hour energy balancing
  - Compensate capacity resources that provide system reliability and flexibility

- SCL will join on April 1, 2020
WHY ARE WE JOINING THE MARKET?

Environmental benefit of integrating renewables through flexible hydro

Core Business benefit of employee growth, improved coordination

Furthers our mission of Customers first

Future Readiness for greater Market Integration
WHAT ARE KEY MARKET ISSUES FOR SEATTLE?

- Governance
- Price Formation
- Resource Sufficiency
- GHG Accounting
CAISO GOVERNANCE & EIM/EDAM GOVERNANCE

CA Governor and CA Senate

ISO Board of Governors

EIM Governing Body

No Advisory Committees with formal input process on issues

Politically appointed; statutorily obligated to reduce costs to California consumers and ensure furtherance of California consumer and environmental protection state law

CAISO CEO

CAISO Staff

Market Design | Operations

Market

Reliability Coordination

EIM | Real-Time | Day-Ahead

Primary Authority limited to issues where primary driver is EIM

Department of Marketing Monitoring

Seattle City Light
**PRICE FORMATION & PERFORMANCE**

- Compensation for resource attributes provided
- Proper price signals that accurately indicate shortages and scarcity
- Well functioning market that minimizes out of market actions

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**Figure 6. Generator Reliability Attribute Matrix**

<table>
<thead>
<tr>
<th>Resource Type</th>
<th>Frequency Response (Inertial &amp; Primary)</th>
<th>Voltage Control</th>
<th>Fast Reserve</th>
<th>Ramping</th>
<th>Fuel Assurance</th>
<th>Flexibility</th>
<th>Other</th>
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</thead>
<tbody>
<tr>
<td>Hydro</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
</tr>
<tr>
<td>Natural Gas - Combustion Turbine</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
<td>⬤</td>
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<tr>
<td>Oil - Steam</td>
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<tr>
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<tr>
<td>Natural Gas - Steam</td>
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<td>OIL / Diesel - Combustion Turbine</td>
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<td>Demand Response</td>
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<td>Wind</td>
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</table>
RECENT SUCCESSES FOR HYDRO
MARKET POWER MITIGATION AND DEFAULT ENERGY BIDS OVERVIEW

Local Market Power Mitigation in CAISO Markets:

- Market power: ability of a firm to raise the market price of a good or service over marginal costs for a profit.

- Market-based bids are allowed when the market is competitive, cost-based bids or “default energy bids” that reflect marginal costs are used when an entity is deemed to potentially exercise market power.

- CAISO uses a “three pivotal supplier test” mitigation framework. Tests whether an entity has the potential to exercise market power. When there is a constraint in a local area, test removes the three largest suppliers in the area and tests to see if there is sufficient supply to meet demand in the area. If no, supplier is “pivotal” and mitigation triggers.
MARKET POWER MITIGATION AND DEFAULT ENERGY BIDS

Default Energy Bid

- DEB is designed to approximate a resources variable costs (e.g. cost of fuel to produce electricity) instead of marginal costs which would also include opportunity costs.

- When mitigation triggers, a resource’s bid is “mitigated” to its DEB or the competitive locational marginal price at the resource’s location, whichever is higher.
RECENT SUCCESSES FOR HYDRO RESOURCES

• CAISO commenced a policy initiative and stakeholder initiative to address mitigation and DEB issues in September of 2018 in response to market participants with hydro resources.

• Highlights of CAISO’s proposal:

  **Hydro DEB formula**
  
  o All hydro with storage eligible.
  
  o Incorporates opportunity costs tied to maximum storage horizon of a resource. CAISO defines short-term storage resources as those with any amount of storage-3 months and long-term storage as 4 months+ of storage.
  
  o Formula points to max of gas floor price, day-ahead index, balance of month index and month ahead indices multiplied by a “scalar.”
  
  o Gas floor price floor mean to account for real-time changes in market prices (heat rate * gas prices).
  
  o “Scalar” targeted to the storage horizon of a resource and is based on achieving an acceptable standard of efficient dispatch for a resource. Proposal for short-term storage is 135% and long-term storage is 110%.
FERC ORDER APPROVING CAISO PROPOSAL

• On September 30th, FERC published its order on the LMPM initiative
  o Affirmed DEB proposal and changes to CAISO’s mitigation timing process
  o Denied CAISO’s “Net Export Limit” proposal

• FERC found the DEB just and reasonable and ready to be implemented on October 14th.

• Huge success for Seattle as it will allow our DEB to accurately reflect our opportunity costs when mitigated.
NEXT STEPS

• Extension of CAISO’s Day-Ahead Market to EIM entities

• Improvements to CAISO’s Day-Ahead Market run that could improve price formation issues for capacity backed resources like Hydro

• Improvements to CAISO’s EIM Governing Body through the Governance Review Committee

• Continued review and advocacy on price formation issues to compensate hydro for its resource characteristics.
OUR MISSION
Seattle City Light is dedicated to delivering customers affordable, reliable and environmentally responsible electricity services.

OUR VISION
We resolve to provide a positive, fulfilling and engaging experience for our employees. We will expect and reinforce leadership behaviors that contribute to that culture. Our workforce is the foundation upon which we achieve our public service goals and will reflect the diversity of the community we serve.

We strive to improve quality of life by understanding and answering the needs of our customers. We aim to provide more opportunities to those with fewer resources and will protect the well-being and safety of the public.

We aspire to be the nation’s greenest utility by fulfilling our mission in an environmentally and socially responsible manner.

OUR VALUES
Safety, Environmental Stewardship, Innovation, Excellence, Customer Care