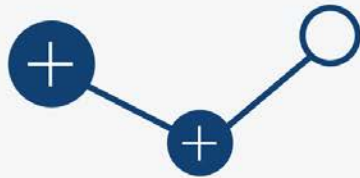


Sub-hourly settlement: Option exploration

April 2020

In accordance with its mandate to operate in the public interest, the AESO will be audio and video recording this session and making the recording available to the general public at www.aeso.ca. The accessibility of these discussions is important to ensure the openness and transparency of this AESO process, and to facilitate the participation of stakeholders. Participation in this session is completely voluntary and subject to the terms of this notice.

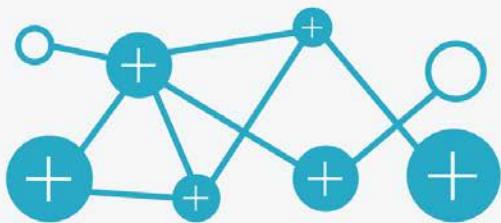
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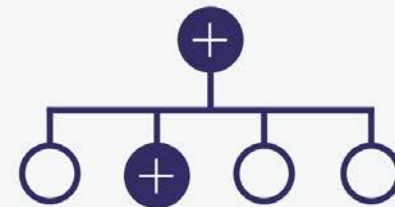
Connect
CUSTOMERS



PLAN
transmission



Operate the
GRID



Plan and Operate the
MARKET

- Responsible for safe, reliable, economic planning and operation of Alberta Interconnected Electric System (AIES)
- AESO is a not-for-profit, statutory corporation; independent of government and industry:
 - Governed by independent board appointed by Minister of Energy
 - Must operate in the public interest
 - No financial interest in any generation unit, transmission or distribution infrastructure
 - No government funding; costs recovered from Alberta ratepayers



The background of the slide is a blue-tinted photograph of two hands shaking in a firm grip. The hands are positioned in the center-left of the frame. The background is slightly blurred, showing what appears to be a cityscape or industrial setting. A network of thin white lines and dots is overlaid on the right side of the image, suggesting a digital or interconnected theme.

OUR ENGAGEMENT PRINCIPLES

Inclusive and Accessible

Strategic and Coordinated

Transparent and Timely

Customized and Meaningful

Items	Time	Presenter
Welcome and introductions	9:00 – 9:10	Murray Hnatyshyn
Stakeholder feedback review	9:10 – 9:30	Murray Hnatyshyn
Options	9:30 – 10:30	Thanh Nguyen
Other Considerations	10:30 – 11:00	Thanh Nguyen
Q&A	11:00 – 11:30	All
Next Steps	11:30 – 11:45	Murray Hnatyshyn

Review of Session 1 and Stakeholder Feedback

- Determine if there is value in moving towards a shorter interval and if yes, what interval?
- Through the stakeholder engagement the AESO is looking to better understand:
 - The expected enhancement in price fidelity and flexibility
 - The expected financial impact on loads and generators
 - Implementation costs for AESO and market participants
 - Timing required to transition to a sub-hourly settlement interval

- AESO received comments about:
 - Consultation approach
 - Support and concern about initiative
 - Scope
 - Implementation options
 - Implementation impacts
 - Implementation timing

- Timing may be rushed
- Would like more facilitated discussions
- Options should be explored before costs can be estimated
- Cost estimates require more time to be provided
 - Estimates given ranged from 2 -12 months

- Reasons for support
 - Improving price fidelity and incenting flexibility are desirable enhancements to the energy only market
 - May incent investment in storage
 - Allows greater load participation
 - Align with more electrified society and distributed generation technologies with revenue and billing based on actual provision and use of electricity

- Time of fiscal constraint in Alberta and not a time to introduce non-essential change
- Renewables concerns
 - Create wealth transfer from renewables to conventional generators which may cool renewable investment in the province
- Problem not well defined – seems like a solution looking for a problem.

Review

Scope from Session 1

In scope	Out of scope
<ul style="list-style-type: none">• Confirm opportunities and define the problem• Review of the benefit and costs of moving to sub-hourly settlement and how it will incent flexibility and increase price fidelity• Impacts to operating reserves and energy offers• Develop and assess sub-hourly settlement options• Identify potential rule changes required to implement sub-hourly settlement	<ul style="list-style-type: none">• Implementation of any needed dispatching and offer changes• Implementation of any needed operating reserves changes• Implementation of any needed rule changes - would follow AUC Rule 017 process

- Scope should be expanded
 - Include a session on how dispatch is done and SMP is derived
 - Analysis on price elasticity: include an estimate of ability of gains from end use customers responding on a sub-hourly basis
 - Explanation of how SHS will impact flexibility roadmap
- Scope should be reduced
 - Scope is potentially far reaching and can impact retail and tariff billing processes
- No Change
 - Avoid scope creep - contain to SHS and Payment to Suppliers on the Margin – fundamental changes to market design not needed at this time
 - Don't change dispatch approach - it would cause fundamental change to market

- Duration of the interval - mixed responses from market participants
 - Stay hourly – no change needed
 - 15 minutes - most interval meters are currently calibrated to 15 minutes
 - 5 minutes provides the best price signal
- Applicability - mixed responses from market participants
 - It should apply to all
 - Can be different between generators and loads
 - But if applied to loads, must be the same for all loads
 - Allow opt in for cumulative meters but mandatory for interval meters
 - Voluntary for all - SHS is only beneficial to subset of market participants
 - Develop a pilot for loads
 - Restricted to self-retailers and price responsive loads
 - Allows for better assessment of changes needed to billing and load settlement process
 - Minimizes DFO costs

Stakeholder comments

Implementation options - suggestions

- Develop an equivalent PSM for load
- Develop other products to incent flexibility
 - Ramp product
 - AS product designed to attract loads and peaking generation

- Market participants generally agreed with the impacts identified by the AESO
 - Metering
 - IT systems
 - Data storage
- Market participants identified the following additional impacts
 - Contracts
 - Renegotiations of existing market deals
 - Energy Price Setting Plan (RRO)
 - Measurement Canada Standards
 - Need to ensure changes suggested by AESO are aligned with MCS changes
 - Human resources costs

- Metering: changing of POD meters, reprogramming current interval meters
 - 3 months to 10 years
 - Shorter for those with interval meters, longer for those with cumulative meters
- IT systems: upgrading servers, software, data collection systems, settlement systems
 - 4 to 36 months
- Data storage: upgrading of servers, data storage
 - 3 to 24 months
- Other: contract renegotiations, update reports
 - 18 months +

Implementation options

The AESO heard from stakeholders

- more time is required to estimate costs
- costs can be better estimated when options are better understood

Options to be explored prior to costs

- This section explores
 - Offers and settlement intervals
 - Dispatch and settlement intervals
 - Duration of sub-hourly interval
 - Participation approaches
 - Generation
 - Load
 - Intertie

Offers, dispatch and settlement interval

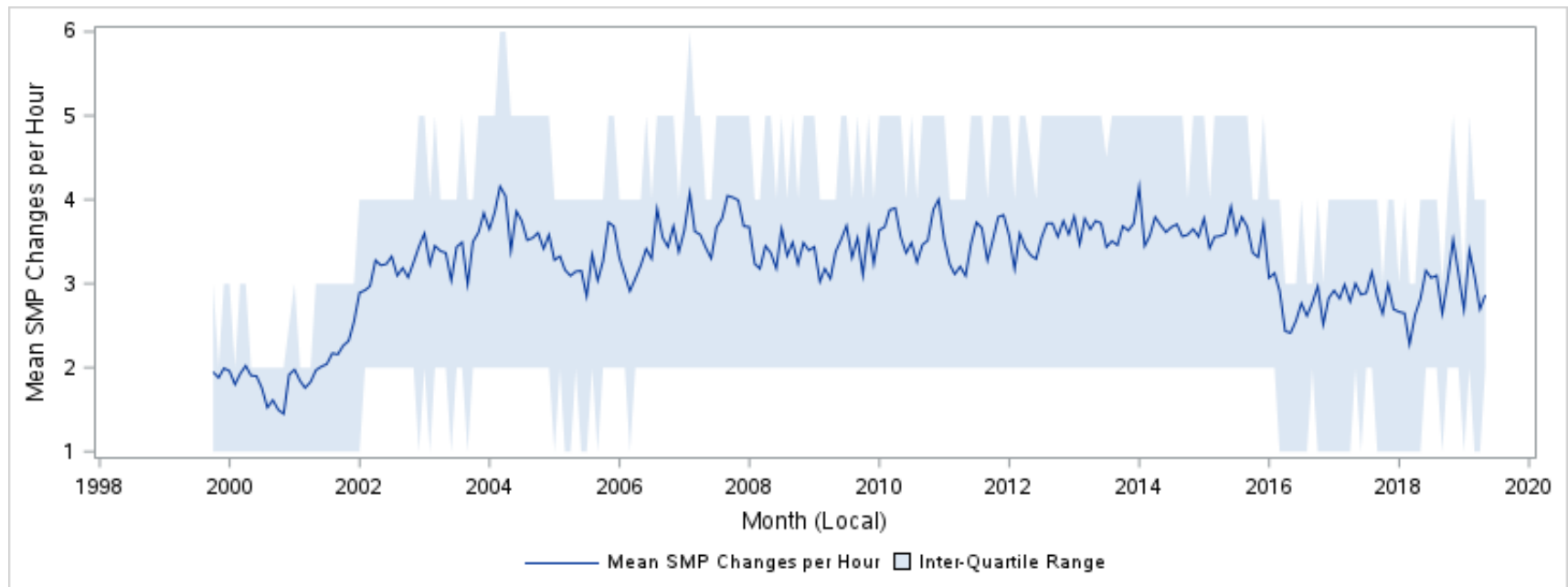
- Currently offers are submitted on an hourly basis
 - Restatements can occur at any time for an acceptable operational reason
- Do offers need to align with the settlement interval?
 - Points for:
 - Better aligns offers with period over which payment will be received
 - Points against:
 - Asset operational status doesn't change with offer interval – this holds true under current hourly interval
 - May introduce unnecessary system changes, increasing implementation complexity

- Current dispatch practices:
 - Dispatch supply on an as needed basis
 - Dispatch to ensure system flexibility needs are met
- Does dispatch need to align with the settlement interval?
 - Points for
 - Better aligns generator payment with delivery of energy
 - Points against
 - May need to introduce a very short settlement interval to allow for dispatch to meet the system balancing needs
 - Argument for changing current practices is not strong – past practices have met system needs, past Net Demand Variability studies have indicated this approach will meet future system needs
 - Unless the settlement interval aligns perfectly with the dispatch interval allocative efficiency loss still may occur as there is a mismatch between settlement and dispatch intervals

Duration of sub-hourly interval

- Currently the following intervals are used
 - All interval meters capture data on 15 minute basis
 - Most interval meters can be reconfigured to capture shorter than 15 minute intervals
 - Loads on cumulative meters are profiled on an hourly basis
- Options for duration of interval
 1. Continue to settle hourly
 2. Settle using 15 minute intervals
 3. Settle using 5 minute intervals

- Historically, there have been an average of 2 – 4 SMP changes each hour over the last 20 years
 - This is supportive of a 15 minute settlement interval



- Objective
 - To quantify the impact of the different interval options for sub-hourly settlement on generators and price responsive loads
 - Test the revenue impact for settlement at the hourly, 15 minute and 5 minute intervals
 - Test the cost impact for price responsive load for settlement at the hourly, 15 minute and 5 minute intervals
 - The revenue/cost difference for the different settlement intervals represents the gains from price fidelity, alignment between consumption and production at that time
- Data
 - Analysis used historical data (generation, price responsive load, SMP) for the last 5 years
 - For production volumes SCADA data was used for most of the assets in order to get 5 minute granularity. For other assets only 15 minute volumes from settlement data could be used

- Methodology
 - We determined the settlement interval prices for hourly, 15 minutes and 5 minutes
 - For each of the different settlement intervals we determined the production and consumption of each asset
 - Revenue or charge was determined by multiplying the relevant pool price with the production or consumption in the interval

- Assumptions
 - The 5 minute interval calculation was done only for a subset of assets where their SCADA data was a good estimate of their net to grid generation
 - Assumed that shortening settlement interval has no impact on offer behaviours or asset operations
 - Did not take into account uplift payments into revenues for generators

Generator revenue

15 minute interval (All assets on CSD)

Hourly Revenue (\$)					
Technology	2015	2016	2017	2018	2019
Coal	1,167,670,060	663,218,452	772,471,839	1,544,637,199	1,607,879,334
Cogeneration	324,208,450	189,566,690	244,345,106	665,776,124	761,041,112
Combined Cycle	200,765,511	111,403,465	169,963,637	477,346,333	543,710,658
Hydro	74,083,026	33,123,345	44,276,883	110,733,995	119,611,038
Other	21,078,489	10,555,115	11,302,136	35,962,467	36,755,717
Simple Cycle	67,542,456	18,179,839	27,774,926	170,319,372	209,385,424
Wind	89,724,597	71,705,174	87,447,007	159,578,231	161,821,085
Total	1,945,072,590	1,097,752,079	1,357,581,533	3,164,353,721	3,440,204,368

% Change in going from Hourly to 15 minute interval					
Technology	2015	2016	2017	2018	2019
Coal	-0.06%	0.00%	-0.01%	0.05%	0.05%
Cogeneration	0.09%	0.00%	0.02%	-0.01%	0.01%
Combined Cycle	0.07%	0.07%	0.06%	0.02%	0.04%
Hydro	0.47%	0.15%	0.40%	0.18%	0.33%
Other	0.47%	0.04%	0.09%	0.05%	0.07%
Simple Cycle	0.94%	0.24%	0.40%	0.13%	0.19%
Wind	-0.17%	-0.04%	-0.10%	-0.11%	-0.19%
Total	0.03%	0.02%	0.02%	0.03%	0.04%

Generator revenue

5 minute interval*

	Hourly Revenue (\$)				
Technology	2015	2016	2017	2018	2019
Coal	1,167,670,060	663,218,452	772,471,839	1,544,637,199	1,607,879,334
Cogeneration	90,137,943	49,973,677	69,138,202	192,289,595	241,486,640
Combined Cycle	155,926,370	97,024,451	149,728,236	385,368,975	428,463,823
Hydro	74,083,026	33,123,345	44,276,883	110,733,995	119,611,038
Other	17,838,618	8,122,733	7,720,585	27,376,650	27,465,134
Simple Cycle	59,241,173	16,370,033	24,548,768	145,571,369	179,530,290
Wind	89,724,597	71,705,174	87,447,007	159,578,231	161,821,085
Total	1,654,621,788	939,537,864	1,155,331,519	2,565,556,014	2,766,257,344

	% Change in going from Hourly to 5 minute interval				
Technology	2015	2016	2017	2018	2019
Coal	-0.07%	0.00%	-0.01%	0.05%	0.05%
Cogeneration	0.32%	-0.02%	0.05%	0.00%	0.05%
Combined Cycle	-0.04%	0.06%	0.05%	0.03%	0.04%
Hydro	0.60%	0.20%	0.47%	0.27%	0.45%
Other	0.52%	0.06%	0.14%	0.08%	0.08%
Simple Cycle	1.01%	0.23%	0.45%	0.18%	0.24%
Wind	-0.19%	-0.05%	-0.11%	-0.12%	-0.21%
Total	0.02%	0.02%	0.02%	0.05%	0.06%

*Subset of assets used – ones with 5 minute data available

Generator financial impacts comparison of 15 vs 5 minutes

% Change in going from 15 to 5 minute interval

Technology	2015	2016	2017	2018	2019
Coal	-0.01%	0.00%	0.00%	0.00%	0.01%
Cogeneration	0.04%	0.00%	0.01%	0.00%	0.01%
Combined Cycle	0.00%	0.01%	0.01%	0.00%	0.00%
Hydro	0.12%	0.05%	0.07%	0.09%	0.12%
Other	0.02%	0.01%	0.01%	0.01%	0.01%
Simple Cycle	0.09%	0.02%	0.03%	0.03%	0.02%
Wind	-0.02%	-0.01%	-0.01%	-0.01%	-0.02%
Total	0.01%	0.00%	0.00%	0.01%	0.01%

- Change of revenue as the interval is shorted impacts some technology more than others.
- The difference in % gain from 15 to 5 minute interval is minimal with most year between 0.00 to 0.01%
- Individual assets may have more fluctuations as this data is an aggregation of the technology type

Generation total revenues

15 minute settlement

- Overall, total generation revenues increase marginally when moving to a shorter settlement interval of 15 minutes
- This is due to a better reflection of prices during periods of production

Yearly Revenue Comparison for Generators

Year	Total Generation (MWh)	Total Revenue 15 minute (\$)	Total Revenue hourly (\$)	Change in Total Revenue (\$)	% Change in Total Revenue
2015	57,739,238	1,945,672,992	1,945,072,590	600,402	0.031%
2016	58,849,613	1,097,925,932	1,097,752,079	173,853	0.016%
2017	59,871,752	1,357,859,262	1,357,581,533	277,729	0.020%
2018	61,303,498	3,165,412,709	3,164,353,721	1,058,988	0.033%
2019	61,162,869	3,441,726,987	3,440,204,368	1,522,619	0.044%

Price responsive load

Benefits of sub-hourly settlement

- The AESO identified existing price responsive loads and evaluated their electricity costs using a 15minute settlement relative to past hourly bills
- Overall, electricity costs decline but only marginally
 - Note this analysis does not take into consideration changes to behaviour that these loads may enact with a shorter settlement interval

Yearly Cost Comparison for Price Responsive Load

	2015	2016	2017	2018	2019
Total Load (MWh)	1,940,363	1,903,467	1,859,877	1,595,269	1,834,973
\$ Cost Hourly Settlement	46,929,564	33,729,833	38,816,073	60,066,122	74,911,512
\$ Cost 15 Minute Settlement	46,668,183	33,720,455	38,777,053	60,022,447	74,793,241
\$ Cost 5 Minute Settlement	46,670,577	33,720,375	38,775,047	60,038,914	74,815,150
% benefit from hourly to 15 minute	0.01%	0.00%	0.00%	0.00%	0.00%
% benefit from hourly to 5 minute	0.01%	0.00%	0.00%	0.00%	0.00%

- The analysis suggests that price fidelity signals can be enhanced with a sub-hourly settlement
 - However, the improvements are only marginal using historical data
 - These amounts are under-valued as the analysis assumed that there were no changes to asset behaviours under the different interval scenarios. It would be logical to assume that under a sub-hourly regime, the assets would provide more of a response and thus the impacts would be larger.

- Continue to settle the energy market on an hourly interval
 - Points for
 - No changes required and thus provides stability to the market
 - Points against
 - Does not improve price fidelity as consumption/production of power does not align with price in that moment in time
 - Creates or maintains misalignment with other jurisdictions as they are moving towards sub-hourly settlement

Duration options

15 minute interval

- Settle the energy market on 15 minute interval
 - Points for
 - Minimal changes for generation and load interval meters as all interval meters are collecting data on 15 minute interval
 - Better alignment of price signals with consumption and production
 - Aligns with current Tariff coincident peak measure
 - Better alignment with other jurisdictions as they are moving towards sub-hourly settlement
 - Aligns with historical data showing SMP changes occurring less than 4 times an hour on average
 - Provides for a market with better price flexibility signals which align with new generation and load types
 - Points against
 - Requires changes to rules, systems and processes
 - Alignment of pricing and dispatch still mismatched
 - *Payment to supplies on the margin likely needs to continue*
 - If applied to cumulative meter loads this represents a change in current practices

- Settle the energy market on a five minute interval
 - Points for
 - Improves price fidelity as consumption and production of power more closely align with price signals
 - Enables the AESO to be best able to meet future flexible resource needs (ie. batteries/ real time of use meters)
 - Better alignment with other jurisdictions as they are moving towards sub-hourly settlement
 - Points against
 - Changes to interval meters will be required to collect data on 5 minute basis increasing costs on meter recalibration and data storage
 - Minimal revenue changes between 15 minutes and 5 minutes settlement interval
 - Requires changes to rules, systems and processes
 - If applied to cumulative meter loads this represents a change in current practices

- Do you think the analysis is complete?
- Is there anything additional you believe the AESO should do?
- Would you be changing your behaviour to optimize the benefits of sub-hourly settlement and how would we quantify this benefit?

Participation options

Participation considerations

Not all participants have interval meters and change out costs are expensive for both the meters and the software

- Generation: all generators have interval meters capturing data on a 15 minute basis
 1. Settled all generators sub-hourly
 2. Voluntary participation: opt in
- Load (wholesale): a small number of load sites have interval meters but these sites represent approximately 65% of the MWh consumption
 1. All loads settled sub-hourly
 2. Sub-hourly for loads with interval meters, all cumulative meters settled hourly
 3. Voluntary participation: opt in
- Intertie: based on e-tags and not metered
 1. Settle sub-hourly at same implementation timelines as generation and load
 2. Settle hourly until priced intertie initiative is completed

- All generators should participate in the shorter settlement interval
 - Points for
 - This will better align payment for generation with the performance of the generating unit
 - Will help to reduce the need for payment for suppliers on the margin making the costs associated with meeting load more transparent
 - *But likely not eliminate it with a 15 minute settlement interval*
 - Points against
 - Change isn't required – the current payment to suppliers on the margin allows generator payments to reflect their costs regardless of the pool price while dispatched
 - Does result in some minor re-allocation of revenues among generators
 - *Measured historically - wind generators experience a minor loss realized revenue*

- Voluntary - allow opt-in for generators
 - Points for
 - This will allow generators to better manage their costs associated with sub-hourly settlement
 - Points against
 - Will increase complexity of settlement process as optionality will have to be accounted for in the system
 - Price fidelity gains due to reduction in uplift payments (payment to suppliers on the margin) will not be maximized

- Concerns
 - If generators are settled sub-hourly, and some loads sub-hourly and others hourly there will be a difference in amount paid and collected
 - A true-up adjustment will be needed to bridge this gap
- To understand the magnitude of this issue, the AESO compared the differences in collected revenues for the different options
 - Option 1: all interval metered loads and cumulative loads on 15 minute settlements
 - Option 2: interval metered loads on 15 minute settlements, and cumulative loads on hourly settlements

- Data
 - We used 2019 settlement data and Daily Interval Meter data provided by the each Load Settlement Agent and Meter Data Manager
- Methodology
 - We determined the settlement interval prices for hourly, and 15 minutes
 - For each of the different settlement intervals we determined the consumption in each LSA area
 - The cumulative meter data was shaped using the DIM information
 - The energy charge was determined by multiplying the pool price in the interval with the consumption in the interval
 - The difference was determined by taking the amount collected in one option vs another

- We assumed that shortening settlement interval has no impact on offer behaviour of generation or load consumption patterns
- The calculations are aggregations of the retailers in the zone
 - Individual retailers may see a larger adjustment as these are netted at the zone level

Load true up adjustments

By settlement zone

LSA	Scenario 1 All settled on 15 minutes	Scenario 2 Partial settlement on 15 minutes	Difference	Difference %
Fortis	\$1,409,828,205	\$1,409,810,236	\$17,968	0.00%
ATCO	\$692,437,282	\$692,483,149	\$(45,867)	(0.01)%
EPCOR	\$452,717,460	\$452,643,104	\$74,355	0.02%
Enmax	\$566,135,994	\$566,025,211	\$110,782	0.02%
Lethbridge	\$49,788,668	\$49,782,241	\$6,426	0.01%
Total	\$3,170,907,609	\$3,170,743,941	\$163,664	0.01%

Load true up adjustments are minor

The impact of some loads remaining on an hourly settlement while others participate in sub-hourly settlement results in a true up allocation to the hourly load participant of approximately 0.01% of total revenue

- Settle all loads sub-hourly
 - Points for
 - Enables all loads to become price responsive
 - All loads are charged the same price and no true-up adjustments are needed
 - Interval change is a simple concept that is easily understood vs other complex options
 - Points against
 - AUC settlement code changes
 - Settlement process can be more complicated
 - *Profiling on cumulative sites has to be done on sub-hourly interval instead of hourly*
 - Not all loads able to or willing to alter consumption based on market prices

- Sub-hourly for loads with interval meters, all others settle hourly
 - Points for
 - Allows loads with interval meters to have billing better match their consumption – price responsive loads costs are reduced
 - A lower cost alternative for LSAs in terms of changing meters and profiling on cumulative sites
 - If transitioning to sub-hourly settlement, allows for a phase in of interval meters from cumulative meters
 - Points against
 - Requires changes to AUC settlement code
 - Settlement process can be more complicated
 - *True-up adjustment must be accounted for*
 - *LSA need to provide additional metering files – cumulative and interval separately*


































- Voluntary: allow opt-in for loads, run a pilot program for some loads
 - Points for
 - Allows loads with the flexibility to respond to price signals to benefit from sub-hourly settlement intervals
 - Points against
 - Requires changes to AUC settlement code
 - Settlement process can be more complicated and costly
 - *Will increase complexity of settlement process as optionality will have to be accounted for in the system*
 - *True-up adjustment must be accounted for and will be more complex*
 - *LSA need to provide additional metering files – cumulative and interval for both opt-in and those that don't opt-in*

- Settle intertie on a sub-hourly interval with same implementation timelines as rest of market
 - Points for
 - Implementation of sub-hourly consistent across all assets
 - Points against
 - Without priced interties, may not allow importers and exporters to respond to price within the scheduling interval
 - Priced interties initiative may require the same rules to be changed and thus these rules may go through rule change process twice within a short time frame
 - Tariff changes may be required



























- Make changes concurrently with priced interties implementation
 - Points for
 - Rule changes only required once as implication of sub-hourly settlement can be incorporated into priced interties initiatives
 - Minimal changes in intertie schedule expected until priced interties are implemented
 - *so intertie assets are not missing out on potential sub-hourly settlement interval revenues*
 - Points against
 - Energy settlement not the same for all assets
 - Tariff changes may be required

Summary of Options

Summary of time interval considerations

	Hourly	15 minutes	5 minutes	Transition 15 – 5minutes
Fidelity: aligns production/ consumption with price				
Flexibility: promotes flexible response from generators				
Flexibility: promotes flexible response from loads				
Complexity of implementation for generators				
Complexity of implementation for price responsive load				
Complexity of implementation for commercial and residential loads				
Change implications for AESO				
Change implications for LSA/ MDM				
Costs		TBD	TBD	TBD

Summary of participation applicability

	Mandatory all gen	Mandatory all loads	Mandatory all interval metered gen and load	Voluntary for all
(assumes 15minute settlement interval)				
Fidelity: aligns production/ consumption with price				
Flexibility: promotes flexible response from generators				
Flexibility: promotes flexible response from loads				
Complexity of implementation for generators				
Complexity of implementation for price responsive load				
Complexity of implementation for commercial and residential loads – true up requirements				
Change implications for AESO				
Change implications for LSA/ MDM				
Costs	TBD	TBD	TBD	TBD

Other considerations

- Currently, active operating reserve prices are indexed to the hourly pool price
 - No issue for standby reserve, these reserves are paid as bid
- Does OR settlement need to align with energy settlement?
 - Points for
 - Better alignment of OR and Energy opportunity costs
 - Points against
 - Can still calculate an hourly pool price using SMP, and continue to index OR to the hourly price
 - *Less system changes required*
 - *No AS rules or contract changes required*

- Ancillary Services
 - There is no expected impact to the current Ancillary Services agreements which include Transmission Must-Run services, Black Start services and Load Shed Service for imports.
- Renewable Electricity Program (REP)
 - The Renewable Electricity Support Agreement (RESA) may require changes.

- *No legislation changes required* as the definition of “settlement interval” is not defined as a 60 minute period
- However, the Electric Utilities Act (EUA) gives guidance on rule making respecting load settlement. Below are the relevant sections of the EUA:
 - 17. The Independent System Operator has the following duties:
 - [...] (l) to administer load settlement;
 - 18(4) The Independent System Operator must, in accordance with the ISO rules,
 - (a) establish the pool price for each settlement interval for electric energy exchanged through the power pool, which must not include any portion of the ISO fees, and
 - (b) make the pool price available to the public. 2003 cE-5.1 s18;2018 c10 s2(9);2019 c1

- Electric Utilities Act (EUA) Load settlement rules
 - 24.1(1) The Commission may make rules respecting load settlement, including rules respecting
 - (a) the conduct of load settlement by electricity market participants,
 - (b) the establishment of processes, procedures, standards, reports and controls required to determine the allocation for each settlement interval of electric energy to sites and to customers,
 - (c) the determination, collection and storage of site, metering and other data in order to provide necessary measurement data,
 - (2) The Independent System Operator must administer load settlement in accordance with the rules made under subsection (1)

- Pursuant to the Commission's mandate under Section 24.1(1) of the EUA, any changes to the settlement interval will lead to the amendment of the AUC Rule 021
- Potential changes
 - Key Terms & Definitions,
 - Estimation for missing data,
 - Load settlement calculations,
 - Load settlement timing,
 - Post final adjustments,
 - LSA reporting to the AESO, and
 - Updates to Wholesale Settlement Information transaction
- A comprehensive list of the changes will be developed and consulted on when an direction is determined

- ISO rules and definitions will be impacted for all options
 - Key Terms & Definitions
 - Financial settlement
 - Pricing
- A comprehensive list of the impacted ISO rules and definitions will be developed and consulted on when an direction is determined
- Interrelation with other consultations
 - Metering standards and proposed new Section 502.10 of the ISO rules, *Revenue Metering System Technical and Operating Requirements*
 - Pricing on inertia

- Are there other participation options that should be considered?
- Do you have any comments on the AESO's assessment summary on duration and applicability?
- Are there other impacts that should be considered?

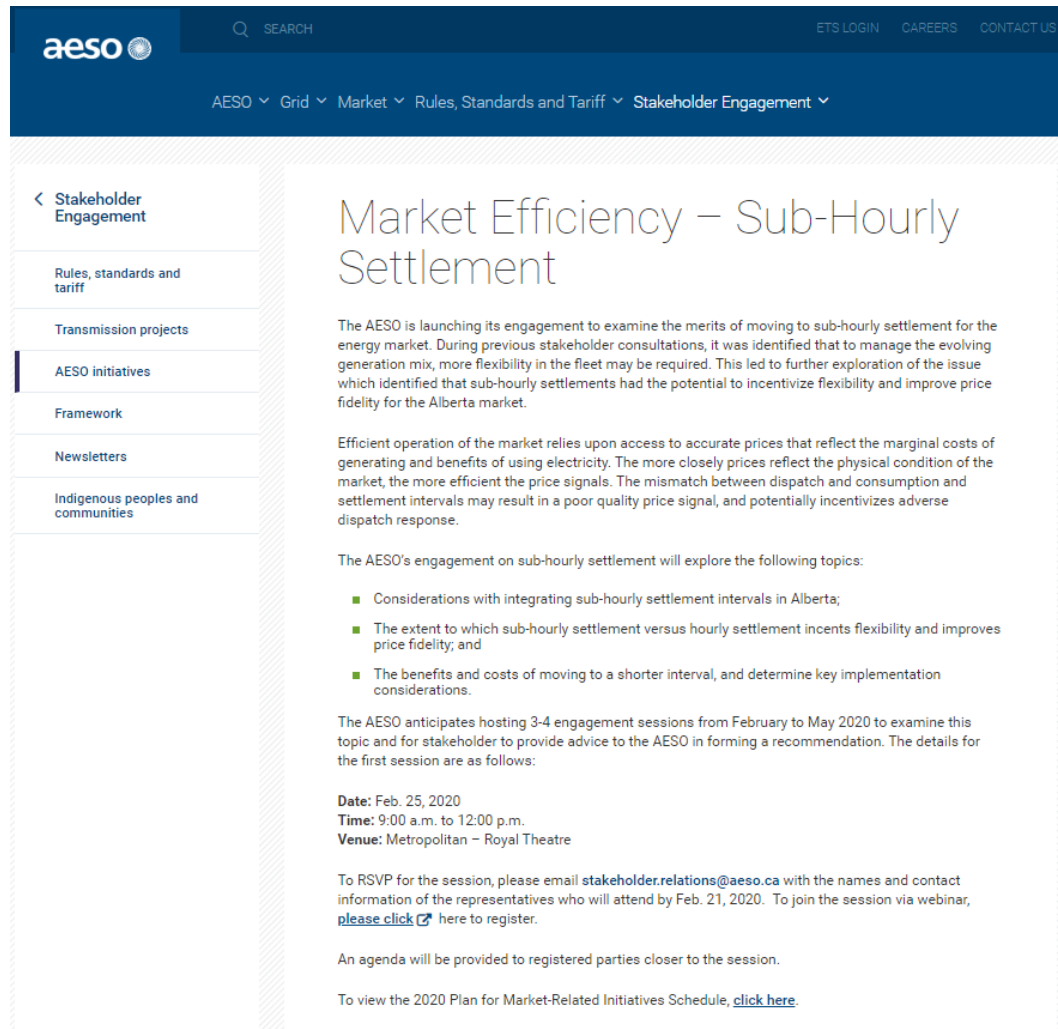
Next Steps

Session 3

- We would like to reach out to LSAs and other interested participants to better understand the how to quantify your costs
- Timing of session 3 will be determined once costs can be estimated
- Topics of discussion:
 - Review feedback from stakeholder comment matrix
 - Benefits
 - Costs



- Comment matrix will be posted on our website



The screenshot shows the AESO website's navigation menu and a page titled "Market Efficiency – Sub-Hourly Settlement". The navigation menu includes "AESO", "Grid", "Market", "Rules, Standards and Tariff", and "Stakeholder Engagement". The page content includes a sidebar with "Stakeholder Engagement" and a main section with the title "Market Efficiency – Sub-Hourly Settlement". The main section contains text about the AESO's engagement to examine the merits of moving to sub-hourly settlement for the energy market, a list of topics to be explored, and information about engagement sessions.

Stakeholder Engagement

- Rules, standards and tariff
- Transmission projects
- AESO initiatives**
- Framework
- Newsletters
- Indigenous peoples and communities

Market Efficiency – Sub-Hourly Settlement

The AESO is launching its engagement to examine the merits of moving to sub-hourly settlement for the energy market. During previous stakeholder consultations, it was identified that to manage the evolving generation mix, more flexibility in the fleet may be required. This led to further exploration of the issue which identified that sub-hourly settlements had the potential to incentivize flexibility and improve price fidelity for the Alberta market.

Efficient operation of the market relies upon access to accurate prices that reflect the marginal costs of generating and benefits of using electricity. The more closely prices reflect the physical condition of the market, the more efficient the price signals. The mismatch between dispatch and consumption and settlement intervals may result in a poor quality price signal, and potentially incentivizes adverse dispatch response.

The AESO's engagement on sub-hourly settlement will explore the following topics:

- Considerations with integrating sub-hourly settlement intervals in Alberta;
- The extent to which sub-hourly settlement versus hourly settlement incents flexibility and improves price fidelity; and
- The benefits and costs of moving to a shorter interval, and determine key implementation considerations.

The AESO anticipates hosting 3-4 engagement sessions from February to May 2020 to examine this topic and for stakeholder to provide advice to the AESO in forming a recommendation. The details for the first session are as follows:

Date: Feb. 25, 2020
Time: 9:00 a.m. to 12:00 p.m.
Venue: Metropolitan – Royal Theatre

To RSVP for the session, please email stakeholder.relations@aeso.ca with the names and contact information of the representatives who will attend by Feb. 21, 2020. To join the session via webinar, [please click](#) here to register.

An agenda will be provided to registered parties closer to the session.

To view the 2020 Plan for Market-Related Initiatives Schedule, [click here](#).

Contact the AESO



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Website: **www.aeso.ca**

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Thank you