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March 30, 2021

## **MEMORANDUM**

**TO: Power Committee**

**FROM: Ben Kujala**

**SUBJECT: Early Look at the Bonneville Portfolio Scenario**

### **BACKGROUND:**

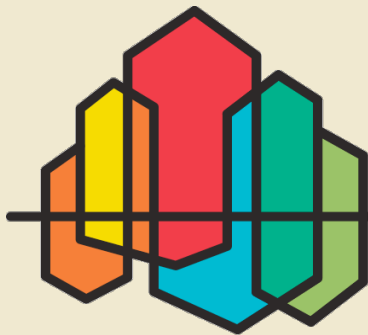
Presenter: Ben Kujala

Summary: This presentation will be a chance to review the setup and inputs for the Bonneville Portfolio analysis and to look at some early high-level results from the analysis.

Analysis on this scenario is ongoing and under active discussion with Bonneville analysts. A draft presentation will be sent to the committee directly to allow for further vetting and refinement ahead of the committee meeting.

Workplan: A.6.1 Complete scenario analysis for the plan

# Early Look at the Bonneville Portfolio Scenario



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**THE 2021  
NORTHWEST  
POWER PLAN**

FOR A SECURE & AFFORDABLE  
ENERGY FUTURE

# Analyze the Bonneville Portfolio



- What Resources are Required to Meet or Reduce the Administrator's Obligation?
- Portfolio costs are one factor of many that the Council will consider and balance as it formulates recommendations on amounts of power to acquire to the Bonneville Administrator
- Much of the information needed for this analysis we expect to be supplied under the existing December 2017 agreement on 4(c)(9) information sharing with Bonneville



# What Resources are Required to Meet the Administrator's Obligation?

The Power Act states the plan is to include a “forecast of power resources estimated by the Council to be required to meet the [Bonneville] Administrator’s obligations and the portion of such obligations the Council determines can be met by resources in each of the priority categories.” This forecast “shall include the approximate amounts of power the Council recommends should be acquired by the [Bonneville] Administrator on a long-term basis and may include, to the extent practicable, an estimate of the types of resources from which such power should be acquired.”



# Limitations of Portfolio Analysis

Portfolio costs are one factor of many that the Council will consider and balance as it formulates recommendations on amounts of power to acquire to the Bonneville Administrator. This scenario - and scenario and portfolio analysis in general - provides information for but does not determine the Council's ultimate recommendations. Staff also recommends this scenario be considered comprehensively with the other scenarios and baseline analysis, not in isolation, before formulating any recommendations to be included in the plan.



# Coordination with Bonneville

- Much of the information needed for this analysis we expect to be supplied under the existing December 2017 agreement on 4(c)(9) information sharing with Bonneville
- Coordination with Bonneville will be critical to both sufficiently define the parameters of the analysis and understand and vet scenario outputs

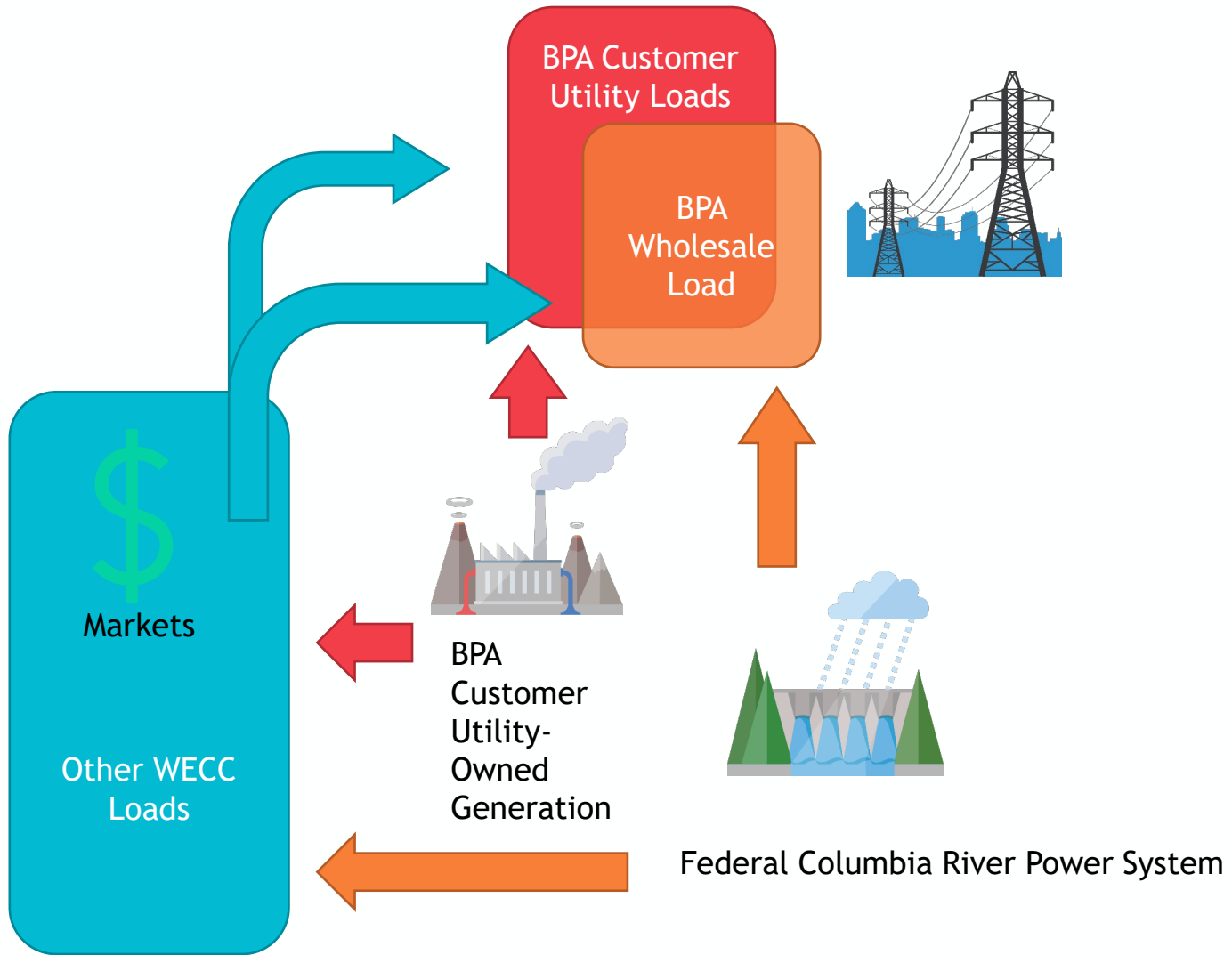


# Elements Needed to Analyze the Bonneville Portfolio

## Bonneville-specific:

- load forecast based on expected obligation (BPA wholesale load)
- generating resource potential and cost
- EE Supply Curves
- DR Supply Curves - assuming Bonneville can arrange a contract for any DR potential in a customer utility that would be dispatched for Bonneville needs
- load to market price correlation
- market reliance limits
- existing resource parameters – aggregate for RPM
- ASCC assumptions using federal GENESYS
- existing system revenue requirement - what is the current Bonneville portfolio revenue requirement?
- debt balance and payments
- transmission to market - beyond adequacy what is the maximum transmission that should be used for marketing opportunities







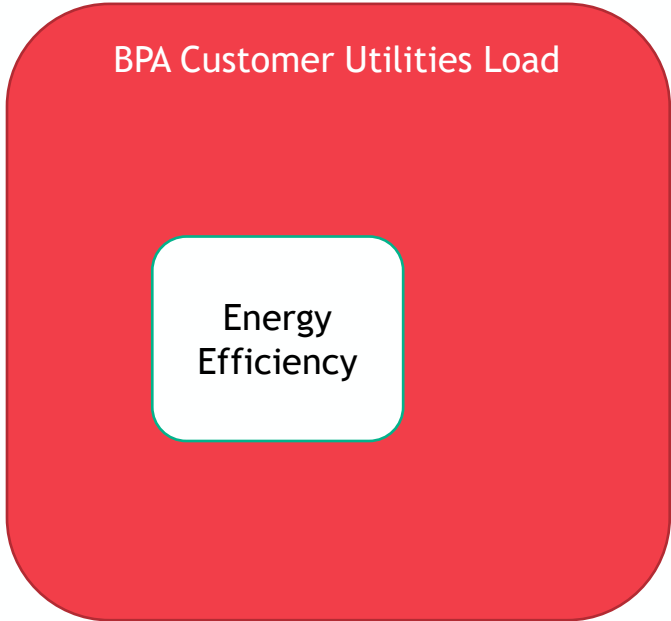
# Discount Rate for BPA Scenarios

- All future costs are discounted at the same rate when comparing resource portfolios
- For the Region we recommended 3.75% discount rate
- For the BPA Scenarios we use 2.84% discount rate
  - Excludes IOU finance costs from mix



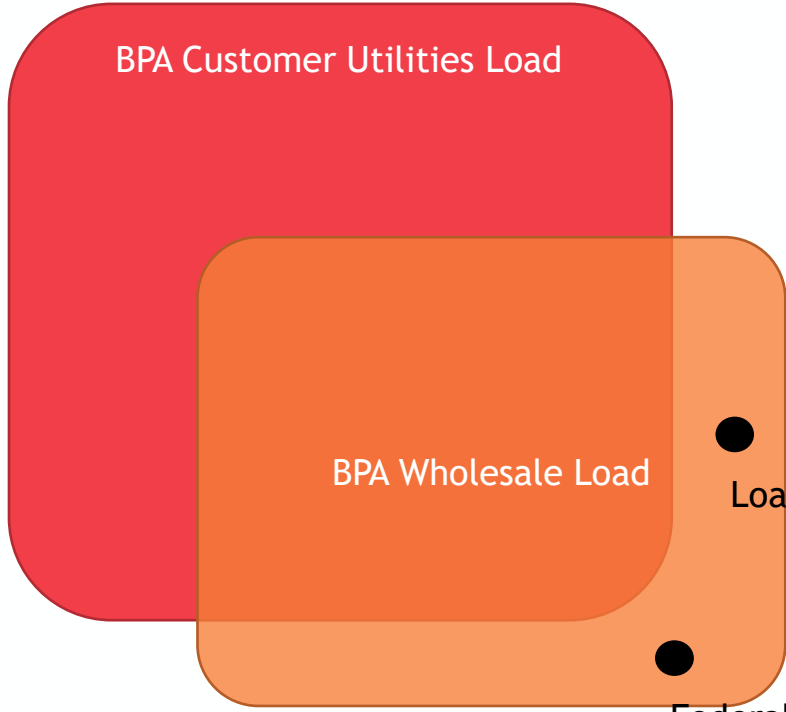
The background features a series of overlapping, semi-transparent geometric shapes. On the left, a teal shape is partially overlapped by a light green shape. To the right, a light blue shape is overlapped by a larger light green shape. The shapes are separated by thin white lines, creating a layered, architectural effect.

# EE in the BPA Portfolio



The impact of EE on BPA wholesale load is based on the BPA customer utilities acquisition.

Our estimate of the potential EE that impacts the BPA wholesale load is based on all the load served by the BPA customer utilities.



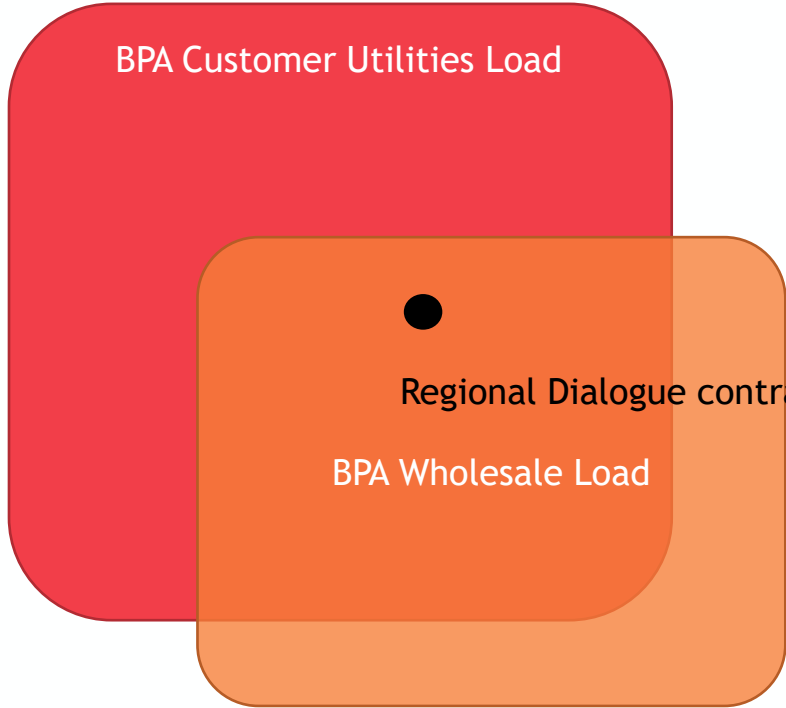
BPA Customer Utilities Load

BPA Wholesale Load

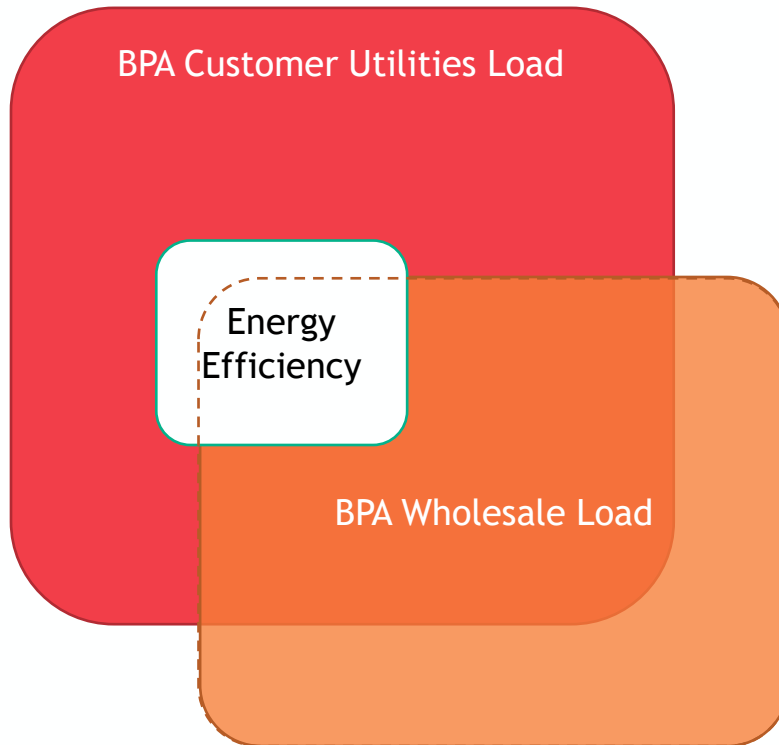
Federal Agency Load

BPA has some surplus contracts and obligations like the Treaty that are not impacted by EE achievement

● Load to meet treaty obligations



But much of BPA's load is impacted by the BPA customer utilities EE achievement.



Energy efficiency achieved by the customer utilities both reduces the wholesale load for BPA and reduces the need for BPA customer utility-owned generation or BPA customer utility market purchases.

We must estimate the proportion of EE achievement that reduces the BPA wholesale load to forecast the amount of power BPA will need.

# When EE is acquired by BPA...

It either...

- Reduces the load BPA is contractually obligated to serve through its Regional Dialogue contracts

Or...

- Reduces load BPA customer utilities serve through means other than taking contractual power from BPA



# Tiered-Rates Methodology Impacts EE allocation

What proportion of EE impacts BPA's obligation under its Regional Dialogue contracts?

We use the BPA Tiered-Rates Methodology billing determinant workbook from the BP-22 Initial Proposal (TRMbd Workbook) to build an estimate





# EE changes Total Retail Load

In the TRMbd Workbook:

- Bonneville assumes 60 aMW of EE is consistent with their customer utilities Total Retail Load (TRL) forecasts
- Incremental EE above or below 60 aMW is allocated based on BPA increasing Energy Efficiency Incentive (EEI) funding
- Incremental EE is funded 92.74% to BPA customer utilities and 7.26% to federal agencies who have load served by BPA, and achieved proportional to funding



# Federal agency load obligation

What happens when BPA reduces the obligation to serve federal agency load?

BPA customer utilities get an increase in their Rate-Period High-Water Mark (RHWM) which increases the electricity they can purchase at Tier-1 rates.

If a customer is below their current RHWM:

- The customer load served by BPA does not change (all other things held static)

If they are above RHWM:

- The customer load served by BPA at tier-1 rates increases to the new RHWM limit



# Approximating the federal agency EE impacts

Federal agency EE is not directly addressed in the TRMbd Workbook, so to approximate the impact we worked with BPA to estimate around half the incremental savings turns into incremental reduction or increase in BPA's load obligation.



# EEI-funded vs Self-funded EE

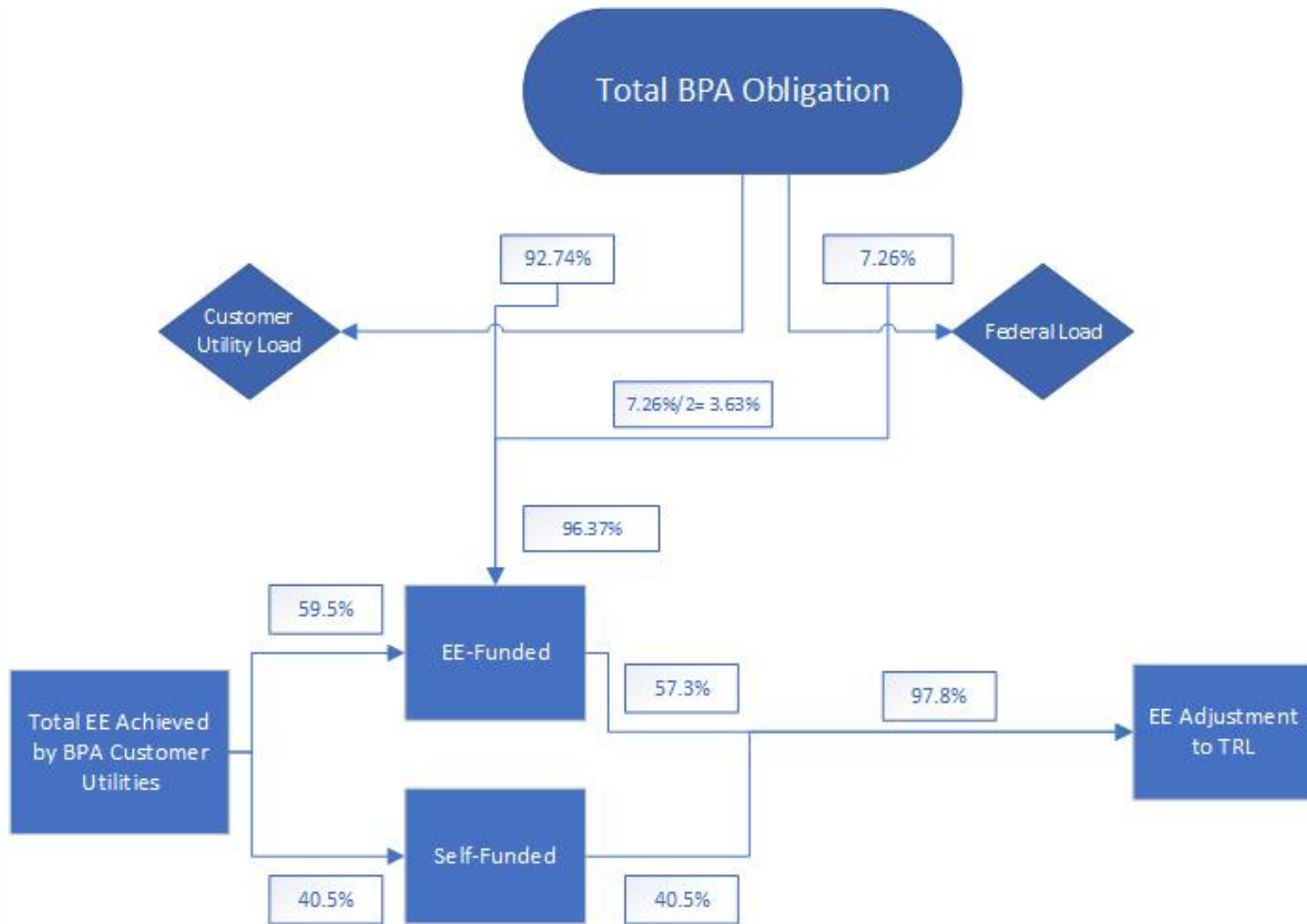
Using the Regional Conservation Progress report (RCP) we see that for BPA customer utilities (2016 to 2019):

- 59.5% of the EE savings is EEI-funded
- 40.5% of the EE savings is self-funded

Since the 2021 Plan is agnostic to funding source, we use these proportions to estimate future savings

Note: self-funded EE is 100% applied to BPA customer utility load (TRL) and does not have the same complications with federal agency EE





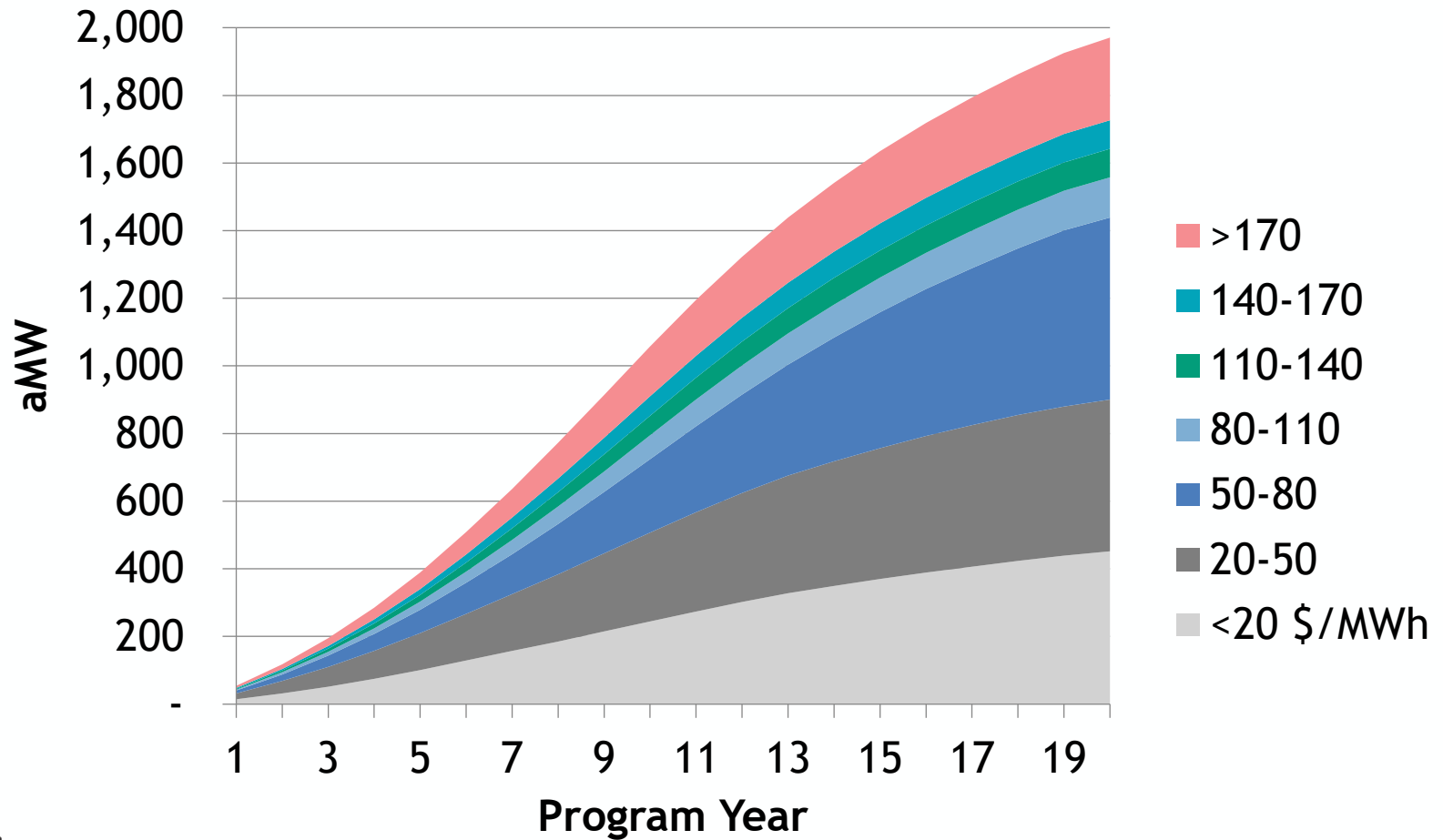
# Estimated impact of EE on BPA's load obligation

Using the TRMbd Workbook with this adjustment we see EE changes the BPA obligation to serve load under the Regional Dialogue contracts anywhere from around 70% up to 92% based on how much EE acquired, on average EE changed the BPA obligation by **80.9%**.

I.e. for 10 aMW of EE purchased from the supply curves, we estimate BPA's load is reduced by 8.09 aMW.

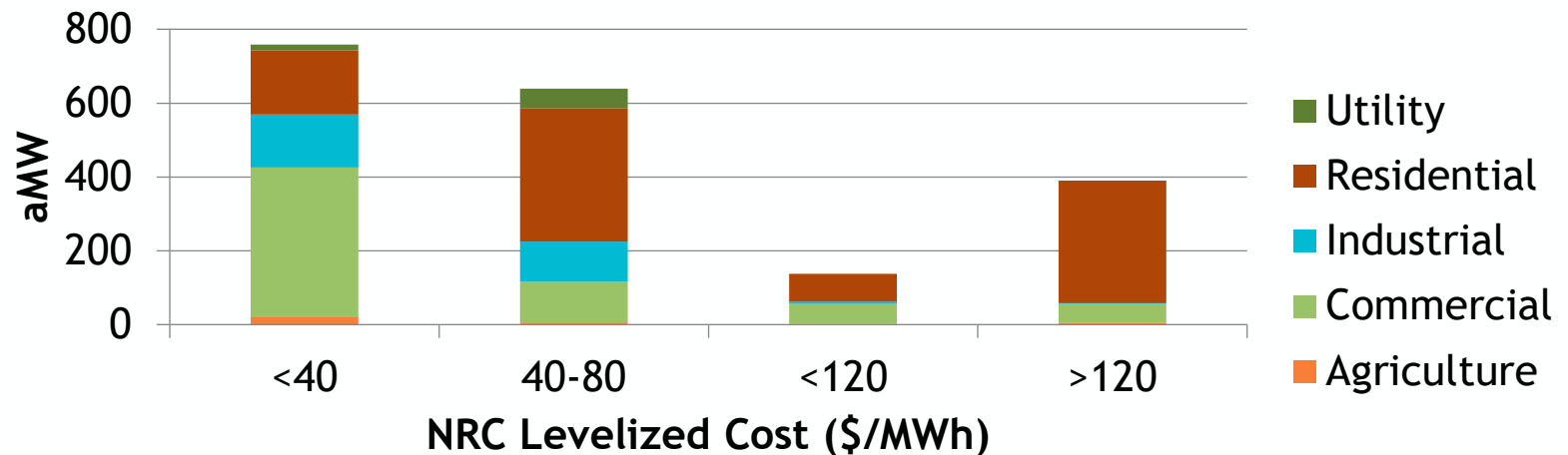


# BPA Achievable Technical Potential by Levelized Cost Bin (2016\$/MWh) & Time



# Potential Savings by Cost Bin & Sector

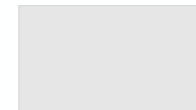
Max Achievable Conservation by Sector at Various Price Bins (Incremental)





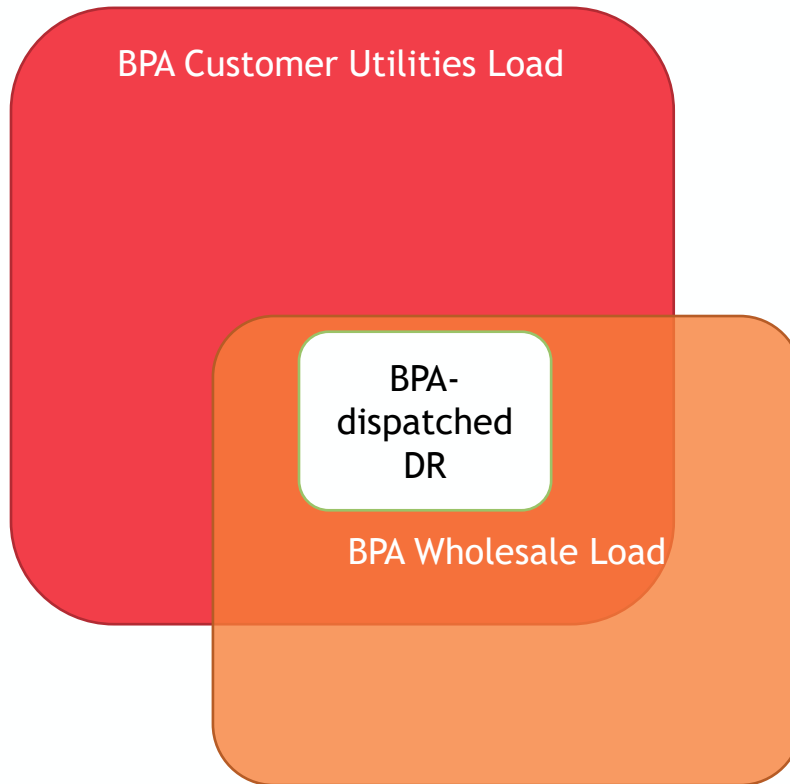
# Number of Homes – Region and BPA

	Region	BPA	BPA Share
Single Family	4,418,134	1,723,072	39%
Multifamily - Low Rise	997,938	339,299	34%
Multifamily - High Rise	295,302	100,403	34%
Manufactured	586,202	187,585	32%
	<b>6,297,577</b>	<b>2,350,359</b>	<b>37%</b>



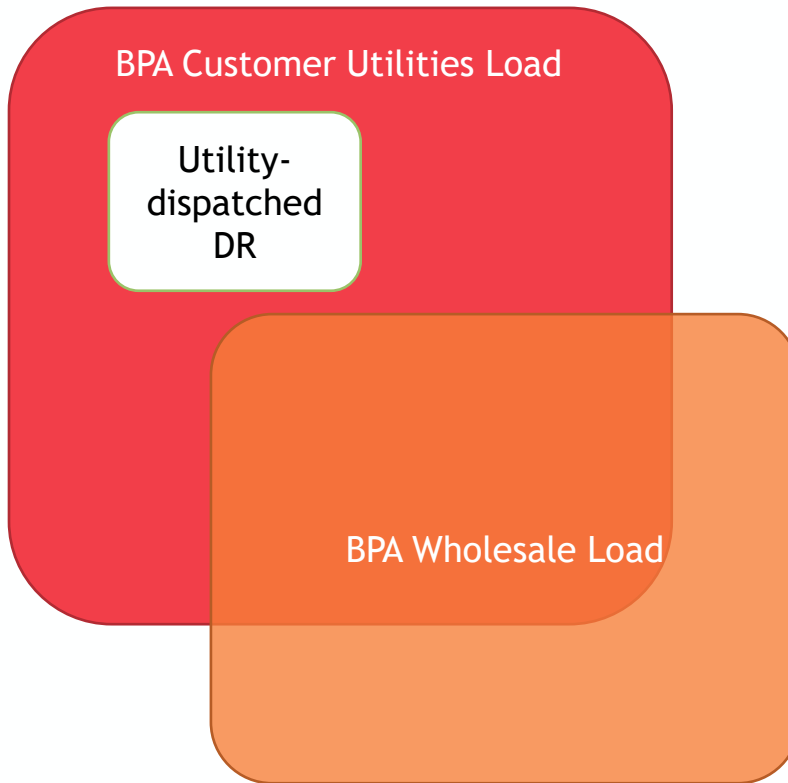


# DR in the BPA Portfolio



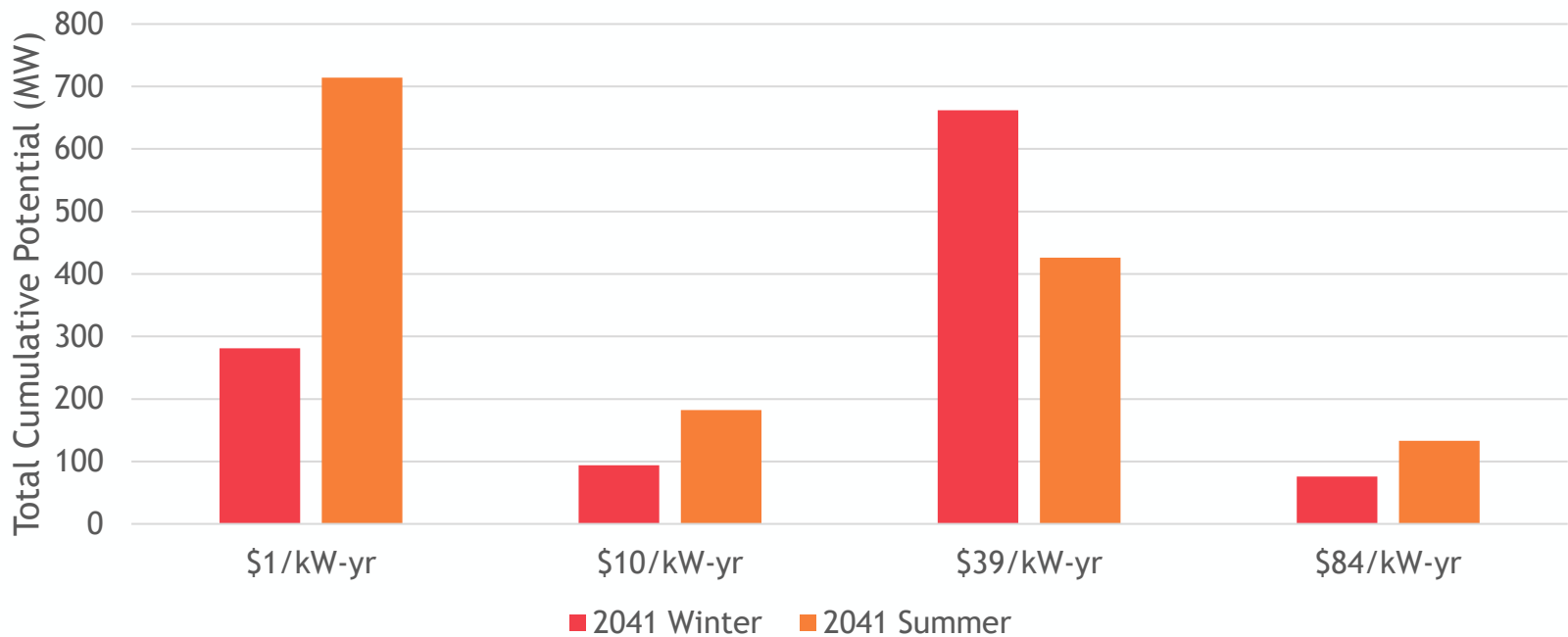
Demand response potential is also primarily based on BPA customer utilities load.

When BPA contracts for DR with its customer utilities, the dispatch of DR would reduce the need for federal generation or BPA market purchases



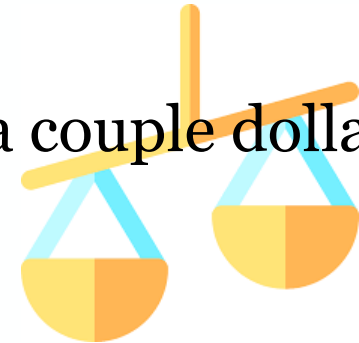
When the customer utilities contract for demand response the primary impact is reducing the need for BPA customer utility-owned generation or BPA customer utility market purchases.

# Total Potential by Price Bin & Season



# BPA Potential Compared to Region

- BPA DR Potential is ~40% of regional
  - BPA Residential is ~43% of region, due to higher electric shares for space and water heating
  - Relatively more potential in winter, due to more electric heating loads
- Levelized costs are comparable, within a couple dollars per kW-yr by bin



An abstract graphic consisting of several overlapping geometric shapes. On the left, there is a teal-colored shape with a white outline, resembling a house or a stylized letter 'A'. To its right is a light blue shape, also with a white outline, resembling a stylized letter 'L' or a vertical bar. Further right is a large, solid light green rectangular area. The overall composition is clean and modern, using a muted color palette.

# BPA Load Forecast

# BPA Forecast in the Act

- The Act requires the plan include a “forecast of power resources estimated by the Council to be required to meet the [Bonneville] Administrator’s obligations and the portion of such obligations the Council determines can be met by resources in each of the priority categories.”
- This forecast “shall include the approximate amounts of power the Council recommends should be acquired by the [Bonneville] Administrator on a long-term basis and may include, to the extent practicable, an estimate of the types of resources from which such power should be acquired.”
- The Council’s recommendations as to the amounts of power and resource types take into account Bonneville’s statutory limits on how it offers and sells power and on using and acquiring resources to meet its obligations.





# Consistency of BPA and Council Load Forecasts

- **Goal:** create long-term load forecast for BPA obligations consistent with Council's regional load forecast
- **Analytical steps:**
  - 1) Provided input data for saturation rate and energy use by enduse, sector and state to BPA load forecasting.
  - 2) Provided Council's Medium (frozen efficiency) load forecast
  - 3) BPA load forecasting created a regional load forecast consistent with Council's regional load forecast.
  - 4) BPA then created a forecast for their obligation.
  - 5) BPA obligation forecast, under (Medium economic conditions, with Frozen Efficiency, without climate change drivers) was then used to create a full set of load forecasts under different economic and climate change variations. This was done by using the relationship between monthly load (FE, Medium case, Council) and the monthly load forecasts under different climate change conditions.

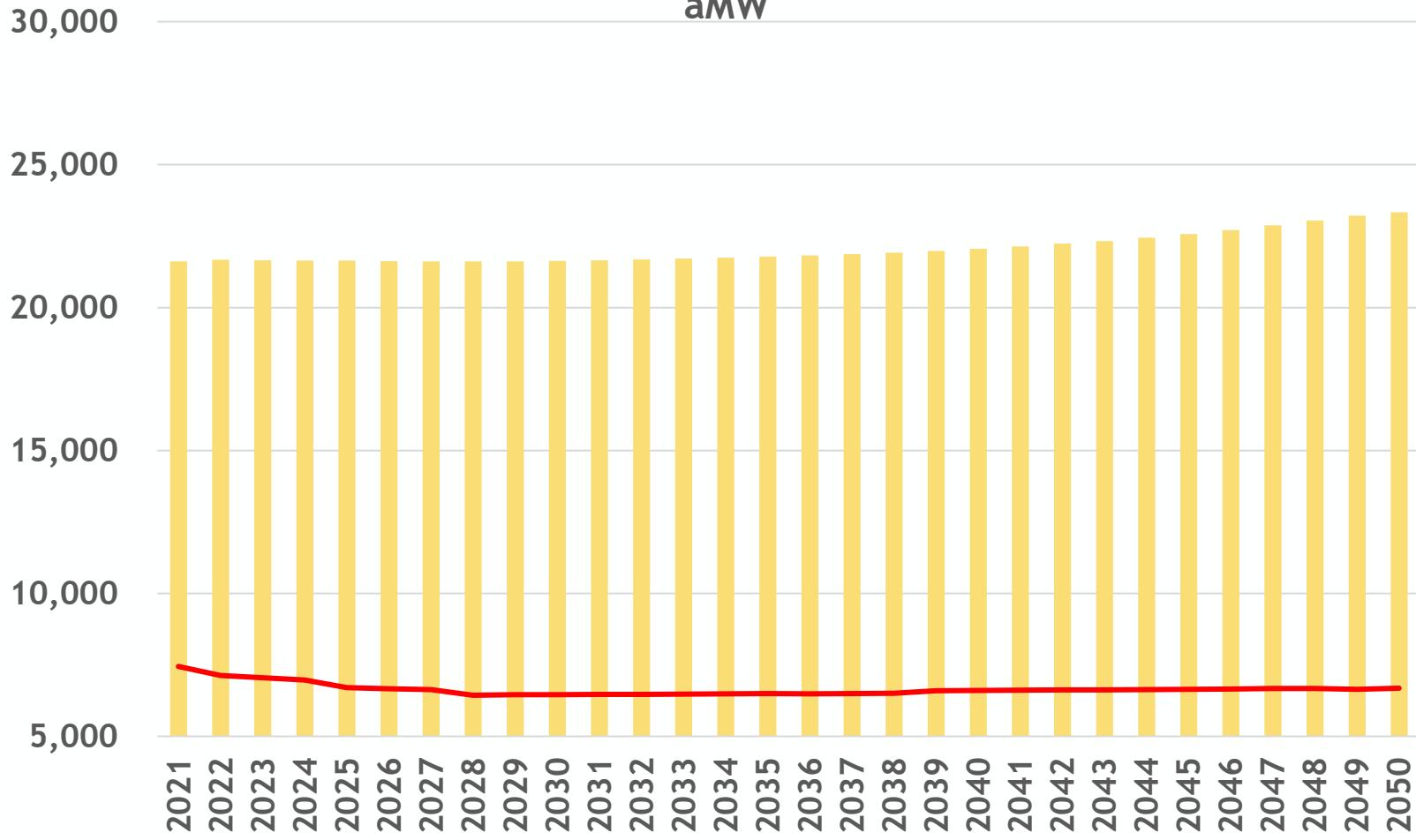


# What are BPA Obligations

- Firm power load service under the long-term Regional Dialogue contracts represents the Administrator's current firm power sales obligations under section 5(b) of the Act. These current RD contracts, however, are not the only obligations to be considered in a twenty-year forecast.
  - Other considerations that need to be factored in include, for example:
    - what might be the firm power sales obligations after 2028 when the current RD contracts end;
    - the effects of planned savings from the implementation of conservation measures;
    - resource acquisitions the Administrator might need to take to help implement the fish and wildlife program
- For the RD contracts, the foundation of this value is the total retail load in each BPA customer utility. From that value is subtracted all of the resources customer utilities are planning to bring to their own load. The remaining load BPA has an obligation to supply.
- Other contractual arrangements have more direct commitments and the specifics of the contracts determine the amount of the BPA obligation.
- These values are added together to create the total BPA obligation.



# Comparison of Regional Load Forecasts and BPA Obligations aMW



■ Council Freeze\_Base    
 — BPA\_Freeze\_Base

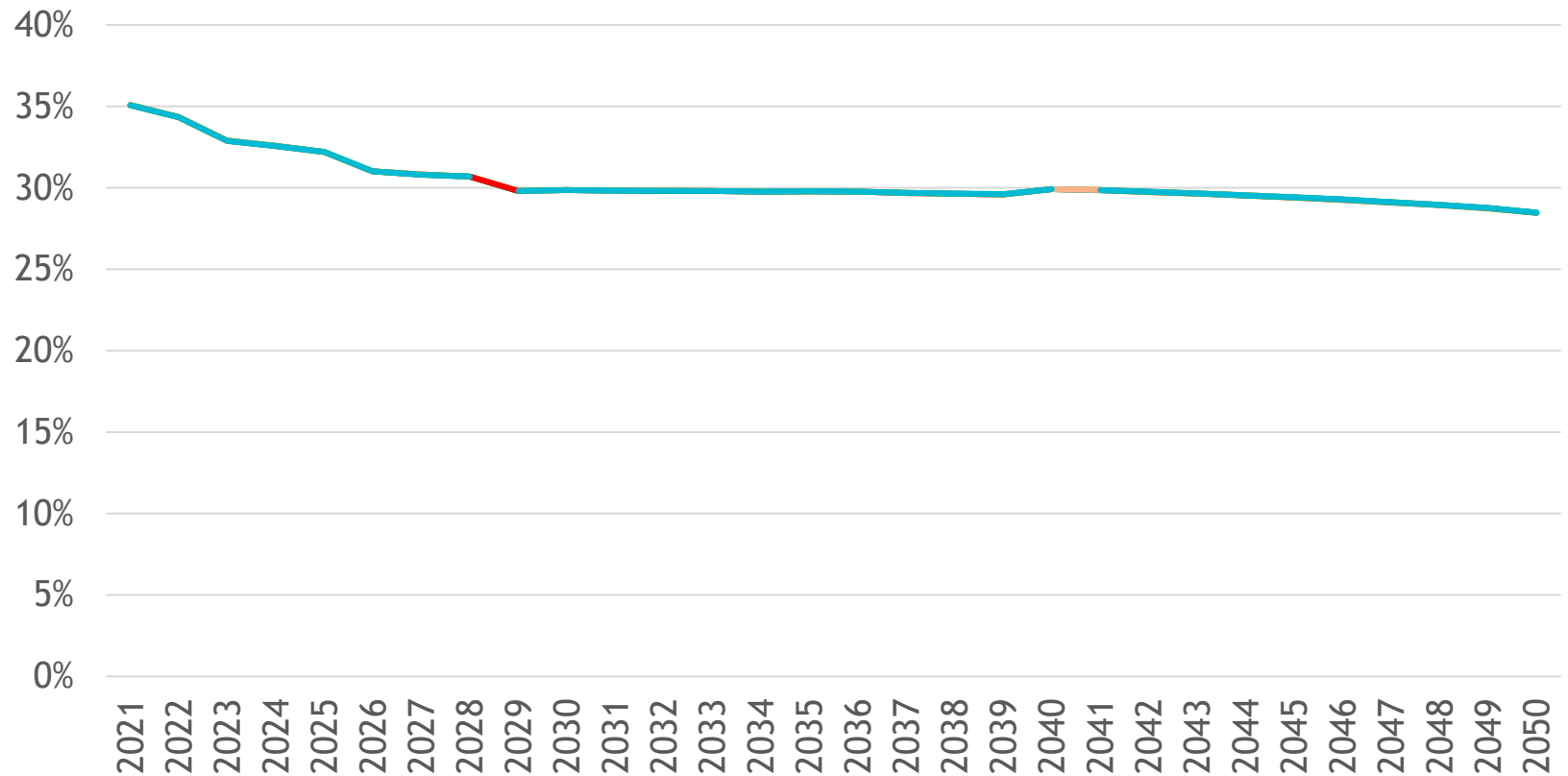
# Comparison of Growth Rates Frozen Efficiency

2021-2041 AAGR	Region	BPA Obligations
Base Case	0.13%	-0.72%
Low Economic growth	-0.33%	-1.18%
High Economic growth	0.59%	-0.26%
Base Case With CanESM2	0.42%	-0.43%
Low Case With CanESM2	-0.02%	-0.87%
High Case With CanESM2	0.87%	0.02%



# BPA Obligations Decline from 35% to 28% of Regional Loads by 2050

BPA's Obligations as Percent of Regional Load  
Across Various Scenarios



- Base Case
- Low Economic growth
- High Economic growth
- Base Case With CanESM2
- Low Case With CanESM2
- High Case With CanESM2



A photograph of a mountainous landscape shrouded in mist. In the foreground, a dark lake is visible. The mountains in the background are partially obscured by thick white fog. A white, geometric, angular overlay is present on the right side of the image, resembling a stylized architectural element or a window frame. The word "Questions?" is written in a large, black, sans-serif font on the left side of the image.

Questions?