Tariff Design Advisory Group

August 23, 2018

Disclaimer

The information contained in this presentation is for information purposes only. While the AESO strives to make the information contained in this presentation as timely and accurate as possible, the AESO makes no claims, promises, or guarantees about the accuracy, completeness, or adequacy of the information contained in this presentation, and expressly disclaims liability for errors or omissions. As such, any reliance placed on the information contained herein is at the reader's sole risk.

Agenda

Time	# min	Agenda Item	Presenter
9:00 am – 9:15 am	15 min	Welcome • Opening remarks • Session overview and objectives • Introductions	Karla Reesor, Facilitator Miranda Keating Erickson Vice-President, Markets
9:15 am – 9:30 am	15 min	Review revisions to proposed Terms of Reference	Matt Gray, Senior Stakeholder Engagement Advisor
9:30 am – 10:00 am	30 min	CMD Background related to Capacity Cost Allocation • Final Comprehensive Market Design Cost Review • Capacity Market Procurement Overview	Murray Hnatyshyn, Manager, Capacity Market Design Analysis Steven Everett, Manager, Forecasting
10:00 am – 10:10 am	10 min	BREAK	
10:10 am – 11:30 am	70 min	Cost Allocation 101 (includes Q & A)	Raj Sharma, Tariff Specialist
11:30 am – 11:50 am	20 min	Review of draft detailed work plans	Raj Sharma
11:50 am – 12:00 pm	10 min	Review of conclusions, action items and next steps	Karla Reesor

Final Comprehensive Market Design Cost Review

How capacity market costs are generated

- Capacity Auctions: all capacity costs are a result of capacity purchased from capacity assets
  - Base auction: three years prior to deliver
  - Rebalancing auctions: 18 months and 3 months prior to delivery
- How much capacity is bought
  - The AESO will determine a capacity value for all assets

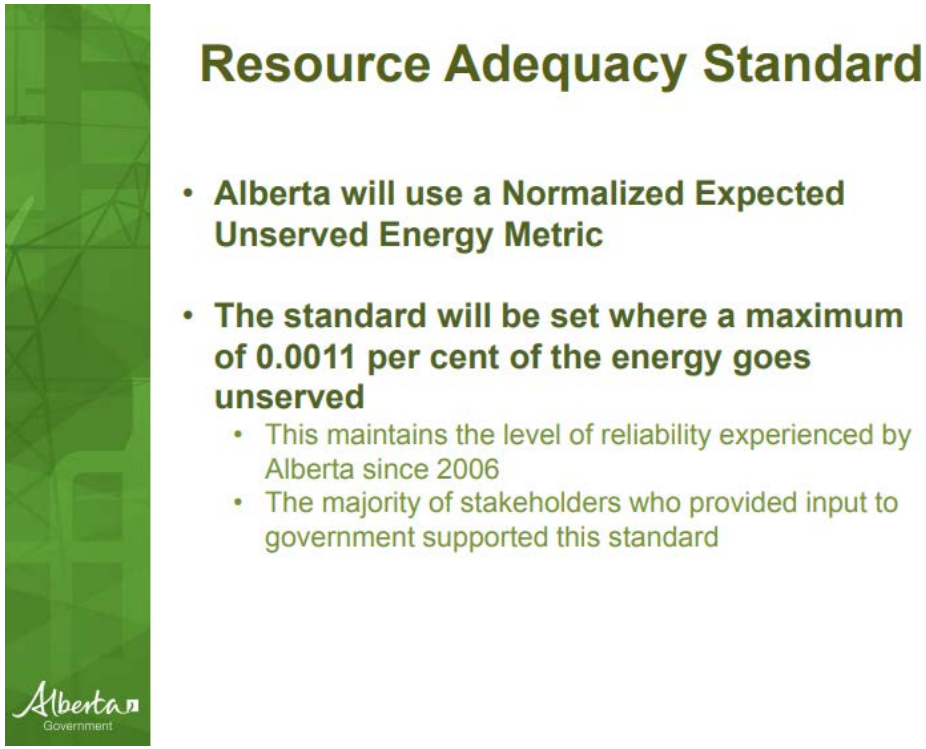
Steps to mitigate costs

- Rebalancing auctions
  - Allows AESO to reduce capacity purchases through sales of capacity if the expected need of capacity is reduced over time
- Performance assessments offsets
  - When capacity is not available or delivered as expected, the AESO will receive a capacity payment “refund”
  - The “refund” is paid to the AESO after over performers have received bonus payments
- Market power mitigation
  - There is a must offer requirement for all generation assets
  - Firms that have the ability to influence price higher to the benefit of their capacity portfolio will be subject to offer restrictions

Capacity Market Procurement Overview

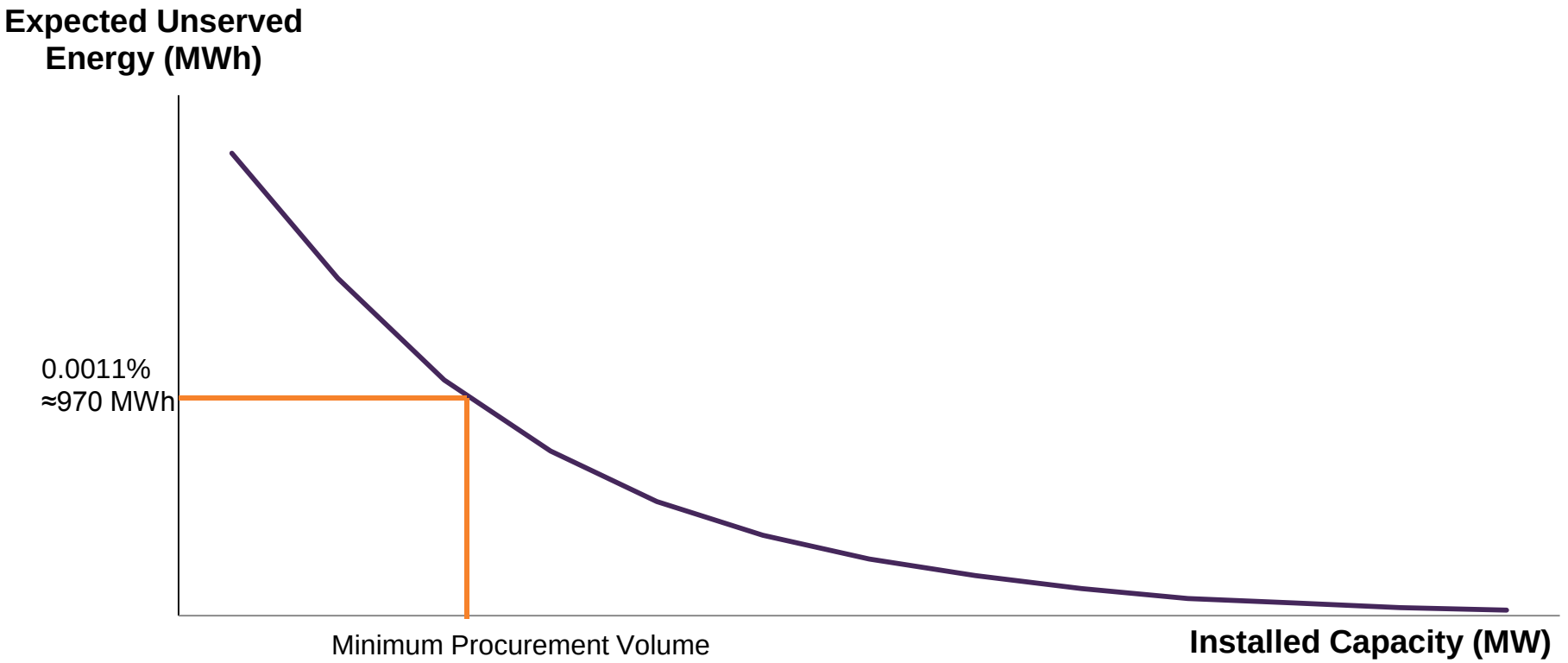
Background - Government Resource Adequacy Standard

- Government policy direction sets out a minimum level of resource adequacy (maximum level of expected unserved energy)
  - Maximum of 0.0011% of energy unserved
    - roughly equivalent to current LTA rule (202.6)
  - Minimum ≠ Target



Resource Adequacy Model – What it does

- The Resource Adequacy Model (RAM) determines the tradeoff between capacity (MW) and reliability (MWh) using a probabilistic approach that varies load and generation
- The RAM will be used to determine how much capacity is required to meet the government's Resource Adequacy Standard



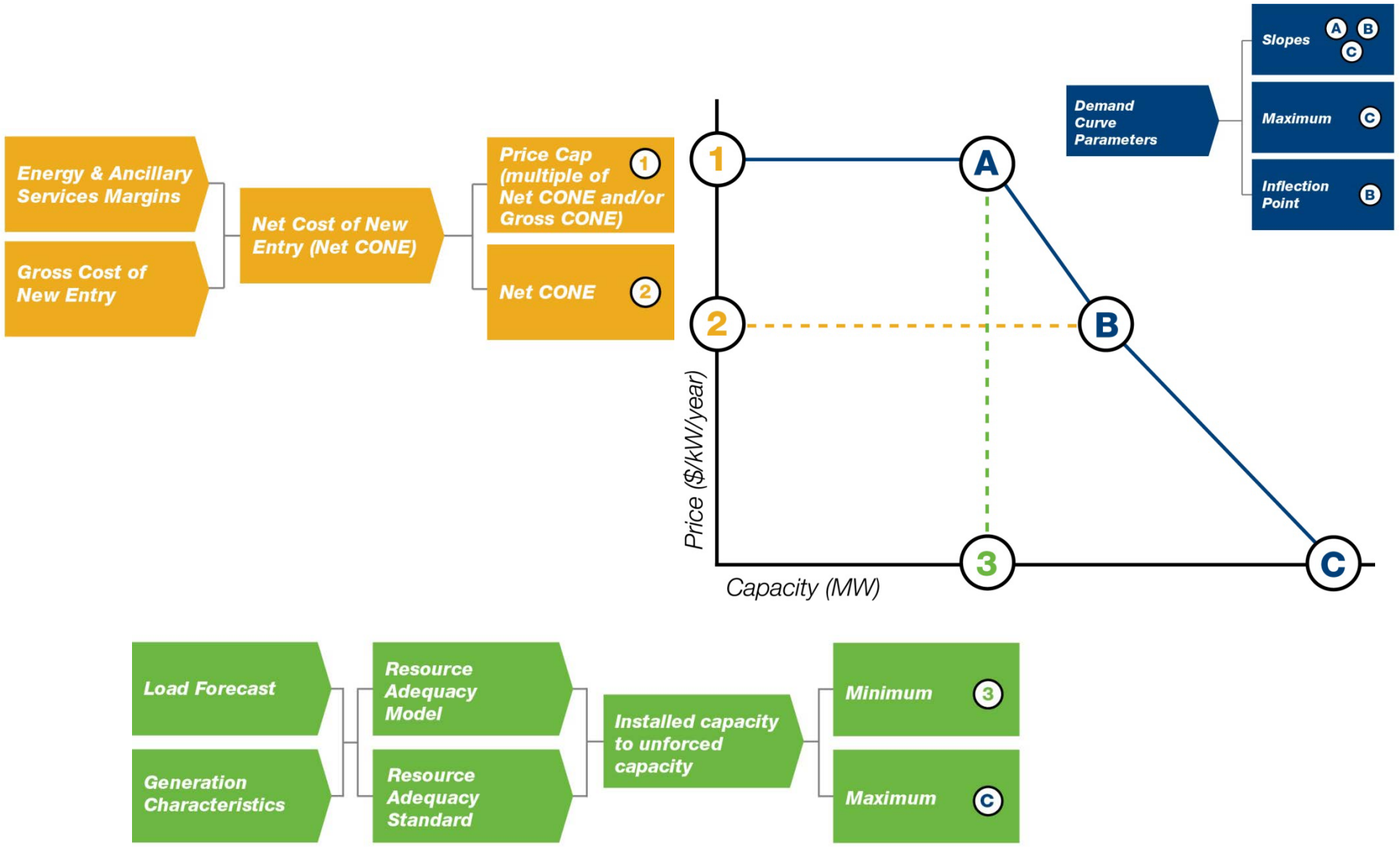
RAM - Model Mechanics

- Construction of scenarios, after a resource mix is defined SERVM runs 7,500 different 8,760 hour simulations
  - 30 weather years (load and renewable profiles)
  - Load forecast economic growth uncertainty (distribution of 5 points)
  - Unit outage modeling, capturing frequency and duration (50 iterations)

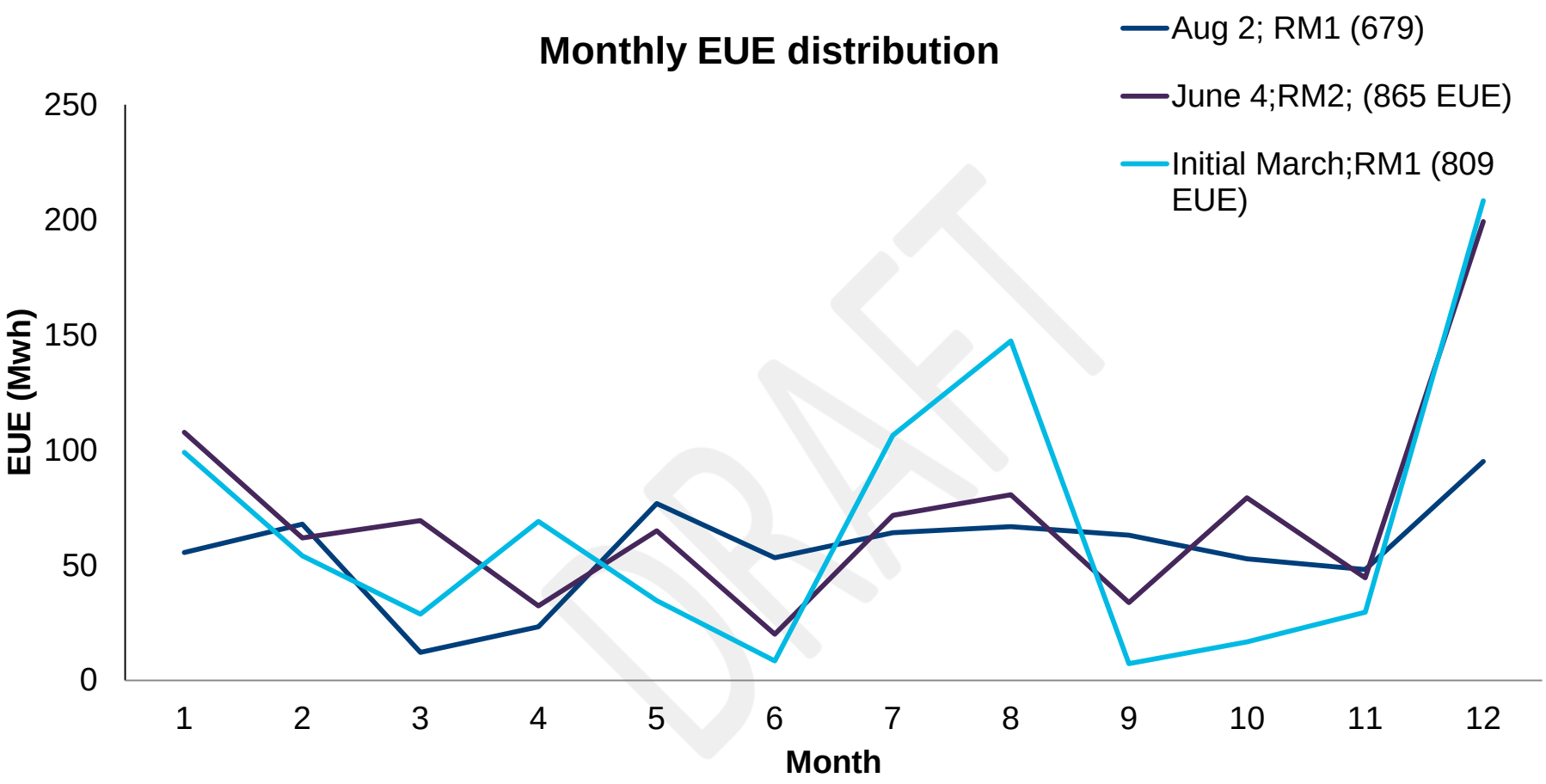
SERVM Framework for Creating Different Scenarios

30 Weather Years (Equal Probability)	x	5 LFE Points (Associated Probabilities)	=	150 Load Scenarios (Associated Probabilities)
150 Load Scenarios (Associated Probabilities)	x	50 Iterations of Unit Performance	=	7,500 Different 8,760 Hour Simulations

Demand Curve Overview



Updated Draft – Results Monthly

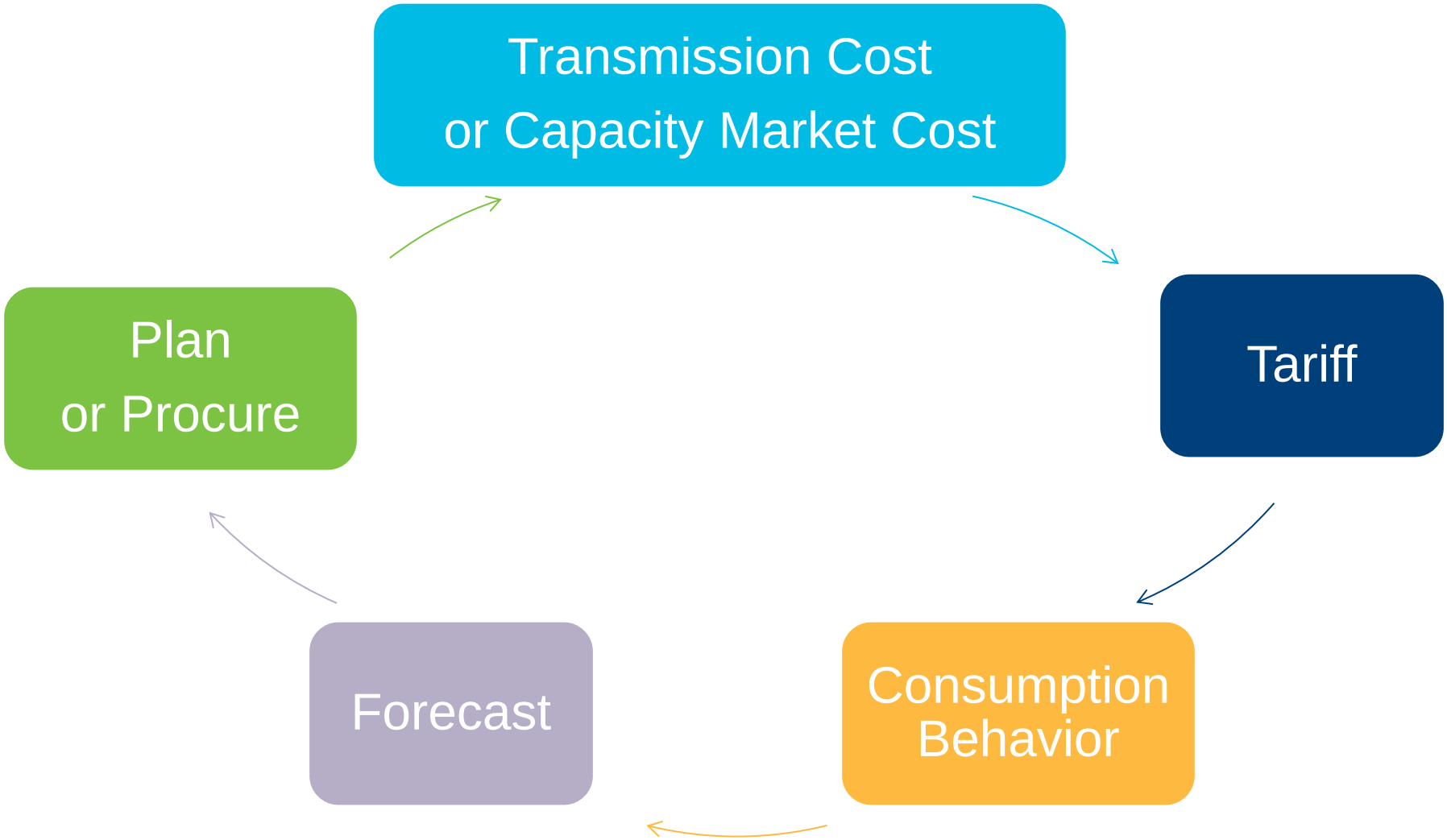


- The AESO can assess output from the RAM to determine which hours, days, months, etc. have the most/least EUE to help inform cost allocation blocks

Questions?

Cost Allocation 101

Tariff design model



Tariff design model (cont'd)

- Cost causation based tariff design
  - Relies on identifying what is causing the cost
  - Then price signal targets consumption behavior that cause cost
    - Important to align all price signals for all costs recovered by the tariff (transmission and, in future, capacity market) to support efficient consumption
- Then resulting change in behavior defers or lowers or eliminates future cost

Tariff Design Components

- Functionalization
- Classification
- Allocation
- Rate design
- Billing determinants
- Bill impact mitigation
- Deferral accounts

Functionalization

- Functionalization: grouping costs together based on what caused them.
  - Transmission
    - Transmission system comprises of thousands of elements
    - To simplify the task of determining what caused these thousands of elements, or will cause similar elements in the future, these elements are grouped together based on the “function” they serve
    - After removing radial point of delivery or supply elements, can rest of transmission elements be grouped together into function? If so how?
  - Capacity market – Can costs be functionalized? If so how?

Classification

- Classification: dividing functionalized costs between consumer demand and energy consumption.
- Within each function, cost can be caused by different aspect of consumption, such as:
  - Peak demand
  - Co-incident peak demand
  - Contract demand
  - Energy
  - Number of customers
  - Per day, etc.
- For a given function, classification determines which aspect of consumption is causing what proportion of the cost.

Classification (cont'd)

- Which **transmission** function(s) should be classified? If so how?

- Which **capacity** market function(s) should be classified? If so how?

Allocation

- Customers can be grouped together into few clearly distinct rate classes based on their hourly usage profile over the year(s)
- Each rate class would then have a different cost causation profile
- Allocation is the exercise of dividing functionalized and classified costs between rate classes
- Findings from functionalization and classification exercises inform the allocation exercise

Billing Determinants

- Billing determinants are the result of a calculation that produces a customer's consumption/demand for a defined period of time
- Common Billing Determinants
  - Coincident peak – peak demand by a group during a defined period of time
  - Total energy – total consumption during a defined period of time
  - Highest metered demand – peak demand by a single customer during a defined period of time
  - Contract demand – contract level
  - Weighted energy – total consumption by multiple defined periods of time

Rate Design

- After cost has been functionalized, classified and allocated to a rate class, a rate must be designed to recover this cost from this rate class
- Functionalization, classification, allocation and rate class behavioral and economic profile information is utilized to create a rate
  - Price signal that is expected to be most effective in meeting the goal
- For capacity market costs, rate design would have to based on weighted energy
  - I.e. time of use (super-peak, on-peak, off-peak)

Bill Impact Mitigation

- Rates should be stable and predictable to allow consumers to plan and respond efficiently
- For load only consumers, total electric energy bill increase of 10% or more is considered excessive (i.e., rate shock)
- If change in tariff design causes rate shock then mitigation plan maybe required
- In past the Commission has directed the AESO to subsidize such affected consumers by collecting the shortfall from all consumers
- Not applicable to capacity market bills at this time

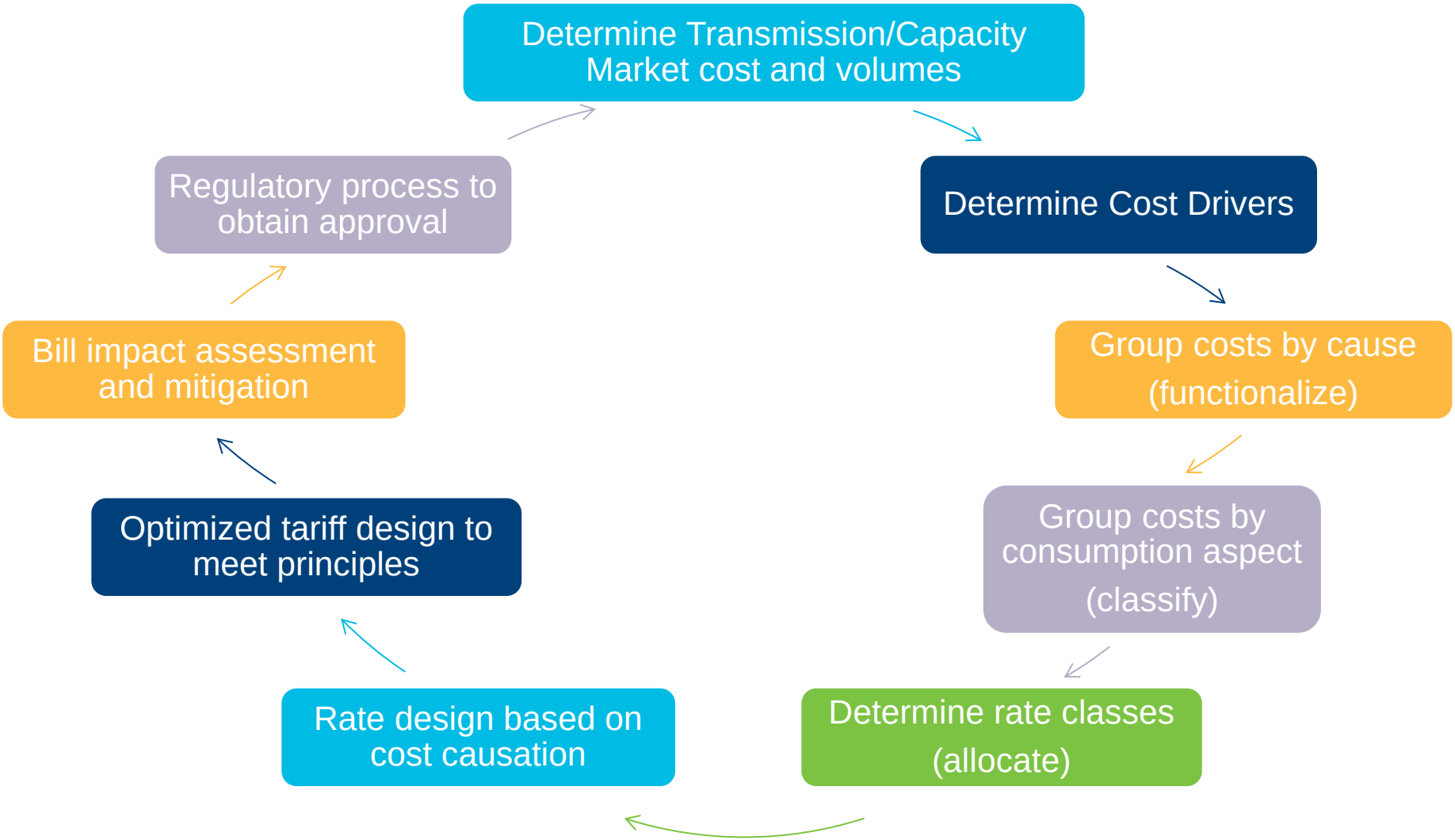
Bill Impact Mitigation (cont'd)

- If change in tariff design causes rate shock:
  - Transmission system and transmission costs would not change but bills can change significantly
  - Which bill impact should be mitigated?
  - What should be the term of any mitigation?
  - Does tariff design remain valid with any such mitigation?

Bill Impact Mitigation (cont'd)

- If tariff design changes significantly:
  - Should market participants be provided a notice if tariff design is changing significantly?
  - What is an appropriate notice period?
  - How would such advance notice change market participant behavior?
  - Does tariff design remain valid with any such change in behavior?

Tariff design exercise



Deferral Accounts

- Tariff design is a forward looking exercise using forecast cost, forecast consumption and behavior and other such information
- Difference between actuals and forecast is dealt with in deferral accounts
- Transmission tariff uses tariff application, tariff update, quarterly correction, and after the fact annual correction model
- What is an appropriate model for the capacity market tariff?

Sample Designs - Transmission

Assumes total annual revenue requirement of about $2 billion

Billing Determinant	Value	Rate
Co-incident peak	97,698 MW	$20,650/MW
Total energy	61,303 GWh	$33/MWh
Highest metered demand (no ratchet)	122,370 MW	$16,486/MW
Billing capacity demand (90% two year ratchet)	156,984 MW	$12,851/MW
Weighted Energy (Weightings of 1:2:3) - Super (4pm-8pm) - On Peak - Off-peak (10pm-8am)	 10,905 GWh 26,773 GWh 23,624 GWh	 $55/MWh $37/MWh $18/MWh

Sample Designs – Capacity Market

Assumes total annual revenue requirement of $1 billion

Billing Determinant	Value	Rate
Weighted Energy (Weightings of 1:2:3) - Super-peak (4pm-8pm) - On-peak - Off-peak (10pm-8am)	 10,905 GWh 26,773 GWh 23,624 GWh	 $27/MWh $18/MWh $9/MWh
Weighted Energy (Weightings of 0:1:4) - three blocks as above	 10,905 GWh 26,773 GWh 23,624 GWh	 $57/MWh $14/MWh $0/MWh
Weighted Energy (Weightings of 1:4) - On-peak (4pm-8pm) - Off-peak	 10,905 GWh 50,398 GWh	 $43/MWh $11/MWh

Key Observations

- Some recent large transmission projects have been caused by generation and by government mandate:
  - Consumers did not directly cause these projects and any of their response would not have deferred or eliminated these projects
- Consumers have responded to prior and current tariff by investing in on-site generation and modifying consumption patterns

Key Observations (cont'd)

- Costs have risen by multiples within last 20 years and are expected level out
- Generation capacity market, small scale renewable generation and community generation may further incent on-site generation
- Consumers are demanding service with different levels of quality (interruptible, non-firm etc.)

How should we proceed?

- What questions do we have?
- What do we want to know?
- What work does this lead to?
  - Historical data
  - Economic data
  - Forecast data
- Balancing scope, resourcing and timeline

Thank you