

Energy Storage Roadmap & Flexibility Roadmap Information Session

August 7, 2019

Topic	Duration
Welcome & Introductions	15 min
Flexibility Roadmap	15 min
Q&A	15 min
Energy Storage Roadmap	30 min
Q&A	15 min

Welcome & Introductions

- AESO is mandated to promote the fair, efficient and openly competitive exchange of electricity
- *Dispatchable Renewables and Energy Storage report** published in September 2018
 - Recommended creating an energy storage roadmap and a flexibility roadmap
- Legislation, regulations and AESO Authoritative Documents do not currently contemplate the integration of energy storage
- AESO is committed to working through these issues

* www.aeso.ca/assets/Uploads/AESO-Dispatchable-Renewables-Storage-Report-May2018.pdf

Flexibility Roadmap

- As detailed in section 5.5.1 of the *Dispatchable Renewables and Energy Storage report*, the objectives of the Flexibility Roadmap are to:
 - Sustain the flexibility modelling process to forecast future flexibility needs and capabilities, including calibrating the models from actual results
 - Proactively plan to incrementally enhance system flexibility through cost-effective approaches, should additional flexibility be required in the future

- As explained in the AESO letter* to stakeholders dated Feb. 7, 2019, the following Energy and AS Markets items of the Market Evolution Roadmap items are considered part of the Flexibility Roadmap:
 - Dispatch tolerance
 - Shorter settlement
 - Ramp product
 - Pricing (price cap, negative pricing, shortage pricing)

* www.aeso.ca/assets/Uploads/market-roadmap-strategy-letter-FINAL2.pdf

- In 2019 and 2020, the Flexibility Roadmap will:
 - Develop related AESO processes
 - Implement the processes and publish the first flexibility performance report and the first flexibility needs report in 2020
 - Assess enhancements to technical requirements and wind / solar forecasting
 - Assess enhancements to real-time operational tools in managing Net Demand Variability
 - Advance related Market Evolution Roadmap items
- Flexibility Roadmap is expected to be completed in 2020, after which:
 - The established processes will continue to be implemented as part of AESO routine business
 - Implementation of measures that received approval to proceed will follow the normal stakeholder consultation and change process
 - Measures that are not being implemented immediately will be monitored in the future as part of regular AESO business

Objective	Work Components	Expected Timelines
<p>Sustain the flexibility modelling process to forecast future flexibility needs and capabilities, including calibrating the models from actual results</p>	<p>1. Develop and implement process to forecast and report on flexibility needs and capabilities, including calibration to actual data</p>	<p>First report published by mid-2020</p>
	<p>2. Develop and implement process to report on actual system flexibility performance</p>	

Objective	Work Components	Expected Timelines
Proactively plan to incrementally enhance system flexibility through cost-effective approaches, should additional flexibility be required in the future	1. Enhance predictability of asset generation levels in response to dispatch (dispatch tolerance)	Rule consultation to start in Q4 2019
	2. Assess market pricing signals for flexibility against flexibility needs (shorter settlement, ramp products, energy market pricing changes)	Timing and scope TBD - assessing impacts from CM decision
	3. Assess potential enhancements to technical requirements for generation assets to provide flexibility	By Q1 2020
	4. Assess enhancements to wind and solar forecasting	By Q4 2019
	5. Assess enhancements to dispatch decision tool for real-time operation	By Q4 2019

Questions about the Flexibility Roadmap?

Email: info@aeso.ca

Energy Storage Roadmap

- Sets out the AESO's plan to facilitate the integration of energy storage
 - Improves clarity required for market qualification and participation, and enable efficient, effective connection, monitoring and control of energy storage facilities
- Aims to meet in-service dates starting in mid-2020
- The long-term integration of energy storage forms a key part of the Energy Storage Roadmap
 - Includes changes to AESO Authoritative Documents and longer-term AESO grid & market system changes

- Level playing field
 - Alberta policy, legislation and regulations lack clarity and specificity with regard to energy storage
 - The unique attributes of energy storage facilities are not the same as loads or generators, as currently contemplated in the AESO Authoritative Documents, resulting in a lack of clarity in the application of those documents
 - Energy storage does not currently enjoy the same ease of connection as other assets
- Value and benefits
 - Energy storage can optimize intermittent generation
 - Energy storage could reduce costs to AES infrastructure through transmission and distribution deferral, resulting in potential cost benefits to customers
 - Fast frequency response from energy storage can enable reductions in required volumes of certain ancillary services, resulting in potential cost benefits to customers
- Other jurisdictions
 - Other jurisdictions have developed (or are developing) processes and rules to incorporate energy storage technologies and services into their regulatory and market frameworks

- Objective of the Principles:
 - Industry alignment
 - Guide the development of the Energy Storage Roadmap
- General Principles related to the Roadmap Objectives:
 - The AESO will facilitate the integration of energy storage
 - Energy storage will be approached as a **unique asset type**; it is neither a load nor a generator
 - The AESO will be impartial to energy storage technology, configuration and point of connection

- ‘Working’ definition:

“Energy Storage is any technology or process that is capable of using electricity as an input, storing the energy for a period of time and then discharging electricity as an output”



ENERGY STORAGE

- Committed
- Current state
- Future state
- Bridge the gap



Transmission

Forecasting & Market Analytics
Transmission Planning
Transmission Engineering
& Standards
Transmission Connection



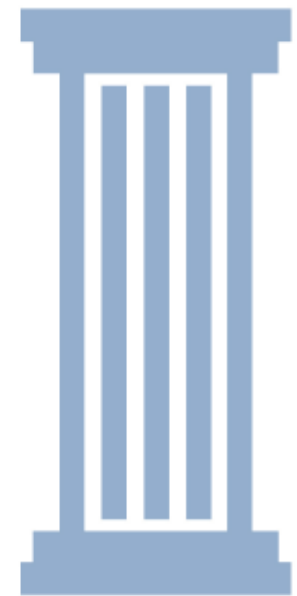
Markets

Market Design
Tariff Design
Operations Planning
& Engineering



Tools

Operations Systems
Grid & Market Operations
Finance & Settlement
IT Systems



Regulatory

Legal & Regulatory

- The AIES currently has no transmission-connected energy storage facilities
- Energy storage can participate in Alberta's electricity markets as two separate assets, a generator or a load
- Existing AESO Authoritative Documents and tools do not fully contemplate energy storage, resulting in a lack of clarity
- The AESO is currently engaging stakeholders in a review of the bulk and regional tariff design
 - Including review of the applicable tariffs or opportunity services as they relate to energy storage

Integrated Schedule – Summary

2019

2020

2021

2022

ROADMAP
DEVELOPMENT

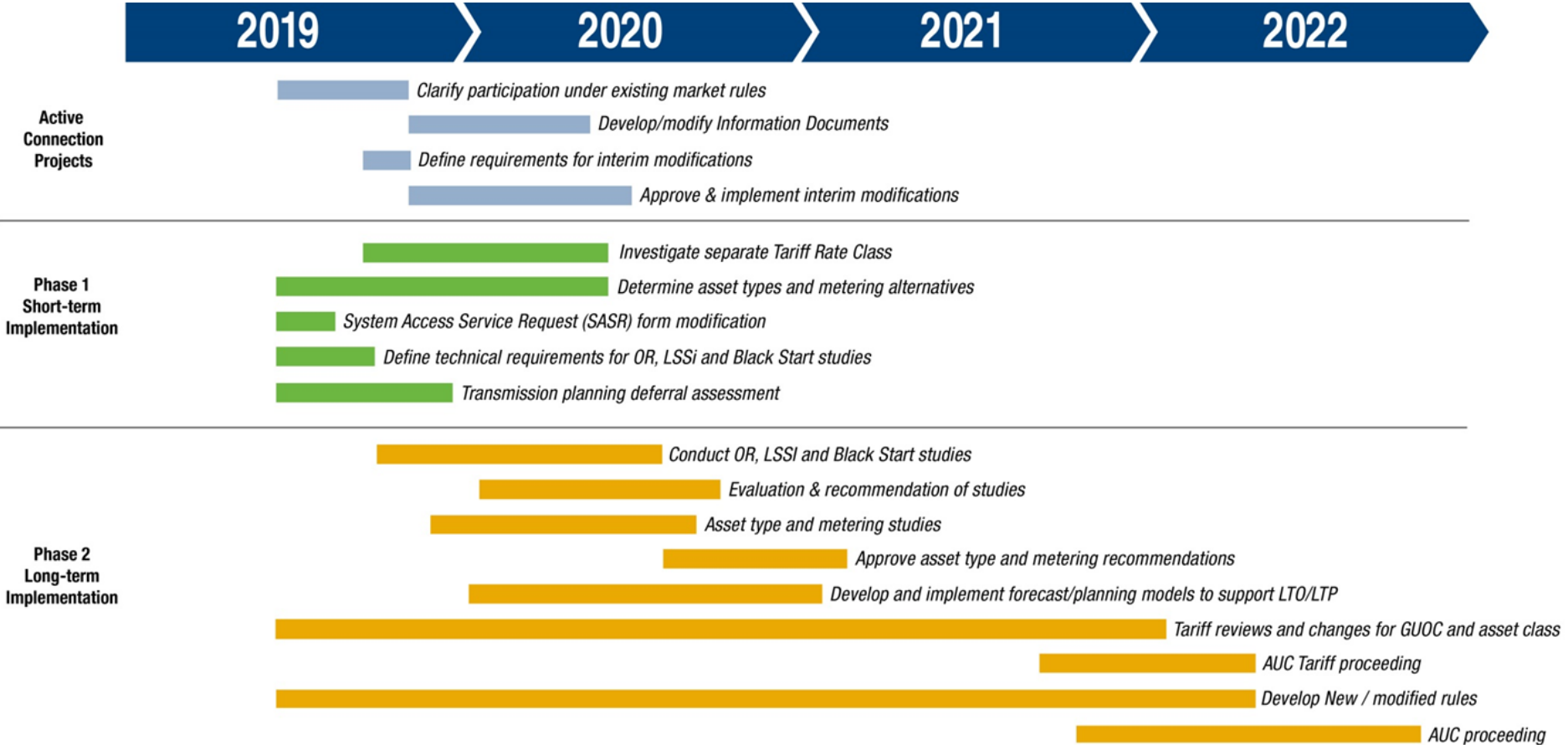
ROADMAP REFINEMENT
AND CONSULTATION

ACTIVE CONNECTIONS
PROJECTS

SHORT-TERM
IMPLEMENTATION

LONG-TERM
IMPLEMENTATION

Integrated Schedule



- Energy Storage Roadmap
 - Published on AESO.ca this afternoon
 - Feedback survey
 - Deadline September 6, 2019
- Implementation
 - Engage with industry
 - Ongoing communication
 - Review potential working groups
 - Continue Phase 1 short-term implementation
 - Provide clarity to enable active energy storage connection projects

Questions about the Energy Storage Roadmap?

Email: energystorage@aeso.ca



- **Twitter:** @theAESO
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Thank You