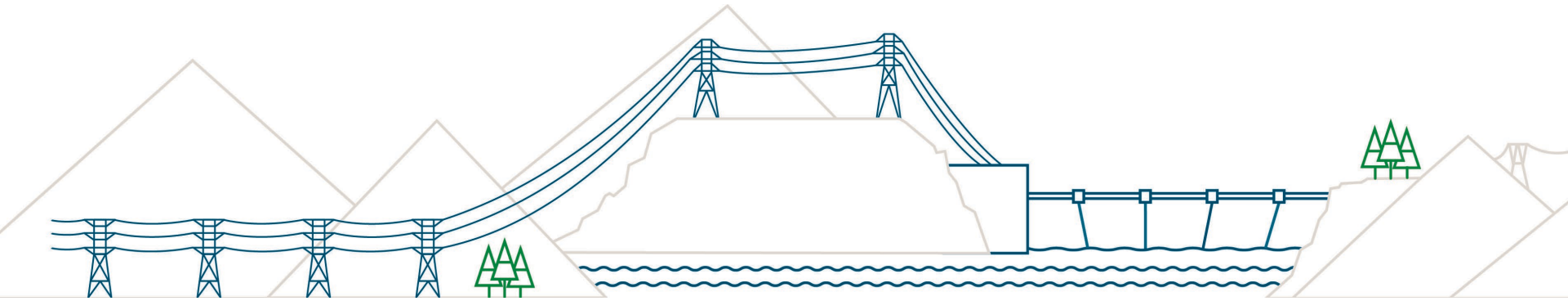
2021 Integrated Resource Plan (IRP) Technical Advisory Committee (TAC) Meeting #3a/b

***Capacity Focused Rate Design Options**

***Demand Side Management Options**



June 18/24, 2020

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Agenda review

Meeting purpose – chance for early feedback from TAC before first round of modelling starts

Welcome & introduction

Basil Stumborg, Kathy Lee

Meeting etiquette	About Webex	IRP timelines	Last meeting recap	Resource options context

Capacity-Focused Rate Design Options

Anthea Jubb, Paulus Mau

Background & Purpose	Capacity Focused Rate Designs	Rate Design Outcomes for F2030

Demand-Side Management (DSM) Options

Eddie Young

Feedback Sought & Background	Methodology CPR	Energy efficiency options	Demand response options

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Virtual meeting etiquette

These principles should make our meetings more effective

- As with in-person meetings, continue to have members participate and alternates observe
- Keep the conversation respectful by focusing on ideas, not the person
- Stay curious about new ideas
- Share the air time – to ensure everyone gets heard

- To minimize distractions – keep yourself on mute
- We'll use the chat box to seek input and ask questions
- We'll not be recording these sessions, and ask for others not to record

Getting familiar with Cisco Webex

We'll be using a few basic tools, which you can find if you hover your mouse over the bottom of the screen

Mute/unmute your mic & turn your video on/off

View the participant list

Open the chat panel:
- to ask questions
- to provide feedback

Audio connection trouble?
See the alternative options here

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A quick update on IRP timelines

COVID-19 caused a delay to the IRP schedule

COVID Impacts:

- BCH's focus temporarily drawn to operational issues
- Capture increased uncertainty in load forecast
- Adjust consultation approach particularly with Indigenous Nations

We are regrouping and starting up again (virtually)

Recap of the last TAC meeting

We provided an overview last time

The first meeting on March 9th, we provided an overview of the IRP to the Technical Advisory Committee and discussed what was coming up.

Previous agenda topics:

- IRP overview (policy context, process and objectives)
- Decision framework (uncertainties reviewed a number of topics of interest)
- Electrification scenarios (high level)

More from last TAC meeting

What is BCH doing with your feedback

What we heard last meeting:

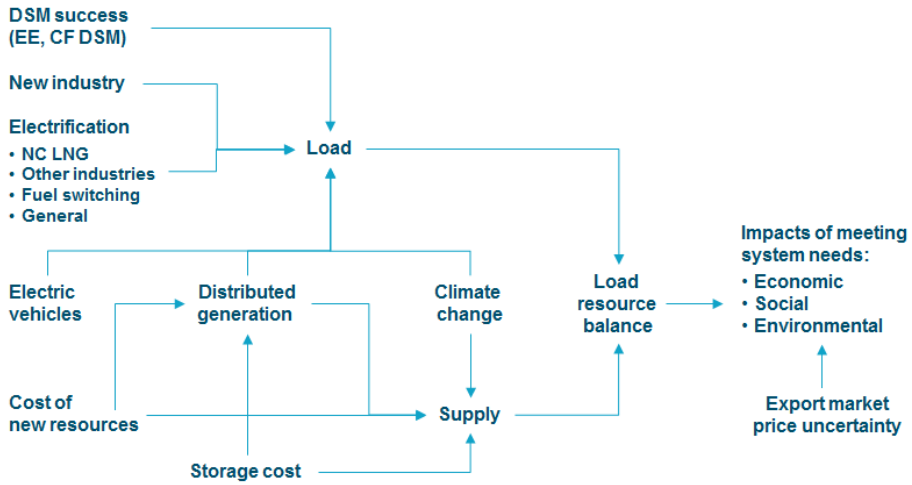
- More information about BC Hydro's electrification efforts
- Comparison of BC Hydro's electrification study with the Trottier study
- More information on low load growth in the short and longer term
- How BC Hydro will be addressing load uncertainty (e.g. scenarios)

We plan to address these topics in the July meetings

Why this topic, now

How does this contribute to comprehensive, timely engagement?

- In our last meeting, we discussed and prioritized a long list of TAC topics
  - We are still planning on working our way through those with TAC
  - We would like to present the new workplan in July
- Resource options and DSM discussions moved up
  - Can allow some consideration before preliminary analysis starts over summer



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How are we using resource options in the IRP?

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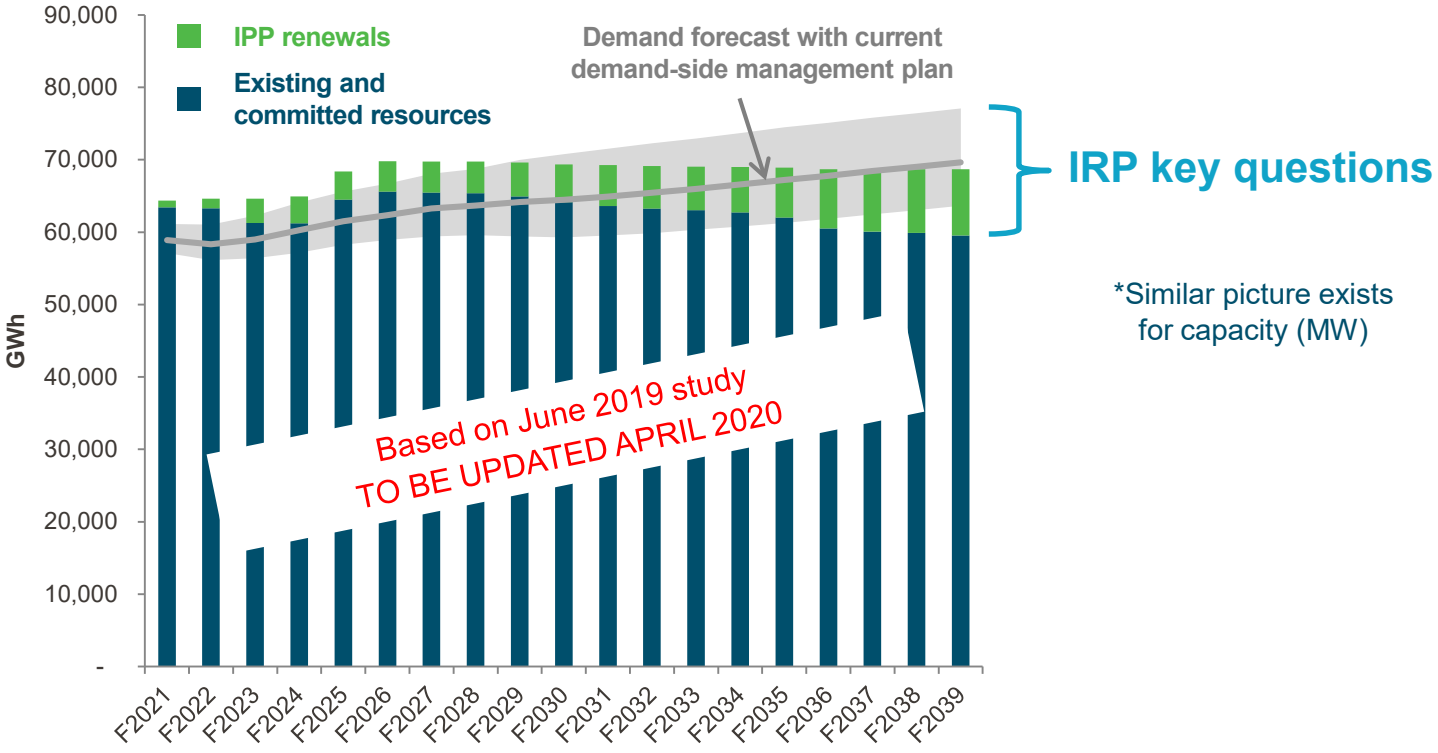
Last meeting we saw this LRB* view (Load Resource Balance)

One picture containing supply-side options, forecast demand, some embedded DSM in the load, DSM uncertainty



IRP key questions

*Similar picture exists for capacity (MW)

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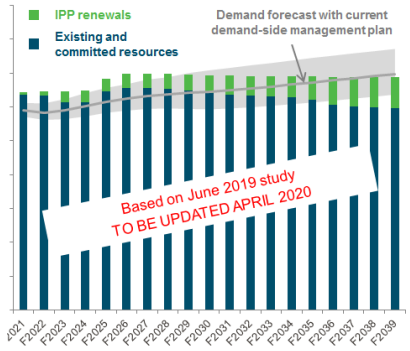
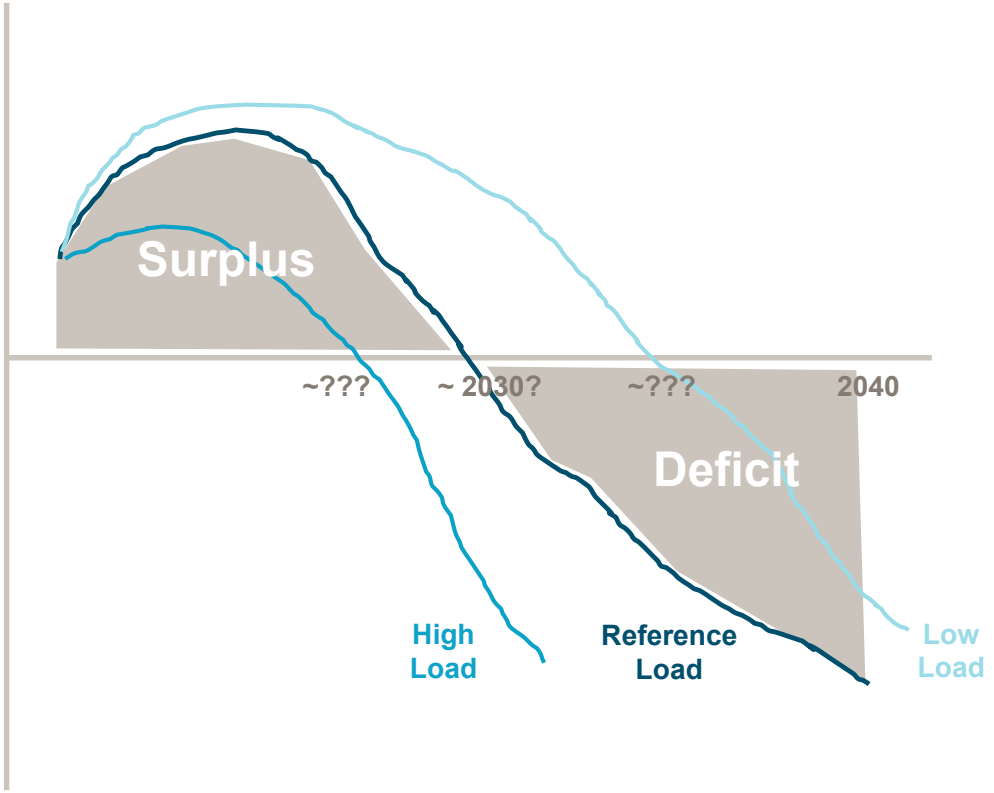
A simplified LRB view

This view emphasizes the near term surplus and the future deficit, along with load uncertainty



IRP modelling will look at what resources (including DSM) to address deficit multi-dimensional problem:

- 10 planning regions
- Energy and capacity
- Load uncertainty
- Multiple objectives



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Applying this LRB diagram to today

To help orient details to the broader context of answering IRP questions

- Presentations today lay out the nature and volume of DSM options
- They cover both energy efficiency, rates and demand response options
- We tend to focus on:
  - Energy efficiency – as mostly about energy savings
  - Rates and demand response – as mostly about capacity
- All will be modelled with appropriate energy and capacity savings
- They will be available for the System Optimizer to choose alongside IPPs and BC Hydro generation options
  - Some are system-wide options, some are regionally based

Applying this LRB diagram to today

To help orient details to the broader context of answering IRP questions

Starting assumption – DSM energy efficiency starts from a position of existing and committed resources

- All energy efficiency options are built on top of this
- The goal of modelling DSM options is to understand avoided cost, other impacts
- Additional considerations (non-financial impacts, savings uncertainty) will be addressed where needed

Round table from TAC members

For today's topic of capacity focused rate design and demand-side management options

What would you like to have addressed today?

In one minute or less

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Capacity Focused Rate Design Options

Anthea Jubb, BC Hydro
Paulus Mau, BC Hydro

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Agenda

Background & Purpose	Capacity Focused Rate Designs	Rate Design Outcomes for F2030

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Background & Purpose

Background

- At the Resource Options Update Session (December 12, 2019) we discussed five potential capacity focused rate designs to consider as resource options for the IRP
- These rate options use price signals to encourage peak shaving and load shifting
- As the goal is to identify capacity resource options, not presented are rate design options that are focused on energy use only (e.g. electrification or energy conservation rates), or other potential policy goals (e.g. lifeline rates)

Purpose: Seek your input on the selection and grouping of the capacity focused rate design options

Capacity Focused Rate Designs

Rate Options	Discussion
Time of Use	• Higher prices at peak periods, lower prices off peak • Encourages customers to shift the timing of their usage
Demand Charges	• Already widely used for large commercial and industrial customers • For IRP, assume additional demand charges are applied during system peak and/or to customer groups with high peak demand (e.g. residential solar) • Reduces the energy charge and encourages customers to smooth out their usage
Critical Peak Pricing	• Very high prices during a small number of critical peak periods, lower prices during all other times • Can provide bill savings for customers who can manage the risk of unplanned peak events • Can provide the utility flexibility to take advantage of market opportunity and manage system constraints
Peak Time Rebate	• Offer a rebate for customers who reduce usage during peak periods • Due to administrative burden, may be better suited to targeted programs than to rates, considered as Demand Response DSM Options: Industrial Load Curtailment and Residential Peak Saver
Real Time Pricing	• Prices follow market, and may vary hourly or daily • Encourages the alignment of supply and demand • Not solely focused on peak demand reduction, and therefore not proposed for consideration as a resource option for the IRP

Capacity Focused Rate Design Options for the IRP

Do you agree with our proposed options?

Do you suggest other options?

Rate Options	Default Rates (customers can opt-out)			Optional Rates (customers chose to participate)		
	Residential	Commercial /Institutional	Industrial	Residential	Commercial /Institutional	Industrial
Time of Use	×	×	×	×	×	×
Demand Charges	Solar / distributed generation customers	×	×		×	×
Critical Peak Pricing	Not proposed as a default rate, as participating customers bear substantial price risk			×	×	×
Peak Time Rebate	Not proposed as a rate, as the utility bears substantial administration costs			See Peak Saver Program		See Load Curtailment Program

Illustrative and Preliminary Rate Design Outcomes for F2030

Average MW reduction during winter peak period

Rate Options	Default Rates (customers can opt out)			Optional Rates (customers chose to participate)		
	Residential	Commercial / Light Industrial (includes institutions)	Industrial	Residential	Commercial /Institutional	Industrial
Time of Use	300	30	40	100	5	40
Demand Charges	TBD	500	350	N/A	70	100
Critical Peak Pricing	N/A	N/A	N/A	200	TBD	TBD

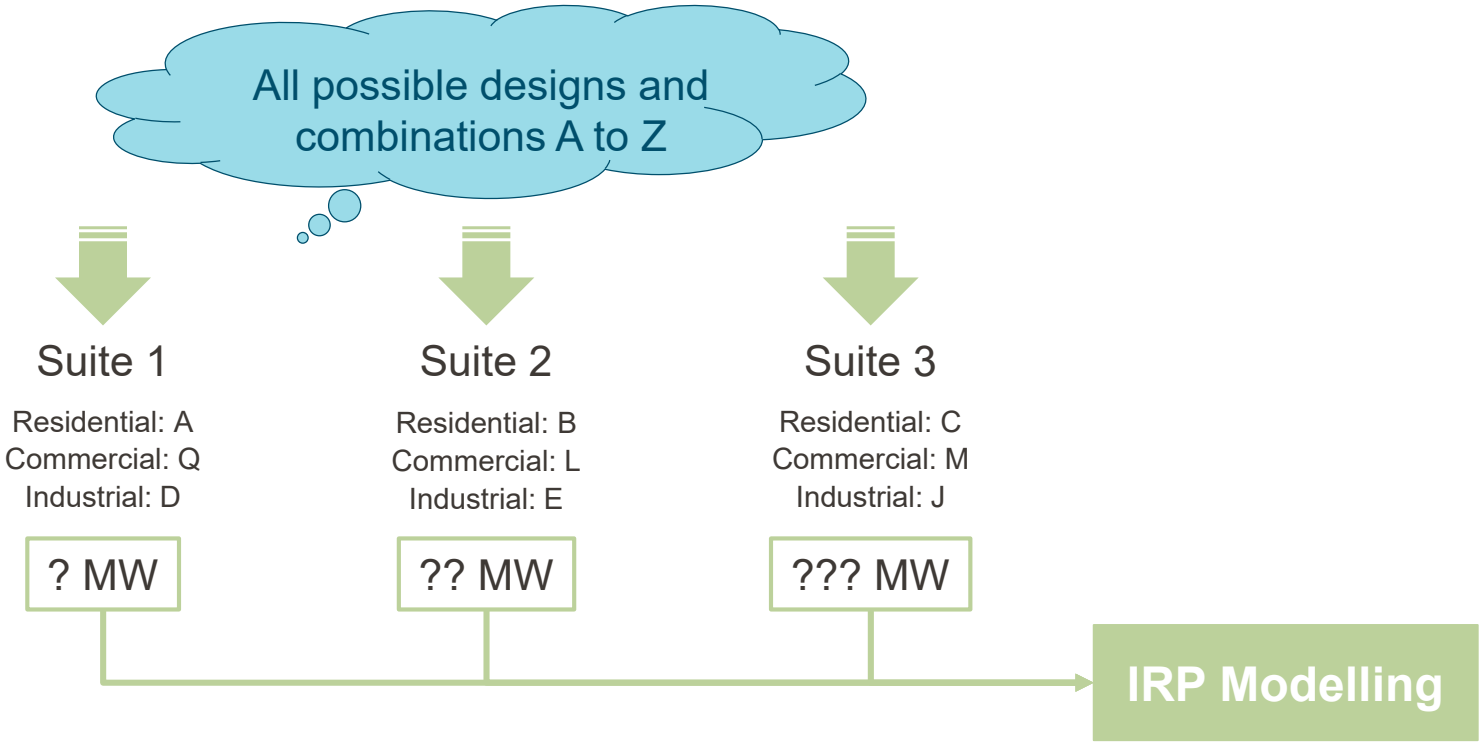
Notes:

- Design combinations may be applied for final analysis (e.g. time of use combined with critical peak pricing)
- Outcomes are illustrative to note the possible magnitude assuming regulatory approval, customer acceptance, and customer response that is consistent with academic literature

Rate Suites for IRP Modelling

Grouping of rate combinations into three rate suites covering all sectors

- Better suited for long term modeling and analysis
- The high-level aggregate outcomes are more important for long-term planning



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Illustrative Rate Suite Based on Grouping by Peak Demand Reduction Potential

	Low Potential	Medium Potential	High Potential
Residential	Optional TOU	Optional TOU + Optional CPP	*Default* TOU + Optional CPP + Demand Charges
Commercial / Light Industrial (Includes Institutions)	Optional TOU + Optional CPP	Optional TOU + Optional CPP + Default Demand	*Default* TOU + Optional CPP + Default Demand
Industrial	Optional CPP	Optional CPP + Optional Demand	Optional CPP + *Default* Demand + *Default* TOU
Input to IRP Model	Total MW reduced Suite 1 e.g. 100 MW	Total MW reduced Suite 2 e.g. 1000 MW	Total MW reduced Suite 3 e.g. 1400 MW

Note: When designs are combined, the impact is not strictly additive

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How to Group Rate Options

Do you agree with our proposed grouping?

Do you suggest we screen our grouping for any of the additional considerations?

- Proposed grouping based on peak demand reduction potential
- Also consider BC Hydro's rate design objectives and Bonbright criteria:
  - Customer acceptance and understanding
  - Economic efficiency
  - Decarbonization
  - Flexibility

Demand Side Management Options

Eddie Young, BC Hydro

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Agenda

Purpose: Review the concepts for the energy efficiency and demand response options for the IRP

Feedback Sought & Background	Methodology CPR	Energy efficiency options	Demand response options

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Feedback Sought & Background

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Feedback Sought

- We are interested in your feedback on whether we have missed an important consideration

Background

- We have developed energy efficiency (EE) and demand response (DR) options, mostly using models from the Conservation Potential Review (CPR)
- Different market potential scenarios represent the energy efficiency and demand response options
- Incremental demand side management (DSM) options have been broken down by the 10 planning regions in B.C.

Methodology

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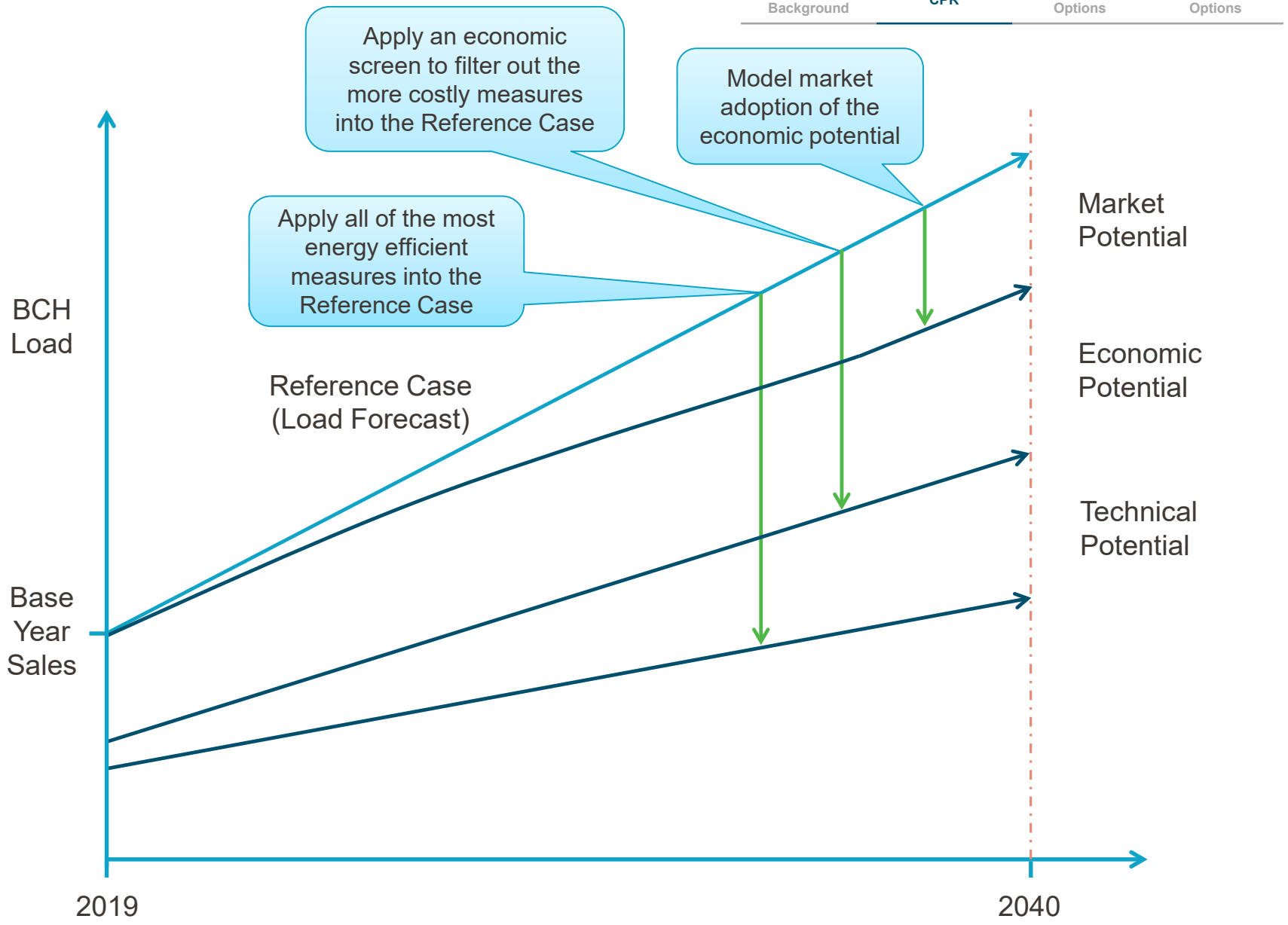
Methodology

Conservation Potential Review (CPR) model overview

- CPR estimates size, cost and location of conservation potential over 20 years
- Conservation potential is relative to BC Hydro's Load Forecast
- Using a CPR is consistent with how other jurisdictions conduct resource planning
- Studied/modelled in 2016 and updated in 2019 for the IRP
- Allows high level DSM options to be created relatively quickly
  – selected options will be further built out via an implementation plan



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Market Potential Overview

Market potential represents the DSM option

- Also known as achievable potential
- For energy efficiency:
  - Focuses on achieving the economic potential by overcoming market barriers such as awareness and cost.
  - Accounts for stock turnover, consumer economics, technology diffusion and it's impact on consumer adoption
  - Key drivers for adoption: load, stock, measure economics
  - Key model levers: incentive levels, admin costs, technology diffusion parameters

CPR Update 2019

We updated the 2016 Conservation Potential Review for the IRP

- Updated CPR models to reflect more current information including:
  - Actual sales up to fiscal 2019, by customer class and end use
  - June 2019 Load Forecast – as filed in the recent Revenue Requirements Application
  - Limited update on measures
  - Global assumptions
- Conservation potential dropped, largely due to the lower load forecast in the commercial sector reducing commercial potential significantly:
  - Economic potential in 2035 dropped 17% relative to 2016 CPR
- No adjustments for COVID-19 due to impacts being assessed – will be monitored

Energy Efficiency Options

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Energy Efficiency Option

Current DSM Plan – programs only

- Programs and initiatives available to residential, commercial and industrial customers, with codes and standards acting as the baseline where applicable
- Consistent with current offers for energy efficiency projects, energy management, and operational benefits
- This option would operate as a base of DSM across all BC, that would facilitate higher energy efficiency and demand response options (regional or system) if needed.
- Benefits/impacts of this option will be tested to look at question of whether current level of DSM is appropriate
- Achieves new incremental energy savings of about 140 GWh/yr (savings in one year), and long-run maximum cumulative energy savings of about 1,600 GWh/yr (over 20 years)

Energy Efficiency Option

Higher Option: DSM Plan with higher incentives

- Model a stretch target for what could be achieved with a more aggressive program for all three sectors (residential, commercial and industrial)
- Higher incentive levels, increased marketing and awareness effort and higher adoption assumptions
- Assumes large industrial projects will be targeted
- Achieves new incremental energy savings of about 250 GWh/yr (savings in one year) or 110 GWh/yr incremental to the option presented on the previous slide
- Achieves long-run maximum cumulative run-rate savings of about 3,100 GWh/yr (over 20 years) or 1,500 GWh/yr incremental to the option presented on the previous slide

Energy Efficiency Option

New construction program

- BC Hydro previously shifted strategy with new construction to prioritize building code – this IRP DSM option explores advancing new construction savings beyond building codes
- Building code improvements have eroded the savings potential for programs, however potential from new buildings remains at a higher cost
- This option provides incentives for new construction to provide incremental savings beyond building code
- Achieves new incremental energy savings of about 10 GWh/yr (savings in one year), and long-run maximum cumulative run-rate savings of about 200 GWh/yr (over 20 years)

Energy Efficiency Option

Solar program

- Solar program / incentives for residential single family homes
- Savings are incremental to what would be achieved through net metering
- Modelled outside of the CPR, but will incorporate same technology diffusion principles to model adoption
- Projected decline in the cost of solar PV will benefit participant economics and improve adoption over time
- Achieves new incremental energy savings of about 10-20 GWh/yr (savings in one year), and long-run maximum cumulative energy savings of about 300 GWh/yr (over 20 years)

Energy Efficiency (EE) Options

Options are not mutually exclusive

EE Options	Characteristics of EE Options	Eligible Customer Classes	Savings
Current DSM Plan – Programs Only	Wide array of custom and prescriptive offers for energy efficiency projects, energy management and operational	Residential Commercial Industrial	New incremental = 140 gwh/yr Long-run cumulative = 1,600 gwh/yr
More Aggressive Program Option	Increase incentives and marketing efforts	Residential Commercial Industrial	New incremental = 250 gwh/yr Long-run cumulative = 3,100 gwh/yr
New Construction Program	Incentives to build new buildings to higher efficiency then current building code	Residential Commercial	New incremental = 10 gwh/yr Long-run cumulative = 200 gwh/yr
Solar Program	Incentives to help reduce the cost of installing solar PV on single family homes	Residential	New incremental = 10-20 gwh/yr Long-run cumulative = 300 gwh/yr

Demand Response Options

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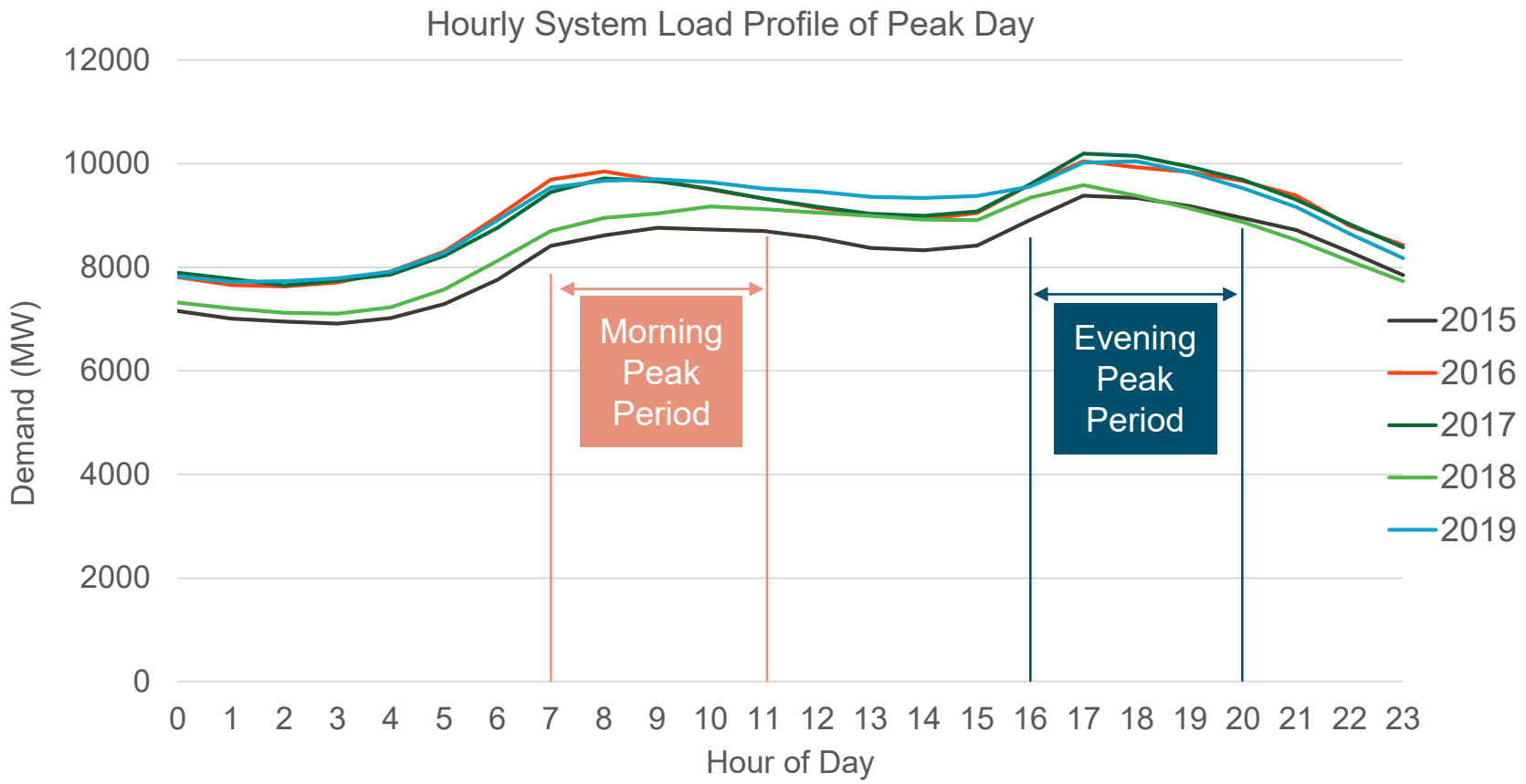
Demand Response

Background

- BC Hydro is a winter peaking utility with the system peak typically occurring in the evening
- BC Hydro must provide both the generation, transmission and distribution capabilities to satisfy peak requirements
- If peak requirements can be reduced, then generation, transmission and distribution investments may be deferred
- The capacity characteristics needed to satisfy peak requirements would also depend on the characteristics of resources already in the system

Load Profile – Average Winter Weekday

Peak days have a morning and evening peak



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Demand Response (DR) Options

Methodology

- Different model than energy efficiency options but similar methodology where a peak demand forecast is built and the potential is relative to the forecast
- Inputs and assumptions informed by DR pilots and Guidehouse (formerly Navigant) experience from other jurisdictions
- Peak period for most DR Options: morning and evening peak on weekdays in Nov to Feb, with up to 20 events per year
- For transmission load curtailment, this product will provide 16 hour events for up to 36 times a year
- Demand response savings ramp up quicker then energy efficiency, reaching 90% of maximum peak savings within five years (except for electric vehicle direct load control)
- An adjustment to peak savings will be made if capacity rates are selected to avoid double counting

Demand Response Options

DR Options	Characteristics of DR Options	Targeted/Controllable End Uses	Eligible Customer Classes	Maximum MW Saved
Direct Load Control	Control of space heating load using a two-way communicating thermostat and of water heating and electric vehicle load using a load control switch	• Electric space heating • Electric water heating • Electric vehicles	Residential Small Commercial & Industrial (Small General Service) Medium Commercial & Industrial (Medium General Service)	Space heating = 200 MW Water heating = 60 MW Electric vehicle = 200 MW
Load Curtailment	Customer to provide a firm load reduction during a demand event	Various load types including HVAC, lighting, refrigeration, and industrial process loads	Large Commercial & Industrial (Large General Service) Extra-Large Commercial & Industrial (Transmission Service Rate)	170 MW
Peak Saver	Customers are notified with 24 hours notice to shift their usage	All eligible, usage of appliances more easily shifted	Residential	80 MW

IRP TAC
Next Steps

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Next steps for the IRP TAC

Details for the July meetings

July meeting dates – scheduling in progress

Meeting topics:

- General workplan
- Generation resource options
- Planning criteria
- Review of some early load resource balance results
- Key IRP questions – discussion
- Key IRP uncertainties – discussion

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