Notice

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. Video recording will be limited to shared screen presentation slides. 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.

The collection of personal information by the AESO for this session will be used for the purpose of capturing stakeholder input for the Bulk and Regional Tariff Design sessions. This information is collected in accordance with Section 33(c) of the *Freedom of Information and Protection of Privacy Act*. If you have any questions or concerns regarding how your information will be handled, please contact the Director, Information and Governance Services at 2500, 330 – 5th Avenue S.W., Calgary, Alberta, T2P 0L4 or by telephone at 403-539-2528.

Bulk and Regional Tariff Design

Stakeholder Engagement – Session 1

March 13, 2020

Welcome and Introductions

Agenda updated

Time	Agenda Item	Presenter
9:00 – 9:15	Welcome, introduction, purpose, session objectives and overview of engagement process • Share overall approach and schedule for engagement • Clarify what stakeholders can expect as we move through the process • Clarifying questions	AESO
9:15 – 10:15	Tariff Design (bulk and regional) Objectives & analysis completed • Provide high level overview of objectives and background analysis completed to date • Clarifying questions	AESO
10:15 – 11:15	Tariff Design Options (Part I) • Background • Proposed AESO tariff design options • Clarifying questions	AESO
11:15 – 11:30	Break	
11:30 – 12:30	Tariff Design Options (Part II) • Proposed AESO tariff design options • Clarifying questions	AESO
12:30 – 1:00	Lunch	
1:00 – 1:30	Rate Design and Impact Tool V1.0 introduction and walk through • Clarifying questions	AESO
1:30 – 2:30	Additional questions, session close out and next steps	AESO

Webinar registrants updated

- ADC
- Alberta Newsprint Company
- Alberta Utilities Commission (AUC)
- AltaLink Management Ltd.
- ATCO Electric
- BECL and Associates Ltd.
- Best Consulting Solutions Inc.
- BluEarth Renewables
- Boost Energy Ventures
- Canadian Natural Resources Ltd
- CanWEA
- Capital Power
- Cenovus Energy Inc.
- Chymko Consulting
- City of Lethbridge
- City of Medicine Hat
- Corvus
- DePal Consulting Limited
- Department of Energy
- Dow Chemical Canada ULC
- Enel
- Energy Storage Canada
- ENMAX Corporation
- EPCOR Distribution and Transmission
- FortisAlberta Inc.
- Hatch Upside
- Heartland Generation
- Inter Pipeline Ltd.
- IPCAA
- Lionstooth Energy Inc.
- Market Surveillance Administrator
- Navigant
- Nican International Consulting Ltd.
- NRGCS
- RMP Energy Storage
- Shell Canada Limited
- Suncor Energy Marketing Inc.
- tcenergy
- TransAlta Corporation
- Turning Point Generation
- Utilities Consumer Advocate
- Wolf Midstream
- 8760

Purpose of this session

- Purpose
  - Present work that has been completed-to date including Rate Design Objectives along with the AESO's analysis;
  - Provide AESO rate design options to stakeholders with Rate Design Objectives analysis; and
  - Respond to questions and gather initial feedback from stakeholders on work-to-date including rate design options, Rate Design Objectives analysis, impact and issues.

Overview of Engagement Process

AESO Stakeholder Engagement Framework

Overall approach

- The AESO intends to:
  - Engage with stakeholders regarding the objectives and principles to be examined and evaluated for developing a rate design proposal for bulk and regional cost recovery
  - Engage with stakeholders in order to incorporate feedback regarding a rate design proposal for bulk and regional cost recovery
  - Supply stakeholders with analysis tools and the opportunity to present stakeholder proposals for rate design for bulk and regional cost recovery
  - File with the Alberta Utilities Commission (AUC) an application for bulk and regional rate design by Sept. 30, 2020

Objectives of the overall engagement

- Objectives of the bulk and regional tariff design sessions include facilitation of a common understanding of the:
  i. Problem statement and the tariff rate design objectives;
  ii. High-level rate design concepts and methodology to evaluate rate designs against the rate design objectives;
  iii. Detailed rate design options' impacts on rate payers; and
  iv. A common understanding and agreement on proposed scope of the Sept. 30, 2020 application to the AUC.

Overview of process schedule

Session 1 *March 13, 2020*	Session 2 *April 17, 2020*	Session 3 *May 21, 2020*	Session 4 *September 2020*
Session objectives: • AESO to present rate design options for bulk and regional cost recovery with rate objectives assessment • Provide rate design analysis tools • Review, respond to clarifying questions and collect inital input on options	**Session objectives:** • Summarize feedback from Session 1 • Stakeholders to present their own rate design options with rate objectives assessment • Discuss options	**Session objectives:** • AESO to present final recommended rate design • Rate design analysis tools and bill impact	**Session objectives:** • Presentation of summary of upcoming application • Stakeholders to be informed of rate design, impact and analysis

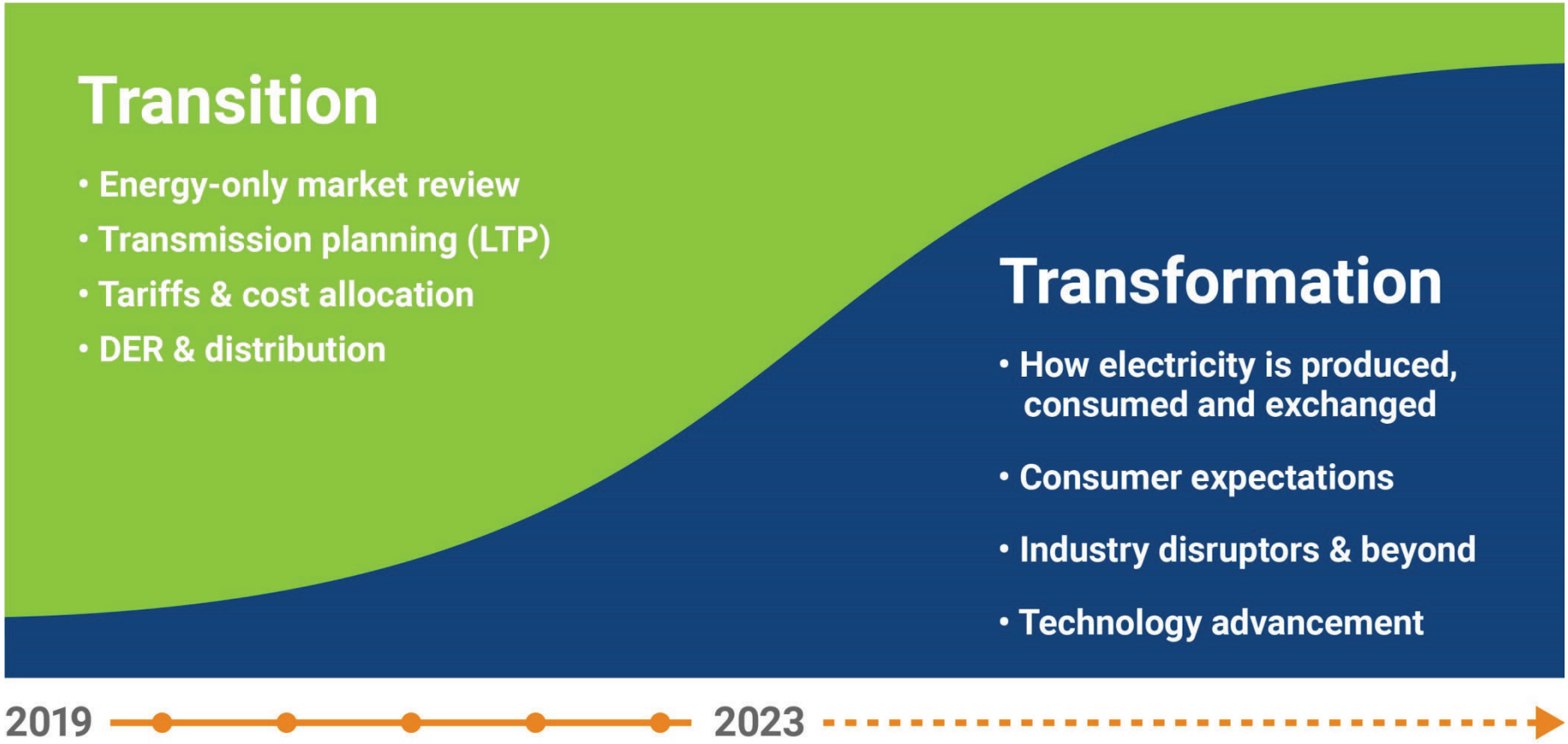
Stakeholder participation

The participation of everyone here is critical to the engagement process. To ensure everyone has the opportunity to participate, we ask you to:

- Listen to understand others' perspectives
- Disagree respectfully
- Speak one at a time
- Balance airtime fairly
- Keep an open mind

Tariff Design Objectives

Transition to transformation



ISO tariff – the case for change

- A comprehensive tariff review process every three years is **not agile, flexible or adaptable enough** to enable the transformational change occurring in how electricity is produced, consumed and exchanged
- A review process must consider the concept of cost causation, rate design objectives in addition to appropriate price signals to ensure:
  - Recovery of revenue requirement
  - Fairness, objectivity and equity
  - Stability and predictability
  - Practicality
- We are proposing a modular approach to evolving the ISO tariff to:
  - Simplify, possibly modularize the ISO tariff structure and process
  - Provide appropriate price signals, aligned across the value chain

AESO tariff filings for 2020

- Intend to file one compliance application and three modules or phases to meet Directions described as “next ISO tariff application”:
  - 2018 compliance application (filed Jan. 31, 2020)
  - **Module 1 - Bulk and regional tariff redesign**
  - Module 2 – Point-of-delivery (POD) cost function, investment policy and optional facilities
  - Module 3 - Other including, power factor deficiency, criteria for system vs connection projects, “grey area” costs, stakeholder consultation on some new provisions addressed in Decision

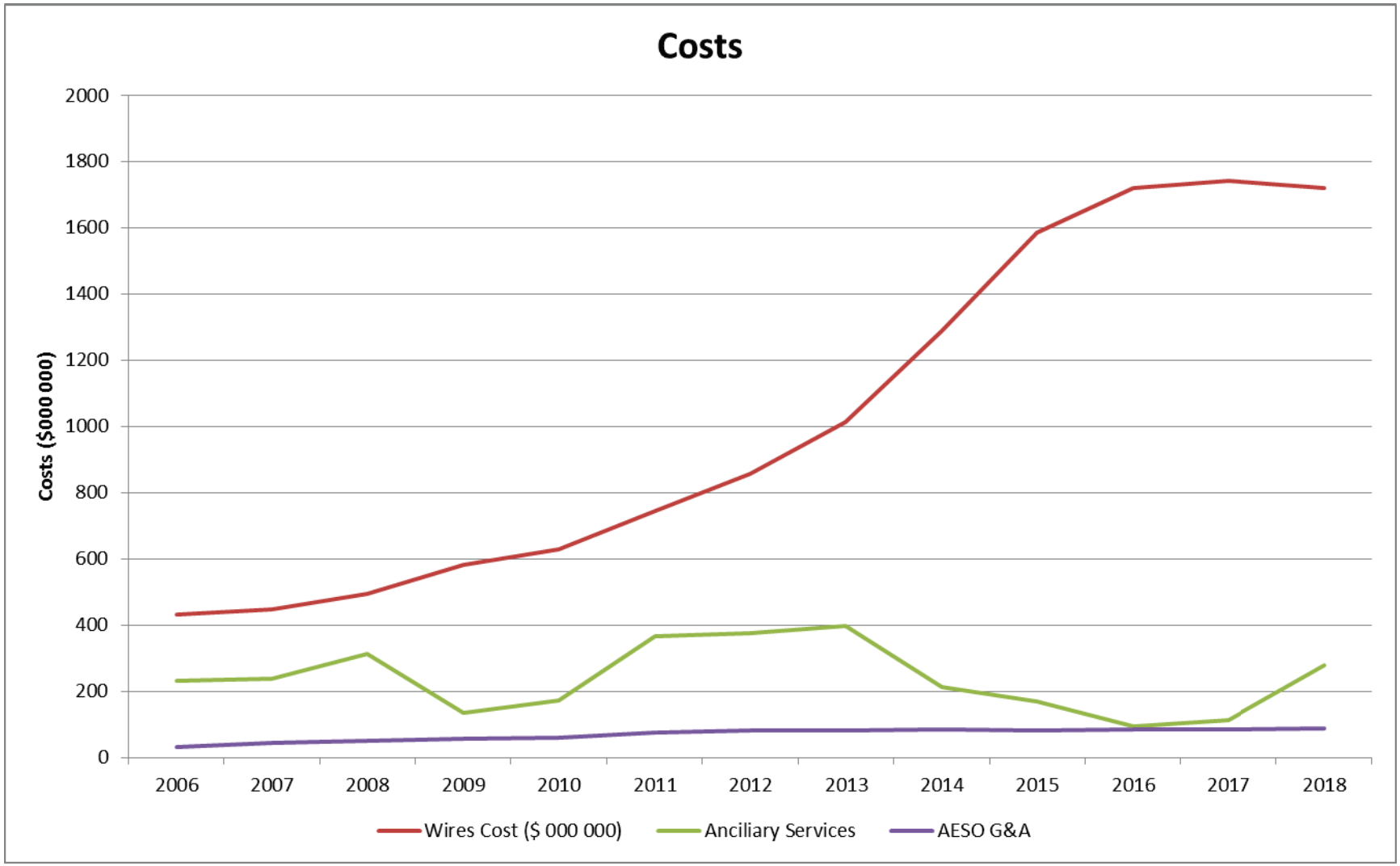
Problem statement | Where are we today and why are we here?

- Transmission costs are sunk and costs are high
  - Incentives have not been proportional to reduction in future cost
- Regulatory construct: postage stamp and load-only tariff
  - Look for new ways to achieve efficiency within existing regulation and legislation
  - New technologies (i.e., energy storage) tariff principles fit within regulatory construct
  - Commission suggests that the AESO has more legislative discretion than currently using

Problem statement | Where are we today and why are we here? cont.

- Future build is primarily driven by factors other than load
  - Very limited efficiency can be incorporated given our rigid regulatory construct
- Customers have made investments (sunk costs)
  - Fairness is critical and may also be efficient
- Current pricing signals do not align with planning signals
  - Commission directed AESO to review bulk and regional tariff design
  - Customers are responding to the price signal but hasn't materially impacted the build

Wires cost have grown dramatically increasing the price signals sent by 12CP



Tariff redesign guiding objectives

1. Effective Long Term Price Signals

- Efficient use of the transmission system by aligning price signals and planning signals
  - Optimization of existing system
  - Optimize future build (cost/benefit)
- Flow through of transmission cost signals to end-use customers
  - Where possible and applicable
  - Align transmission signals and communicate “information” to DFO rate design

Regulatory certainty to allow long-term price signal

2. Facilitate Innovation and Flexibility

- Adaptive and agile
- ISO tariff not a barrier to innovation
- Provide optionality
- Reduce “command & control” and allow customer innovation
- Use pilot or phased in approaches

Simplicity in design to not harm price-signals

Tariff redesign guiding objectives cont.

3. **Reflect accurate costs* of grid connection and services**
   - Value the "products" of the AIES (reliability, access to markets, voltage, frequency, . . .)
   - Fairness for all customers and technologies connecting to the grid
   - Minimize or eliminate cross-subsidies
4. **Explore options within legislation and regulation**
   - Postage stamp (including rates and rate classes)
   - Interruptible rate – locational option like an "anti DOS"
   - Provide a range of alternatives within existing legislation and regulation
5. **Path to change that is effective and minimally disruptive**
   - Transmission rates will enable, or be an asset to, the AB economy
   - Use pilots or phased in approaches

Analysis Completed

Transmission Tariff Working Group (TTWG) learnings

- System peak load is not a dominant measure of system stress or usage
- System load and power flow are not strongly correlated
- Alternative sources of energy, for example self-supply, are becoming more competitive to transmission system supplied electrical energy but transmission system still provides reliability back stop which has significant value to most customers

TTWG learnings cont.

- Some USA jurisdictions use customers' load at the time of networks' co-incident peak (CP) load to charge high voltage network costs
  - Current ISO tariff includes an implementation of this approach in bulk system charge
    - Month-end monthly charge based on customer's actual load at the time of networks' CP load for the month

Delivered cost-of-electricity learnings

- Per unit cost (i.e., $/MWh) is lower for high-volume (i.e., MWh) consumers
- The fastest growing components of the delivered cost-of-electricity relate to transmission and distribution
- Delivered electricity costs have increased, while electricity self-supply costs have declined significantly over the last decade
- Some consumers may be better off to self-supply their electricity depending on return expectations, assuming:
  - Current markets rules, and
  - Current transmission and distribution rates, terms and conditions, and standards

Guidehouse (Navigant) report on industries with price regulation

Industry	Price Regulation	Tariff / Pricing Mechanism
Natural Gas Pipeline Transmission	• Deregulated commodity • Non-bypassable infrastructure; minimal substitution	• Bundled. Regulated cost of service applies to pipeline infrastructure – operators recourse rate • Negotiated rates (bilateral commodity transactions), equivalent of bilateral electricity trading • Market based rates (spot commodity), equivalent of spot electricity trading • Market based storage rates
Tele-communication	• Landline, mobile phone, and internet: deregulated after essential basic service • Large substitution (land vs mobile vs. VOIP) • Bypassable infrastructure due to high substitution	• Ubiquitous service fee for basic service (pays down the asset) • Additional usage charges per service (equivalent of retail choice)
Cable Television	• Deregulated past the franchise • Bypassable infrastructure due to high substitution	• Basic-tier service and rates regulated for local franchising authority • Cable providers can sell additional features at market rates

Guidehouse (Navigant) report on industries with price regulation cont.

Industry	Price Regulation	Tariff / Pricing Mechanism
Netflix	• Value-added service streamed over internet infrastructure to customers that have purchased access to the infrastructure	• Unregulated pricing
Freight Railroads	• Differentiated pricing for captive vs. non-captive customer • Captive customers can litigate the exercise of market power or unreasonable rates (market-based rate authority)	• Differential pricing – charging different prices to different customers • Captive customers can be charged more than customers having additional transportation options
Taxi	• Regulated, deregulated for disruptors • High substitution of regulated infrastructure with self-arranging one • Uber etc. self-arrange infrastructure	• Infrastructure is regulated - medallion system like a franchise service territory • Medallion can be sold (like a franchise). Rate card is approved for different services – per mile, idling
Water and Wastewater	• Non-bypassable • No substitution	• Historically lack of regulated pricing mechanisms • Moving to rate designs that include cost of service or volumetric block rates

Tariff Design Options

Tariff design essentials

- **Demand rates must be sufficient** to recover transmission facility owner (TFO) revenue requirement and must not differ on the basis of location (postage stamp requirement):
  - **Costs |** What is driving the cost?
    - Charge based on share of cost drivers
    - For example, outflow at time of region peak
  - **Benefits |** What benefits are being provided?
    - Charge based on available benefit
    - For example, 50 MW of outflow service available in all hours

Tariff design essentials cont.

- **Avoid rates** that do not ensure revenue requirement recovery, or that do not align with postage stamp requirement:
  - **Usage |** What benefits are being realized?
    - Charge based on actual use
  - **Value |** How much is customer willing to pay?
    - Charge based on maximum willingness to pay
  - **Alternatives |** What are the alternatives to transmission service?
    - Charge based on cost of next most expensive option to energy from grid

Rate measures/billing determinant primer

- **Demand Charge ($/MW)**
  - Does not reflect benefits of energy consumption
  - Varying: Charge based on maximum demand over billing cycle
    - Distorts consumption decisions since effective price is very high at peak times
    - Provides incentive to reduce demand
  - Fixed: Charge based on maximum demand over long term
    - Does not distort marginal price of energy
    - No incentive to manage demand
- **Fixed Charge ($ per customer)**
  - Customer charge, subscription fee
    - Does not distort marginal price of energy
    - Does not reflect varying use of energy
    - Does not reflect benefits of energy consumption

Rate measures/billing determinant primer

- **Coincident Peak Charge ($/MW)**
  - Charge based on demand at time of peak
    - Assumes transmission cost is linked to peak use
    - May create inefficient cost shifting
    - Does not reflect benefits of energy consumption
- **Energy Charge ($/MWh)**
  - Charge based on energy consumed, effectively an adder to energy price
    - Costs of transmission are not directly proportional to energy use
    - No incentive to manage demand

Rate design options

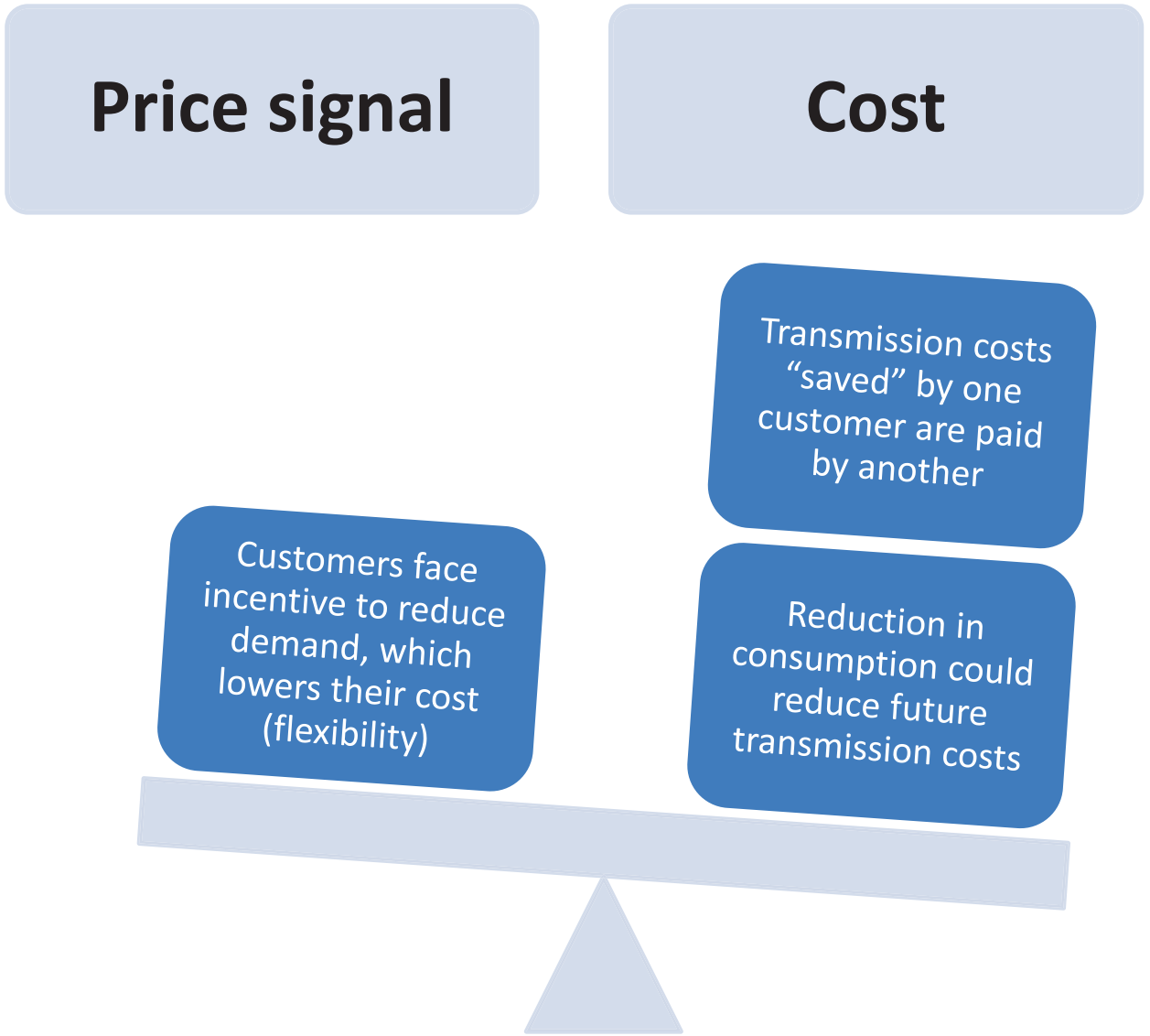
- Three approaches lead to three options:
  - **Option 1: Rate reflects transmission costs**
    - Example rate: charge based on consumption during area and/or regional peak
  - **Option 2: Rate reflects transmission benefits**
    - Example rate: fixed per customer and/or per MW charge
  - **Option 3: Hybrid – Rate reflects both cost and benefit**
    - Example rate: fixed charge + variable charge based on consumption during area and/or regional peak

Conceptual Evaluation

Evaluation against rate design objectives

- Use of economic efficiency principles to assess trade-offs between options with respect to rate design objectives:
  1. **Effective long-term price signals**
     - Evaluate whether rates create behavioral incentives that encourage efficient use of existing assets and signal long-term costs
  2. **Facilitate innovation and flexibility**
     - Do rates enable competition, reduce/remove barriers to entry
  3. **Reflect accurate costs of grid connection and services**
     - Do rates reflect cost and value of current and future investment
- Rate design objectives 4 and 5 deal with legal framework and set boundaries for options we consider
  4. **Explore options within legislation and regulation**
     - Narrow all possible options to those that are allowed (Legal analysis)
  5. **Path to change that is effective and minimally disruptive**
     - Manage through pilots, phased-in approaches

Understanding the tradeoffs



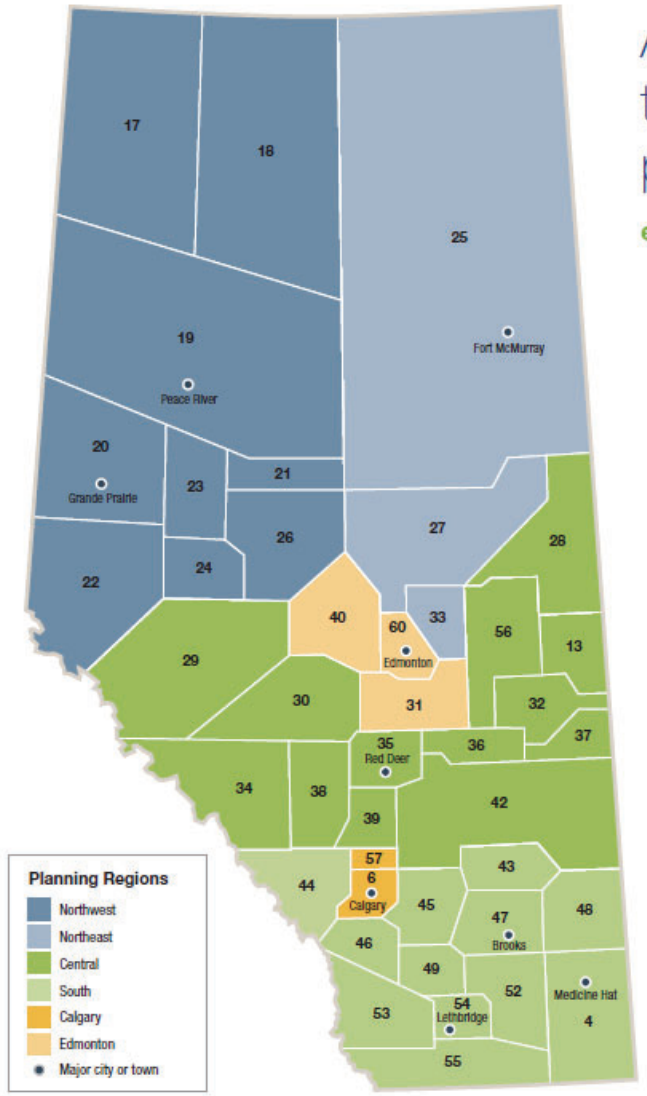
Option 1: Rate Reflects Cost

Option 1: Rate reflects cost

“Peak contribution rate”

- **Concept**
  - How does load (outflow from system) cause the cost
    - Costs are driven by flows on the system
    - Flows can be either within a region (intra) or between regions (inter)
- **Implementation**
  - Categorize transmission assets **by function**, for example:
    - Intra-regional and inter-regional facilities
  - Divide cost of assets **by cost driver**, for example:
    - Peak load by region, peak load by area (as a proxy for flows)
- **Outcome (example)**
  - Rate charged based on time of area peak and time of region peak
  - Arguably postage stamp since rate is the same across Alberta
  - Timing of region/area peak determines customer’s bill

Regions and areas in Alberta



AESO transmission planning areas

NUMERICAL

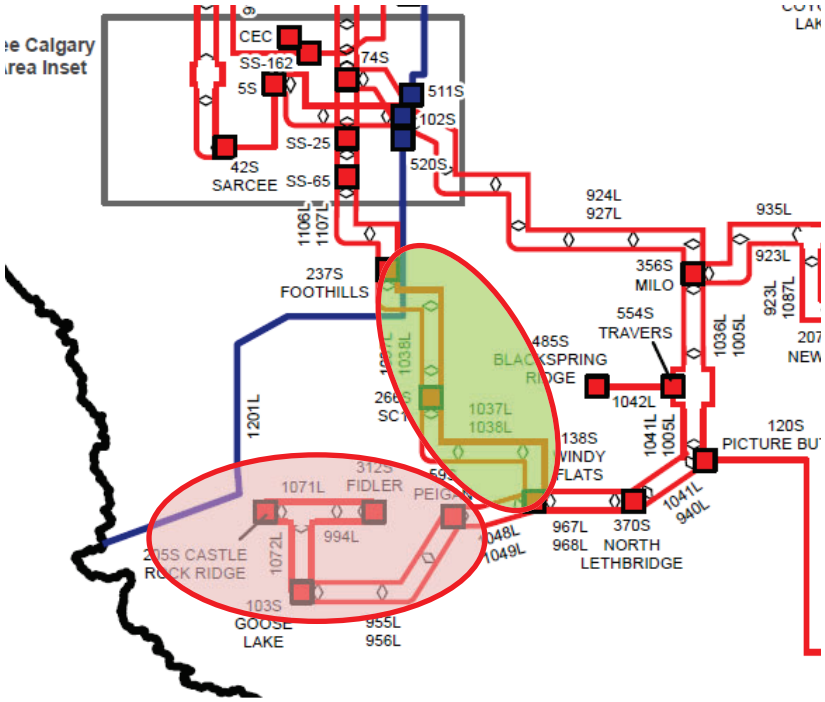
4 Medicine Hat
6 Calgary
13 Lloydminster
17 Rainbow Lake
18 High Level
19 Peace River
20 Grande Prairie
21 High Prairie
22 Grande Cache
23 Valleyview
24 Fox Creek
25 Fort McMurray
26 Swan Hills
27 Athabasca/Lac La Biche
28 Cold Lake
29 Hinton/Edson
30 Drayton Valley
31 Wetaskiwin
32 Wainwright
33 Fort Saskatchewan
34 Abraham Lake
35 Red Deer
36 Alliance/Battle River
37 Provost
38 Caroline
39 Didsbury
40 Wabamun
42 Hanna
43 Sheerness
44 Seebe
45 Strathmore/Blackie
46 High River
47 Brooks
48 Empress
49 Stavely
52 Vauxhall
53 Fort Macleod
54 Lethbridge
55 Glenwood
56 Vegreville
57 Airdrie
60 Edmonton

ALPHABETICAL

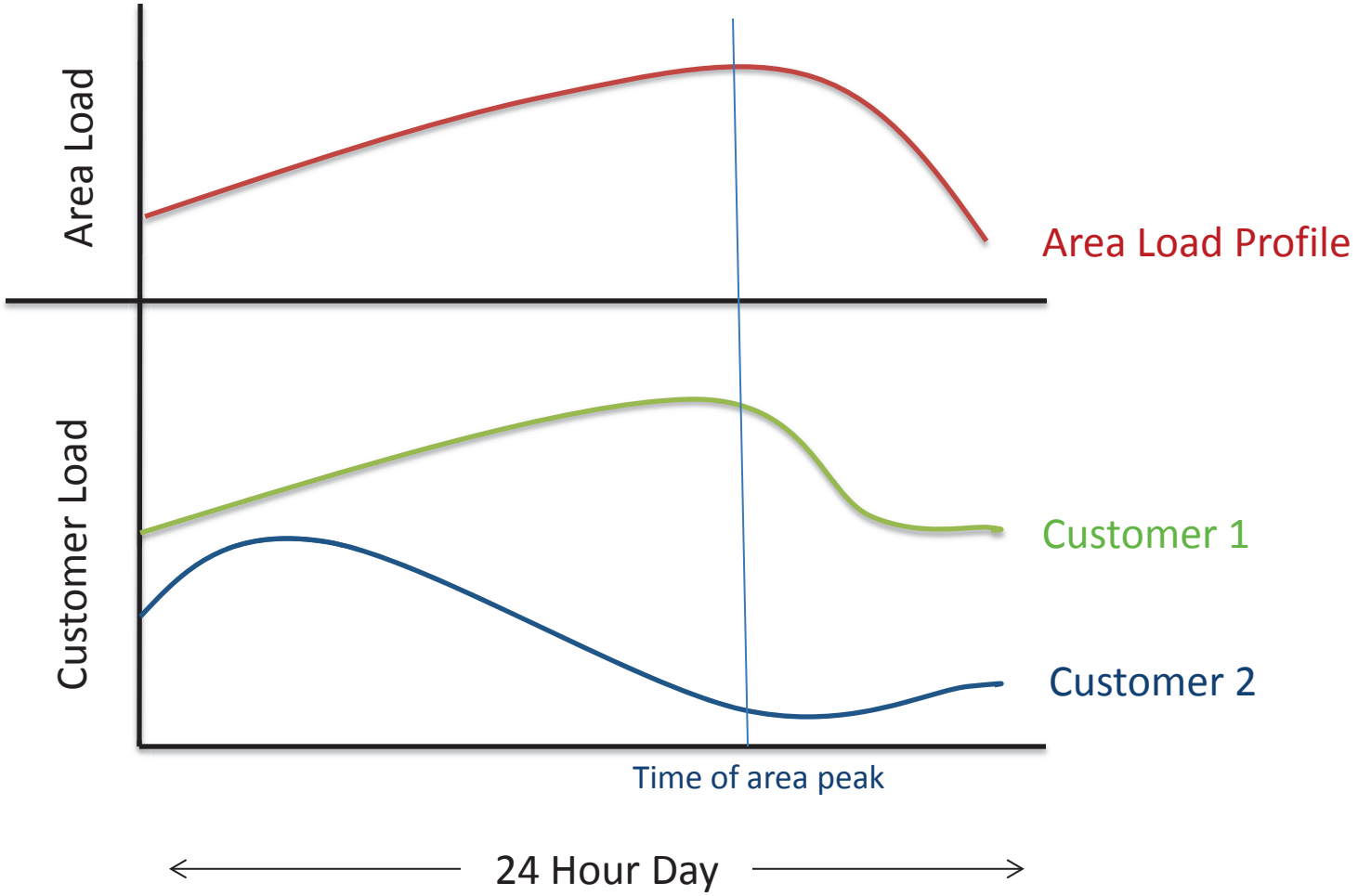
34 Abraham Lake
57 Airdrie
36 Alliance/Battle River
27 Athabasca/Lac La Biche
47 Brooks
6 Calgary
38 Caroline
28 Cold Lake
39 Didsbury
30 Drayton Valley
60 Edmonton
48 Empress
53 Fort Macleod
25 Fort McMurray
33 Fort Saskatchewan
24 Fox Creek
55 Glenwood
22 Grande Cache
20 Grande Prairie
42 Hanna
21 High Prairie
18 High Level
46 High River
29 Hinton/Edson
54 Lethbridge
13 Lloydminster
4 Medicine Hat
19 Peace River
37 Provost
17 Rainbow Lake
35 Red Deer
44 Seebe
43 Sheerness
49 Stavely
45 Strathmore/Blackie
26 Swan Hills
23 Valleyview
52 Vauxhall
56 Vegreville
40 Wabamun
32 Wainwright
31 Wetaskiwin

Inter-regional vs. intra-regional

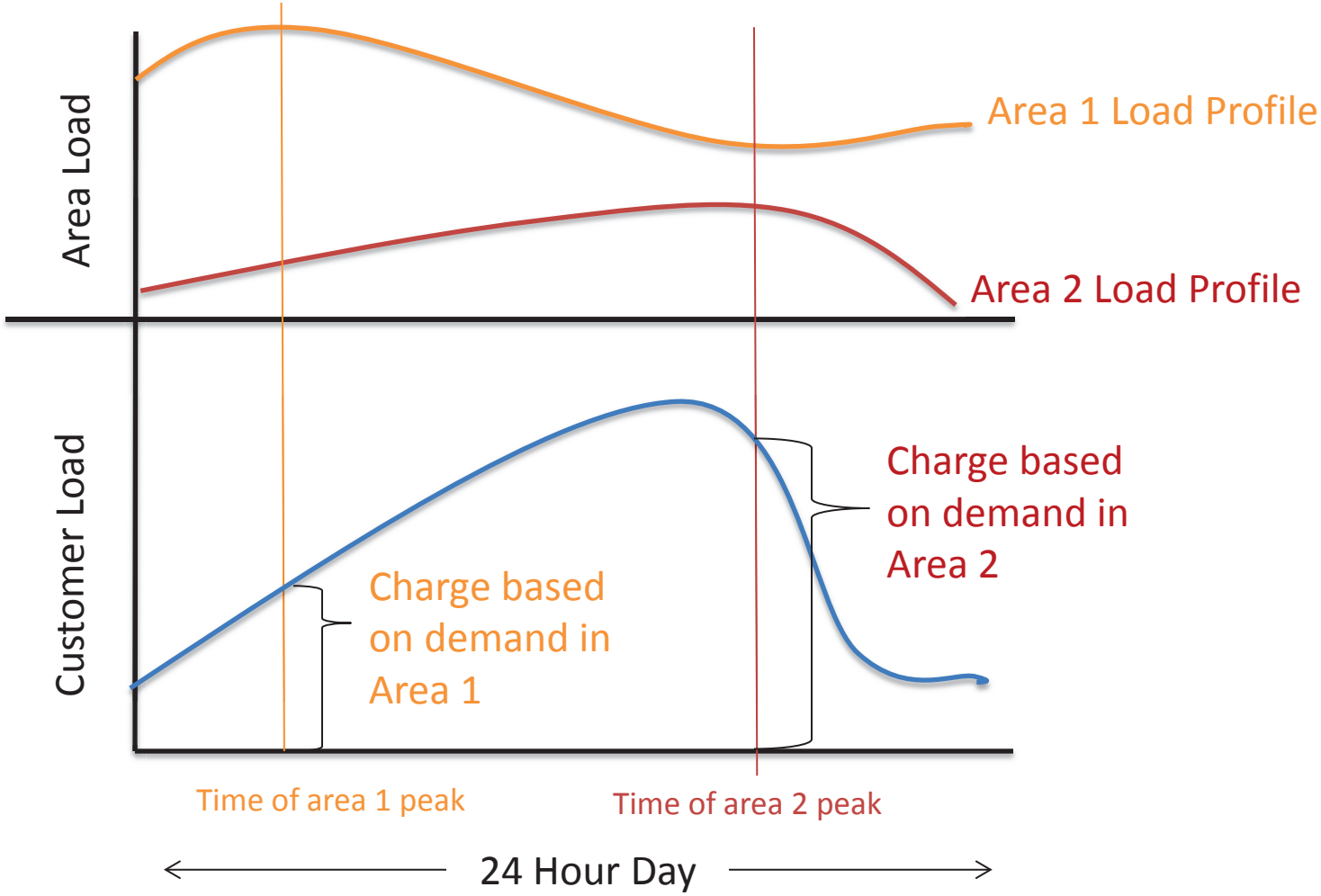
- Inter-regional: takes power from one region to another, example:
  - Foothills path to Calgary (FATD)
- Intra-regional: collects generation and serves load within a specific region, example:
  - SATR network in Pincher Creek



Customers pay based on consumption at peak



Customers with same load profile charged differently in different areas



Option 1: Rate reflects costs – pros

- More locational and targeted price signals to optimize current use and reduce future needs
  - Continues to encourage behavior to avoid peak periods, but in a way that can help reduce future transmission costs
  - Incentive to reduce demand is better aligned with transmission planning (which is based on flows in regions/areas)
- Explores options within legislative framework
  - Rate charged based on time of area peak and time of region peak
  - Arguably postage stamp since rate is the same across Alberta
  - Timing of region/area peak determines customer's bill

Option 1: Rate reflects cost – cons

- Rates are charged based on consumption that may not align with benefit
  - E.g. a project to integrate wind is charged based on winter peak but is used more in summer
- Rates do not reflect value of having a connection
- More complex to implement
  - AESO will need to provide information about timing of peaks to customers (more data)
  - Need to define and justify inter and intra regions definitions
    - Need to define assets as inter and intra
    - Can change over time
    - More difficult for participants to respond to changing signals

Option 1: Rate reflects cost – tradeoffs

- Effective long-term price signals
  - Consumption decisions will be distorted when delivered energy cost is very high (at peak times)
- Facilitate innovation and flexibility
  - Value to customers may not be linked with their consumption at the time of system peak
  - Reducing regional/area peak demand may reduce transmission cost (more than reducing demand at system peak)
- Reflect accurate costs of grid connection and services
  - Transmission cost is linked to flows in area/region
    - Area/region peak a proxy for flows
  - Consumers can shift costs by avoiding consumption at peak time
    - Efficient when it reduces overall transmission cost, but creates inefficient cross subsidization if overall costs aren't reduced

Break updated

Option 2: Rate Reflects Benefit

Option 2: Rate reflects benefit

“Fixed contribution rate”

- **Concept**
  - How does load receive benefits?
    - Receive benefits based on connection and energy use
- **Implementation**
  - Categorize transmission assets **by category**, for example:
    - Facilities for load/multi-use or facilities to enable competitive market
  - Divide cost of assets **by benefits received**, for example:
    - Load benefits up to its maximum ability to consume (whether it uses benefit or not)
    - Load benefits based on energy consumed
- **Outcome (example)**
  - Rate charged for benefits available (fixed demand charge) and for usage (energy charge)
    - Apply diversity factor (see later slides)

Option 2: Rate reflects benefits – pros

- Fixed demand charge encourages efficient use of the transmission system
  - Does not encourage inefficient peak avoidance
- Rate reflects value of receiving energy through the grid
- Consumers pay in proportion to use
  - No cross subsidization or cost shifting

Option 2: Rate reflects benefits – cons

- Does not provide signal to reduce energy consumption at times of system stress (that may trigger build)
  - No incentive for load to reduce consumption in an area where there are benefits
  - No locational price signal
- Rates don't align with the drivers of transmission costs
  - Costs of transmission are not proportional to use in all hours; may lead to perception of unfair charges
- Charge per MWh distorts energy market price signal
  - Load will reduce consumption even when there is no transmission stress (see appendix)

Option 2: Rate reflects benefits – tradeoffs for fixed demand charge

- Effective long term price signals
  - Efficient consumption decisions based on price of energy
- Facilitate innovation and flexibility
  - Benefit derives from having a connection to the grid; once you are connected, benefits are available regardless of how much energy is used
  - Assumes that cost of transmission is not driven by load usage in any specific way
- Reflect accurate costs of grid connection and services
  - Does not reflect varying use of transmission to consume energy
  - Costs are incurred based on the cost of connection to the network, not size of individual peak demand

Option 2: Rate reflects benefits – tradeoffs for energy charge

- Effective long-term price signals
  - Creates a loss of efficiency if demand is elastic and responds to a higher price of delivered energy in all hours by consuming less
- Facilitate innovation and flexibility
  - Consumers pay in relative proportion to use
- Reflect accurate costs of grid connection and services
  - Cost of transmission is not equivalent in all hours
  - Costs of transmission are not directly proportional to energy use
  - Benefits to customers may occur over all their consumption

Option 3: Hybrid – Rate Reflects Cost and Benefit

Option 3: Hybrid – rate reflects cost and benefit

"Fixed plus peak contribution rate"

- **Concept**
  - Combination of cost and benefit approach
  - Other two options can be improved
- **Implementation**
  - Categorize transmission assets *by category* (as in Option 2)
  - Charge assets **for load on fixed basis** and assets **for generation on peak charge**
    - Balance price signal and fairness
- **Outcome (example)**
  - Fixed demand charge for load/multi-use portion of costs
    - Set by contract capacity or long-term maximum flow
      - *Apply diversity factor (see later slides)*
  - Variable charge (demand at time of region/area peak)

Option 3: Hybrid – rate reflects cost and benefit – pros

- Fixed demand charge
  - Optimize use of existing system by not distorting load's decision to consume energy
  - Reflects customer benefits received from connection to AIES, regardless of use
- Charge based on area/region peak
  - Sends a signal about future costs: encourage load to reduce demand at times of system stress, in a way that creates value to overall system
  - Costs of transmission (driven by inter/intra regional flows) reflected through rates
  - Arguably postage stamp since rate is the same across Alberta

Option 3: Hybrid – rate reflects cost and benefit – cons

- Fixed demand charge
  - Customers cannot respond to manage cost (except by reducing long-term demand)
- Charge based on area/region peak
  - Additional implementation complexity
    - Define and justify area/region and intra/inter breakdown, potentially changing over time
    - AESO needs to provide regional/area data to customers

Option 3: Hybrid – rate reflects cost and benefit – tradeoffs

- Fixed demand charge
  - Effective long-term price signals
    - Do not distort consumption decision on the margin
  - Facilitate innovation and flexibility
    - Enables customer choice without creating cross subsidy
  - Reflect accurate costs of grid connection and services
    - Customers pay for benefit of access to the system, regardless of use
- Charge at time of area/region peak
  - Effective long-term price signals
    - Signal value of reduction when it will benefit overall system
  - Facilitate innovation and flexibility
    - Create value from reducing costs with effective peak reduction
  - Reflect accurate costs of grid connection and services
    - Costs of transmission driven by flows; area/regional peak are proxy

Summary of Tradeoffs

Summary of tradeoffs

Rate Design Objectives	Option 1: Rate reflects cost	Option 2: Rate reflects benefit	Option 3: Hybrid - Rate reflects cost and benefit
Price Signals	-Strongest price signal at time of area/region peak if value is linked to use at area/region peak	-No price signal to reduce demand at a specific time -No value in reducing future transmission costs	-Small price signal at time of area/region peak to recognize smaller value in reducing future tx costs
Innovation and Flexibility	-Customer flexibility may result in lower bills -Flexibility closer aligned to existing rate design	-Innovation and flexibility to be provided through additional rate classes and services	-Innovation and flexibility to be provided through additional rate classes and services
Reflect Accurate Costs	-Load reductions **may** save future transmission costs –May create cost shifting between customers	-Assumes transmission cost not linked to load behaviour in a specific way	-Load reductions **may** save future transmission costs -But reduced cost shifting relative to Option 1
Options within framework	-Arguably aligns with current legislative construct	-Acceptable	-Arguably aligns with current legislative construct
Minimally Disruptive	-Rate mitigation options TBD	-Rate mitigation options TBD	-Rate mitigation options TBD

Rate Classes

Rate class

- Group customers into similar consumption profiles
  - Customer groups differ in how they receive benefits from the grid or contribute to costs of transmission system as a group
- For example:
  - Rate can be set based on load profile of the class
    - Transmission connected customer with onsite generation
      - *Typically net load spikes up when generation is down*
      - *Individual spikes in load typically do not happen at the same time*
    - Transmission connected customer with no onsite generation
      - *Typically changes in load occur at the same time*
    - DFO customers
      - *Typically low load diversity*
      - *Individual spikes in load occur at the same time*

Diversity factor example

- Example of adjusting rate by customer group: “diversity factor”
  - A low ratio (high diversity) means in aggregate the group pulls a fraction of their aggregated contract capacity
  - A high ratio (low diversity) means in aggregate the group pulls close to their aggregated contracted capacity

	Customers in Group 1	Customers in Group 2	Customers in Group 3
Maximum total pull (MW)	666	1,621	7,073
Total contract capacity (MW)	1,661	2,645	8,553
Ratio (max pull/contract capacity)	0.40	0.61	0.83

Additional rate classes

- Interruptible service
  - Maximize use of transmission system
  - Is there a lower quality/lower price service AESO can offer?
    - Transmission facilities were built to serve load, including expected load growth
      - *No transmission rights, no free-riders*
    - Load customers may want to switch to interruptible
- Standby service
  - Customers may only consume from the system occasionally
    - For example, when onsite generation trips
  - Are customers who only occasionally flow onto the system contributing a fair share?
    - Benefit of having the grid available 24/7
    - No contribution to costs if they avoid 12 CP

Rate Options and Energy Storage

Options* considered for storage

I. Charge based on flows
   - DTS for inflows and STS for outflows (current tariff)

II. No DTS costs while providing “Market Services” (FERC Order 841 treatment)

III. Interruptible service with lower rate, since storage can be off if transmission system is stressed
   - Direct physical control by AESO, asset can be tripped off without notice (AESO has certainty)
   - Dispatch control based on bids and offers: Financial incentive to comply (not full certainty)

* Options apply to market assets and not storage as a transmission asset

Energy storage considerations

- Offering lower level of service with lower rate requires certainty that asset will not contribute to future transmission costs
  - Limit availability of rate to energy storage versus all loads
    - Loads that can act like storage may want similar treatment
    - Transmission system is built and planned for firm load
      - *Available transmission capability partly exists in anticipation of future growth in firm load; capability may be made available if conditions materialize differently than planned*
- Level playing field between storage and generation
  - All generation needs to pay fuel costs and fuel transportation cost
    - DTS is paying for the use of infrastructure to transport energy
  - Load providing AS are charged DTS costs

Energy storage under options

- Charge based on flows
  - Option 1: Rate reflects cost
    - Transmission costs can be avoided by staying off at peak times (Similar to 12 CP)
  - Option 2: Rate reflects benefit
    - Fixed charge cannot be avoided
    - Rate class may adjust fixed charge, based on class load profile
  - Option 3: Hybrid – rate reflects cost and benefit
    - Fixed charge cannot be avoided
    - Rate class may adjust fixed charge, based on class load profile
    - Transmission costs can be avoided by staying off at peak times
- Interruptible rate could be made available in all 3 options

Summary of Options and Classes

Summary of rate options with services and rate classes

Services & Rate Classes	Option 1 - Cost	Option 2 - Benefit	Option 3 - Cost & Benefit
Rate based on	Peak Contribution	Fixed Contribution	Fixed + Peak Contribution
High quality (or "*firm*") transmission service	Like Demand Transmission Service (DTS)		
Classes	n/a	Standby Energy Storage Industrial Others	Standby Energy Storage Industrial Others
Importance of having rate class	Low	High	Medium
Low quality (or "*less firm*") transmission service	Like Demand Opportunity Service (DOS) or other interruptible service		
Energy Storage Participation	Avoid charging at peak times	Charge over longer period, take low quality transmission service	Avoid charging at peak times, charge over longer period, take low quality transmission service

Lunch Break

Rate Design and Impact Tool V1.0

Additional Questions updated

Next steps updated

- Session 1 (March 13, 2020)
  - Short session survey will be sent out following the session
  - Session summary to be prepared
  - Webinar recording and session summary will be posted on www.aeso.ca
- Session 2 (April 17, 2020)
  - Summarize feedback from Session 1
  - Session objectives:
    - Stakeholders to present their own rate design options with rate objectives assessment
    - Discuss options
- Session 3 (May 21, 2020)
- Session 4 (September 2020)

Contact the AESO

- ***Twitter:*** *@theAESO*
- ***Email:*** *tariffdesign@aeso.ca*
- ***Website:*** *www.aeso.ca*
- Subscribe to our stakeholder newsletter

Thank you