RATE DESIGN APPLICATION (RDA)
MODULE 2

Workshop No. 2 Agenda

Facilitator: Anne Wilson

March 3, 2017

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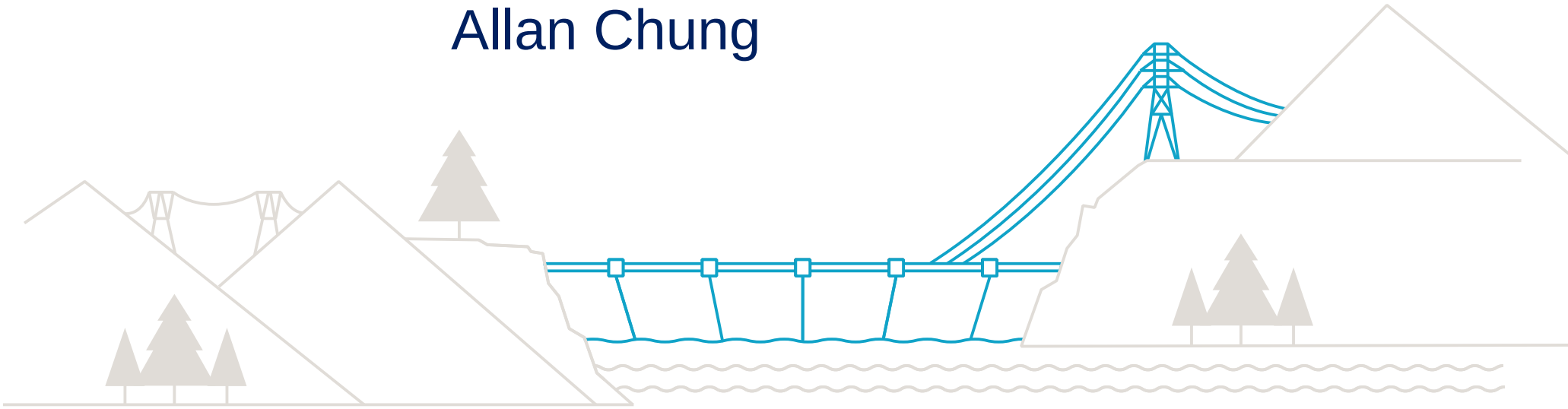
Workshop No. 2 – March 3, 2017 Agenda

Approximate Time	Item	Presenter
9:00 – 9:15	Welcome and Agenda Review	Anne Wilson
9:15 – 10:15	1. Optional Rates	Gord Doyle, Allan Chung
10:15 – 10:30	BREAK	
10:30 – 11:30	1. Optional Rates (continued)	Allan Chung
11:30 – 12:00	2. Irrigation	Shane Hiebert
12:00 – 1:00	LUNCH	
1:00 – 1:45	3. Street Lighting	Calvin Hastings, Ed Mah
1:45 – 2:45	4. Non-integrated Areas	Shane Hiebert
2:45 – 3:00	Closing and Next Steps	Anne Wilson

Residential Optional Rates

Presenters: Gord Doyle
Allan Chung



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Optional Rates – Policy Considerations

Low-Carbon Electrification

BC Hydro has begun to explore low-carbon electrification consistent with the Climate Leadership Plan released by the Province of B.C. in August 2016

- Low-carbon electrification - using clean electricity in place of other forms of energy such as gasoline, natural gas, and diesel, where replacing those fuels with clean electricity contributes to greenhouse gas emission reductions
- Within the plan the Province includes discussion on how demand-side management programs can take on an expanded role in climate leadership, help customers understand their greenhouse gas emissions and provide investments that increase efficiency and reduce greenhouse gas emissions

Optional Rates – Policy Considerations

Low-Carbon Electrification

Our work on low-carbon electrification to date has included the following:

- Development of an initial inventory of low-carbon electrification end-uses across the residential, commercial, and industrial customer segments
- Working with government and industry to fulfill the Climate Leadership Plan action of using electricity to power natural gas production and processing
- A scan of electrification programs developed and delivered in other jurisdictions in North America
- Considering how existing demand-side management programs could be expanded to incorporate support for low-carbon electrification opportunities

Optional Rates

Climate Leadership Plan

The development of Optional Rates are another tool that could help BC Hydro support low-carbon objectives. Some considerations include:

- Look to remove any disincentive that the default rates may pose to low-carbon electrification
- Encourage customers to make changes to how they use energy
- Bonbright rate design criteria and principles
- Combine programs with rates to achieve mutual benefit

Rate options described in this workshop do not imply any preferred alternative by BC Hydro but are rather intended to stimulate discussion regarding how optional rates could work to meet customer needs

Optional Rates

Responding to residential customer needs

Optional rates could provide customers rate choice that reflect how they use electricity:

1. Customers without access to natural gas and with electric space heating
    - Time of Use
    - Flat Rate
2. Customers who have made a choice to install efficient end uses such as heat pumps or electric vehicles
    - Time of Use
    - Flat Rate
3. Customers who would like more control over their energy costs
    - Time of Use

Outline

1. Optional flat residential rate
2. Voluntary TOU rates scope and timing
3. Rationale for voluntary TOU rates
4. Rate design and illustrative residential voluntary TOU rates
5. Next steps

Optional Flat Residential Rate

Existing Flat Residential Rate

Rate Schedules (RS) 1151, 1161 – Exempt Residential Service

- Availability - for residential service and uses exempted from rate schedules 1101 and 1121, including:
  - farms that meet certain criteria
  - residential service customers in Rate Zone IB
- RS 1151 Basic Charge - 19.57¢ per day
- RS 1151 Energy Charge - 9.93¢ per kW.h

Optional Flat Residential Rate

Challenges of introducing a voluntary flat rate

1. Self-selection bias and impacts to BC Hydro revenue
   - Small customers will stay on RIB for access to lower Tier 1 energy
   - Large customers will choose the flat rate to avoid higher Tier 2 energy
   - Result is a potential revenue shortfall
2. Little benefit to electric heat customers at the median
   - The cost of Tier 1 energy increases by 20% which largely offsets the 20% decrease in Tier 2 energy cost

Optional Flat Residential Rate

Challenges of introducing a voluntary flat rate

- Eligibility
  - Administrative challenges
  - If tied to equipment ownership (e.g., heat pump) – customer would need to demonstrate proof of ownership and BC Hydro would need to maintain customer records.
- Alignment with Bonbright criteria

Voluntary TOU Rates Scope and Timing

Scope:

Develop voluntary time of use (TOU) rate options for residential and general service customers

Timing:

- To be developed as part of 2015 RDA Module 2 – Application Fall 2017 filing
- Effective date would be dependent on implementation timing

Voluntary Time of Use (TOU) Rates Can:

1. Support Clean Electrification

- Can remove barriers of default residential inclining block rate
  - Does not result in paying higher rate for increases in consumption if consumption grows in the off-peak
  - Electric Vehicles
- Can reduce bill impacts for some electric heat customers
  - Energy consumed throughout the off-peak hours is at a lower price than the step 2 price of the inclining block rate
- Can help BC Hydro load management
  - Encourages shift from peak to non-peak hours

2. Provide Customer Choice

- Savings on their electricity bill if they are able to shift load from the peak periods to the off-peak periods

Rationale for Voluntary TOU Rates
BC Hydro Needs

1. BC Hydro's marginal cost of energy and capacity varies by season and time of day
   - System is winter peaking – drives T&D infrastructure needs
   - Freshet period energy surplus
2. Load Management supported by 2013 Integrated Resource Plan

Rationale for Voluntary TOU Rates
Residential Customer Needs

1. Residential customers are seeking options to current RIB rate:
   - RIB Rate Report
     - customers without access to natural gas and with electric space heating
   - RIB rate may not align with low-carbon electrification objectives
     - customers with efficient end use such as heat pumps
     - EV owners
2. Voluntary TOU rate may provide residential customer with:
   - rate choice
   - more control over their electricity costs
   - savings on their electricity bill by encouraging customers to shift load from the peak periods to the off-peak periods

Jurisdictional Analysis

Canadian Utilities

- Alberta - generation choice is offered e.g., real time pricing for residential and commercial customers is offered by retailers (e.g., ENMAX, Direct Energy Alberta) via unregulated price, indexed to the wholesale market
- Ontario – all utilities have mandatory residential and small general service TOU rates
- Hydro Quebec has optional dual fuel rate for residential customers with dual gas/electric boiler. When temperature drops, the customer's heating equipment is switched.
- Nova Scotia Power offers an optional TOU rate for residential customers employing electric-based heating systems utilizing electric thermal storage equipment

Jurisdictional Analysis - Residential

US Utilities

- Based on 2010 survey, 70% of utilities surveyed offer some kind of time varying rate for the residential class
- TOU rates are the most common, offered by more than half of the utilities surveyed
- Only a minority of TOU rates are mandatory, and the majority of TOU rates are opt-in
- Average ratio of TOU peak to off-peak price was 3:1

Jurisdictional Analysis

Pacific Northwest Residential Pricing Pilots

Utility/Organization	State/Province	Name of Pilot	Year(s)	Rates Tested	Range of Price Ratios	Range of Peak Prices	Range of Impacts	Number of Pilot Participants	Season of System Peak
BC Hydro	British Columbia	Residential TOU/CPP Pilot	2007-2008	TOU CPP	TOU: 3.0-6.2 CPP: 7.9-11.1	TOU: 19-28¢ CPP: 50¢	TOU: 3-13%, CPP: 17-22%	TOU: 1,031 CPP: 273	Winter
Idaho Power	Idaho	Energy Watch (EW) and Time-of-Day (TOD) Pilot Programs	2005-2006	TOU CPP	TOU: 1.8 CPP: 3.7	TOU: 8¢ CPP: 20¢	TOU: 0% CPP: 50%	TOU: 85 CPP: 68	Summer
PacifiCorp	Oregon	TOU Rate Option	2002-2005	TOU	Summer: 1.7-2.1 Winter: 1.7	Summer: 11-14¢ Winter: 11¢	Summer: 6-8% Winter: 7%	~1200	Summer Winter
Portland General Electric (PGE)	Oregon	Residential TOU Option	2002-2003	TOU	2.7	8¢	8%	1,900	Winter
Portland General Electric (PGE)	Oregon	Critical Peak Pricing Pilot	2011-2013	CPP	4.4	44¢	11%	996	Winter
Puget Sound Energy	Washington	TOU Program	2001	TOU	1.4	See notes	5%	300,000	Winter
US DOE, PNNL, BPA, PacifiCorp, Portland General Electric, Public Utility District #1 of Clallam County, and City of Port Angeles	Washington/ Oregon	Olympic Peninsula Project	2006-2007	CPP	7.0	35¢	20%	112	Winter

Source: Demand Response Market Research: Portland General Electric, 2016 to 2035
Prepared by the Brattle Group January 2016

Residential Voluntary TOU Rate Examples

Utility	Default Rate Structure	TOU Rate Name	Season	Peak Price (c/KWh)	Off-Peak Price (c/kWh)	Peak to Off-peak price ratio	Note
Arizona Public Service Co.	4 Tier for summer, flat for winter	ET-2	Summer Winter	24.477 (12pm-7pm) 19.847 (12pm-7pm)	6.118 (midnight-12pm, 7pm-midnight) 6.116 (midnight-12pm, 7pm-midnight)	4 3..2	For residential use in separately metered dwelling unit
Georgia Power	3 Tier, 2 Seasons	TOU-REO-10	Summer Winter	20.32 (2pm-7pm)	4.94 (midnight-2pm, 7pm-midnight) 4.94 (all hours)	4	For residential use in separately metered dwelling unit
Pacificorp (Oregon)	Flat	Portfolio Time of Use Supply Service Schedule 210	Summer Apr-Oct Winter Nov-Mar	10.343 (4pm-8pm) M-F 7.535 (6am-10am, 5pm-8pm) M-F	3.094 (All other hours incl. holidays) 3.094 (All other hours incl. holidays)	3.3 2.4	For residential and small non residential. Rates shown are for residential (Sched 210 rates added to Sched 4 rate)

Residential Voluntary TOU Rate Examples

Utility	Default Rate Structure	TOU Rate Name	Season	Peak Price (c/KWh)	Off-Peak Price (c/kWh)	Peak to Off-Peak Price Ratio	Note
Portland General Electric	Two Tier	Residential Service Schedule 7 TOU Portfolio	Summer May-Oct Winter Nov-Apr	13.197 (3pm-8pm) M-F 13.197 (6am-10am, 5pm-8pm) M-F	7.572 (6am-3pm,8pm-10pm) M-F, (6am-10pm) Sat 4.399 (10pm-6am) All days 7.572 (10am-5pm, 8pm-10pm) M-F, (6am-10pm) Sat 4.399 (10pm-6am) All days	3 3	Available to residential domestic load including EV load
PG&E	3 Tier	Residential Time of Use Service TOU-A	Summer Jun-Sep Winter Oct-May	40.458 (3pm-8pm) M-F (12.011) Baseline Credit 28.662 (3pm-8pm) M-F (12.011) Baseline credit	32.90 (all other hours incl. holiday) (12.011) Baseline Credit 27.232 (all other hours incl. holiday) (12.011) Baseline credit	1.2 1.05	Tiered Option A-peak and off-peak assigned to tiers on pro-rated basis. Baseline credit applied to baseline usage only.
PG&E	3 Tier	Residential Time of Use Service TOU-B	Summer Jun-Sep Winter Oct-May	35.719 (4pm-9pm) M-F 21.972 (4pm-9pm) M-F	25.413 (all other hours, incl. holiday) 20.092 (all other hours, incl. holiday)	1.4 1.09	Non-tiered Option B

BC Hydro Residential Voluntary TOU Rate Pilot (CRI TOU) – 2006/07 and 2007/08

- Initiative started in the winter of 2006/07 for 12 month period and was extended a second year
- Approximately 2,100 homes targeted in Vancouver, Campbell River and Fort St. John
- Voluntary TOU pricing program - discourage usage during peak periods
  - 5 TOU rates were tested
  - Included education and information to encourage conservation and load management
  - Determined program impact using control and rate test groups
- For winter 2007/08:
  - Continued TOU rates by offering second year to existing subscribers
  - Tested Critical Peak Pricing rates combined with TOU
  - Tested reduced peak period
  - Tested load control

BC Hydro Residential Voluntary TOU Pilot

Price Levels and Price Ratio (for Year 1)

Lower Mainland (Vancouver, Burnaby, North & West Van) **AND the North** (Fort St. John)

Rate Schedule	Basic Charge	On-Peak Period	Winter Off-Peak rate (¢/kWh)	Winter On-Peak rate (¢/kWh)	Non-Winter rate (¢/kWh)	Price Ratio On Peak : Off-Peak	Balancing Amount
(FOR LM & FSJ) **1141**	$3.80 / month	4 - 9 pm on weekdays between Nov 1 - Feb 28	6.33	19	6.33	3.00:1	✓
(FOR LM & FSJ) **1142**	$3.80 / month	4 - 9 pm on weekdays between Nov 1 - Feb 28	6.33	25	6.33	3.95:1	✓
(FOR LM ONLY) **1143**	$3.80 / month	4 - 9 pm on weekdays between Nov 1 - Feb 28	4.5	28	4.5	6.22:1	✓

Vancouver Island - Campbell River

Rate Schedule	Basic Charge	On-Peak Period	Winter Off-Peak rate (¢/kWh)	Winter On-Peak rate (¢/kWh)	Non-Winter rate (¢/kWh)		Balancing Amount
(Campbell River Only) **1144**	$3.80 / month	7 - 11 am in the morning & 4 - 9 pm on weekdays between Nov 1 - Feb 28	4.5	15	6.33	3.33:1	✓
(Campbell River Only) **1145**	$3.80 / month	7 - 11 am in the morning & 4 - 9 pm on weekdays between Nov 1 - Feb 28	4.5	20	6.33	4.44:1	✓

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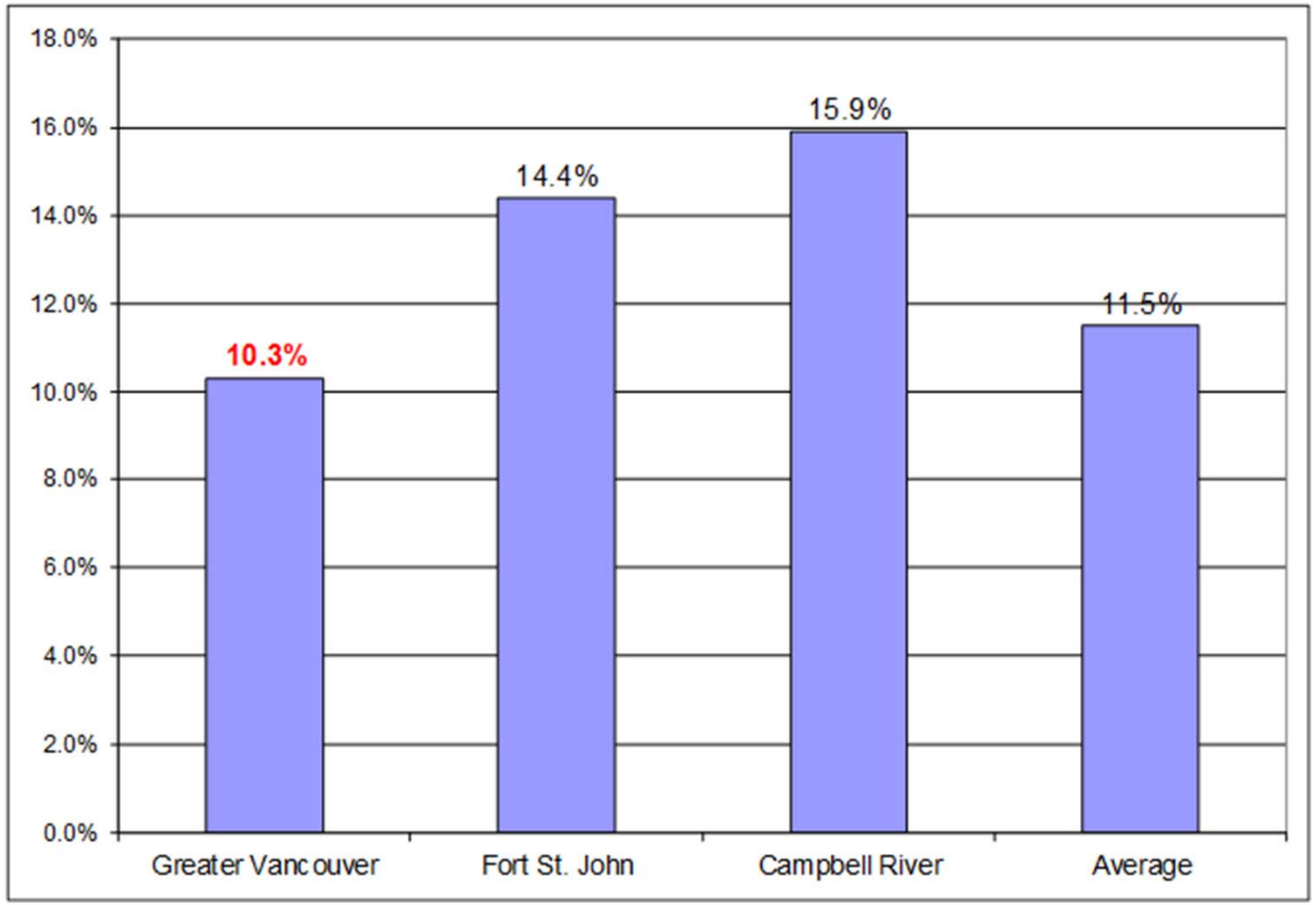
BC Hydro Residential TOU Pilot

Results: Reduction during Peak Hours in Winter 2006/07



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Lessons from Other Utility TOU Programs

1. Monitor other programs – what works and what doesn't
2. On Peak to Off-Peak ratio > 3:1
3. Peak Duration – 4 to 6 hours
4. Include enabling technology – e.g., Programmable Thermostat
5. Include customer education and regular communication with participants
6. Offer first year bill guarantee – will not pay more on TOU than standard rate for same usage

What features do you think are important for a voluntary residential TOU rate?

Rate Design Principles for TOU Rate Design

- Economic efficiency
  - Encourage by using prices that reflect marginal costs
- Fairness
  - Minimize impacts on non-participants by using a rate design that is revenue neutral
- Practicality
  - Simple for customers to understand and practical for BC Hydro to administer

Do you have any comments on these principles for TOU rate design?

Preliminary Voluntary TOU Rate Design Options

There are two basic approaches to consider

1. One part voluntary TOU rate structure:
   - TOU prices applied to actual consumption
2. Two part voluntary TOU rate structure:
   - A balancing amount - the revenue difference between billing the historical consumption under the Residential Inclining Block (RIB) rate and the proposed TOU rate
   - TOU prices applied to actual consumption
3. Other?

One Part Voluntary TOU Rate Structure

Basic Charge – fixed dollar charge per month which covers customer related costs for residential service

Time of use energy rates – vary by time of day e.g., peak and off-peak periods

Bill components =

Basic charge +

(TOU Peak Energy Rate x Peak kWh) +

(TOU Off-peak Energy Rate x Off-peak kWh)

Rate Design Approach

One Part Voluntary TOU Rate Structure

TOU rates set so that the revenue collected under the average customer class load profile and consumption level would be equal to the revenue collected under the default rate

Advantages:

- Easy to understand and implement

Disadvantages:

- Gains (bill decreases) and losses (bill increases) without change in consumption pattern

Do you have any comments on the one part rate design approach?

Option 1 – Illustrative One Part Voluntary TOU Rate

Methodology

- Use average residential class load shape to determine revenue neutral TOU energy rates
- Set winter peak price at 26 c/kWh (close to 3:1 ratio relative to off-peak rate)
  - Also reflects allocation of G, T&D marginal capacity costs to peak period
- Set winter off-peak price to be revenue neutral
- Super off-peak period
  - Overnight period with a lower rate, excludes share of demand related cost
  - Encourages overnight EV charging when BC Hydro has spare capacity

Illustrative One Part Voluntary TOU Pricing and Periods

	Rate (cents/kWh)	Months	Days	Hours
Peak	26	Winter Nov – Feb	Weekdays, excluding stat holidays	4pm-9pm
Off-Peak	9.31	Winter Nov – Feb	Weekdays, excluding stat holidays	7am-4pm 9pm-11pm
			Weekends and stat holidays	7am-11pm
		Non-winter Mar-Oct	All days	7am-11pm
Super Off-Peak	4.77	All months	All days	11pm-7am

The following are illustrative rates intended to stimulate discussion regarding how optional rates could meet customer needs

Do you have any comments on the illustrative TOU seasons and TOU periods?

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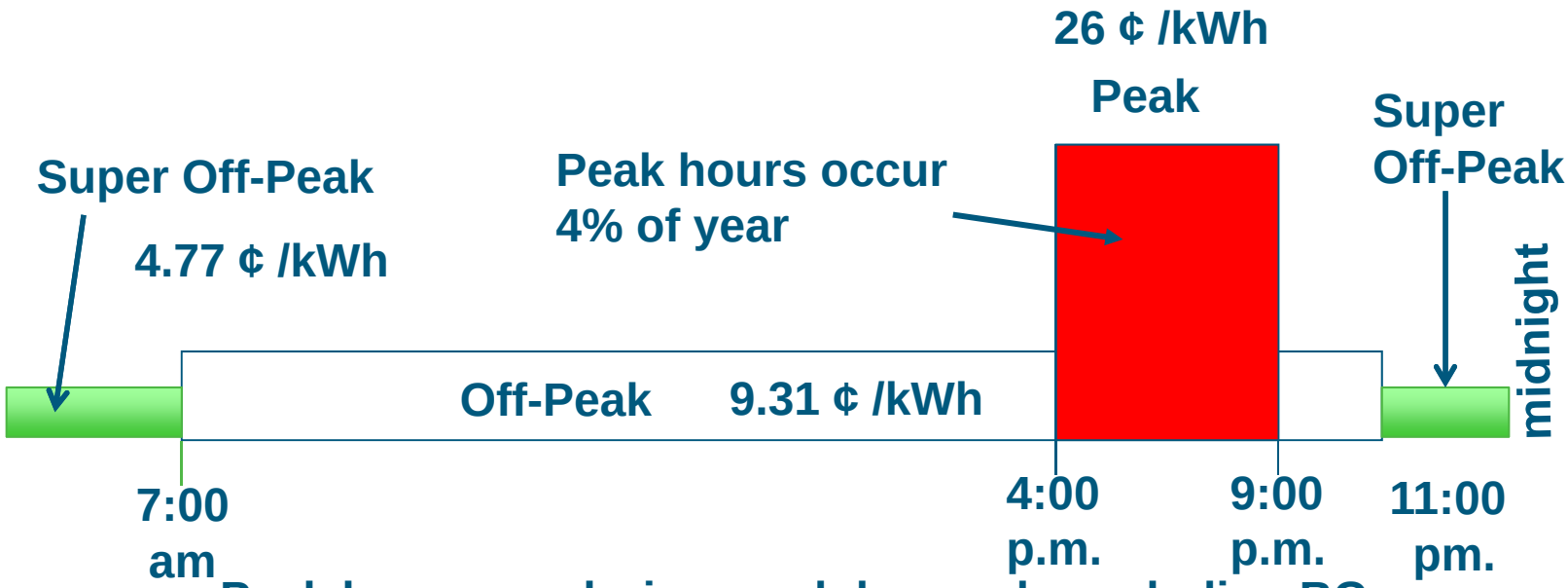
Illustrative One Part Voluntary TOU Rates

Winter Rates (November - February)



Peak hours are during weekdays only excluding BC statutory holidays, November through February

Weekends and all other months exclude peak hours

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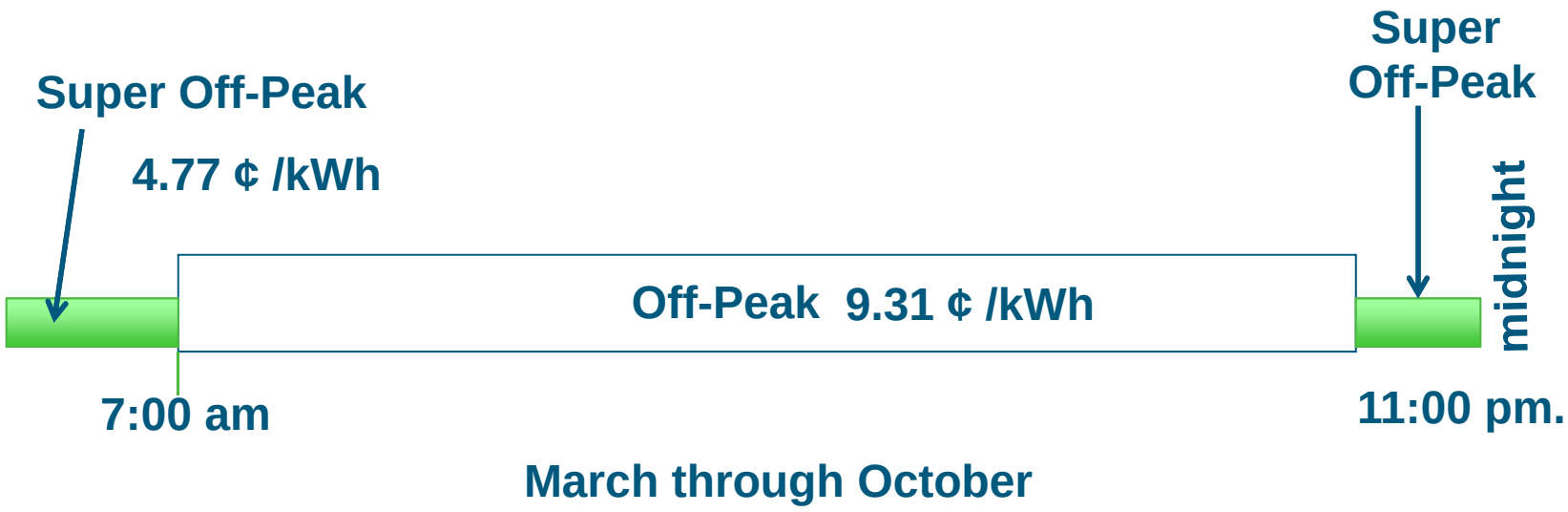
Illustrative One Part Voluntary TOU Rates

Non-Winter Rates



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One Part Voluntary TOU Rate - Illustrative Annual Bill Comparison

TOU rate designed to be revenue neutral for the average customer

	Average Customer	Electric Heat Customer	Non-Electric Heat Customer
Winter peak	863	1,231	717
Off-Peak	7,519	10,300	6,418
Super-Off Peak	2,845	4,218	2,301
Total kWh per account	11,227	15,749	9,436
RS 1101 Bill	$1,127	$1,689	$907
TOU Bill	$1,127	$1,547	$961
Bill impact (TOU - RS 1101 Bill)	$0.00	-$142.14	$53.35
Bill Impact %	0.00%	-8.41%	5.88%

	One Part TOU Rate
Basic Charge ($/month)	5.58
Peak Rate	0.2600
Off-Peak Rate	0.0931
Super Off-Peak Rate	0.0477

Assuming no change in consumption:

- the Electric Heat Customer pays less under TOU compared to the RIB rate
- the Non-Electric Heat Customer pays more under TOU compared to the RIB rate

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Two Part Voluntary TOU Rate Structure

Program Charge – covers incremental cost of administering program

Time of use energy rates – vary by time of day e.g., peak and off-peak periods

A Balancing Amount – the revenue difference between billing the historical consumption under RS1101 and the proposed TOU rate using an assigned load profile.

Bill components =

Program charge +

Balancing amount +

(TOU Peak Energy Rate x Peak kWh) +

(TOU Off-peak Energy Rate x Off-peak kWh)

Two Part Voluntary TOU Rate Illustrative Bill

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Service address	Account number	Billing date	Invoice number	Page
JOHN DOE 1234 ANYNAME ST ANYTOWN BC V6B 5A1	1234 567	Jan 14, 2018	115008166954	3 of 3

METER READING INFORMATION

Meter # 1234567	kWh
Start Nov 1, 2017	18,142
End Dec 31, 2017	19,142
Difference	1,000

1000 kWh used over 61 days

kWh used this period

- 300 kWh Peak
- 600 kWh Off Peak
- 100 kWh Super Off Peak

Bill details

Nov 1, 2017 to Dec 31, 2017

PREVIOUS BILLING PERIOD

Previous bill	$90.95
Payment received Nov 1, 2017	- $90.95
BALANCE FORWARD	**$0.00**

ELECTRICITY CHARGES

Based on Residential Conservation Rate 1101

Basic charge (61 days @ $ 0.1764/day)	$10.76

ENERGY CHARGES

Peak period charge: 300 kW.h @ $0.26 /kW.h	$78.00
Off peak period charge: 600 kW.h @ $0.08 /kW.h	$48.00
Super off peak period charge: 100 kW.h @ 0.04 /kW.h	$4.00
Balancing amount	$8.00CR
Rate rider 5%	$6.10
Residential transit levy (61 days @ $0.06240/day)	$3.81

TAXES

GST (5% on charges above)	$6.60
TOTAL DUE THIS PERIOD	**$138.51**

TAX SUMMARY (INCLUDED IN CURRENT CHARGES)

GST/HST	$6.60

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Two Part Voluntary TOU Rate Structure

Maintains customer revenue neutrality (in addition to class revenue neutrality) through the use of a balancing amount

Advantages

- Customer is billed the same amount as if they were on the standard rate unless they change their energy consumption in response to TOU prices
- Customers that make similar behavioural responses on the TOU rate are treated equally by receiving the same benefit

Disadvantages

- More effort to implement in terms of billing, communication and customer recruitment

Do you have any comments on the two part rate design approach?

Option 2 - Two Part Voluntary TOU Rate

Methodology

- Provides more pricing flexibility to set TOU prices at marginal cost
  - Customer revenue neutral at historical consumption
- For simplicity, it is assumed in the following billing example that the TOU prices under Option 2 are the same as under Option 1
  - Peak price reflects marginal cost
  - Off-peak price revenue neutral
  - Super off-peak price flat energy rate excluding share of demand cost
- Option 2 includes a balancing amount

Two Part Voluntary TOU Rate – Illustrative Annual Bill Comparison

	Average Customer	Electric Heat Customer	Non-Electric Heat Customer			Two Part TOU Rate
Winter peak	863	1,231	717		Basic Charge ($/month)	5.58
Off-Peak	7,519	10,300	6,418		Peak Rate	0.2600
Super-Off Peak	2,845	4,218	2,301		Off-Peak Rate	0.0931
					Super Off-Peak Rate	0.0477
Total kWh per account	11,227	15,749	9,436			
RS 1101 Bill	$1,127	$1,689	$907			
TOU Two Part	$1,127	$1,547	$961			
Balancing Amount	$0	$142	-$53			
TOU Bill	$1,127	$1,689	$908			
Bill impact (TOU - RS 1101 Bill)	$0	$0	$0			

Assuming no change in consumption, all customers pay the same amount under TOU compared to the RIB rate

Summary

1. Voluntary TOU rate can provide mutual benefit and customer rate choice
2. One part voluntary TOU rate
   - Easier to administer and for customer to understand
   - Revenue loss may occur if participants are customers that benefit without a change in behaviour
3. Two part voluntary TOU rate
   - More involved to administer and explain to customer
   - Customer revenue neutral at historical consumption
4. Voluntary TOU rate would also be applicable to electric vehicle (EV) load included as part of whole house load
   - BC Hydro will engage with EV stakeholders on rate options

Next Steps

BC Hydro will need to

- Consider stakeholder and customer feedback
- Develop and analyze rate options in more detail
  - Refine voluntary TOU pricing and undertake bill impact analysis
  - BC Hydro to estimate revenue implications and to explore metering and billing issues

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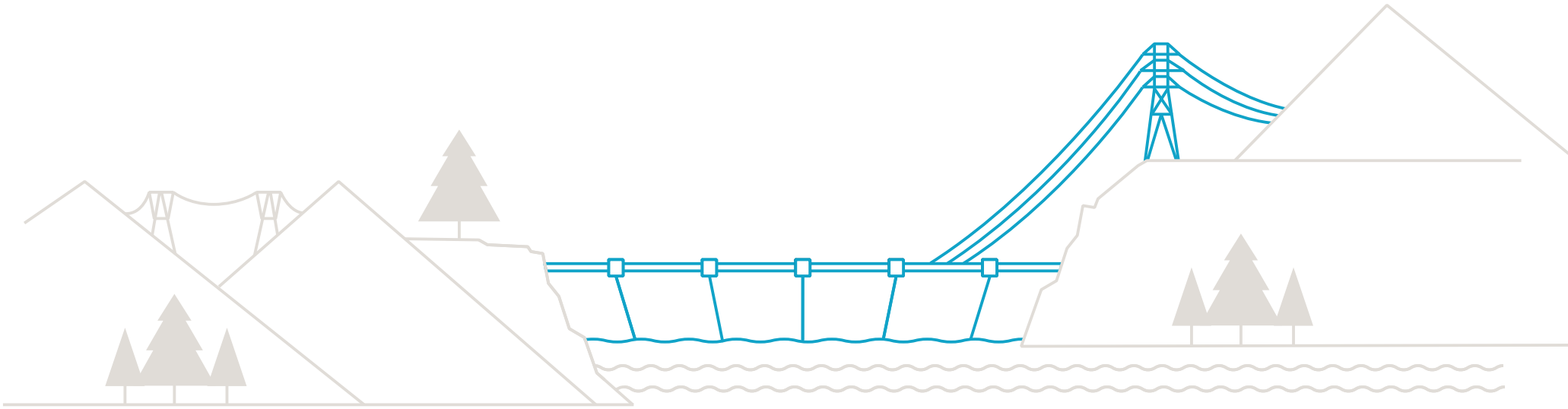
General Service Optional Rates

Presenter: Allan Chung



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Background

- CEC proposed an interruptible rate pilot as part of 2015 Rate Design Application Module 1 (Exhibit C1-10)
- Commission Order G-128-16 directed BC Hydro to commence in October 2016, stakeholder consultation with the CEC with respect to its rate pilot proposal
- Several meetings have been held with CEC to discuss rate options including interruptible rates, time of use rates and freshet rate
  - Voluntary time of use (TOU) rate identified for further development
  - Other rate options still under consideration

Outline

1. Voluntary time of use (TOU) rates scope and timing
2. Rationale for general service voluntary TOU rates
3. Voluntary TOU rate design approaches
4. Rate design options and illustrative LGS TOU rates
5. LGS rate billing demand
6. Next Steps

Voluntary TOU Rates Scope and Timing

Scope:

Develop voluntary time of use (TOU) rate options for residential and general service customers

Timing:

- To be developed as part of Rate Design Application Module 2 – Application Fall 2017 filing
- Effective date would be dependent on implementation timing

Rationale for Voluntary TOU Rates – BC Hydro Needs

1. BC Hydro's marginal cost of energy and capacity varies by season and time of day
   - System is winter peaking – drives T&D infrastructure needs
   - Freshet period has energy surplus
2. Load Management supported by 2013 Integrated Resource Plan

Rationale for Voluntary TOU Rates – General Service Customer Needs

1. General service customers have requested rate choice
    - Commercial Energy Consumers (CEC) proposed interruptible rate pilot in Module 1
    - Proposed target customers flood control, greenhouse growers, forestry
2. BC Hydro has met with CEC and Dewdney Area Improvement District
    - Voluntary TOU rate may meet customer needs
        - Provide customers with options to shift load to lower price periods
        - Grow load in the off-peak periods
        - Provide demand flexibility

Jurisdictional Analysis

Canadian Utilities

- Alberta - generation choice is offered e.g., real time pricing for residential and commercial customers is offered by retailers (e.g., ENMAX, Direct Energy Alberta) via unregulated price, indexed to the wholesale market
- Ontario
  - all utilities have mandatory residential and small general service TOU rates
  - Medium and large general service >50 kW with interval meters pay the Hourly Ontario Energy Price for their electricity price

Jurisdictional Analysis - Commercial

US Utilities

- Based on 2010 survey, 56% of utilities surveyed offer some kind of time varying rate for the commercial class
- The variety of time-varying rates is greater for the commercial class than residential
- Fewer utilities offer TOU rates for the commercial class (37%) than residential (60%)
- A majority of the commercial TOU rates surveyed are voluntary opt-in
- Average ratio of TOU peak to off-peak price was 2:8

General Service TOU Rate Examples

Utility	Default Rate Structure	TOU Rate Name	Season	Peak Price (c/KWh)	Off-Peak Price (c/kWh)	Peak to Off-peak price ratio	Note
Arizona Public Service Co.	Seasonal flat energy rate	E-32 TOU L Large General Service (401 kW+) Time of Use	Summer May-Oct Winter Nov-Apr	6.555 (11am-9pm) M-F 5.193 (11am-9pm)	5.359 (all remaining hours) 3.997 (all remaining hours)	1.2 1.3	Applicable to all standard offer and direct access customers whose average monthly demand is greater than 400 kW per month.
Georgia Power	Declining block energy charge	TOU-GSD-10 TOU General service demand	Summer June-Sep Winter (Oct-May)	12.2372 (2pm-7pm)	shoulder 6.2514 (12pm-2pm, 7pm-9pm) Off-peak 2.3541 (all other hours) 2.3541 (all hours)	5.2	For electric service for Commercial and Industrial customers

General Service TOU Rate Examples

Utility	Default Rate Structure	TOU Rate Name	Season	Peak Price (c/KWh)	Off-Peak Price (c/kWh)	Peak to Off-Peak Price Ratio	Note
PG&E	TOU	E-19 Medium general-demand metered TOU service	Summer May-Oct Winter Nov-Apr	15.384 (12pm-6pm) M-F	Partial peak 11.333 (8:30am-12pm; 6pm-9:30pm) M-F Off-peak 8.651 (all other hours, M-F; all hours weekends and holidays) Partial peak 10.779 (8:30am-9:30pm) M-F Off-peak 9.317 (all other hours, incl. holiday)	1.78	Schedule E-19 is a mandatory TOU rate for accounts with maximum demands between 500 and 1,000 kW, available on a voluntary basis to accounts below 500 kW on Schedule E-19V.

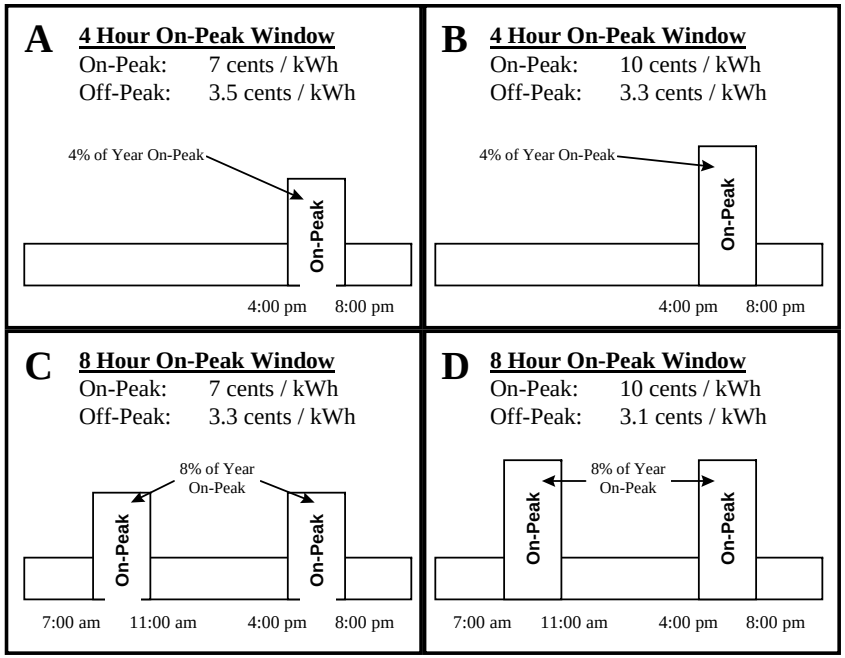
BC Hydro Voluntary General Service TOU Pilot

- BC Hydro offered a voluntary TOU pilot to GS accounts >35 kW from March 2000 to October 2001
- Approximately 500 accounts subscribed to the TOU rate
- TOU prices were market based
- Four rate options were offered which varied the TOU prices and peak period length (4 and 8 hours)

Optional Pricing Plans

Peaks periods for TOU pilot:
- **weekdays**
- **November to February**
- **4 PM to 8 PM (primary)**
- **7 AM to 11 AM (secondary)**

- **All other times are considered off-peak**



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BC Hydro Voluntary General Service TOU Pilot

- Most participants were satisfied with the BC Hydro TOU program
  - Almost half were able to shift their load to off-peak hours and conserve their load during peak hours
  - the main benefits of TOU for most of the participating customers were a reduction in energy costs and a breakdown of information on peak and off-peak energy consumption

Rate Design Principles for TOU Rate Design

- Economic efficiency
  - Encourage by using prices that reflect marginal costs
- Fairness
  - Minimize impacts on non-participants by using a rate design that is revenue neutral
- Practicality
  - Simple for customers to understand and practical for BC Hydro to administer

Do you have any comments on these principles for TOU rate design?

Preliminary Voluntary TOU Rate Design Options

There are two basic approaches to consider

1. One part voluntary TOU rate structure:
   - TOU prices applied to actual consumption
   - Demand charge applied to actual billing demand
2. Two part voluntary TOU rate structure:
   - A balancing amount - the revenue difference between billing the historical consumption under LGS rate and the proposed TOU
   - TOU prices applied to actual consumption
3. Other?

Rate Design Approaches
One Part Voluntary TOU Rate Structure

Basic Charge – fixed dollar charge per month which covers customer related costs for large general service

Time of Use Energy Rates – vary by time of day e.g., peak and off-peak periods

Demand Charge - $/kW charge applied to billing demand

Bill components =

Basic charge +

(TOU Peak Energy Rate x Peak kWh) +

(TOU Off-peak Energy Rate x Off-peak kWh) +

Demand Charge x Billing Demand

Rate Design Approach

One Part Voluntary TOU Rate Structure

TOU rates set so that the revenue collected under the average customer class load profile and consumption level would be equal to the revenue collected under the default rate.

Advantages:

- Easy to understand and implement

Disadvantages:

- Windfall gains (bill decreases) and losses (bill increases) without change in consumption pattern

Do you have any comments on the one part rate design approach?

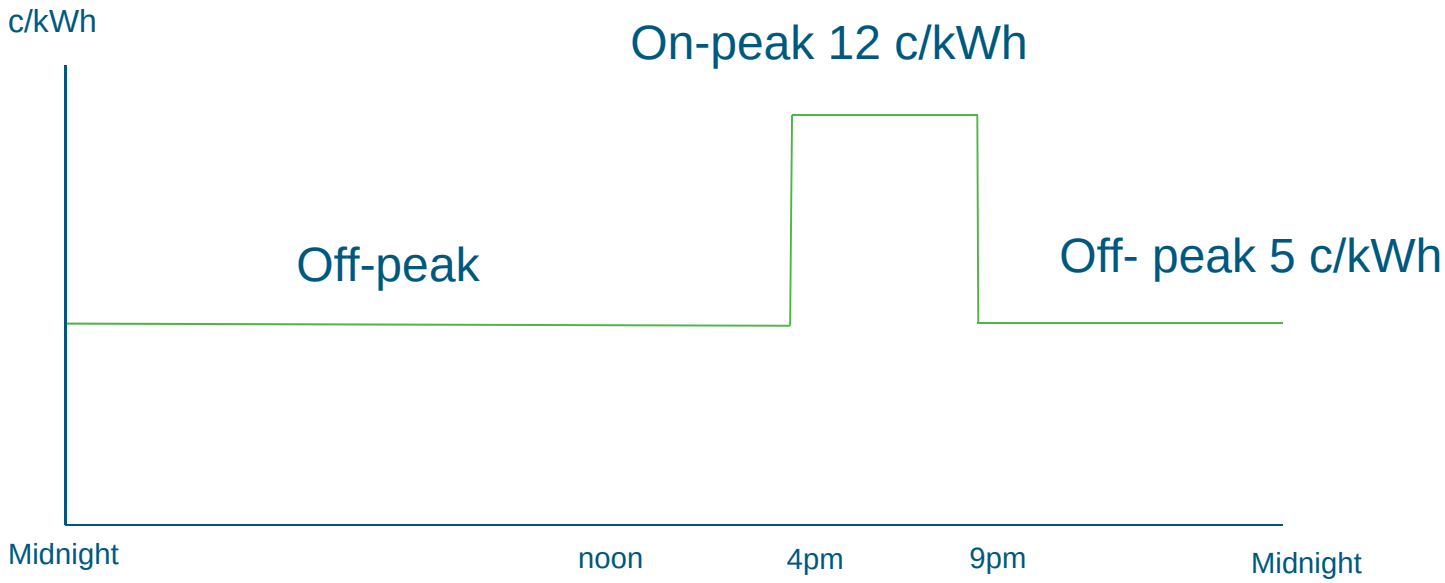
Option 1 – Illustrative One Part Voluntary TOU Rate

Methodology

- Use average LGS class load shape to determine revenue neutral TOU energy rates
- Set winter peak price at 12 c/kWh (2:1 ratio relative to default flat rate).
  - Peak price signals higher G,T&D marginal cost
  - Moderate price level chosen to reduce revenue loss risk
- Freshet period (May-July) has lower rate of 4.5 c/kWh to encourage incremental consumption
- All remaining months, price same as default flat LGS rate
- Set winter off-peak price to be revenue neutral

One Part Voluntary TOU Illustrative Rate

Winter TOU Energy Rates



Peak period – Winter (Nov-Feb) weekdays 4pm-9pm, excluding BC statutory holiday weekdays
Winter off-peak period – All other winter non-peak hours

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One Part Voluntary TOU Illustrative Rate

Season	Energy rates
May – July (Freshet Period)	4.5 c/kWh
Nov-Feb (Winter) Peak Off-peak	 12 c/kWh 5.0 c/kWh
All other months (Mar, April, Aug, Sep and Oct)	5.5 c/kWh

Based on LGS flat energy rate of 5.5 c/kWh in F2018

Note: Peak prices only apply during B.C. non-statutory holiday weekdays from November to February

Do you have any comments on the illustrative TOU pricing and periods?

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Rate Design Approaches

Two Part Voluntary TOU Rate Structure

Program Charge – covers incremental cost of administering program

Time of Use Energy Rates – vary by time of day e.g., peak and off-peak periods

A Balancing Amount – the revenue difference between billing the historical consumption under RS16xx and the proposed TOU rate using an assigned load profile. Includes demand charge applied to historical kW load

Bill components =

Program charge +

Balancing amount (also called delivery charge) +

(TOU Peak Energy Rate x Peak kWh) +

(TOU Off-peak Energy Rate x Off-peak kWh)

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Two Part Voluntary TOU Rate Structure

Maintains customer revenue neutrality (in addition to class revenue neutrality) through the use of a balancing amount.

Advantages

- Customer is billed the same amount as if they were on the standard rate unless they change their energy consumption in response to TOU prices e.g., by shifting load to the off-peak period
- Customers that make similar behavioural responses on the TOU rate are treated equally by receiving the same benefit

Disadvantages

- More effort to implement in terms of billing, communication and customer recruitment

Do you have any comments on the two part rate design approach?

Option 2 – Two Part Voluntary TOU Rate

Methodology

- Provides more pricing flexibility to set TOU prices
  - Customer revenue neutral at historical consumption
- Illustrative TOU price options
  - Standard and high peak prices chosen for simplicity
    - Both are chosen to be lower than estimated marginal cost
  - 5 and 9 hour peak period options
  - Peak to off-peak price ratios vary by option (2.4 to 3.75)
  - Off-peak price chosen to be lower than default flat energy rate. Provides incentive for customer:
    - To shift load from peak to off-peak period
    - To grow load in the off-peak period

Voluntary Two Part TOU Illustrative Rates

Season	Prices	
Winter (Nov-Feb) 5 Hour Peak Period (4-9 p.m.)	Winter Option A 12.0 c/kWh peak price 5 c/kWh off peak price	Winter Option B 15.0 c/kWh peak price 4.5 c/kWh off peak price
Winter (Nov-Feb) 9 Hour Peak Period (7-11 a.m. + 4-9 p.m.)	Winter Option C 12.0 c/kWh peak price 4.5 c/kWh off peak price	Winter Option D 15.0 c/kWh peak price 4.0 c/kWh off peak price
May – July (Freshet Period)	4.5 c/kWh	
All other months (Mar, Apr, Aug, Sep and Oct)	5.5 c/kWh	

Note: Peak prices only apply during BC non-statutory holiday weekdays from November to February

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Voluntary Two Part TOU Illustrative Rates

5 Hour On-Peak Window

Nov. - Feb., weekdays, (excluding BC stat holidays)

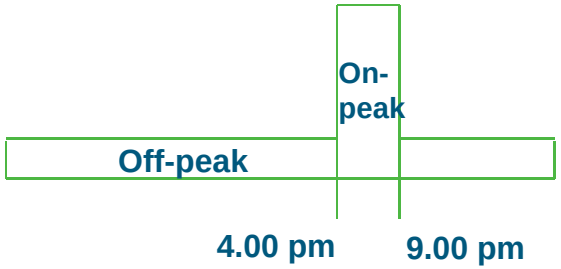
4:00 pm – 9:00 pm

Off-Peak: all other hours

A **5 Hour On-Peak Window**

On-Peak: 12 cents / kWh

Off-Peak: 5 cents/ kWh



Standard Peak Price

Customers with unrestricted growth

9 Hour On-Peak Window

Nov. - Feb., weekdays (excluding BC stat holidays)

7:00 am – 11:00 am AND

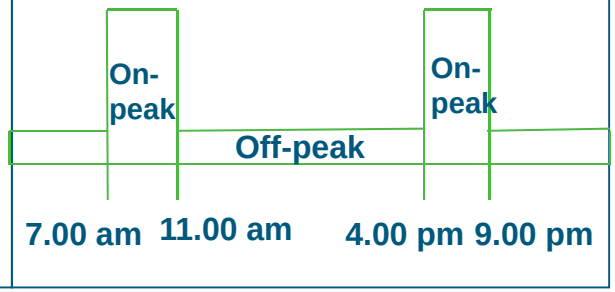
4:00 pm – 9:00 pm

Off-Peak: all other hours

C **9 Hour On-Peak Window**

On-Peak: 12 cents / kWh

Off-Peak: 4.5 cents/ kWh



Customers with controlled growth

Do you have any comments on the illustrative TOU price options, seasons and periods?

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Voluntary Two Part TOU Illustrative Rates

High Peak Price

5 Hour On-Peak Window

Nov. - Feb., weekdays, (excluding BC stat holidays)

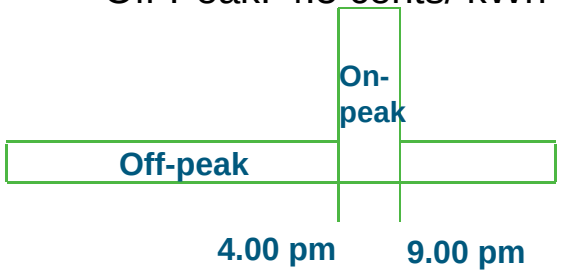
4:00 pm – 9:00 pm

Off-Peak: all other hours

B **5 Hour On-Peak Window**

On-Peak: 15 cents / kWh

Off-Peak: 4.5 cents/ kWh



Customers with load-shifting strategies

9 Hour On-Peak Window

Nov. - Feb., weekdays (excluding BC stat holidays)

7:00 am – 11:00 am AND

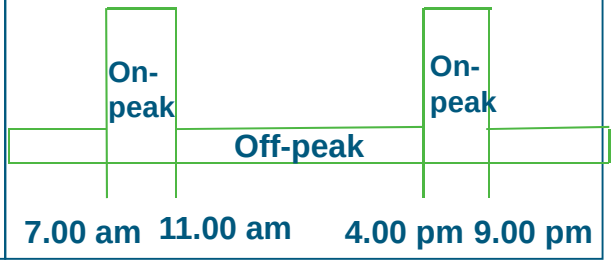
4:00 pm – 9:00 pm

Off-Peak: all other hours

D **9 Hour On-Peak Window**

On-Peak: 15 cents / kWh

Off-Peak: 4.0 cents/ kWh



Customers with load reduction/ conservation strategies

Do you have any comments on the illustrative TOU price options, seasons and periods?

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LGS Rate Billing Demand

1. The LGS rate (RS 16xx) billing demand is defined as the highest kW demand in the billing period.
   - Rolling 15 minute average
2. The monthly minimum charge in the LGS rate is defined as

   "50% of the highest maximum Demand Charge billed in any Billing Period wholly within an on-peak period during the immediately preceding eleven Billing Periods. For the purpose of this provision an on-peak period commences on 1 November in any year and terminates on 31 March of the following year."
3. Seasonal low load factor customers such as DAID indicate that the LGS demand ratchet is unfair and can lead to large bill impacts.

LGS Rate Billing Demand

- Billing demand in RS 1823 is defined to include the highest kV.A demand during the High Load Hours (HLH) in the billing period. The HLH period is defined as the hours from 06:00 to 22:00 Monday to Saturday, except for BC Statutory Holidays.
- Some of the advantages cited in 2005 Transmission Service Outstanding Matters application include:
  - fair allocation of demand related costs within the transmission class since customers who peak in the HLH will contribute more in demand charges than customers who peak in the LLH period
  - provides price signal to shift peak demand to LLH
  - aligns demand charges between RS 1823 and RS 1825 (Transmission Service TOU rate)

LGS Rate Billing Demand

The following issues needs to be explored further by BC Hydro regarding changing the LGS billing demand definition:

1. Metering, billing and rate administration
2. Revenue impact
3. Customers that would benefit from this opportunity
4. Optional versus mandatory

For now, BC Hydro has included this as a possible rate option on a mandatory basis under the default rate or under an optional TOU rate

Summary Rate Options

1. One part voluntary LGS TOU rate with billing demand defined only in the HLH
2. Two part voluntary LGS TOU rate with balancing amount, TOU energy prices
   - Demand charge does not apply to incremental load growth
   - Demand charge applied to historical kW load included in balancing amount
3. Examine impact of changing billing demand to be defined in the HLH only in default LGS and MGS rates (like in RS 1823)
   - BC Hydro to estimate revenue implications and to explore metering and billing issues

Do you have any comments on these rate options?

Next Steps

BC Hydro will

- Consider stakeholder and customer feedback
- Continue to engage with CEC and other interested stakeholders to determine customer issues and interest in TOU rate options
- Develop and analyze rate options in more detail
  - Refine TOU pricing and undertake bill impact analysis
  - BC Hydro to estimate revenue implications and to explore metering and billing issues

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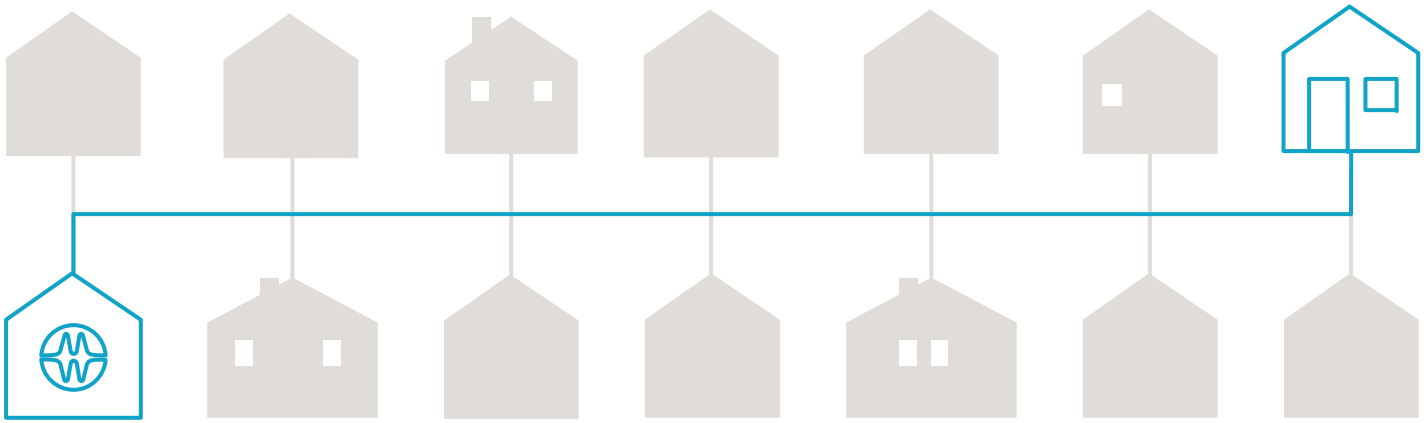
Irrigation Rates

Presenter: Shane Hiebert



March 3, 2017

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Presentation Summary

- Background
- Overview of the Irrigation Rate
- 2007 RDA Decision
- Jurisdictional Review
- Consumption and Load Profile
- Preliminary Rate Review Options
- Planned Engagement Approach

Background

- Rate Schedule 1401/1402 is a seasonal end-use rate that is relatively unchanged since 1969
- Irrigation customers are their own class of customers for cost allocation purposes
  - Customers have a summer peaking load profile and are not allocated costs associated with providing service during the four winter coincidence peak months
  - Smallest rate class - F2015 revenues approximately $6 million (1.4% of total) with an under recovery of about $0.9 million (0.02% of total)
- Around 3300 customers in three customer segments have been identified: Crop Production, Golf Courses & Hotels and Municipal/Water Districts

Overview of the Irrigation Rate

Irrigation Rate Eligibility - *"Available for motor loads of 746 watts [1 horsepower] or more used for irrigation and outdoor sprinkling where electricity will be used principally during the Irrigation Season as defined below…"*

Irrigation Season

- *"the period commencing with a meter reading on or about March 1, having a mid-season meter reading on or about July 31, and ending with a meter reading on or about October 31 of that same year."*
- *"BC Hydro may, in its discretion extend the aforesaid Irrigation Season by postponing the termination date to any date not later than November 30, for the sole purpose of permitting a Customer to fill reservoirs necessary for the operation of the irrigation or sprinkling system."*

Irrigation Rate Structure

Rate Components	Irrigation Season	Non-Irrigation Season
Minimum Charge	$5.37/kW of connected load per month for 8 months whether consumption registered or not	Nil up to 500 kWh ---------- If consumption more than 500 kWh, $42.97 per kW of connected load
Energy Charge	5.37¢/kWh	First 150 kWh billed at 5.37¢ / kWh ---------- All additional kWh billed at 42.60¢ per kWh

Terms and Conditions of Service

- No equipment served under this rate schedule shall be served under any other rate schedule
- Service is normally energized during the Non-Irrigation Season but can be disconnected upon customer request
- Customers entitled to a discount of 25¢ per month per kW of connected load if customer supplies transformation from primary to secondary potential – identified as Rate Schedule 1402

Billing

- Bills issued three times a year:

  March - A bill will be issued for the Non-Irrigation season provided there is registered consumption. Also, the minimum charge during Irrigation Season commences in March whether or not the service is energized.

  August – A second bill will be issued. The bill will be calculated as the greater of the energy charge or minimum charge for the period March 1 to July 31.

  November – A third bill will be issued. The bill will be calculated as the greater of the energy charge for the Irrigation Season or the Minimum charge for the season, less payment received for August bill.

Do you have any comments on the current billing frequency?

2007 RDA Decision

Directives and Approvals

- Phase in three-year equal percentage rate rebalancing to achieve revenue to cost ratio of 1.0 - directive not applied per UCA section 58.1(3)
- Approval granted to create unique Rate Schedule 1402 for customers with their own transformation

Considerations

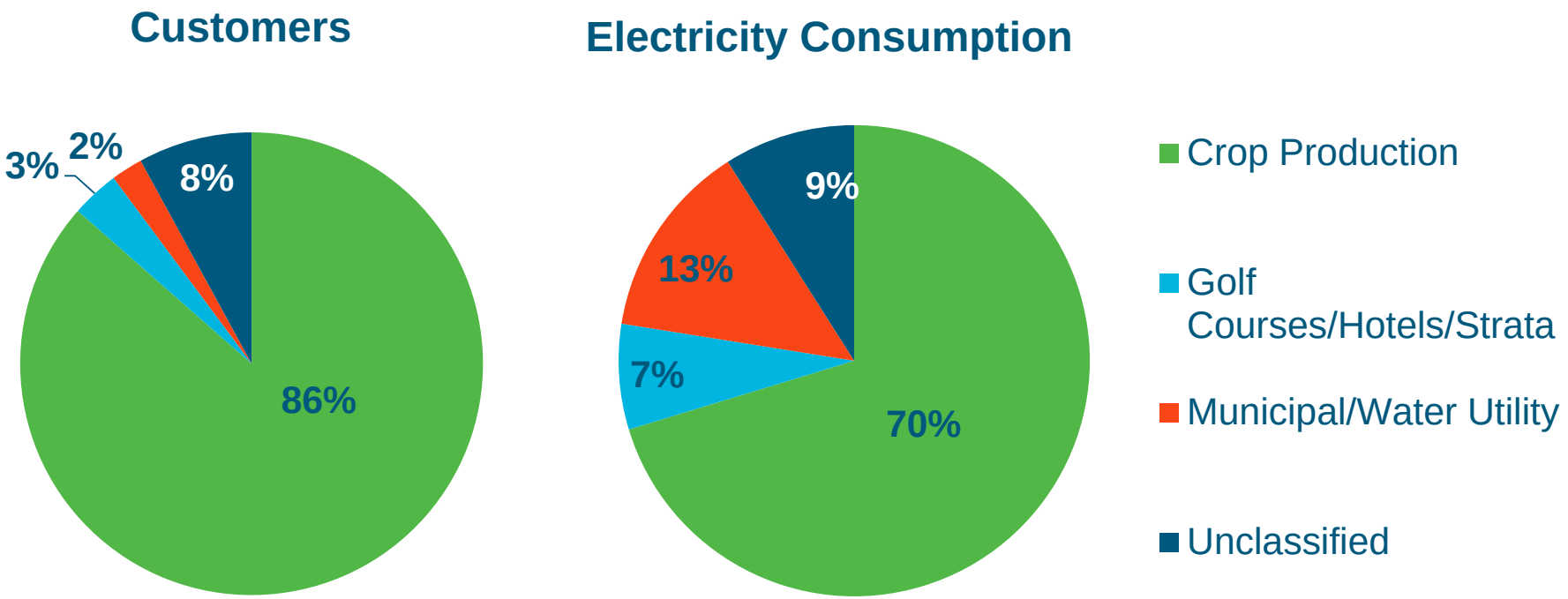
- The Commission Panel urged BC Hydro to consider the suitability of Rate Schedules 1401 and 1402 for municipal and hotel/golf course customers and to address this issue in its next rate design application

Jurisdictional Review

- In Western Canada, FortisBC, FortisAlberta, ATCO Electric and SaskPower offer an end-use rate for Irrigation customers
- Eligibility criteria similar in BC & Alberta; limited to farm irrigation customers in Saskatchewan:
  - **BC Hydro** – Irrigation and outdoor sprinkling
  - **FortisBC & Fortis Alberta** – Irrigation and drainage
  - **ATCO Electric** – Seasonal pumping loads up to 150kW
  - **SaskPower** – Farm irrigation loads
- Irrigation Season of other Western Canadian utilities runs from April 1 to October 31

BC Hydro Irrigation Customers

In F2015, there were 3,254 customer accounts with total consumption of 71 million kWh



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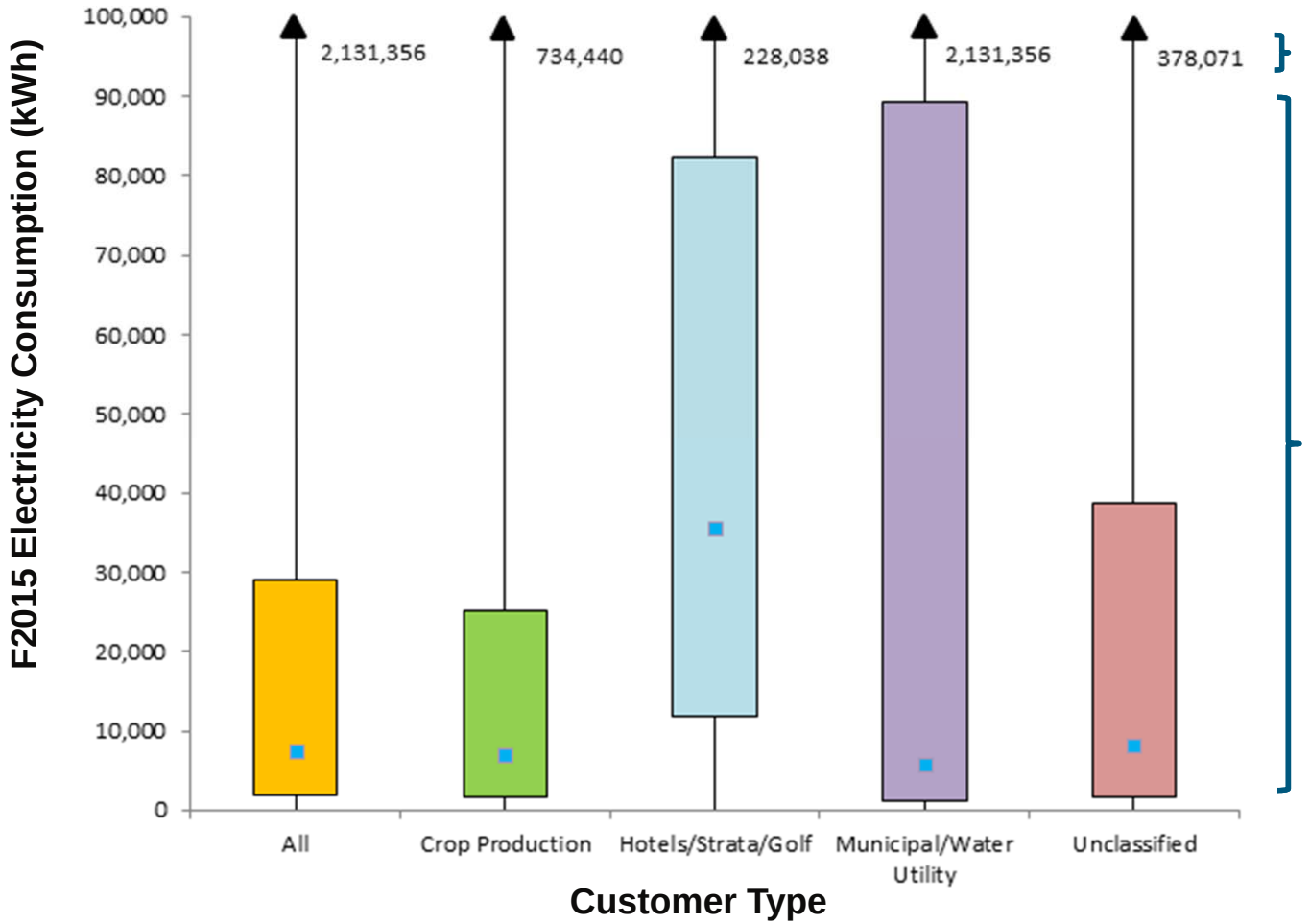
Electricity Consumption by Segment



Electricity consumption of highest use customer

Coloured rectangles represent range of annual electricity consumption for mid 60% of customers

The small blue square represents the median customer

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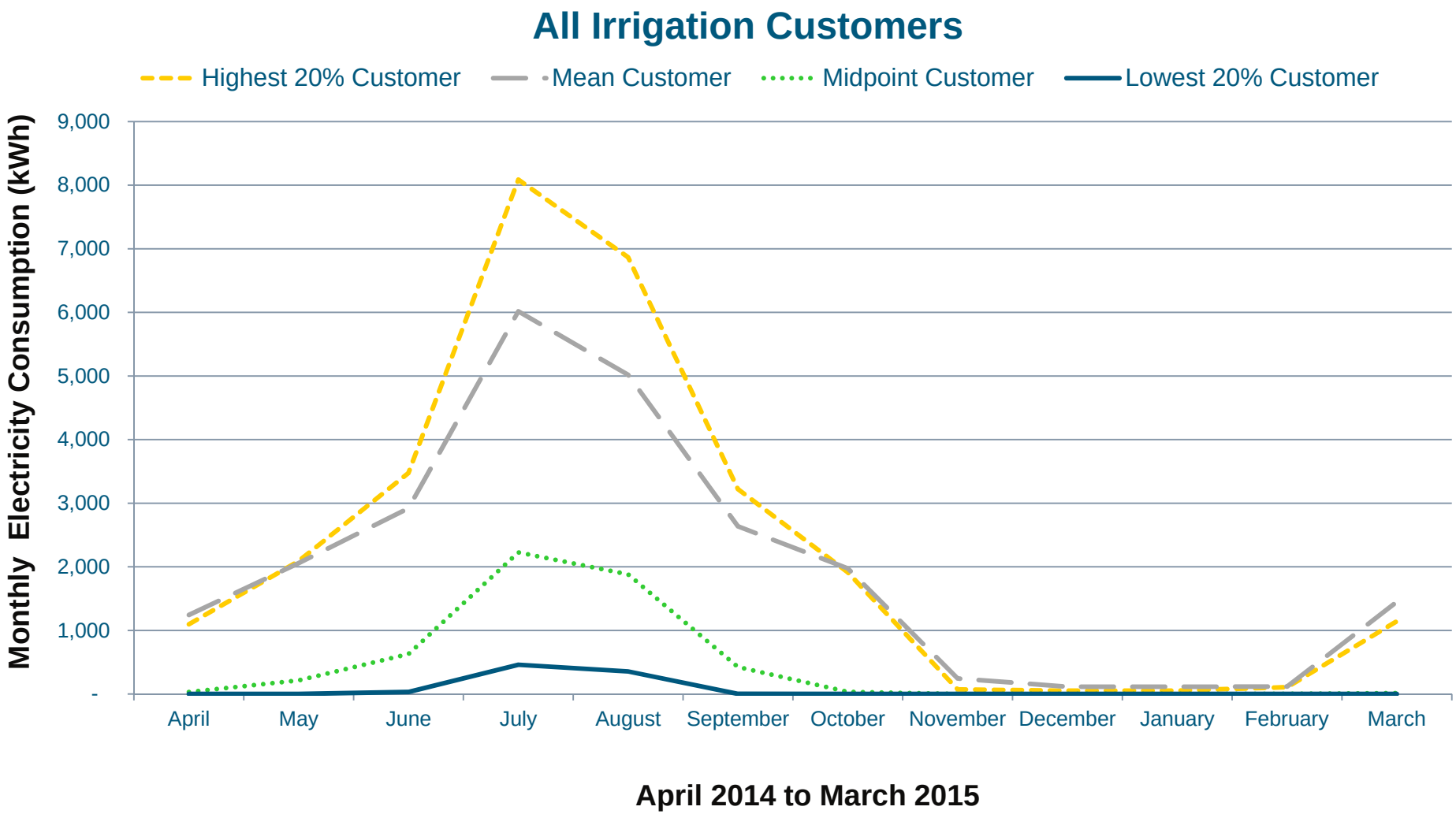
Monthly Electricity Consumption Profile



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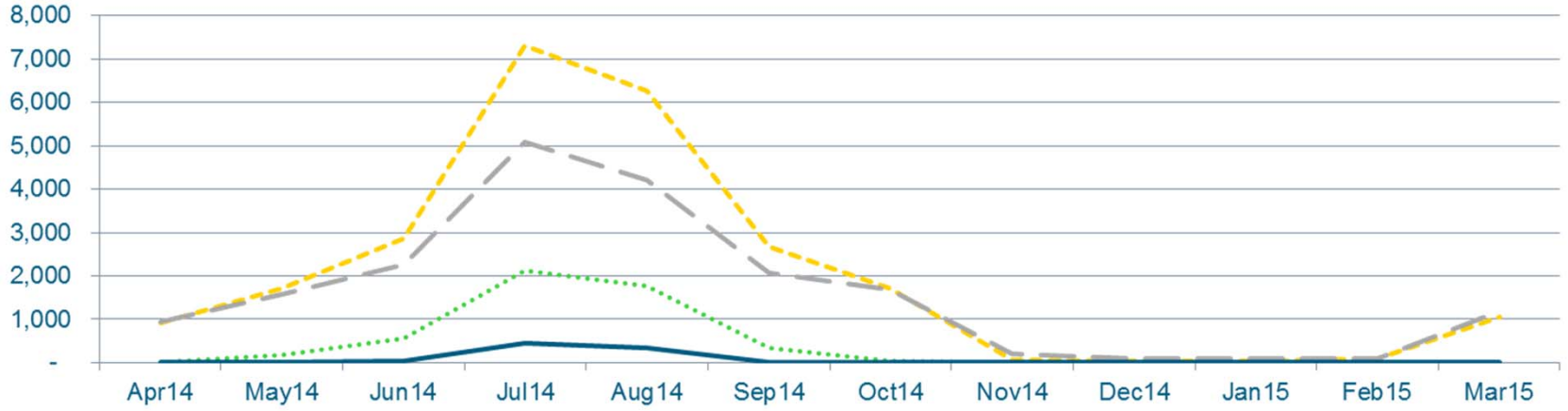
Monthly Electricity Consumption Profile

Crop Production



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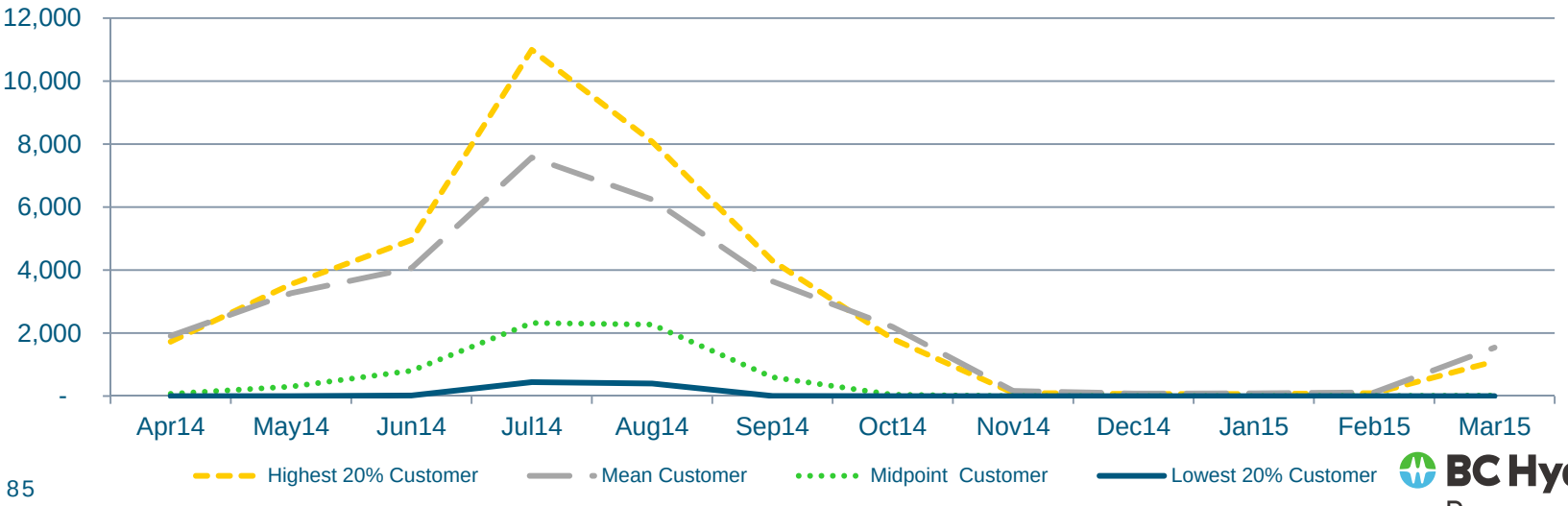

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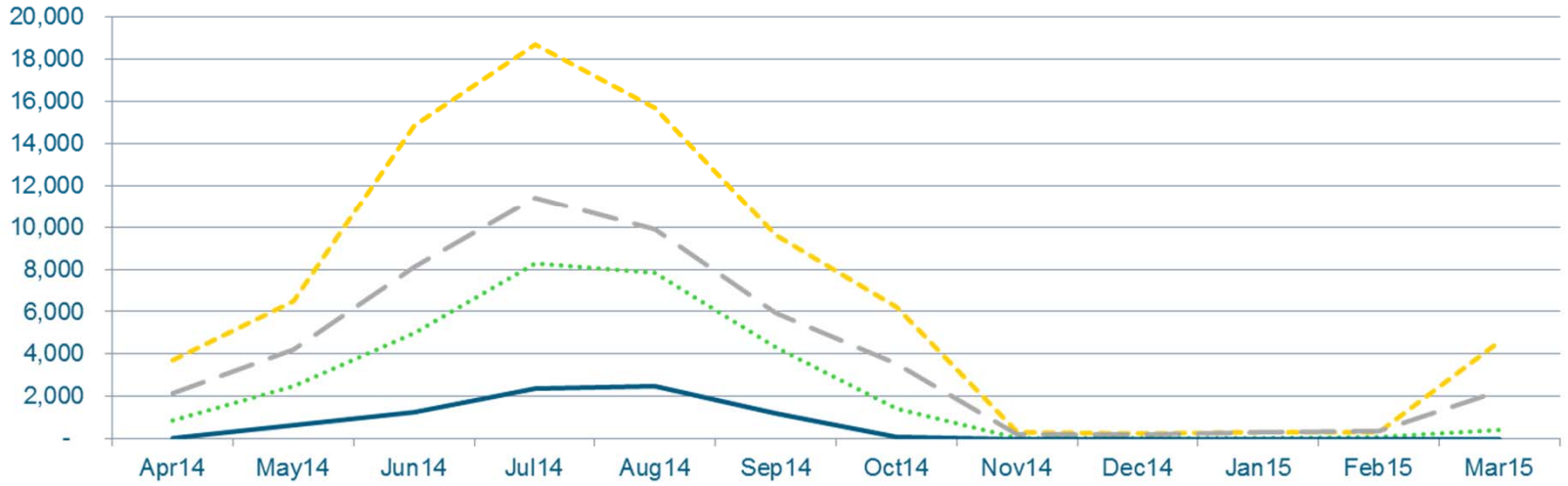
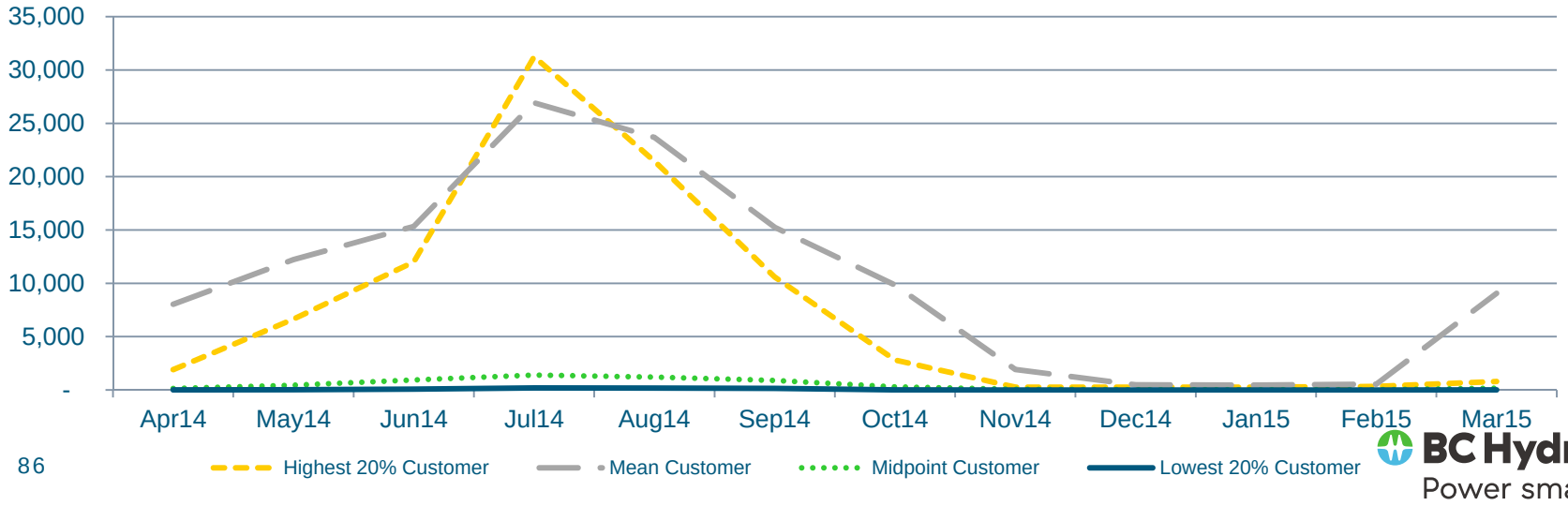
Monthly Electricity Consumption Profile

Hotel/Strata/Golf Course



Municipal / Water Utilities



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Preliminary Rate Review Options

- Review the cost of service basis for the Irrigation Rate to determine whether changes to the eligibility criteria are appropriate:
  - Reviewing each of the customer segments as well as the current 746 watt minimum motor load requirement
- Review the appropriateness of the minimum charge:
  - Should the minimum charge be based on or include a measure of actual demand?
  - Should the minimum charge be replaced with a basic charge per customer and set to cover a portion of customer service costs?
- In accordance with Direction 7, BC Hydro is not considering inter-class rate rebalancing options

Do you have any comments on these options?
Are there additional areas that you believe BC Hydro should be exploring?

Module 2 Irrigation Engagement

Approach

- Meet with customers and facilitate a reasonable customer understanding of the existing rate and rate design process
- Seek views on rate options and what additional information may be relevant to consider

Planned Engagement

- Meeting with associations representing BC crop producers, golf courses/hotels, municipal and large customers
- Engagement to be aligned with Farm Rate review including customer workshops in the Lower Mainland and Interior

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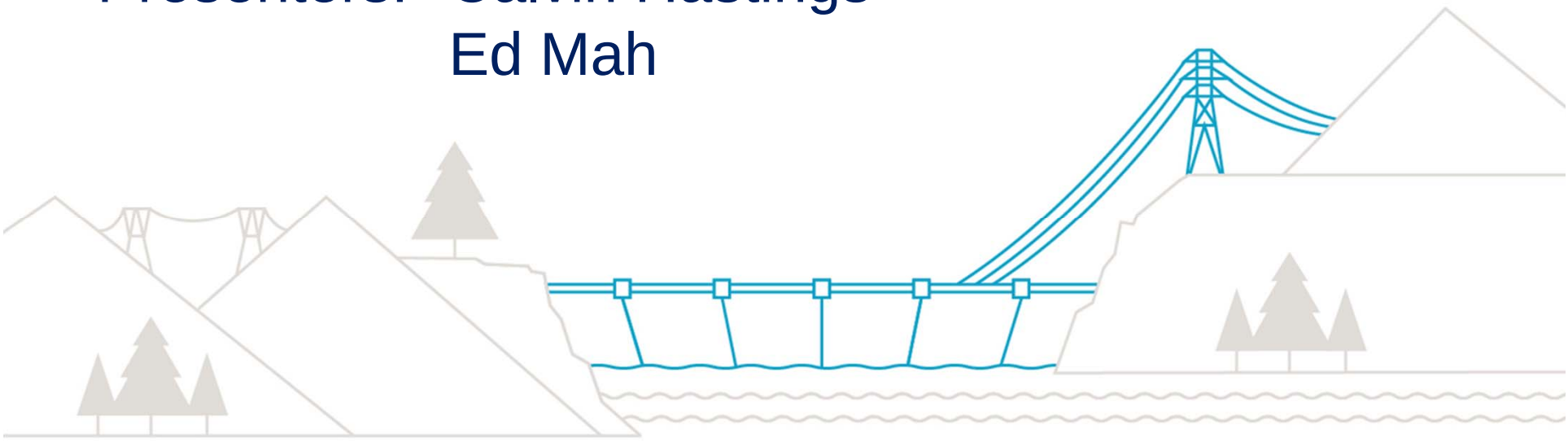
Street Lighting

Presenters: Calvin Hastings
Ed Mah



March 3, 2017

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BC Hydro Street Lighting Rate Classes

- **BC Hydro has 2 street lighting rate classes. Split approved in Module 1 of RDA.**
- **We recover cost of service for each rate class separately.**
- **Rates are postage stamp based on average costs and total revenue in rate class.**

BC Hydro Owned Street Lighting

Rate Schedule 1701 – Overhead Street Lighting

- Lights and poles are owned and maintained by BC Hydro and leased to customers
- Monthly charge to cover cost of service (capitalized costs, operating costs, maintenance costs and electricity costs)

Rate Schedule 1755 – Private Outdoor Lighting

- Closed
- Lights are owned and maintained by BC Hydro
- Poles are owned and maintained by BC Hydro or customer

Customer Owned Street Lighting

Rate Schedule 1702 - Ornamental Street Lighting

- Lights and poles are owned and maintained by customer.
- Cost based on electricity used

Rate Schedule 1703 – Street Lighting Service

- Closed to new customers
- Lights are owned and maintained by customers but installed on BC Hydro poles
- Contact charge plus electricity charge

Rate Schedule 1704 – Traffic Control

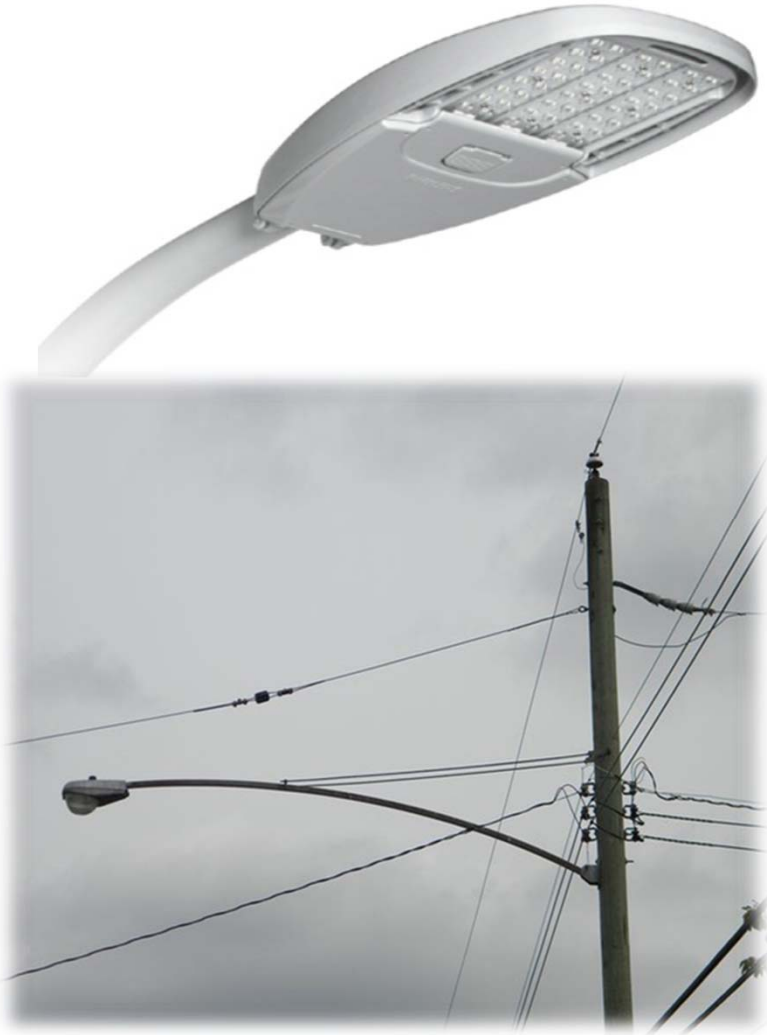
- Lights and poles are owned and maintained by customer
- Cost based on electricity used

Main Focus
LED Street Lights

A transformational shift to LED street lighting technology is underway throughout most of the world

- Better light colour with better light control
- Lower operating costs through lower consumption and power demand (30-50%)
- More reliable operation
- Lower maintenance costs

Rate 1701
BC Hydro Owned Street Lights



We continue to evaluate LED technology for the 91,000 BC Hydro owned Street Lights

- One year pilot involving 168 LED Street Lights in Richmond completes in April 2017
- Pursue LED rates for Rate 1701 if results are favourable
- Conversion capital costs have been included in our F2017 to F2019 Revenue Requirement Application
- Soonest implementation of LEDs would begin in early to middle 2018

Rate 1701
LED Rate Design Considerations

Customers are seeking to be able to take advantage of cost reductions associated with LED technology

Rate Design Considerations

- Need to design rates that will support the implementation LED Streetlights for customers taking service under Rate 1701
- Since there is no upfront capital contribution from customers, need to recover the net book value of existing street lights to be replaced before end-of-life
- Maintain the postage stamp nature of the rates in the rate class
- Revenue neutral (cannot rebalance rates between rate classes)
- Efficient to implement and administer

Other Considerations

- Should take advantage of the experiences and learnings from our pilot program and from our customers that already have LED lights installed
- How do we establish roll out of LED technology for Rate 1701 Street Lights?
  - Some 91,000 Street Lights to be replaced over a planned 5 Year roll-out program

Rate 1701
LED Rate Design Survey Results

We have been consulting with Customers on the inclusion of LEDs in Rate 1701. A Survey issued to Rate 1701 Customers was completed on January 30, 2017 with the following preliminary results:

- 54 responses received representing approximately 40% of Rate 1701 installed base
- Responses received from all types of municipalities that take service under Rate 1701
  - Large-Small, Northern-Southern, Island-Mainland. Municipalities, Districts and First Nations participated
- Very good response rate and the survey appears to have increased the interest level of customers
- A report summarizing the results is being prepared and will be posted to the RDA website
- 55% of responders have started to implemented LEDs for Rate 1702 lights they own
- 7% of customers with Rate 1702 street lights have replaced more than 20% of these street lights
- 50% of customers with Rate 1702 street lights expect to complete LED conversion by 2022
- To recover the undepreciated value of the existing HPS lights, a visible rate rider seems preferable, an upfront charge was also preferred by many
- Technical specifications:
  - All lighting distributions will be required
  - No consistency in wattage levels so a variety will be required
  - Colour temperature: 4000K preferred by 25%, 3000K by 11% and 3500K by 10% of survey responders

Rate 1701
LED Rate Design Next Steps

- Complete analysis of results from Customer Survey
- Ongoing Customer Engagement
- Incorporate the results of the Richmond Pilot
- Continue rate design to develop rate options – for example:

  Option 1: a series of consolidated monthly rates for various LED wattage

  - Advantage: replicates the format of the existing rates in RS 1701
  - Disadvantage: does not easily facilitate future possible rate considerations such as dimming or metering

  Option 2: develop a series of consolidated monthly rates for fixtures with a separate energy component

  - Advantage: more flexibility to accommodate technology (different wattage lamps) and future technology
  - Disadvantage: may be more difficult to implement and administer

  Other Options: may come out of engagement activities

  - Develop preferred option on how NBV of existing Street Lights to be retired should be recovered
  - Develop how the roll-out of LED Street Lights under Rate 1701 should be accomplished

Rate 1702
Customer Owned LED Street Lights

Customers can convert now to enjoy lower operating costs for their own Street Lights

- There are no RS 1702 amendments identified for RDA Module 2
- Unlike Rate 1701 Street Lights, customers pay the up-front cost and own their own lights
- Province of B.C. Corporate Supply Agreement is available to Customers to obtain best pricing for LED lights from approved vendors and list of qualified consultants
- Use BC Hydro's Street Light Information Management (SLIM) system to report unit wattages changes and realize monthly billing reductions
- Customers can consider adaptive controls (dimming) for further operational savings
- Financial Evaluation tool available to support communities with development of business case:
  - http://www2.gov.bc.ca/gov/content/governments/services-for-government/bc-bid-resources/goods-and-services-catalogue/led-street-lights-across-bc

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Rate 1703 - Customer Owned Street Lights on BC Hydro Owned Poles

As for Rate 1702, customers can convert now to enjoy lower operating costs for their own Street Lights

Rate Design Considerations

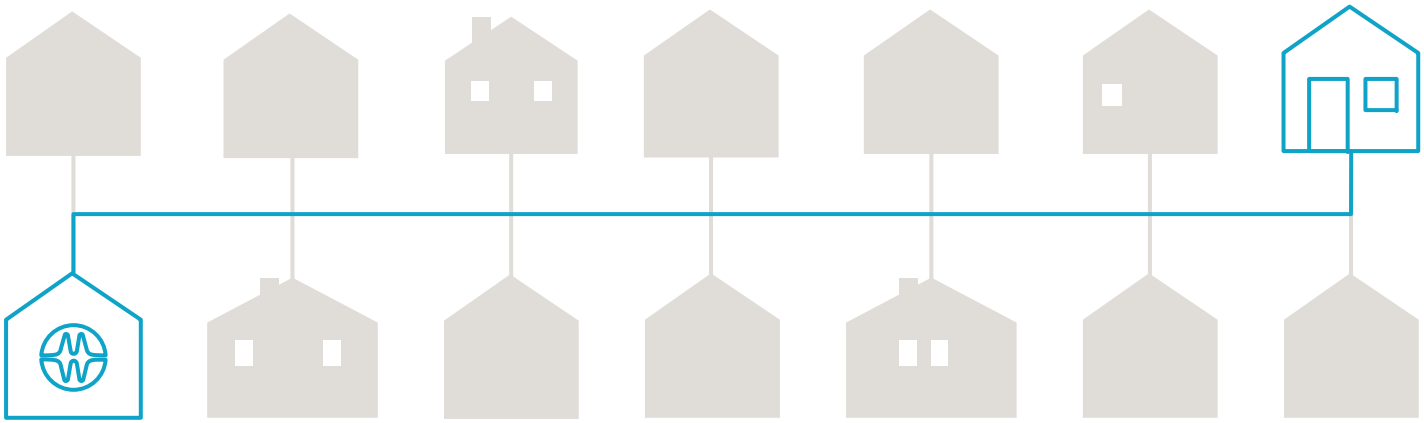
- Pole contact charge
  - The rental charge customers pay to BC Hydro for space on poles to which they attach their lights
  - Currently 99.84 ¢ per fixture per month
  - Lower than rental for other non-BC Hydro usages including:
    - strand attachments
    - equipment attachments
  - Sufficient space must be reserved to allow customer to perform maintenance safely in addition to attaching fixtures

Rate 1703
Rate Design Next Steps

- Complete jurisdictional review
- Initiate customer engagement
- Initiate rate design activities
  - Continue to develop rate options – for example:
    - Develop a contact charge based on the cost of the proportion of the pole space that must be reserved for a Street Lights.
- If a higher contact charge is established, should it be implemented immediately or phased in over a period of time?

Non-Integrated Area (NIA) Rates

Presenter: Shane Hiebert



March 3, 2017

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Overview

- Introduction to NIA
- Module 1 – Overview and Commitments
- Zone IB Backgrounder
- Zone II Engagement, Customer and Rate Information
- Zone II Preliminary Rate Options

Non-Integrated Areas (NIA) Overview

- About 6,800 customer accounts
- 14 remote service areas & 2 rate zones, mostly along the Central Coast and Northern Interior
  - **Zone IB** – Bella Bella District; served by storage hydroelectricity
  - **Zone II** – All other customers; most communities served by diesel with some renewables (hydroelectricity, biomass and solar)

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Module 1 NIA Rates Overview

- Provided overview of Non-Integrated Areas with focus on Zone II rates, noting:
  - Zone II rate structures have not significantly changed since the 1980's
  - Revenue collected in Zone II is below the cost of service
  - Rate approaches in other Canadian jurisdictions
- Three conceptual Zone II rate options discussed: Status Quo, apply full cost of service to rates, apply Zone I rate structures:
  - Initial feedback requested indicated Intervener interest in exploring Status Quo and application of Zone I rate options

Module 1 NIA Commitments

Rates, Terms and Conditions

- Default residential and general service rates to be confirmed to properly inform option of equalizing Zone II and IB rates with Zone I
- Exploring applicability of Terms and Conditions (including Standard Charges) to Zone IB and Zone II customers (e.g. – unique circumstances in NIA regarding when or how much security deposit is required)
- Engaging with Zone IB and II on other Module 2 work that would impact NIA customers
- Considering constraints/impacts of Special Direction 10 and Remote Communities Regulation on Zone II rates
- Jurisdictional review will inform Module 2 engagement
- Seek feedback on rate treatment that should be applicable to remote communities which may be added to BC Hydro's service territory in future

Do you have any comments in respect to these tariff items?

Module 1 NIA Commitments

Customer Service

- Considering customer service options for Zone IB and II (e.g. - Skype for in-person assistance, local hires as point of contact for in-person assistance)
- Posting clearly worded customer business practices on our website
- Changing business processes to allow repayments over longer periods
- Creating a guarantor option as an alternative to Security Deposits
- Piloting a winter moratorium on residential disconnections for non-payment in 2016/2017
- Delaying disconnections for medical reasons
- Establishing a Low Income Advisory group that would include Zone IB and II representation
- Looking at coordinating INAC housing funded projects with Electricity Conservation Assistance Program (ECAP) upgrades

Do you have any comments in respect to these customer service items?

Zone IB Background

2007 RDA – Phase II and III Proceeding and Decision

- BC Hydro did not initially propose any changes to communities in Zone II and the rate structure for those communities, which at that time included Bella Bella
- Heiltsuk Tribal Council and Shearwater Marine Limited of Bella Bella, took the position that Bella Bella should be on Zone I rates
- Commission persuaded that the declining block price structure of the energy purchase agreement between BC Hydro and CCPC [now Boralex] constitutes a rationale for finding that the inclining block feature of BC Hydro's Zone II rate schedules is inappropriate for Bella Bella
- Commission ordered that Bella Bella customers be placed on Zone I rates

Zone IB Background

Current Situation

- Long-term EPA between Boralex and BC Hydro expired on December 31, 2016
- BC Hydro and Boralex have agreed a six month extension of the old EPA to June 30, 2017
- BC Hydro and Boralex continue to negotiate
- BC Hydro engaging with Bella Bella customers (NIARG) on identifying areas of interest

Given the linkages between Zone I rates being applied to Bella Bella (Zone IB) customers and the structure of the Boralex EPA, should the review of Zone IB be postponed until the EPA is approved?

Zone IB Customers and Rates

- About 600 Zone IB customers in F2015
- Following the 2007 RDA Decision, BC Hydro placed Zone IB customers on the default rate structure that existed at that time and Zone IB residential customers were subsequently exempted from the Residential Inclining Block

	Exempt Residential Service (RS 1151/1161)	Small General Service (under 35 KW) (RS 13xx)
Number of Customers	511	74
Basic Charge (¢ / day)	19.57	23.47
Energy Charge (¢ / kWh)	9.93	11.16

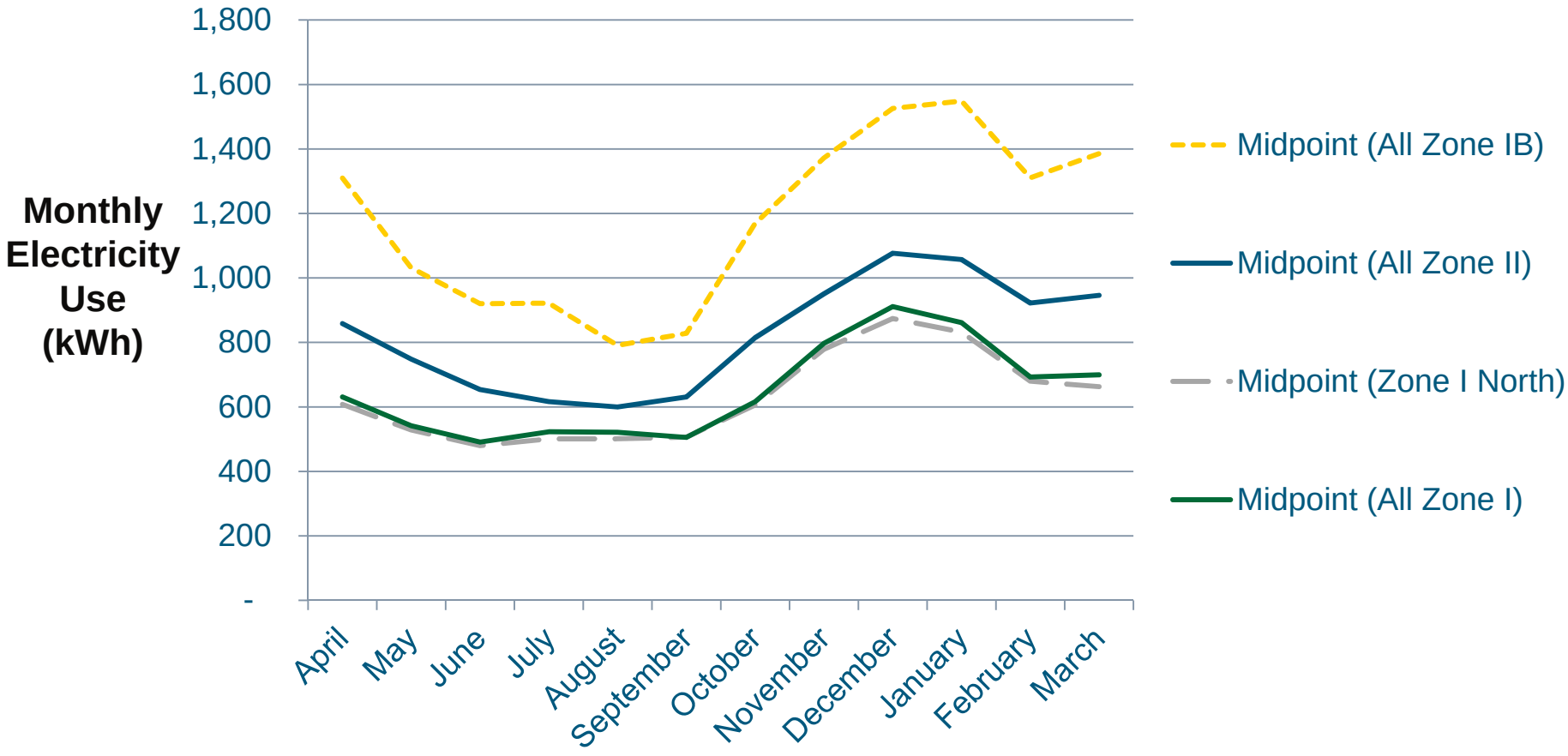
Zone IB Customers and Rates

Exempt General Service (RS 12xx)

	Energy Charge	Demand Charge
Initial Tier	First 14,800 kWh @ 11.16 ¢ / kWh	No charge for first 35kW
Second Tier	All additional energy consumption @ 5.36 ¢ / kWh	Next 115kW @ $5.72 per kW
Third Tier	N/A	All additional kW @ $10.97 per kW

- 11 customers on Exempt General Service rate
- Exempt General Service rates serve as control group for the default Zone I Medium and Large General Service rates; being phased out as of April 1, 2017

Residential Electricity Consumption Zones I, IB and II



F2015 - April 2014 to March 2015

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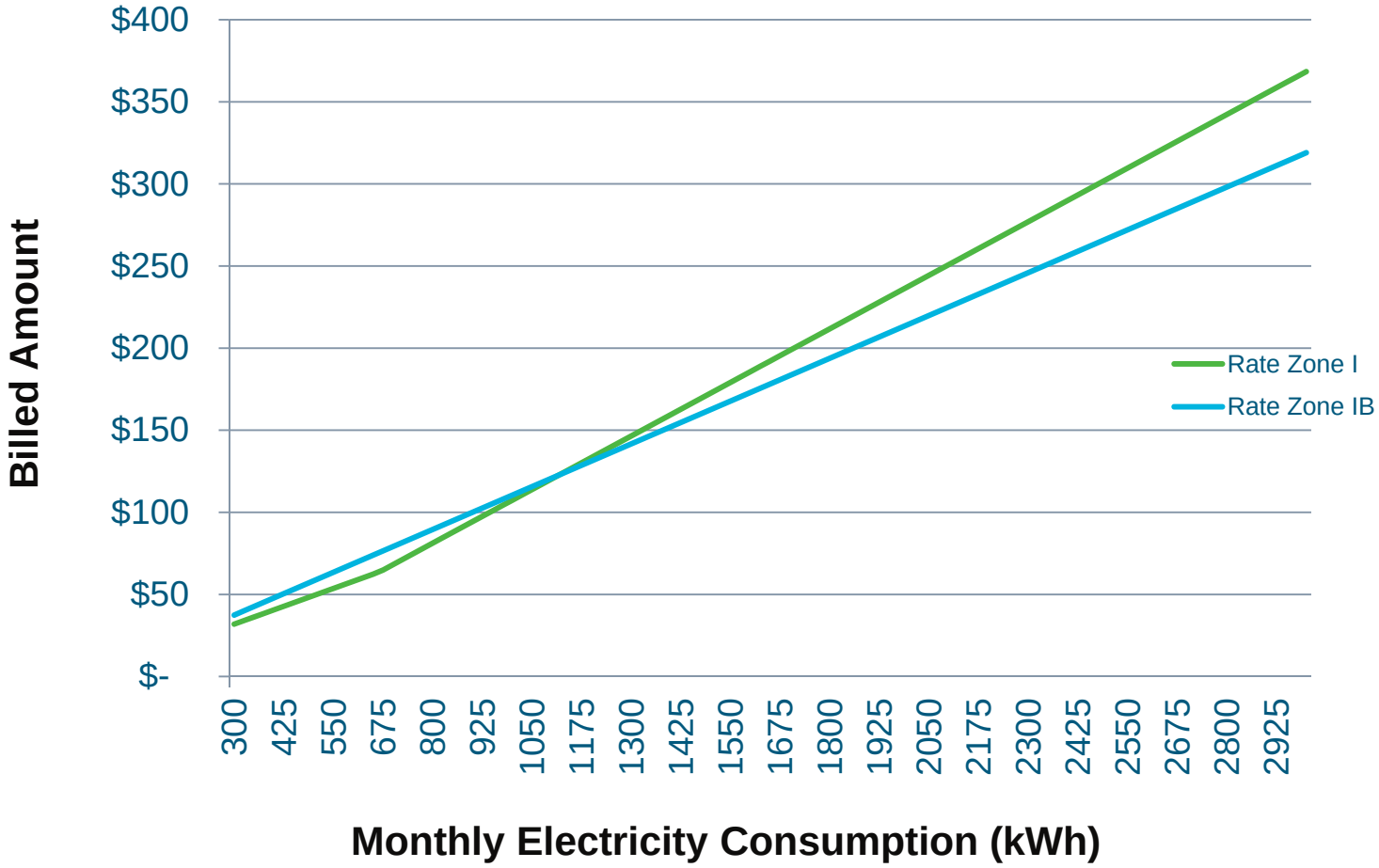
Rate Zone IB and I Residential Customer Monthly Bill Comparison



- Residential customers consuming more than 1,100 kWh per month (2,200 kWh per two month billing period) pay less on current Zone IB rate
- Most Zone IB customers expected to pay less in Summer and more in Winter if charged on Zone I Residential Inclining Block rate

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Module 2 NIA Engagement

Approach

- Met with NIA customers to provide a basic understanding of the RDA process, their rates, their usage, and preliminary rate options being considered
- Sought views on rate options and what additional information may be relevant to consider

Activities

- Made presentations and have requested input from First Nations and community leaders from various Zone II communities representing a majority of Zone II customers
  - Central Coast - Skidegate, Queen Charlotte City, Port Clements, Massett, Old Masset
  - North Interior - Kwadacha, Tsay Keh Dene, and Good Hope Lake
- Held community workshops – Skidegate/Queen Charlotte, Port Clements, Massett and Kwadacha

Zone II Rates

Three Zone II specific customer rates: Residential, Small General Service and General Service

- Two main components to these rates:
  - **Basic Charge** – Fixed daily charge for fixed customer service costs
  - **Energy Charge** – Variable charge based on energy consumed; demand also a factor for General Service rates

Rates partially incorporate the principle of “postage stamp” rates across BC while also encouraging efficient energy use:

- Basic charges and first tier portion of energy use based on current Zone I rates
- The second tier portion of energy is priced higher to cover some of the higher cost of serving Zone II customers

Jurisdictional Review

Manitoba, Ontario, Quebec, Newfoundland & Labrador and Alaska

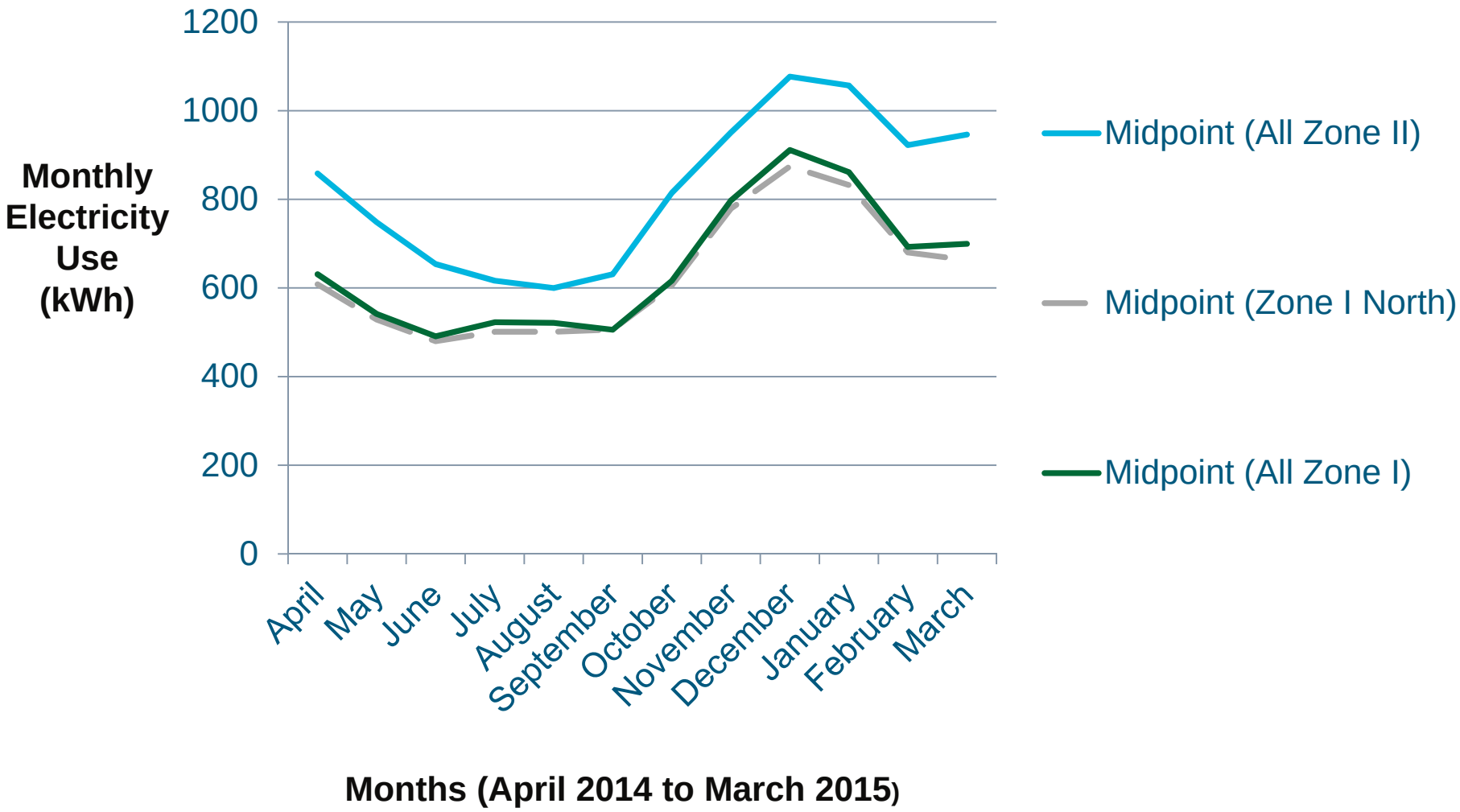
- Rates based on remoteness from system
- Customers pay an initial energy charge generally based on what residential customers on the integrated system pay and are then charged higher rates for electricity use above set thresholds
- In Manitoba, residential customers only charged one energy price equal to that of non-remote customers but electrical service is restricted to 60 amps (7200 watts)
- Lower thresholds at which the second tier (higher energy charge) applies in these jurisdictions

Comparison of Zone II and Zone I Residential Rates

Rate Component	Zone I Residential Inclining Block (RIB) Rate (RS 1101/1121)	Zone II Residential Rate (RS 1107/1127)
Basic Charge (¢ / day)	18.35	19.57
Consumption Threshold (kWh/month)	675	1,500
Rate up to Threshold (¢ / kWh)	8.29	9.93
Rate above Threshold (¢ / kWh)	12.43	17.07

- Residential customers in Zone II do not always pay more than Zone I customers
- Whether a customer is better off on the current Zone II versus Zone I residential rate depends on the amount of electricity used

Average Residential Electricity Use



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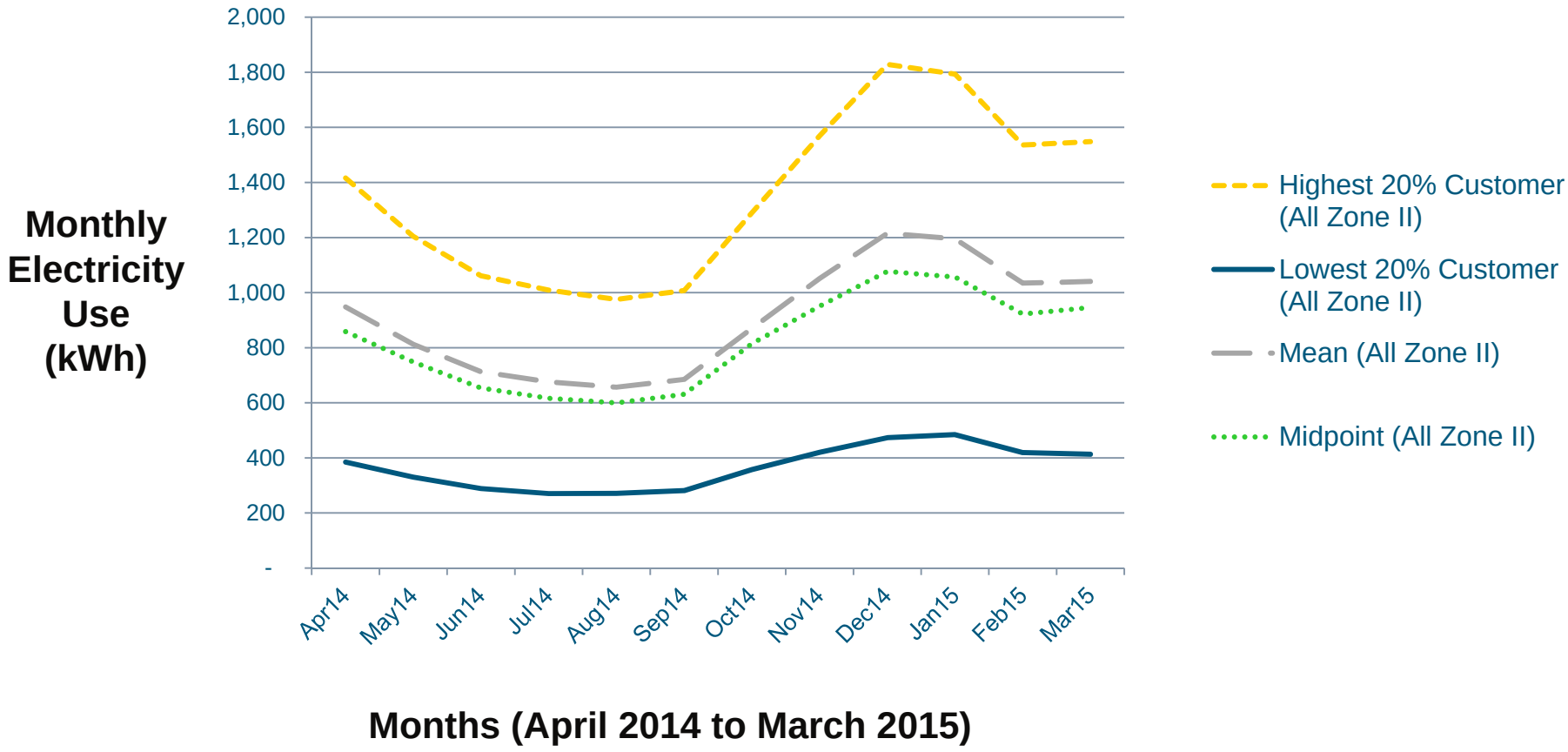
Zone II Residential Electricity Use



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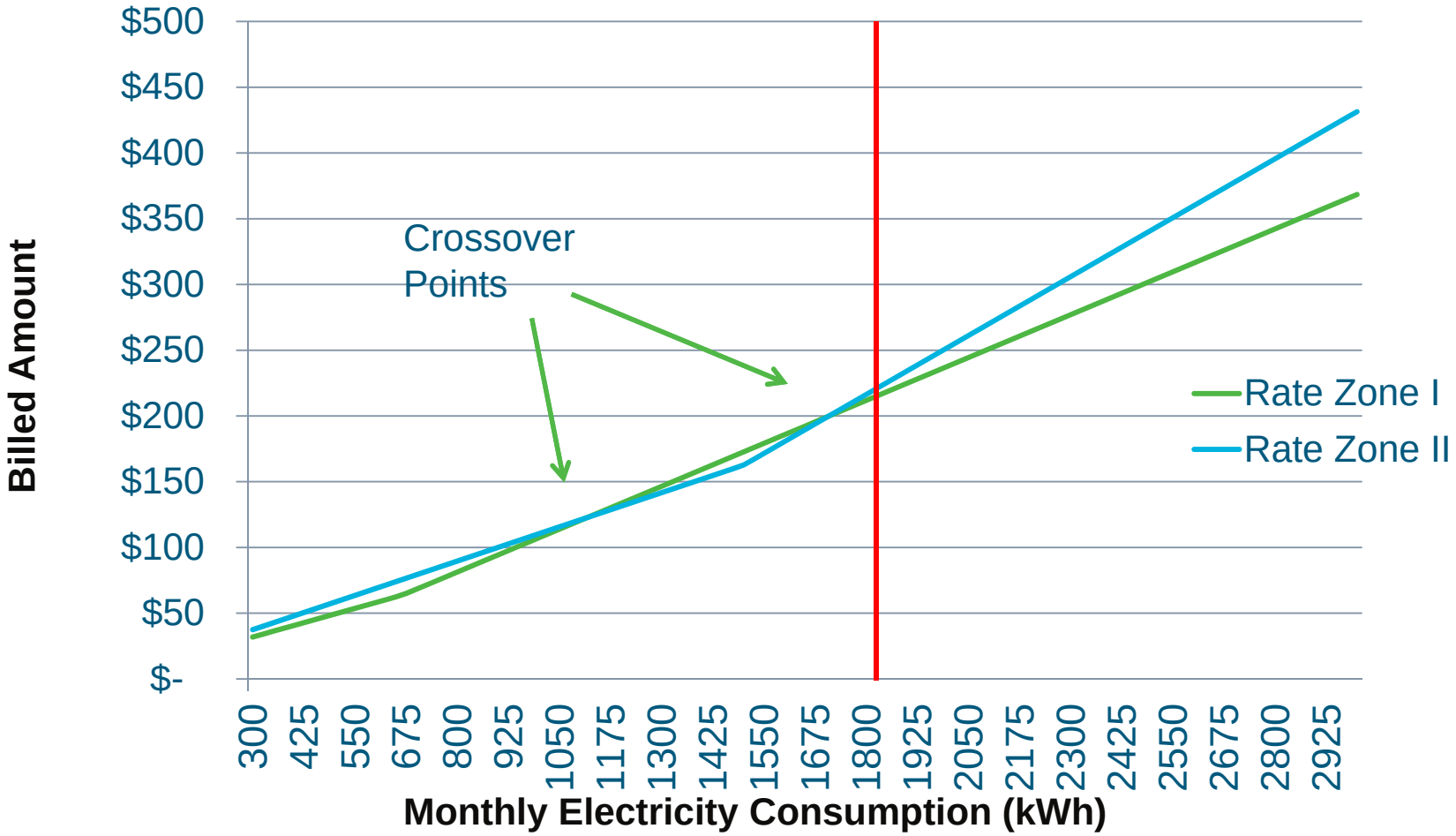
Rate Zone II and I Residential Customers Monthly Bill Comparison

Red line indicates highest monthly electricity use of the top 80th percentile Zone II residential customer



Electricity bills for customers on Zone I and II residential rates are similar but Zone II bills are more expensive at higher consumption levels

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Who is more likely to be a high user of Electricity?

The 2012 Residential End Use Study oversampled Zone II customers and identified the following factors as correlated with higher levels of electricity use:

- Homes: single detached homes (+ 2500 square feet, full basement, heated garage/workshop, built between 1976 and 1985)
- Household: account holder 35-54 years old, 4+ residents, lived in year round
- Appliances: 1 or more full freezers, dishwasher, TV, Internet Router, +30 lightbulbs
- Part or full-time business operated at residence
- Electricity as main heating fuel source:
  - Electric space heating (baseboard &/or portable heaters)
  - Electric water heating (larger hot water tanks (over 180L or 40 gallons))

What makes Zone II usage different from other residential customers?

Differences between Zone II vs Zone I Residential Customers

- Higher percentage of single detached homes and mobile homes in Zone II
- Water heating almost entirely heated by electricity in Zone II whereas most Zone I customers in single detached homes heat water with natural gas

Similarities between Zone II vs Zone I Residential Customers

- Percentages of residents per account quite similar across Zones II and I
- Percentage of customers using electricity for space heating similar across Zones II and I

BC Hydro planning to look at the data further to see if there is more information that would help us to understand how Zone II customers use electricity.

Are there any other customer characteristic questions or issues that you think we should be considering?

Zone II Small General Service and General Service Rates

Rates

- Small General Service – Customer demand is less than 35 kW
- General Service – Customer demand is 35 kW or greater

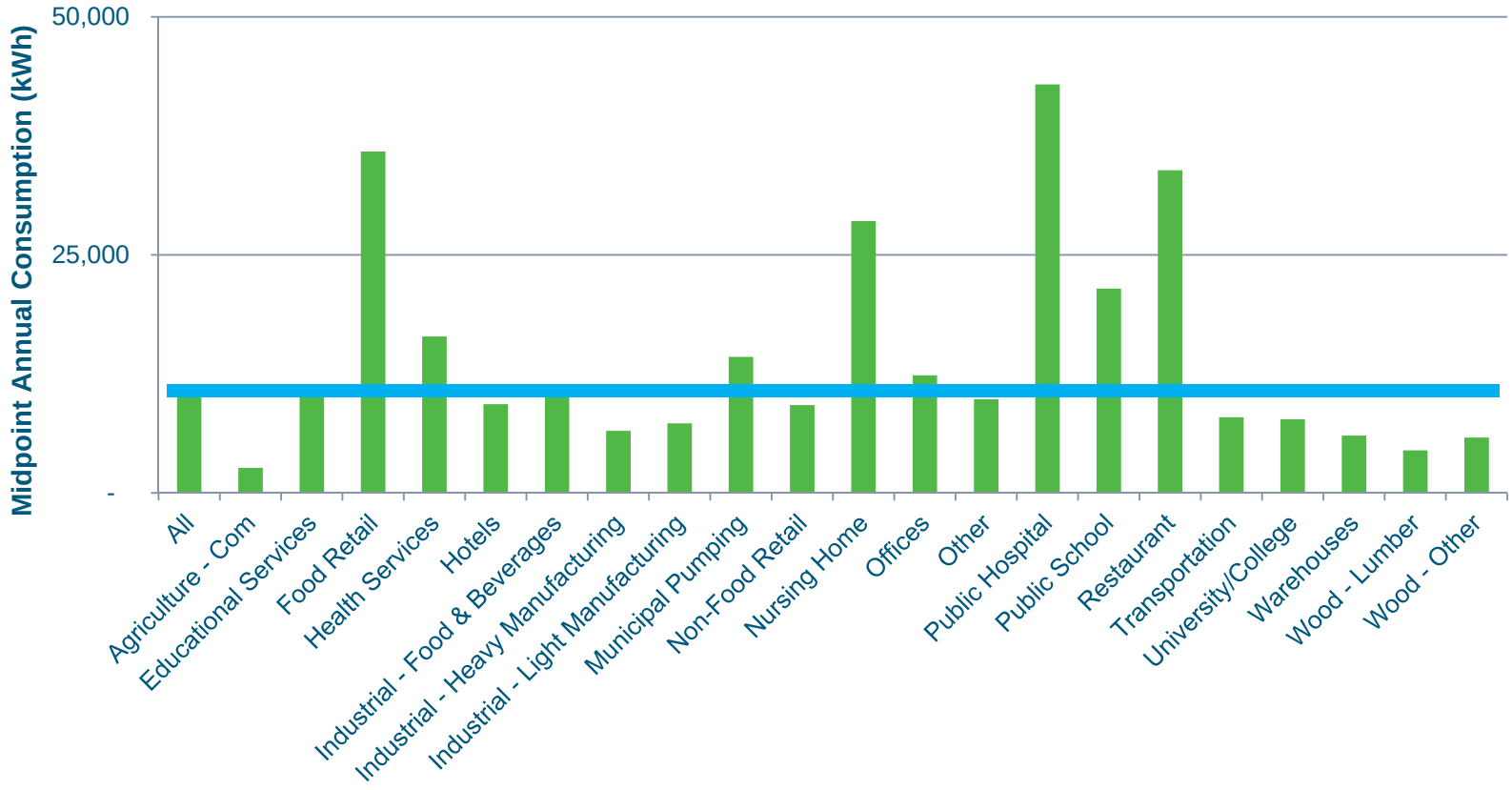
Basic charge

- **23.47 ¢** per day

Energy charge

- Initially **11.16 ¢** per kWh up to a certain consumption threshold and **18.58 ¢** per kWh beyond threshold amount
- Threshold for Small General Service customers is 7000 kWh /month
- Threshold for General Service Customers is 200 kWh per kW of electricity demand
  - Discounts available if customer uses their own transformer or takes electricity at higher (primary) voltage;
  - Minimum charge based on Zone I rates

Zone II Small General Service



- Around 1100 customers representing just over 20% of overall Zone II load
- Green bars represent median (midpoint) annual consumption by use
- Electricity consumption varies widely by type of business/organization

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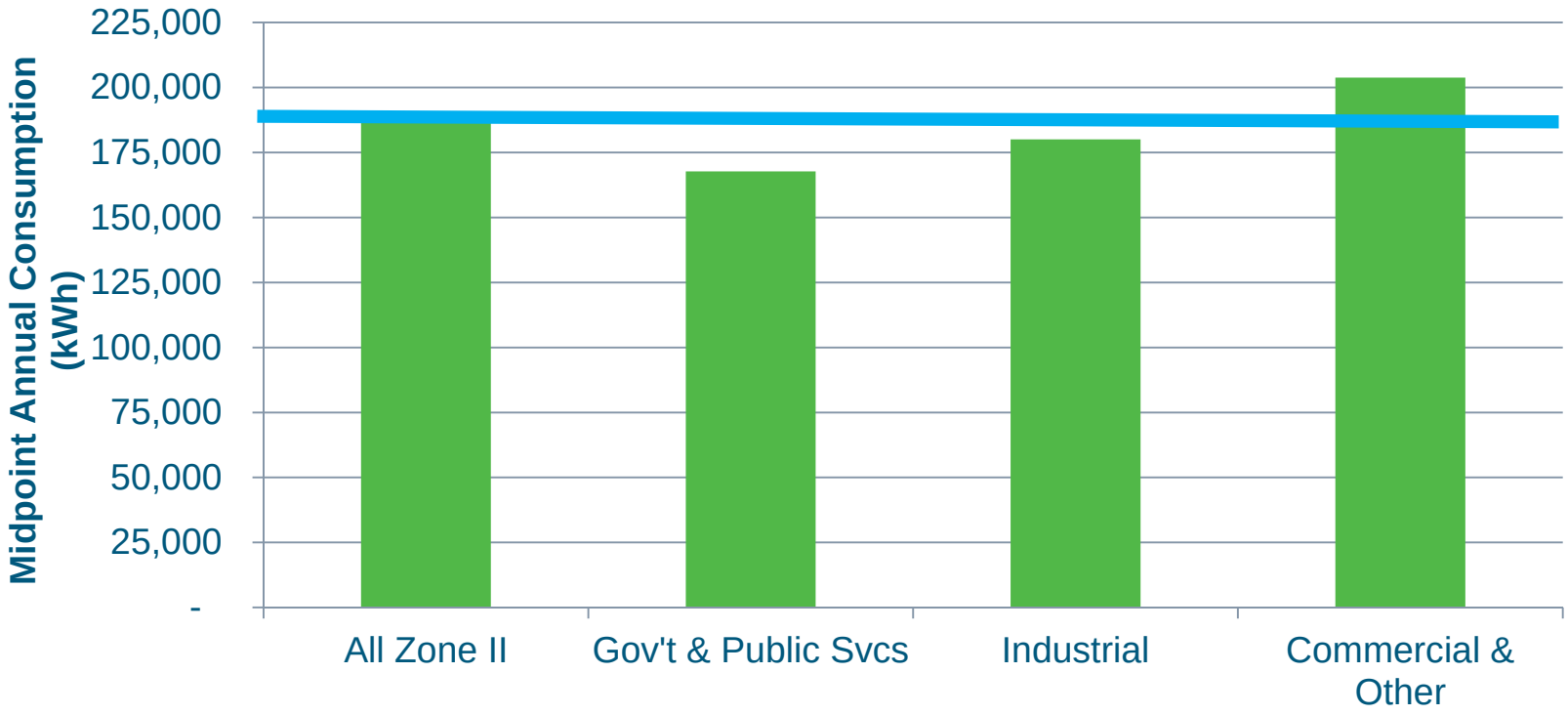
Zone II General Service



- Approximately 75 Zone II customers representing just under 20% of Zone II load
- Green bars represent annual midpoint (median) customer usage
- Similar median (midpoint) consumption levels but use varies between customers

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Potential Options

1. Status Quo (No Changes)
2. Apply Zone I rates in Zone II
3. Full Cost Recovery - Increase Zone II rates to cover Zone II cost of service
4. Retain separate rates but make changes to the rate structure

Option 1 – No Change to Rate Structures

No bill impacts for this option

Pros

- Stability of rate structure as current rates have been in place for a long time
- Because the basic charge and the first tier of the energy use are based on Zone I rates, it partially reflects a province-wide “postage stamp” approach:
  - As a majority of Zone II customers do not exceed the threshold between the Tier 1 and Tier 2 energy charge, most customers already pay equivalent of Zone I rates
  - Higher consuming customers are subject to a higher energy charge that encourages conservation during the winter heating season and is closer to the cost of generation
- Tier 2 energy price appears to have historically discouraged electric space heating in Zone II:
  - Percent of residential customers who have reported using electricity as a space heating fuel is lower in Zone II than in Zone I despite natural gas not being available
- No administrative changes required

Option 1 – No Change to Rate Structures

Cons

- Rate structures do not fully reflect “postage stamp” principle
- Continued under recovery of costs from Zone II customers
- Unlike Zone I residential rate structures, the residential energy charge threshold of 1,500 kWh per month only encourages conservation from the highest consuming customers

Option 2
Make Zone II rates the same as Zone I

Bill Impacts

Residential Customers

- Over 90% of residential customers would see some reduction in their bills over a 12 month period
- Typical Zone II customer bills would go down by around 8% or $65 over a 12 month period
- High and low consuming customers would see the largest bill reductions

Small General Service Customers

- About 70% of customers would see some increase in their annual bills
- Typical Zone II annual customer bill would go up by about 1% or $16
- Highest consuming customers would see bill reductions as they wouldn't be exposed to a Tier 2 energy charge

Option 2
Make Zone II rates the same as Zone I

Bill Impacts

General Service Customers

- Under this option, existing customers would either be charged based on the Medium General Service or Large General Service Rate
- Based on BC Hydro's RDA Module 1 rate proposals which were recently approved on January 20, 2017, over 95% of Zone II General Service customers would see an annual bill decrease
- Customers within a load factor range of between 30% - 70% would see bill reductions of between 8% and 52%

Option 2
Make Zone II rates the same as Zone I

Pros

- Having the same rate for Zone I and II customers is consistent with the “postage stamp” principle
- Applying the same rates for both Zone I and II customers will reduce both the number and complexity of rates and should be easier for BC Hydro to administer
- While this option is estimated to increase the under recovery of costs from Zone II customers by $1 - $2 million, Zone I customers would be minimally impacted (rates would increase by a fraction of a per cent)
- Zone I rates as proposed are no more difficult to understand than Zone II rates
- As the current Zone I Residential Inclining Block rate threshold is 675 kWh / month, a majority of customers would receive a Tier 2 price signal in most months of the year

Option 2
Make Zone II rates the same as Zone I

Cons

- Option slightly increases the under recovery of costs from Zone II customers
- The Zone I residential rate is designed around the Zone I customer use profile (i.e. – it doesn't reflect Zone II usage profiles, which are 100-200kWh/month higher than Zone I)

Options 3 and 4

Full Cost Recovery

- Increase revenue from rate to equal cost of service
- Encourages fair apportionment of costs among customers
- Very large bill impacts
- Further departure from postage stamp pricing principles compared with Options 1 or 2

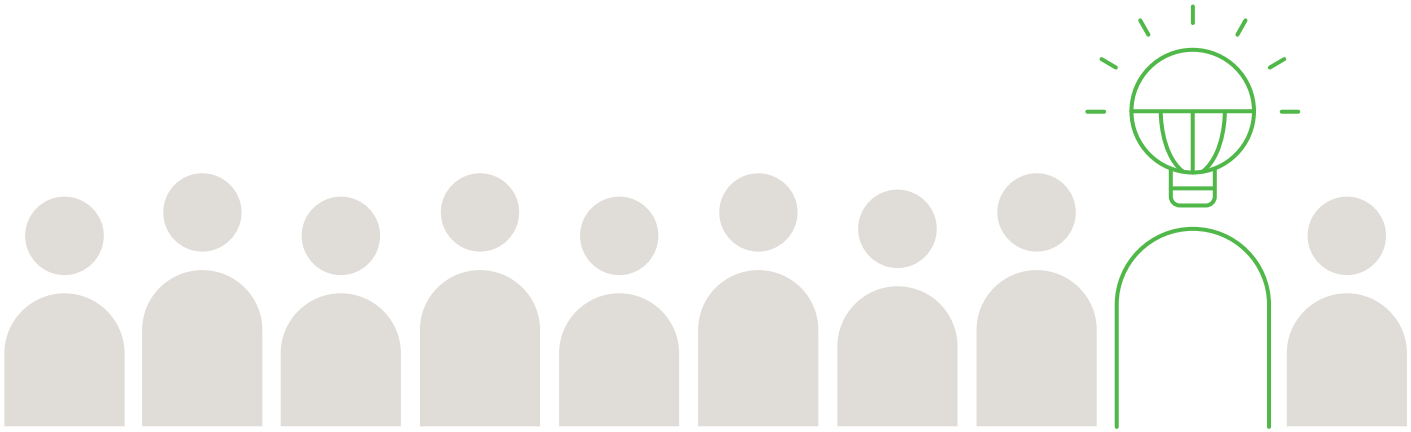
Retain Separate Rates for Zone II customers but make changes to the rate structure

- Adjust energy charges
- Relook at thresholds

Do you have any comments on the options? Should we be considering anything else?

Next Steps

Facilitator: Anne Wilson



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Next Steps

Feedback

- Feedback requested on Optional Rates (Residential and General Service), Irrigation, Street Lighting and Non-integrated Areas **3 weeks after** the workshop summary notes are posted

Next Steps

Contact Information

Email: bchydroregulatorygroup@bchydro.com

Indicate “Attention RDA – Module 2” in the subject line.

Mail: BC Hydro - Regulatory Group – Attention RDA – Module 2
16th Floor, 333 Dunsmuir Street
Vancouver, BC V6B 5R3

Web: Rate Design Application Website: www.bchydro.com/2015rda