Stakeholder recommendations on rate design reform: Matter 357

PRESENTED BY
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New Brunswick Energy and Utilities Board

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THE Brattle GROUP

The Board Staff retained The Brattle Group to assist the Staff in two areas

1. Identifying issues for determination in Matter 357 based on the evidentiary record and comments from stakeholders
2. Determining what issues should and can be resolved in the immediate, medium, and long-terms

We were informed that the goals of this review of rate design included reducing inequities, establishing a design that was easily adaptable to future changes (*e.g.*, technology and the business environment), and establishing a rate design that was clear, manageable, and predictable

Several stakeholders were involved in the project

- Canadian Federation of Independent Business
- Enbridge Gas New Brunswick with a subject matter expert from Concentric Energy Advisors
- J.D. Irving, Ltd., a large industrial customer
- NB Power Staff (with a subject matter expert from Elenchus Research Associates and another subject matter expert from Christensen Associates Energy Consulting)
- New Brunswick Energy and Utilities Board Staff
- New Brunswick Public Intervener (with a subject matter expert from Industrial Economics, Incorporated)
- Union of New Brunswick Municipalities
- Utilities Municipal with a subject matter expert from BDR NorthAmerica, Inc.
- David Amos, an individual ratepayer
- Gerald Bourque, an individual ratepayer
- Dr. Roger Richard, an individual ratepayer

Chatham House rules were followed in reporting the workshop discussions

According to the Chatham House rule, which is widely followed globally (e.g., in the Harvard Electricity Policy Group), participants are free to use the information received during the workshop, but ***neither the identity nor the affiliation of the speaker(s), nor that of any other participant, may be revealed in any reports that are written after the workshops have ended***

Source: https://www.chathamhouse.org/chatham-house-rule/

Stakeholders met to debate and discuss rate design reform in three workshops

The workshops were held in Fredericton on June 26, 2019, July 24–25, 2019, and September 19–20, 2019

At each workshop, Brattle laid out the issues and stakeholders discussed them qualitatively using a **nominal group technique** and then evaluated them through a series of quantitative **scorecard exercises**

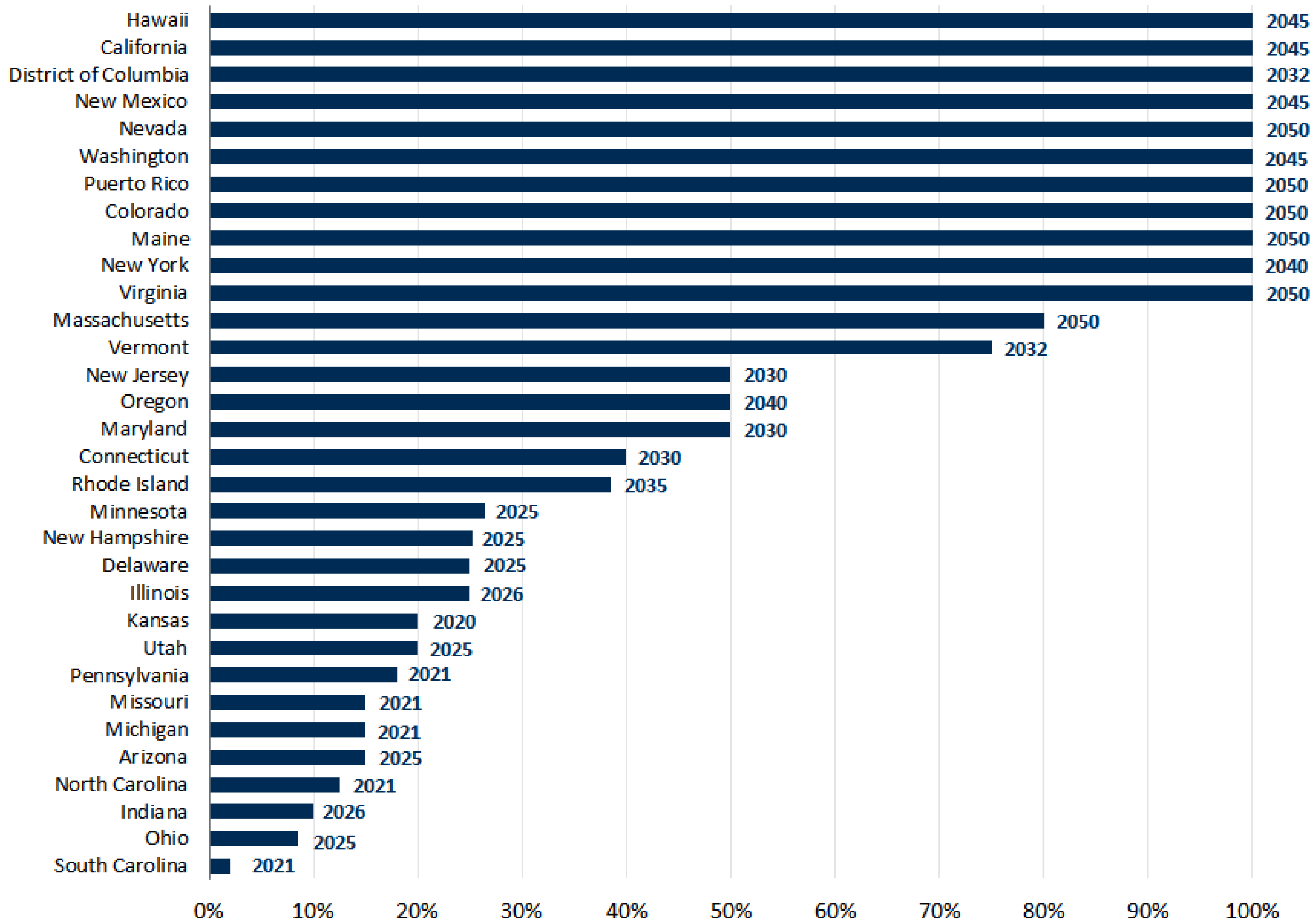
- In the scorecard exercises, each stakeholder was given 100 points to allocate across the issues being discussed
- When the scoring was done, the results were aggregated and presented to the group; also shown was the variance in responses by issue. Another round of discussion followed

Here is an illustration of what a stakeholder's scorecard of rate design objectives might look like

Objective	Points
Accountability of Utility	0
Affordability	0
Bill Stability	20
Cost Reflectivity (Marginal Pricing)	0
Customer Education and Gradualism	20
Economic Efficiency	0
Environmental Sustainability and Conservation	0
Equity	40
Promotion of Public Benefits	10
Protection of Vulnerable Customers	10
Rate Choices	0
Revenue Recovery	0
Revenue Stability	0
Transparency to Customers	0
Total	**100**

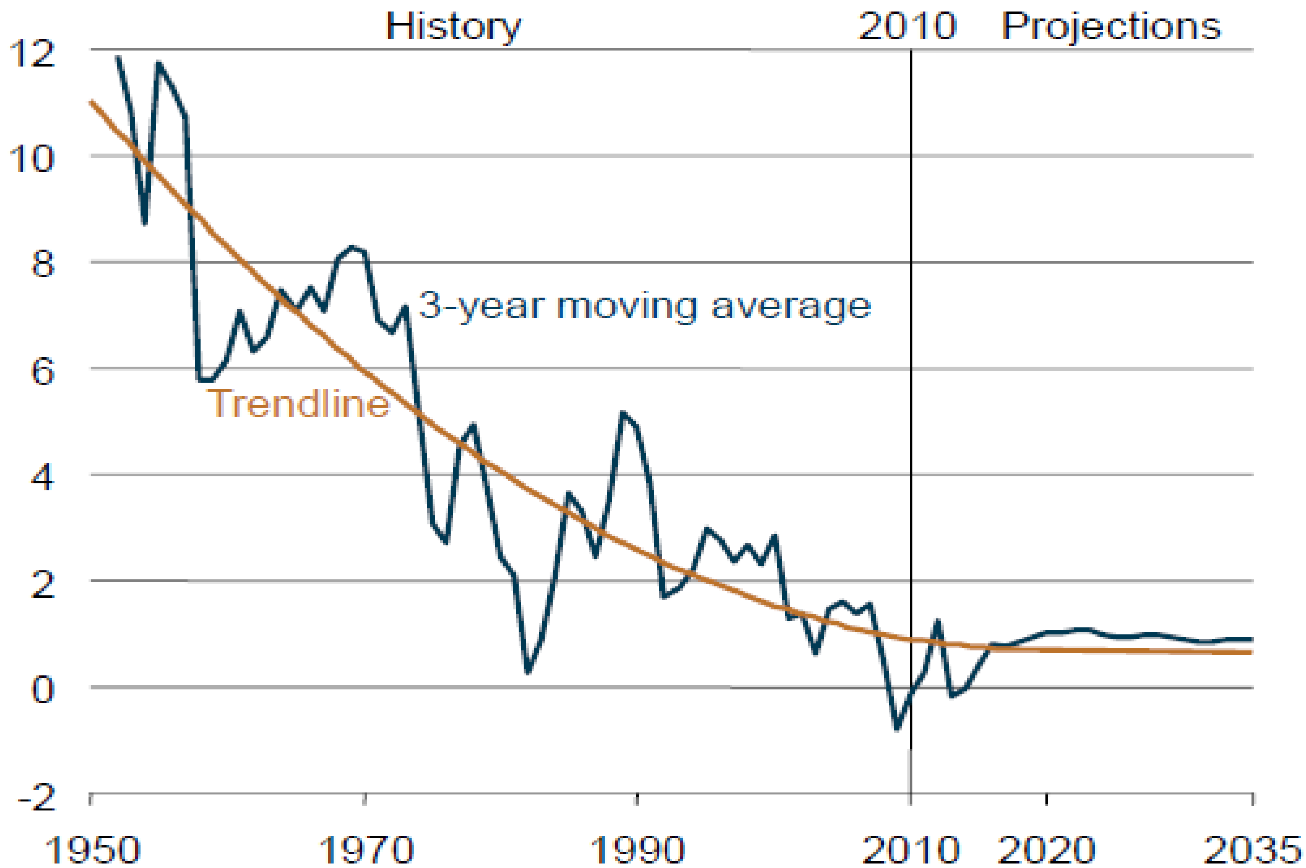
We began the first workshop with a primer on why rate design is being modernized

In the US, the states are going green with envy



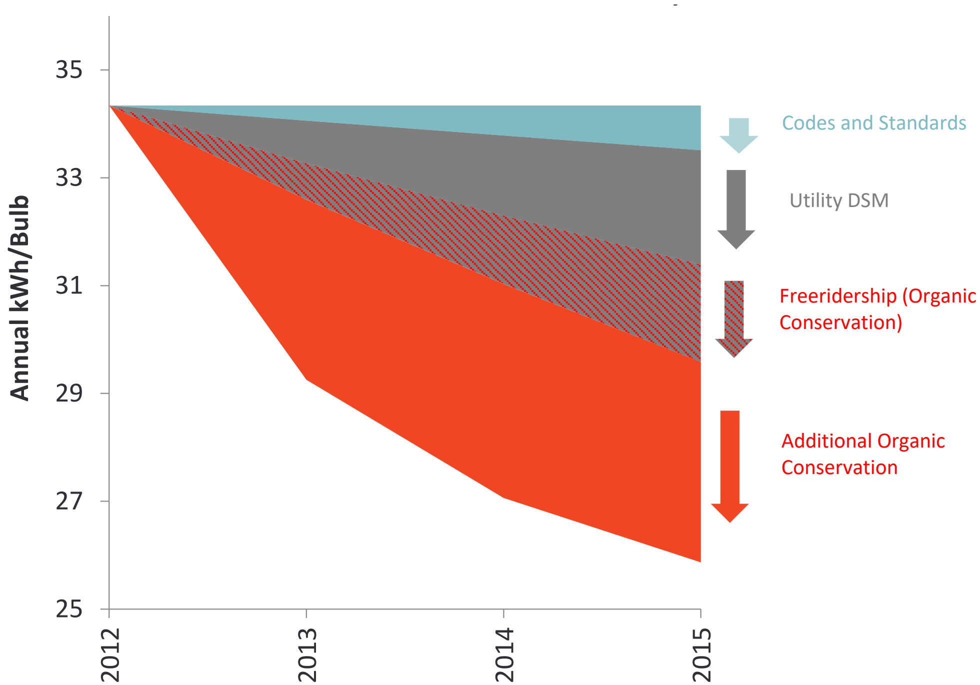
Notes: Targets for Hawaii, DC, and Maine specify 100% renewables, while other 100% targets allow for different forms of clean energy. New Jersey has also issued an Energy Master Plan targeting 100% clean energy by 2050. Targets for Colorado, Minnesota, Missouri, New Mexico, and North Carolina are specific to IOUs. Massachusetts' goal of 80% by 2050 is based on its Clean Energy Standard, while a separate Renewable Portfolio Standard has an implied target of 35% by 2030 (with Class I requirement growing by 1% per year thereafter).

In the US, annual % sales growth has been declining since 1950



In the US, “organic conservation” (OC) is enhancing energy efficiency beyond utility and government programs

Annual Energy Consumption per Avg. Bulb



Comments

- OC is the difference between the AEO forecast and NSP’s projected impact of codes and standards and DSM programs
- Including the impact of free-ridership, organic conservation will account for roughly 65% of the total efficiency improvement between 2012 and 2015

One Truism and Eight Propositions about Rate Design

Truism 1: Rate design never fails to stir up an argument

"There has never been any lack of interest in the subject of electricity tariffs. Like all charges upon the consumer, they are an unfailing source of annoyance to those who pay, and of argument in those who levy them. There is general agreement that appropriate tariffs are essential to any rapid development of electricity supply, and there is complete disagreement as to what constitutes an appropriate tariff."

- D.J. Bolton, *Costs and Tariffs in Electricity Supply* (1938)

Proposition 1: Modern tariffs embody the following elements

- They promote economic efficiency as well as equity
- They incentivize energy efficiency and demand response
- They facilitate the development and integration of clean energy resources
- They allow customers to control their electricity use and bill
- They provide choices to customers

In 1961, Professor Bonbright laid out the principles of rate design

I. Economic Efficiency	Static efficiency of the rate classes and rate blocks in discouraging wasteful use of service while promoting all justified types and amounts of use
	Reflection of all of the present and future private and social costs and benefits occasioned by a service's provision (i.e., all internalities and externalities)
	Dynamic efficiency in promoting innovation and responding economically to changing demand and supply patterns
II. Equity	Fairness of the specified rates in the approportionment of total costs of service among the different ratepayers so as to avoid arbitrariness and capriciousness and to attain equity
	Avoidance of undue discrimination in rate relationships so as to be, if possible, compensatory
III. Revenue Stability	Effectiveness in yielding total revenue requirements under the fair-return standard without any socially undesirable expansion of the rate base or socially undesirable level of product quality and safety
	Revenue stability and predictability, with a minimum of unexpected changes that are seriously adverse to utility companies
IV. Bill Stability	Stability and predictability of the rates themselves, with a minimum of unexpected changes that are seriously adverse to utility customers and with a sense of historical continuity
V. Customer Satisfaction	Simplicity, certainty, convenience of payment, economy in collection, understandability, public acceptability, and feasibility of application
	Freedom from controversies as to proper interpretation

In the 21st century, big changes are taking place in consumer psychology and digital technology

Most households use Amazon, Google, smart phones, Netflix and Wi-Fi

Many households have installed video cameras for home security, smart thermostats, and smart appliances

- Some have installed PV panels on the roof and many more are considering doing the same
  - A few drive around in EVs and others are considering getting one
    Some are toying with the idea of putting batteries in the garage

Everyone wants greater control over his or her life, especially the Millennials

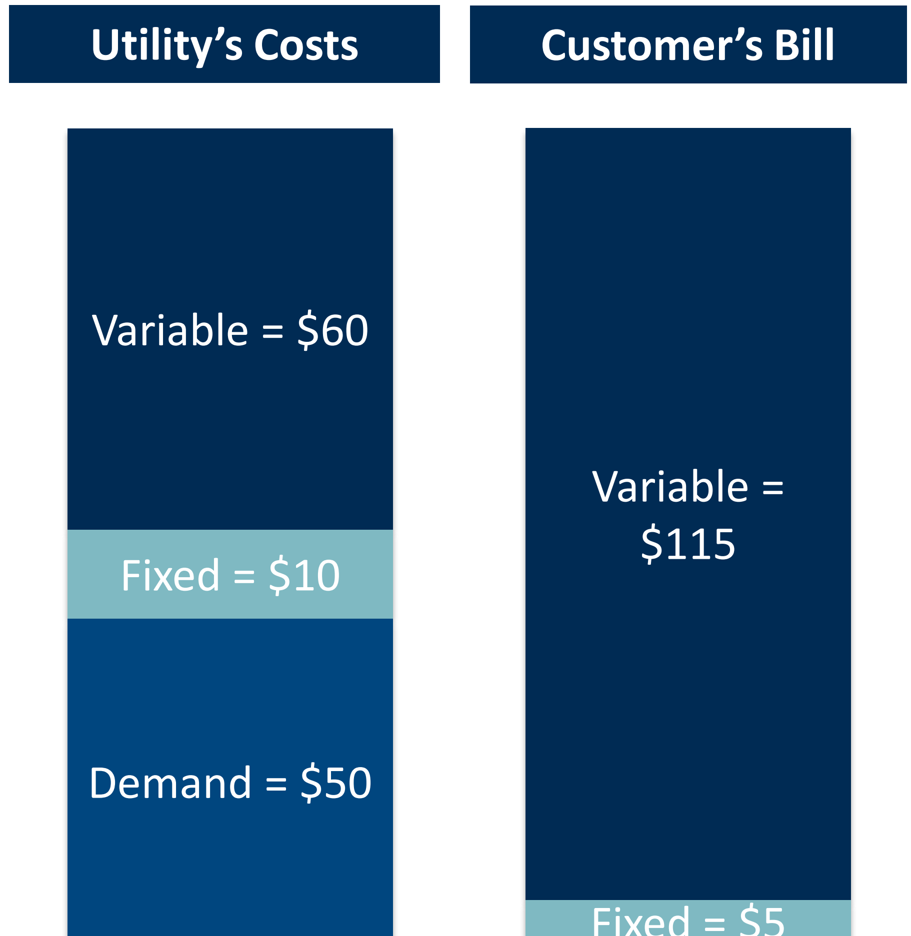
But just about all these people face electricity rates that are “so last century”

Cost Categories

Variable ($/kWh)
- Fuel/gas supply
- Operations & maintenance

Fixed ($/customer)
- Metering & billing
- Overhead

Size-related (demand) ($/kW)
- Transmission capacity
- Distribution capacity
- Generation capacity



Behavioral economics tells us that consumers have diverse preferences

Some want the lowest price

- They are willing to be flexible in the manner in which they use electricity

Some want to lock in a guaranteed bill

- They are willing to pay a premium for peace-of-mind

Many others are in between these two bookends

- Some might want a guaranteed bill but may want to lower it if they would be rewarded for reducing demand at certain times
- Others may wish to subscribe to a given level of demand

All customers want choice but *they only want what they want*

Proposition 2: Rate design involves trade-offs between competing objectives

The Bonbright Principles are predicated on **cost-causation,** and allow the following objectives to be achieved

- Equity/minimization of cross-subsidies
- Reduced long-run costs due to more efficient use of the network
- Efficient siting of distributed energy resources (DERs)

Customer considerations will require that strictly cost-reflective tariff designs be modified

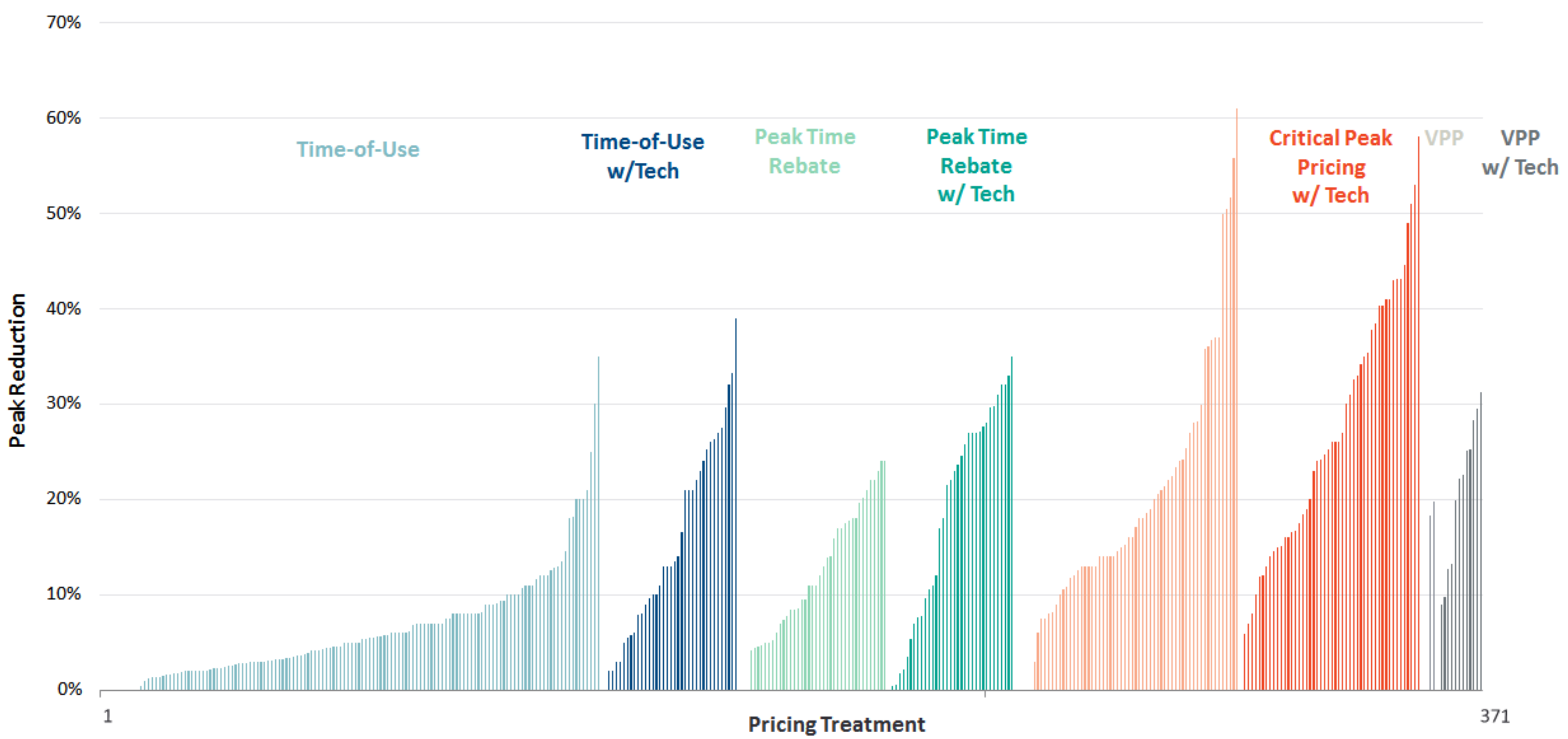
- Simplicity / understandability
- Customer acceptance / appeal / perceived fairness
- Mitigating large bill changes / volatility
- Protecting vulnerable customer segments

Proposition 3: There are several types of rate designs

Rate Design	Definition
Fixed bill	Customers pay a fixed monthly bill accompanied with tools for lowering the bill (such as incentives for lowering peak usage).
Seasonal Rates	The year is divided into different seasons, commonly winter and summer, each of which have distinct rates. Prices are higher in peak seasons to reflect seasonal variation in the cost of supplying energy.
Demand Charges	Customers are charged based on peak electricity consumption, typically over a span of 15, 30, or 60 minutes.
Time-of-Use (TOU)	The day is divided into peak and off-peak time periods. Prices are higher during the peak period hours to reflect the higher cost of supplying energy during that period.
Critical Peak Pricing (CPP)	Customers pay higher prices during critical events when system costs are highest or when the power grid is severely stressed.
Peak Time Rebates (PTR)	Customers are paid for load reductions on critical days, estimated relative to a forecast of what the customer would have otherwise consumed (their “baseline”).
Variable Peak Pricing (VPP)	During alternative peak days, customers pay a rate that varies by day to reflect dynamic variations in the cost of electricity.
Demand Subscription Service (DSS)	Customers subscribe to a kW demand level based on the size of their connected load. If they exceed their subscribed level, they must reduce their demand to restore electrical service.
Transactive Energy (TE)	Customers subscribe to a “baseline” load shape based on their typical usage patterns, and then buy or sell deviations from their baseline.
Real-Time Pricing (RTP)	Customers pay prices that vary by the hour to reflect the actual cost of electricity.

Proposition 4: There is compelling evidence that customers respond to price changes

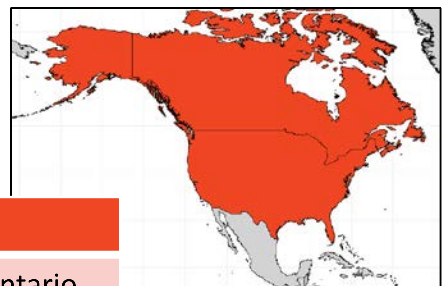
Pilots feature a combination of rate designs (TOU, CPP, PTR, and VPP), which influence the level of peak reduction

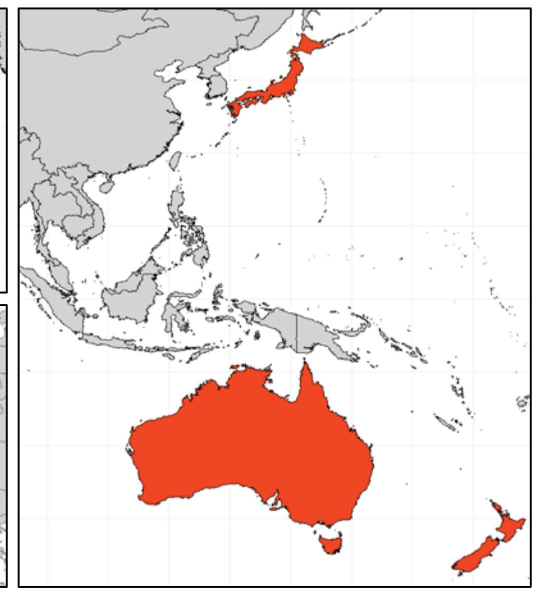


We have created a large database of pricing pilots called *Arcturus* to analyze the results

Arcturus includes the results of 65+ residential pricing pilots

- 370+ experimental pricing treatments
- Over 60 utilities spanning nine countries and four continents
- Data on duration of peak period, number of participating customers, opt-in / opt-out enrollment, season of pilot, and more

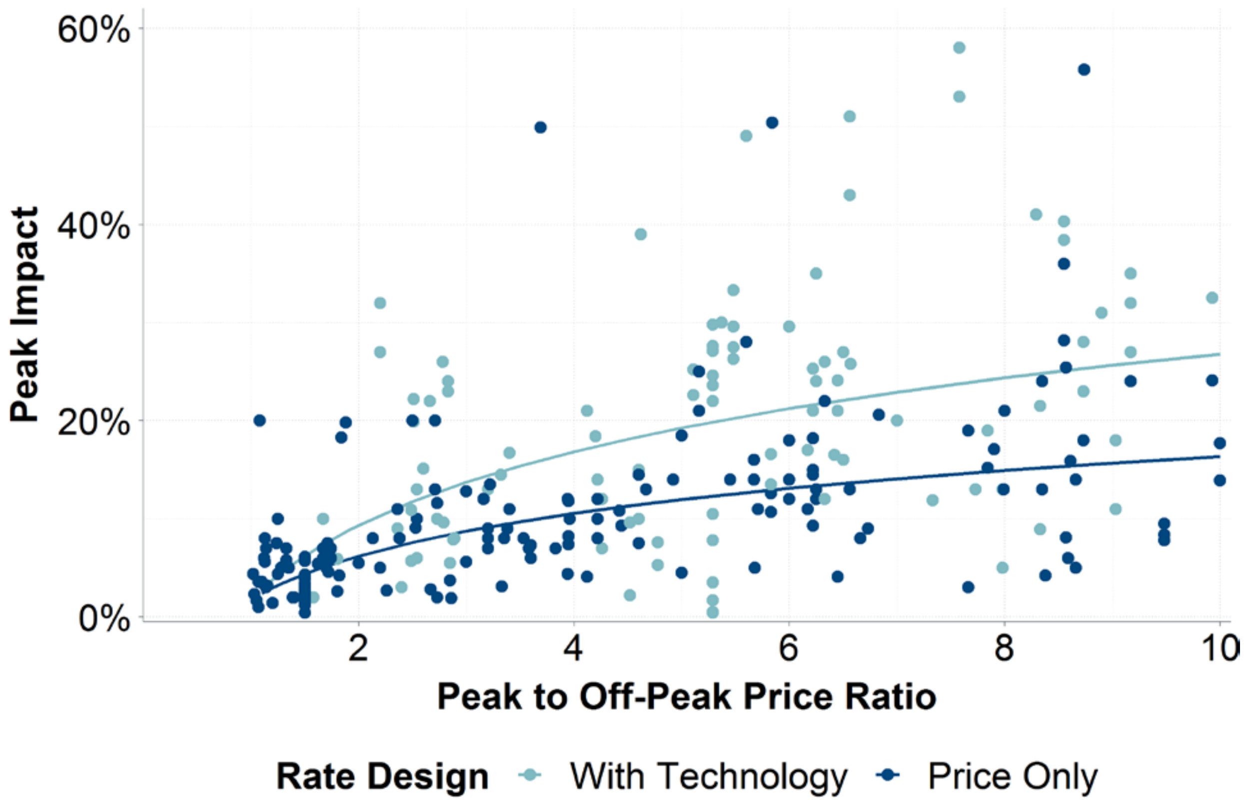




Country	States/Provinces
Canada	British Columbia, Ontario, Quebec
United States	AZ, CA, CO, CT, DC, FL, ID, IL, KS, MA, MD, MI, MO, ND, NJ, NM, NV, OH, OK, OR, PA, VT, TX, WA

Notes: For confidentiality, one Asian utility is not included in the above map.

Through a meta-analysis, we have derived two *Arcs of Price Response*



Proposition 5: Modern rate designs are being offered in several jurisdictions

	Mandatory	Opt-in	Opt-out
Flat bill		Georgia Power, Oklahoma Gas & Electric	
Peak-time rebates			Maryland, California, Illinois
Demand charges		Arizona Public Service, Black Hills, Salt River Project	
Time-of-use (TOU) volumetric rates	Fort Collins (Colorado)	Texas	SMUD (California)
Dynamic volumetric rates (CPP, PTR, and RTP)		Oklahoma, Illinois	California

Proposition 6: Millions of customers have accepted modern tariffs

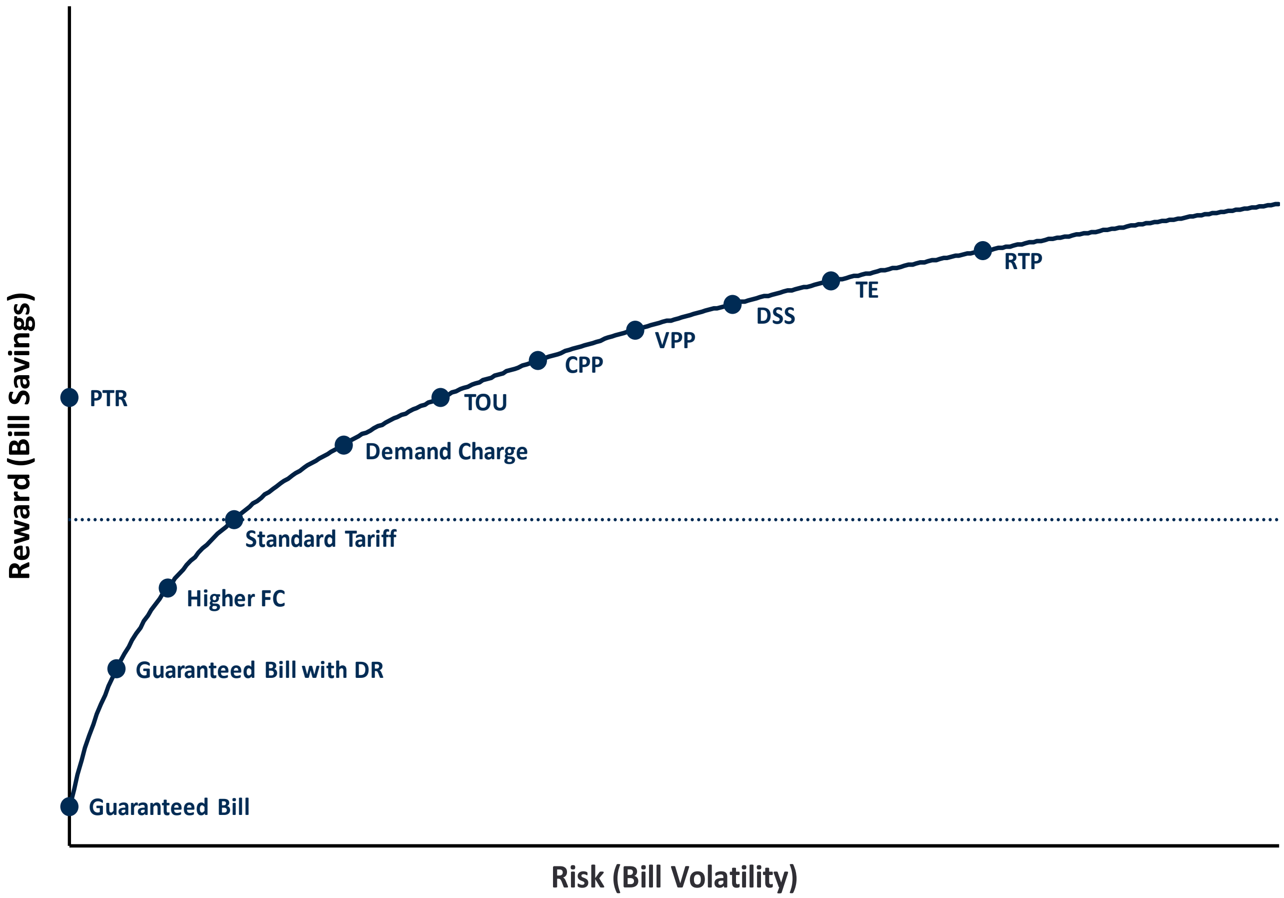
Utility or Location	Type of Rate	Applicability	Participating Customers
Oklahoma Gas & Electric	Variable Peak Pricing (VPP)	Opt-in	20% (130,000)
Maryland (BGE, Pepco, Delmarva)	Dynamic Peak Time Rebate (PTR)	Default	80%
Ontario, Canada	Time-of-Use (TOU)	Default	90% (3.6 million)
Great Britain	Time-of-Use (TOU)	Opt-in	13% (3.5 million)
Hong Kong (CLP Power Limited)	Dynamic Peak Time Rebate (PTR)	Opt-in	27,000
Arizona (APS, SRP)	Time-of-Use (TOU)	Opt-in	57% of APS' residential customers (20% of which are also on a demand charge), 36% of SRP's
California (PG&E, SCE, SDG&E)	Time-of-Use (TOU)	Default (2019)	TBD – 75-90%*
California (SMUD)	Time-of-Use (TOU)	Default	75-90%*
Colorado (Fort Collins)	Time-of-Use (TOU)	Mandatory (for residential)	100%
Illinois (ComEd, Ameren Illinois)	Real Time Pricing (RTP)	Opt-in	50,000
France	Time-of-Use (TOU)	Opt-in	50%
Spain	Real Time Pricing (RTP)	Default	50%
Italy	Time-of-Use (TOU)	Default	75-90%*

*Estimated participation based on historical trends

Proposition 7: Utilities are offering rate design choices to customers

- A Guaranteed bill (GB)
- B GB with discounts for demand response (DR)
- C Increased fixed charge (FC)
- D Standard tariff
- E Demand charge
- F Time-of-Use (TOU)
- G Critical peak pricing (CPP)
- H Peak time rebates (PTR)
- I Variable peak pricing (VPP)
- J Demand subscription service (DSS)
- K Transactive energy (TE)
- L Real-time pricing (RTP)

These rate designs create an efficient pricing frontier which is central to promoting customer choice

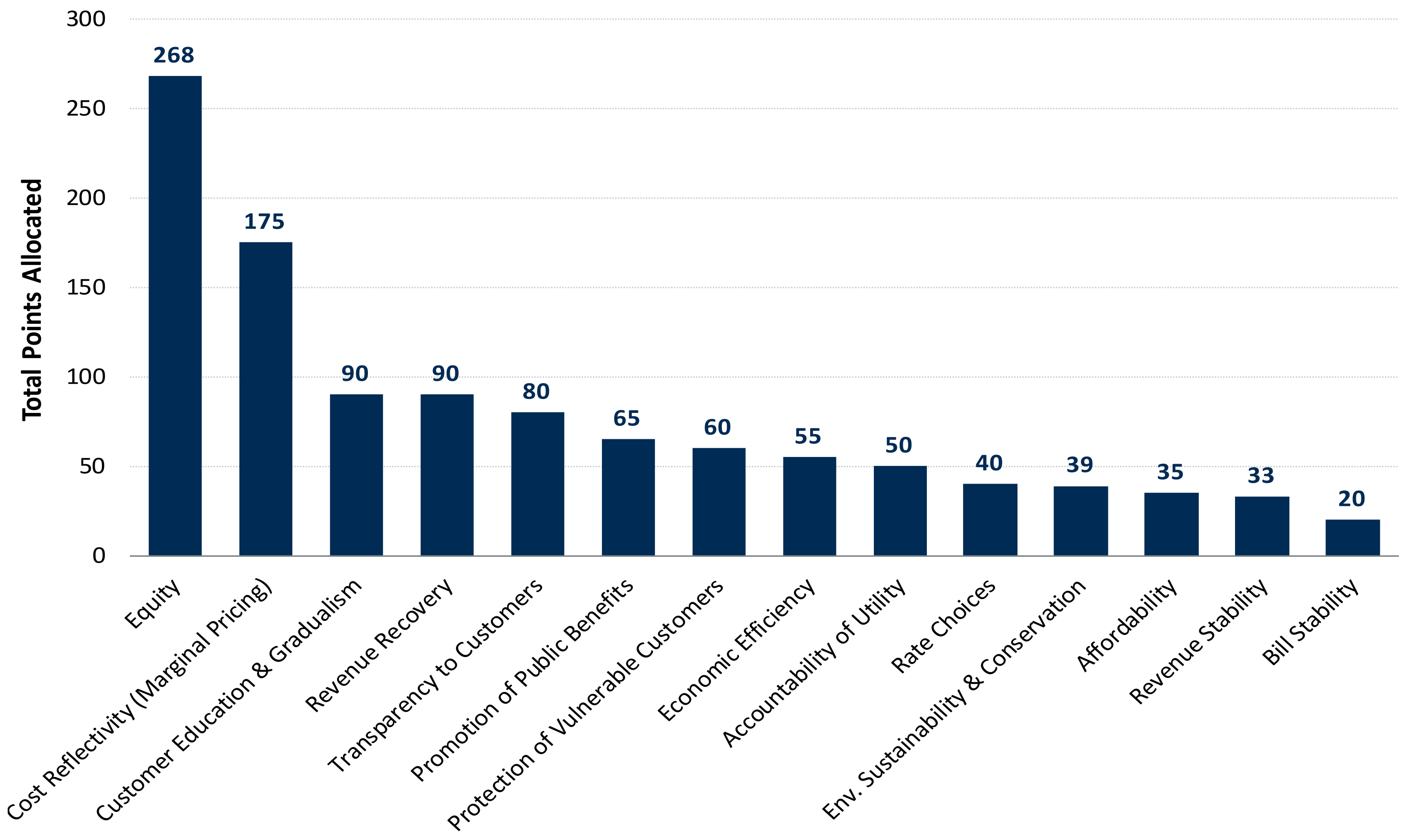


Proposition 8: There are several steps in transitioning to new rates

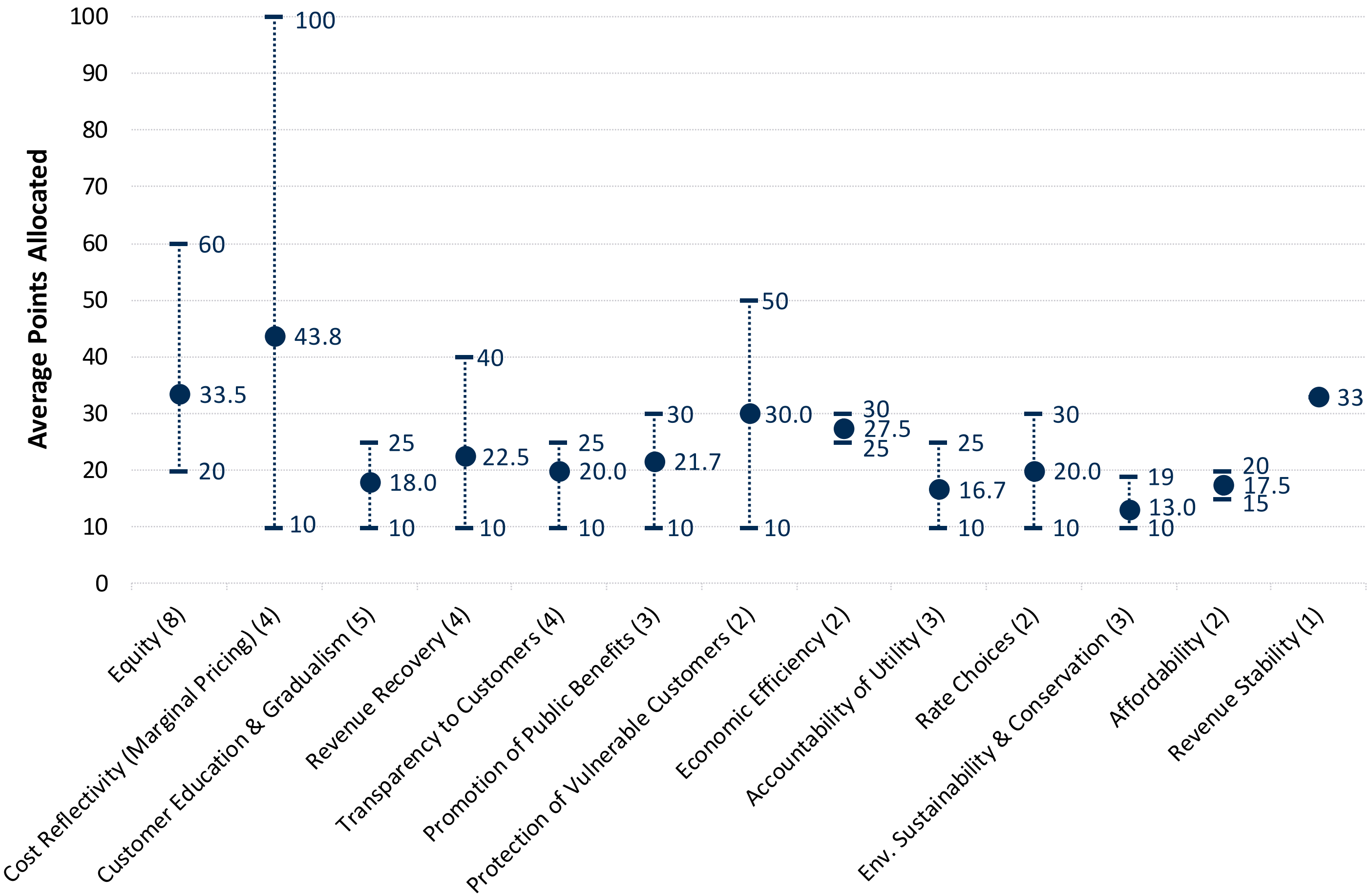
1. Select rate design for deployment
2. Compute bill changes
3. Understand which customers will see adverse bill impact
4. Re-run bill impact analysis with DR
5. Consider remedies to adverse bill impact
6. Conduct focus groups
7. Run a pilot to measure response
8. Determine rollout strategy
9. Track deployment of modern rate design

The Scorecard Exercises

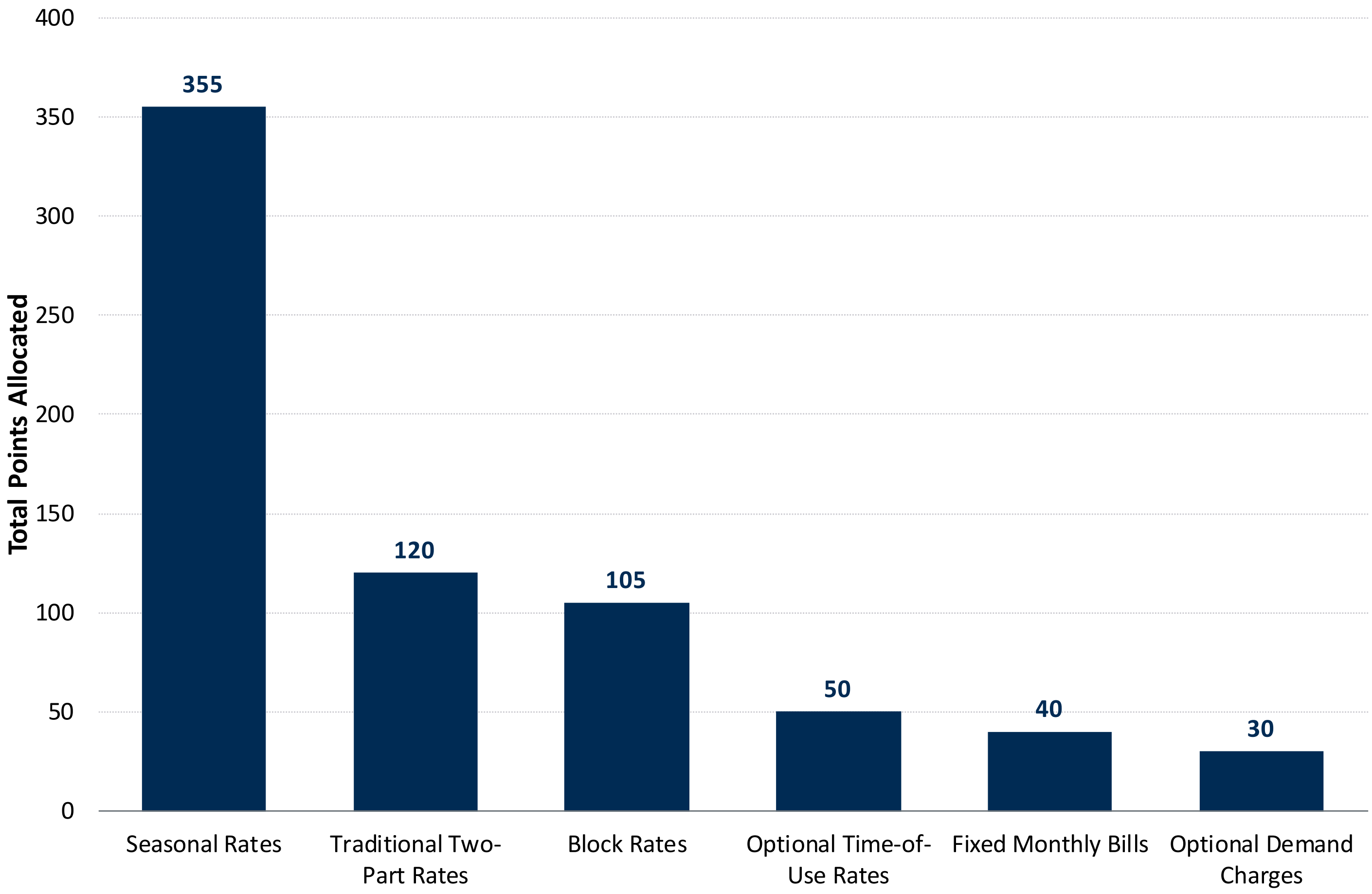
First, we used the scorecard exercise to prioritize rate design objectives



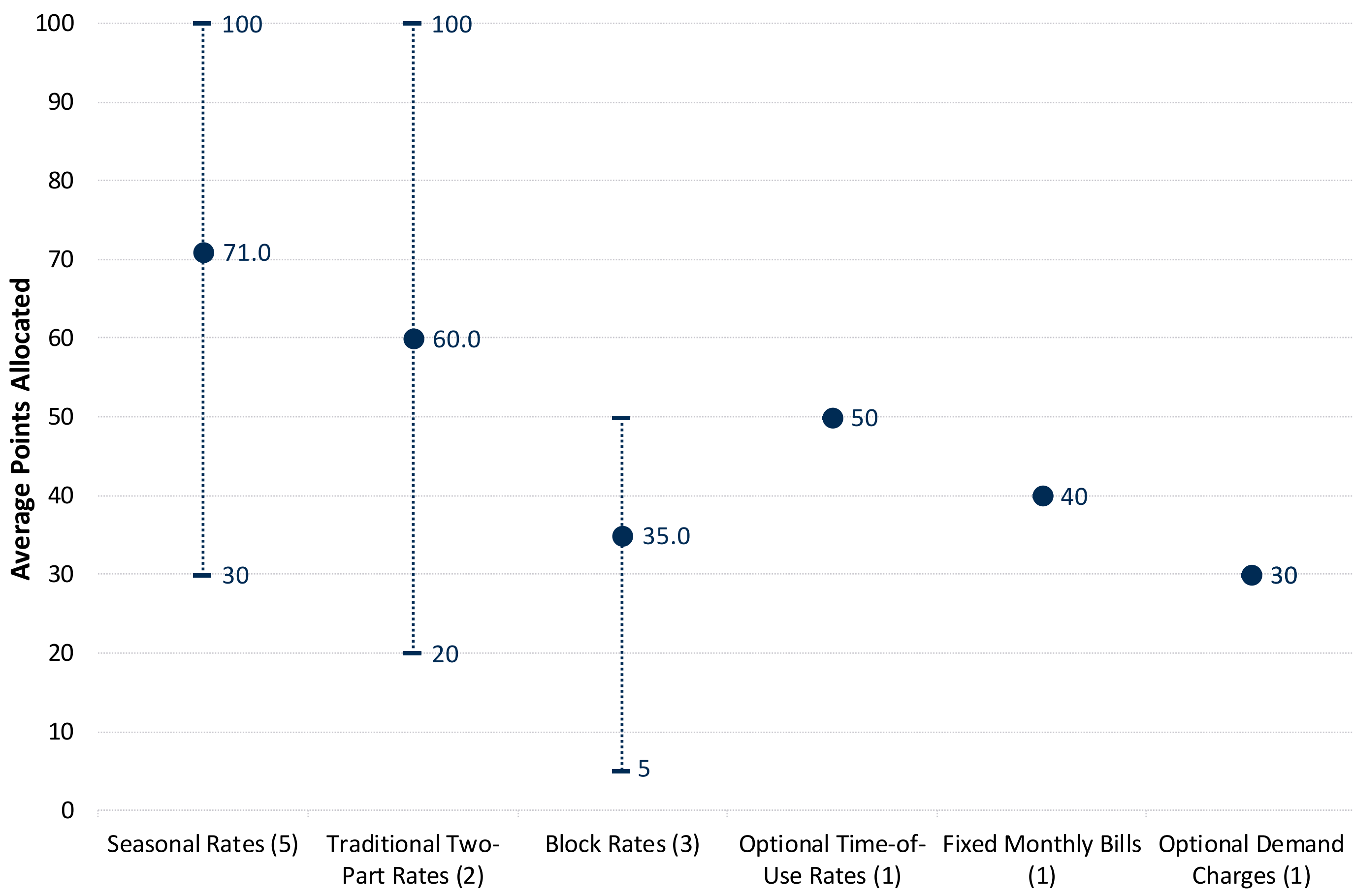
There was considerable dispersion of views among stakeholders across rate design objectives



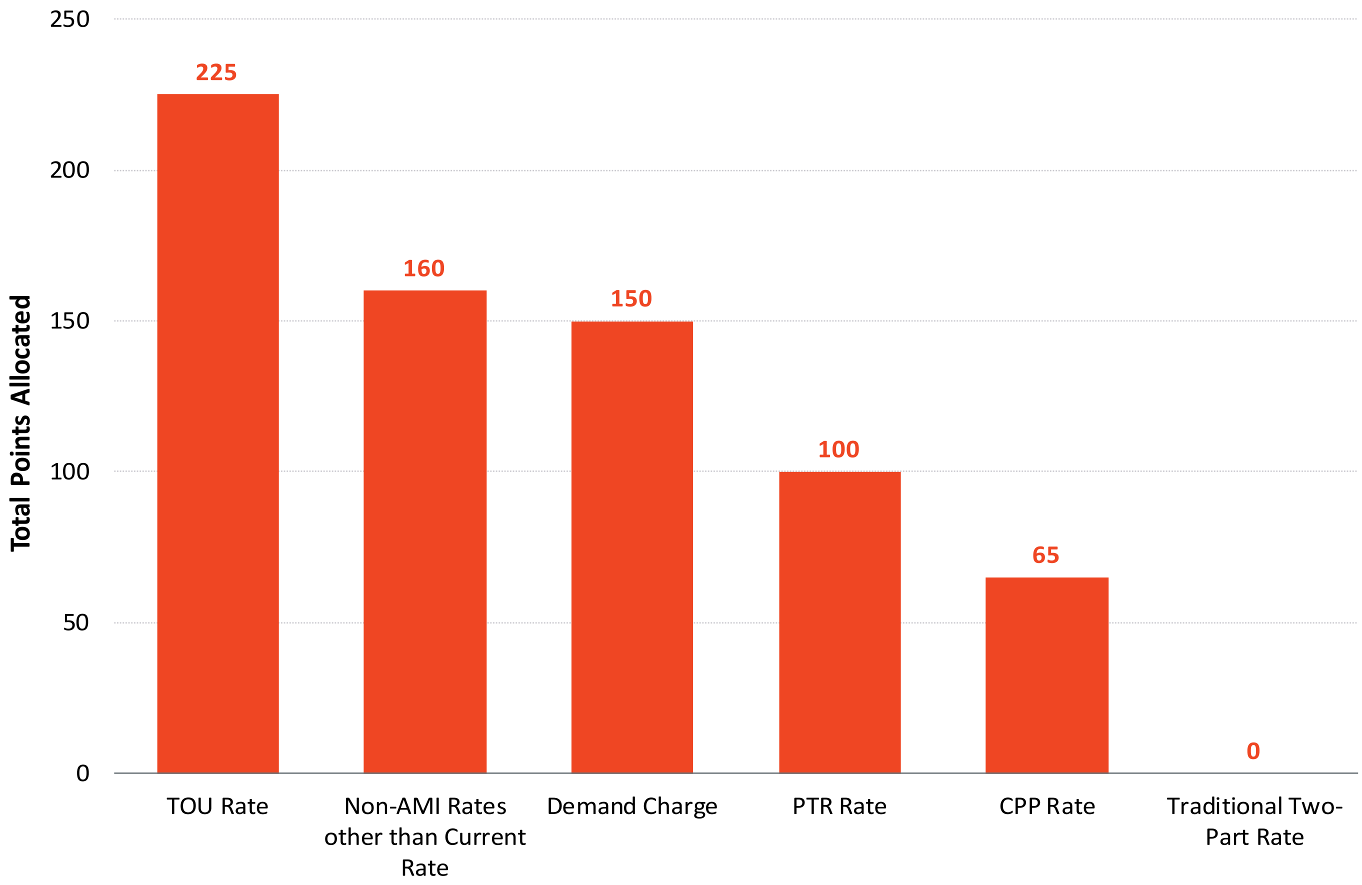
Second, we used the scorecard exercise to prioritize rate designs that could be pursued **without AMI**



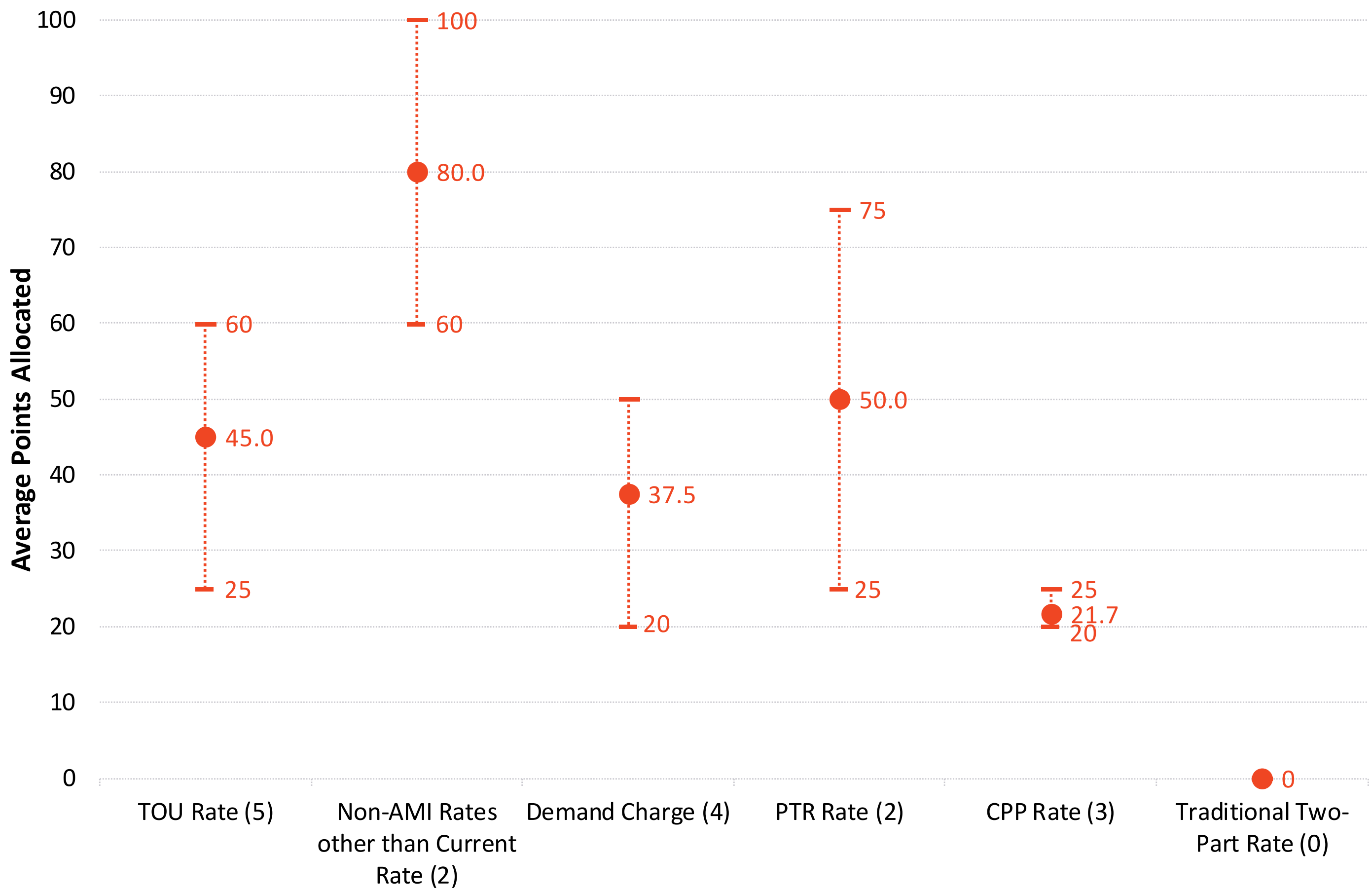
There was dispersion of views across stakeholders on rate designs without AMI



Third, we used the scorecard exercise to prioritize rate designs **with AMI**



There was dispersion of viewpoints across stakeholders on rate designs with AMI



Sequencing of Issues

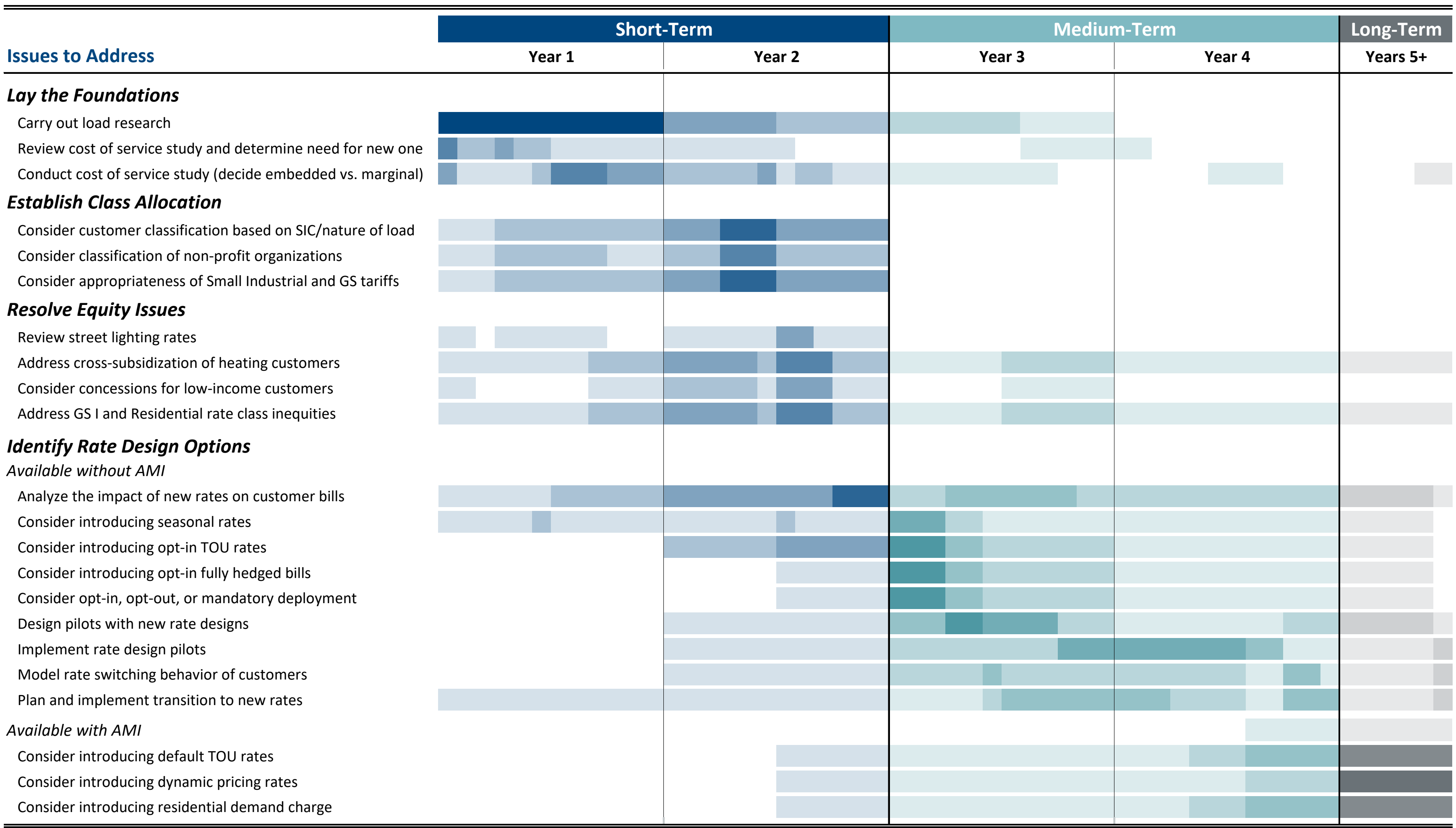
Through the first two workshops, we identified several steps in the rate design process (1/2)

- Carry out load research
- Review and conduct cost of service study
- Consider customer classification based on nature of load
- Consider classification of non-profit organizations
- Consider appropriateness of separate Small Industrial and GS tariffs
- Review street lighting rates
- Address cross-subsidization of heating customers
- Consider concessions for vulnerable customers
- Address GS I and Residential rate class inequities
- Analyze the impact of new rates on customer bills

Through the first two workshops, we identified several steps in the rate design process (2/2)

- Consider introducing seasonal rates
- Consider introducing opt-in TOU rates
- Consider introducing opt-in fully-hedged bills
- Design and implement rate design pilots
- Model rate switching behavior of customers
- Plan and implement transition to new rates
- Consider introducing default TOU rates
- Consider introducing dynamic pricing
- Consider introducing residential demand charge

In the third workshop, stakeholders provided their thoughts on sequencing the issues



There was considerable diversity in views across the stakeholders

Beyond the diversity of opinion on how to sequence the issues, there was disagreement as to when the whole process, or "Year 1," should begin

There was also some disagreement on how many parties need to be involved with each issue

However, there were also some areas of convergence

Everyone agreed that carrying out load research was a short-term priority and thus should come first

Stakeholders also all prioritized establishing cost allocation in the short-term

They generally agreed that an overarching goal should be to analyze and remove cross-subsidies between customers (*i.e.*, restoring equity in rate design)

Prior to making rate design enhancements, there was strong support for completing a marginal cost study for pricing purposes

Conducting a marginal cost study for the first time would be a more intensive process than simply refreshing an embedded cost study, but the process could begin earlier, while load data is still being collected

Some parties argued that a significant amount of data required for the marginal cost of service study has been collected by NB Power for the DSM Integrated Resource Plan, Evaluation, Measurement and Verification efforts and similar endeavors.

Simpler rate designs options should be considered before more complex ones

Non-AMI rate designs can be used to inform the possible development of more innovative or wide-spread rate design reform, particularly with respect to residential customers

Stakeholders tended to view dynamic pricing options and demand charges as longer-term considerations for NB Power and the Board to consider when the necessary AMI infrastructure is in place

Several stakeholders noted that these rates would likely come after NB Power has deployed seasonal and/or TOU rates, and customers are familiar with the notion of time-variation in rates

The stakeholders did not specify a detailed path to modernizing rates

Instead, they recognized that reform of rate design ought to remain flexible enough to respond to how customers accept and respond to the new rate designs

- Thus, the recommendations and suggested sequencings in this report are not intended to be definitive or prescriptive, but to be suggestive

It goes without saying that this report reflects only the views of the stakeholders who attended the workshops and chose to participate in the discussions and exercises

Moving forward, all stakeholders saw value in maintaining transparency and collaboration in the process

Stakeholders agreed that **working groups** would need to be formed to further define several of the more contentious issues, identify data needs, and assess appropriate methodologies for tackling them

- Defining the specific scope of working groups beyond the goal of consensus building would require further discussion and deliberation
- While some stakeholders noted that workshops can significantly reduce the amount of time spent in hearings, working groups would also be subject to scheduling and resource constraints
    - As a result, the working group process should likely be restricted to the most pressing and consequential issues
    - For instance, it could focus on the review of existing load research and cost of service studies and identifying the need for new ones

Other issues, especially those relating to rate design, might get resolved directly by NB Power and the Board

Ultimately, the final decision on what happens next rests with the Board

The Board has the prerogative to decide which of the issues identified through the project to pursue, as well as when and how to pursue them

- It may also want to seek input from other jurisdictions that have gone down the same path
- It goes without saying that the right to preserve the status quo resides with the Board

Appendix A

A Pocket History of Rate Design

Rate design developments
(1882 - 1961)

Year	Author	Contribution
1882	Thomas Edison	Electric light was priced to match the competitive price from gas light and not based on the cost of generating electricity
1892	John Hopkinson	Suggested a two–part tariff with the first part based on usage and the second part based on connected kW demand
1894	Arthur Wright	Modified Hopkinson's proposal so that the second part would be based on actual maximum demand
1897	Williams S. Barstow	Proposed time-of-day pricing at the 1898 meeting of the AEIC, where his ideas were rejected in favor of the Wright system
1946	Ronald Coase	Proposed a two-part tariff, where the first part was designed to recover fixed costs and the second part was designed to recover fuel and other costs that vary with the amount of kWh sold
1951	Hendrik S. Houthakker	Argued that implementing a two-period TOU rate is better than a maximum demand tariff because the latter ignores the demand that is coincident with system peak
1961	James C. Bonbright	Published his canon, Principles of Public Utility Rates, that laid out the criteria for creating efficient and equitable rate designs

Rate design developments
(1971 - 2005)

Year	Author	Contribution
1971	William Vickrey	Proffered the concept of real-time-pricing (RTP) in Responsive Pricing of Public Utility Services
1976	California Legislature	Added a baseline law to the Public Utilities Code in the Warren-Miller Energy Lifeline Act, creating a two-tiered inclining rate
1978	U.S. Congress	Passed the Public Utility Regulatory Act (PURPA), which called on all states to assess the cost-effectiveness of TOU rates
1981	Fred Schweppe	Described a technology-enabled RTP future in Homeostatic Control
2001	California Legislature	Introduced AB 1X, which created the five-tier inclining block rate where the heights of the tiers bore no relationship to costs. By freezing the first two tiers, it ensured that the upper tiers would spiral out of control
2001	California PUC	Began rapid deployment of California Alternative Rates for Energy (CARE) to assist low-income customers during the energy crisis Began to study the role of price-responsive demand and advanced meters in linking retail and wholesale markets to prevent future crises
2005	U.S. Congress	Passed the Energy Policy Act of 2005, which requires all electric utilities to offer net metering upon request

Appendix B

International Developments in Rate Design

Utilities across the globe are also experimenting with multiple pricing options

Since 2014, Spain has offered real-time pricing as the regulated default rate for residential customers, with approximately 40% of customers currently enrolled

In Italy, TOU rates have been mandatory since 2010 for all low-voltage residential customers

- A 1.5 year transitional phase included limited variation between the peak and off-peak prices, before expanding to a larger price difference for the final tariff

In the United Kingdom, Green Energy UK offers a time-varying TIDE tariff, while in 2018 Octopus Energy tested the first half-hourly TOU tariff and found that customers shifted usage out of peak periods by 28%

References:

REE, Voluntary price for the smaller consumer, https://www.ree.es/en/activities/operation-of-the-electricity-systemvoluntary-price-small-consumer-pvpc

Maggiore et. al., Evaluation of the effects of a tariff change on the Italian residential customers subject to a mandatory time-of-use tariff, https://www.eceee.org/library/conference_proceedings/eceee_Summer_Studies/2013/7-monitoring-and-evaluation/evaluation-of-the-effects-of-a-tariff-change-on-the-italian-residential-customers-subject-to-a-mandatory-time-of-use-tariff/

Octopus Energy, Agile Octopus: paving the way to a low carbon future, https://octopus.energy/static/consumer/documents/agile-report.pdf

Green Energy UK, A new and better way to control home energy bills, https://www.greenenergyuk.com/PressRelease.aspx?PRESS_RELEASE_ID=76

British Columbia, Canada
Time-of-Use Pilots

BC Hydro, which serves approximately 95% of British Columbia's 4.63 million residents, conducted a pilot from 2006-2008 testing TOU and TOU/CPP rates for approximately 2,000 opt-in customers

- BC Hydro's residential energy charge currently includes an inclining block structure, but at the time was simply a flat rate
- To avoid adverse selection, BC Hydro randomly assigned participants into either a control group, or a treatment group facing five different TOU rate schedules
  - The control group were billed on the regular residential rate, as was the treatment group during summer months. In winter, the TOU rates had peak/off-peak price ratios of 3-6, while the CPP/TOU rate had a peak/off-peak ratio of 7.9 for CPP and 3 for TOU
- At the time, BC Hydro staff found that over the pilot's first winter, the treatment group's peak kWh was 9.6% less than the control group's peak kWh, and that the availability of an in-home display (IHD) did not have a discernible effect
  - However, a more recent regression analysis based on the pilot's second winter of operation estimated that IHD would approximately double TOU reductions of 2.2%-4.4% without IHD, and critical peak reductions of 4.8%-5.3% without IHD

References:

Woo, C.K., J. Zarnikau, A. Shiu, R. Li, "Winter Residential Optional Dynamic Pricing: British Columbia, Canada", *The Energy Journal* 38:5 (2017)

Ontario, Canada
Time-of-Use Rates (1/2)

The Ontario Energy Board mandated the installation of smart meters for all customers to promote a culture of conservation. The C$ 2 billion rollout of 4.7 million smart meters was complete by 2014

Alongside smart meters, Ontario introduced default TOU rates in 2011-12 for residential and small commercial customers

- Some 90% of Ontario's 4 million residential customers have been buying their energy through a regulated supply option, which features a three-period TOU rate
- The TOU rates only apply to the energy portion of the customer's bill
- Off-peak, mid-peak, and on-peak prices are defined by season
- A small number of customers without smart meters are on Tiered Pricing rates with seasonally differentiated tiers and prices
- Large commercial and industrial customers pay wholesale prices

References:
Ontario Energy Board, Electricity Rates, https://www.oeb.ca/rates-and-your-bill/electricity-rates

Ontario, Canada
Time-of-Use Rates (2/2)

A Brattle analysis of the TOU rates from their inception in 2009 through 2014 found that for the province as a whole, TOU reduced usage during the summer peak by 3.3% in the pre-2012 period, 2.3% in 2012, 2.0% in 2013 and 1.2% in 2014

- Local distribution companies (LDCs) gradually adopted TOU rates beginning in 2009, and were all on TOU by 2012
- Load shifting impacts were lower in winter, which similar to the summer impacts decreased over successive years of the study
  - The peak/off-peak price ratio for all of LDCs throughout the analysis period was approximately 1.5
- No evidence of electricity conservation was observed

References:

Lessem, N., A. Faruqui, S. Sergici, and D. Mountain, "The Impact of Time-of-Use Rates in Ontario," *Public Utilities Fortnightly* (Feb. 2017)

Quebec, Canada
Dynamic Pricing (1/2)

From December 2008 to March 2010, Hydro-Québec (HQ) conducted a "Time it Right" pilot with 2,200 households in four cities

– The pilot tested two rate designs, Réso (TOU) and Réso+ (TOU/CPP), summarized below

	Réso				Réso+			
	Winter		Summer		Winter		Summer	
(CAD c/kWh)	Peak	Off-Peak	Peak	Off-Peak	Peak	Off-Peak	Peak	Off-Peak
First 15 kWh per day	6.57	4.34	6.15	4.65	6.15	3.60	6.15	4.65
Additional kWh	8.63	6.40	8.19	6.69	8.19	5.63	8.19	6.69
Critical peak usage	-	-	-	-	18.19	-	-	-

Notes: Winter is defined as December through March, and summer as April through November. Peak hours are from 6 AM – 10 PM under Réso, and 7-11 AM and 5-9 PM under Réso +. The default fixed charge of 40.46 c/day applied under both experimental rates.

- Under Réso, usage reductions in the peak period were not statistically significant
- Under Réso+, 28 critical days were called, with a statistically significant average reduction of approximately 6% (0.27 kW) in critical peak events over the two winters

– ~88% of participants stayed on the experimental rates through the end of the pilot

References:

Hydro-Quebec, Rapport final du Projet Tarifaire Heure Juste, http://www.regie-energie.qc.ca/audiences/3740-10/Demande3740-10/B-1_HQD-12Doc6_3740_02aout10.pdf

Quebec, Canada
Dynamic Pricing (2/2)

In April 2019, Hydro-Québec began gradually rolling out opt-in residential PTR and CPP rate offerings for a limited number of customers

- Randomly selected customers were invited to sign up for one of the two dynamic pricing rates, with sign ups reaching the maximum limit for winter 2019-2020
- The *Winter Credit Option* offers a 50 c/kWh peak time rebate for reducing electricity during winter peak demand events
  - The fixed charge and two-tiered variable charge for all other hours are the same as under the default residential rate, which charges 4.28 c/kWh for energy consumed up to 40 kWh a day, and 7.36 c/kWh for all other usage
- The *Rate Flex D* rate charges a higher rate of 50 c/kWh for energy consumed during winter peak demand events
  - In summer, the fixed charge and two-tiered variable charge for all other hours are the same as under the default residential rate, while in winter, the variable charge includes savings of 22%-30% depending on the tier
- There may be 25-33 events per winter, at most, for a maximum of 100 hours in all

References:

Hydro-Québec, Dynamic pricing, http://www.hydroquebec.com/residential/customer-space/rates/dynamic-pricing.html

Hydro-Québec, Electricity Rates effective April 1, 2019, http://www.hydroquebec.com/data/documents-donnees/pdf/electricity-rates.pdf

Australia
Time-of-Use Rates

SA Power Networks (SAPN), which serves around 1.7 million customers in South Australia, has recently proposed offering default TOU rates for residential customers with interval meters starting in July 2020

- Around 20% of residential and small business customers currently have interval meters, with that number expected to grow to 50% by 2025
- These rates will include a "solar sponge" component with a super off-peak period of 10 AM – 3 PM when solar exports are high, an off-peak period of 1-6 AM, and a peak period consisting of all other hours
  - In the super off-peak period of 10 AM – 3 PM, the "solar sponge" rate is 25% of the standard rate offered to customers without interval meters, versus prices that are 50% of the standard rate in the off-peak period and 125% in all other hours
- This is designed to respond to a change in the residential daily profile caused by an increase in solar PV adoption, which has caused a pattern of load peaks and troughs and shifted peak demand
  - Over 30% of customers have now installed solar on their rooftops

References:

SAPN, Attachment 17, Tariff Structure Statement Part B – Explanatory Statement, December 2019, https://www.aer.gov.au/system/files/SAPN%20-%20Revised%20Proposal%20-%20Attachment%2017%20-%20Tariff%20Structure%20Statement%20Part%20B%20-%20Explanatory%20Statement%20-%20December%202019_0.pdf

Australia

Three-Part TOU Rates

SAPN is also proposing to offer an optional, three-part "Prosumer" tariff for customers with interval meters

- The monthly demand charge is estimated using average demand over a four-hour period from 5-9 PM for November through March
- The TOU usage rates under the Prosumer tariff will be halved relative to those under the default time-varying rate
- This rate structure accommodates customers who want to discharge energy storage systems during peak periods
- SAPN analysis finds that the standard deviation in customer outcomes (i.e., bill impact) is significantly larger under the Prosumer tariff than with TOU

References:

SAPN, Attachment 17, Tariff Structure Statement Part B – Explanatory Statement, December 2019, https://www.aer.gov.au/system/files/SAPN%20-%20Revised%20Proposal%20-%20Attachment%2017%20-%20Tariff%20Structure%20Statement%20Part%20B%20-%20Explanatory%20Statement%20-%20December%202019_0.pdf

New Zealand

Peak Time Rebate Programs

Vector, the distribution utility that serves Auckland, the most populous city in New Zealand, conducted a PTR pilot program from June – August 2019 with 630 customers

- At the time, Vector served most residential customers on a two-part rate with a flat volumetric charge
- The peak time rebate was applied only to the distribution rate, with a peak to off-peak ratio of 5.4:1
- There were 7 event days with both a morning peak period (7-11 AM) and evening peak period (5-9 PM)
    - Event days were triggered by Vector staff when minimum peak temperature was expected to drop below 9 degrees
- The pilot was carried out jointly with a retailer, Mercury

References:

Confidential The Brattle Group analysis of Vector's winter 2019 pilot

New Zealand
Time-of-Use Rates

In April 2020, Vector Limited expects to restructure its flat distribution charge as a TOU charge for Residential and General Consumer customers

- The TOU rates have a peak period of 7-11 AM and 5-9 PM weekdays, and a peak/off-peak ratio of approximately 2.5:1 for Low User customers and 5:1 for Standard customers
  - The Low User tariff represents a low fixed-charge option to assist low-use customers
- It will be up to the retailers whether to pass through these time-of-use delivery charges to retail customers or to bundle them into some other types of charges.

References and Notes:

Vector Limited, Electricity prices effective from 1 April 2020, https://www.vector.co.nz/personal/electricity/pricing/electricity-prices-2020

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Ahmad Faruqui is an internationally recognized authority on the design, evaluation and benchmarking of tariffs. He has analyzed the efficacy of tariffs featuring fixed charges, demand charges, time-varying rates, inclining block structures, and guaranteed bills. He has also designed experiments to model the impact of these tariffs and organized focus groups to study customer acceptance. Besides tariffs, his areas of expertise include demand response, energy efficiency, distributed energy resources, advanced metering infrastructure, plug-in electric vehicles, energy storage, inter-fuel substitution, combined heat and power, microgrids, and demand forecasting. He has worked for nearly 150 clients on 5 continents, including electric and gas utilities, state and federal commissions, governments, independent system operators, trade associations, research institutes, and manufacturers.

Ahmad has testified or appeared before commissions in Alberta (Canada), Arizona, Arkansas, California, Colorado, Connecticut, Delaware, the District of Columbia, FERC, Illinois, Indiana, Kansas, Maryland, Minnesota, Nevada, Ohio, Oklahoma, Ontario (Canada), Pennsylvania, Saudi Arabia, and Texas. He has presented to governments in Australia, Egypt, Ireland, the Philippines, Thailand, New Zealand and the United Kingdom and given seminars on all 6 continents. He has also given lectures at Carnegie Mellon University, Harvard, Northwestern, Stanford, University of California at Berkeley, and University of California at Davis and taught economics at San Jose State, the University of California at Davis, and the University of Karachi.

His research been cited in Business Week, The Economist, Forbes, National Geographic, The New York Times, San Francisco Chronicle, San Jose Mercury News, Wall Street Journal and USA Today. He has appeared on Fox Business News, National Public Radio and Voice of America. He is the author, co-author or editor of 4 books and more than 150 articles, papers and reports on energy matters. He has published in peer-reviewed journals such as Energy Economics, Energy Journal, Energy Efficiency, Energy Policy, Journal of Regulatory Economics and Utilities Policy and trade journals such as The Electricity Journal and the Public Utilities Fortnightly. He is a member of the editorial board of The Electricity Journal. He holds BA and MA degrees from the University of Karachi, both with the highest honors, and an MA in agricultural economics and a PhD in economics from The University of California at Davis, where he was a research fellow.

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