



# Franklin PUD 2018 Integrated Resource Plan

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# Agenda

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- Integrated Resource Plan Requirements
- Supply/Demand Inputs Update
- Preferred Portfolio Discussion
- 2018 Cost Inputs Update
- Major Market / Tech Developments
- Action Item Updates
- Summary

# Washington State Integrated Resource Plan Requirements

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- In 2006, the Washington State legislature passed RCW 19.280 which mandates that electric utilities develop resource plans
- The law applies to utilities that have more than 25,000 customers and are not load-following customers of the Bonneville Power Administration.
- The law stipulates that qualifying utilities produce a full plan every four years, and provide an update to the full plan every two years.

# IRP Overview

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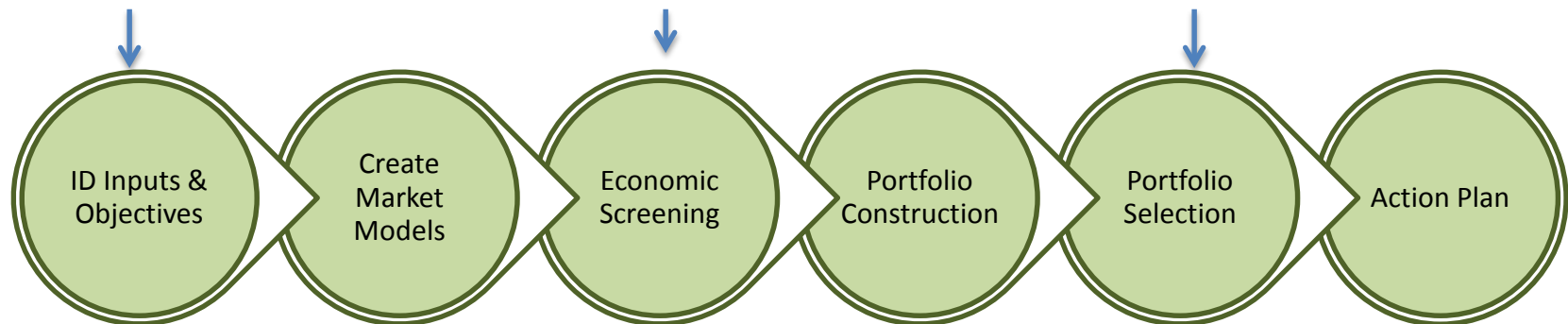
- Franklin PUD's 2018 Integrated Resource Plan (IRP) lays out a strategy for meeting its:
  - Energy needs
  - Capacity demand
  - Washington State renewable portfolio standard (RPS) obligations
- The goal of this IRP is to provide a framework for evaluating a wide array of supply resources, conservation, and renewable energy credits.
- The IRP provides guidance towards strategies that will provide reliable, low cost electricity to the District's ratepayers at a reasonable level of risk.

# Franklin PUD IRP Process

- ✓ Load Forecast
- ✓ Carbon Costs
- ✓ WECC-Wide State RPS

Identify Best Resources  
using Levelized Cost  
Methodology

Simulate Costs for Each  
Strategy; Choose Best  
One



- ✓ WECC-Wide Capacity Addition
- ✓ Franklin PUD Financial Model
- ✓ Monte Carlo Simulator

IRP Team Chooses  
Resource Strategies that  
Meet District Objectives

# Franklin PUD Load Forecast

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## SECTION 1

# Load Forecast Methodology

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- Staff initiates an annual load forecast review cycle
- Historical and projected economic indicators, provided by Woods and Poole, are used as inputs to forecast future loads
  - Economic activity drives the primary retail demand inputs
    - i.e. population and employment
- Historical load, which tends to be more reactive to weather, is isolated and weather normalized
- Effects of conservation, both programmatic non-programmatic, are reflected in historical loads and included in the forecast

# 2017 vs. 2018 Load Forecast Comparison

- The 2018 load forecast is just slightly lower, but very similar to the 2017 forecast
- Strong load growth through the early 2000s, slight dip during the recession, and more modest growth since
- Load growth continues, but at a much slower rate than prior forecasts despite population growth
- Low growth rates driven by continued energy efficiency achievements

Franklin PUD Total Retail Load Forecast and Actuals



\*does not include Axial loads



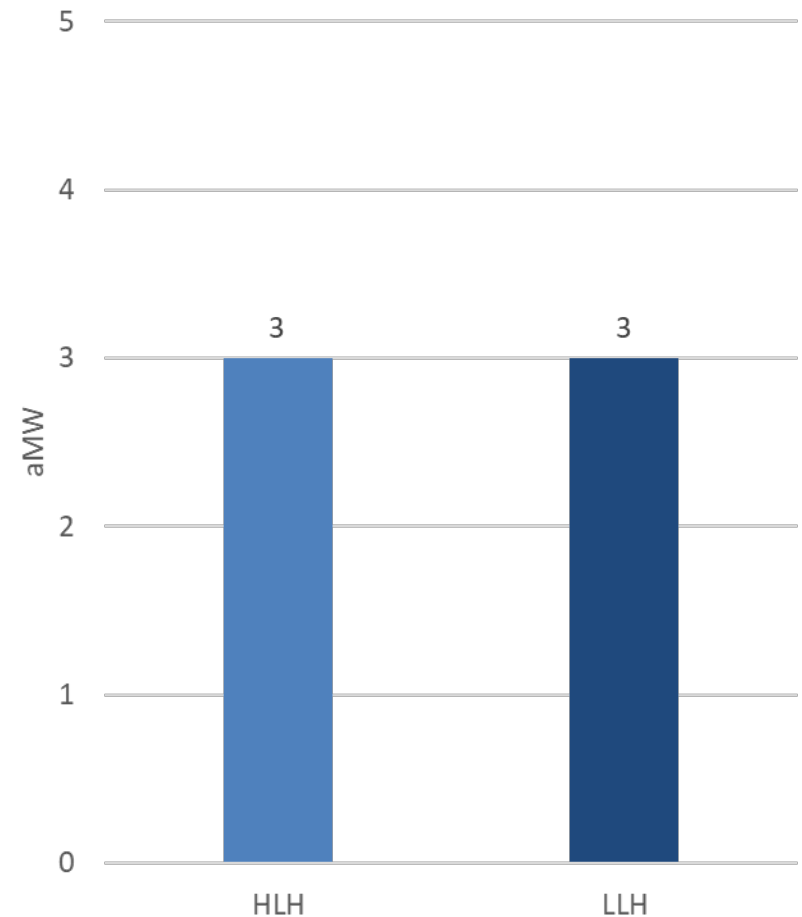
# Current Resource Portfolio

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## SECTION 2

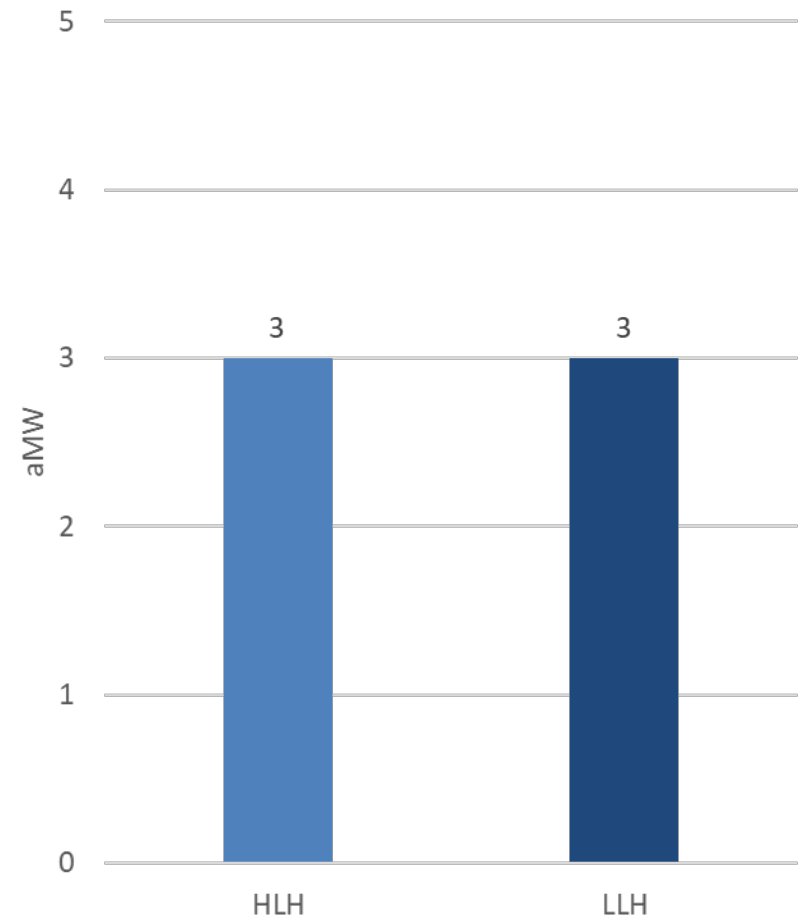
# White Creek Wind

- Wind is not a reliable capacity resource in the NW, no capacity value assumed for capacity analysis
- WCW contract terminates in 2027



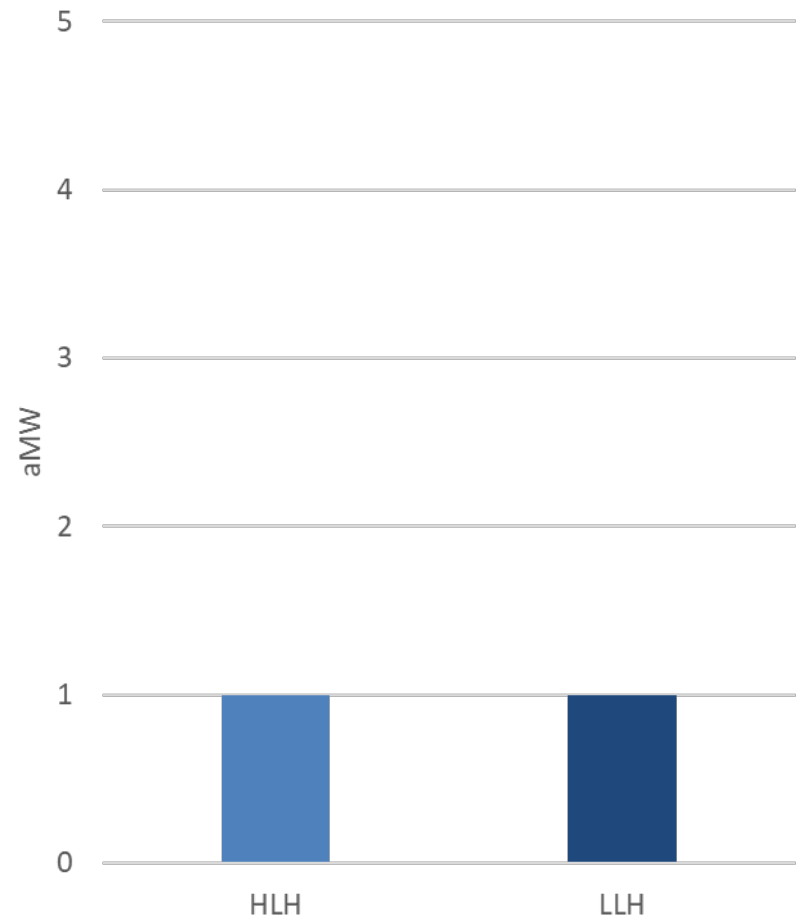
# Nine Canyon Wind

- Nine Canyon is owned and operated by Energy Northwest
- District contracted 10.5% of the output from the project, about 10MW of capacity
  - Through June 2030
- It is not a capacity resource



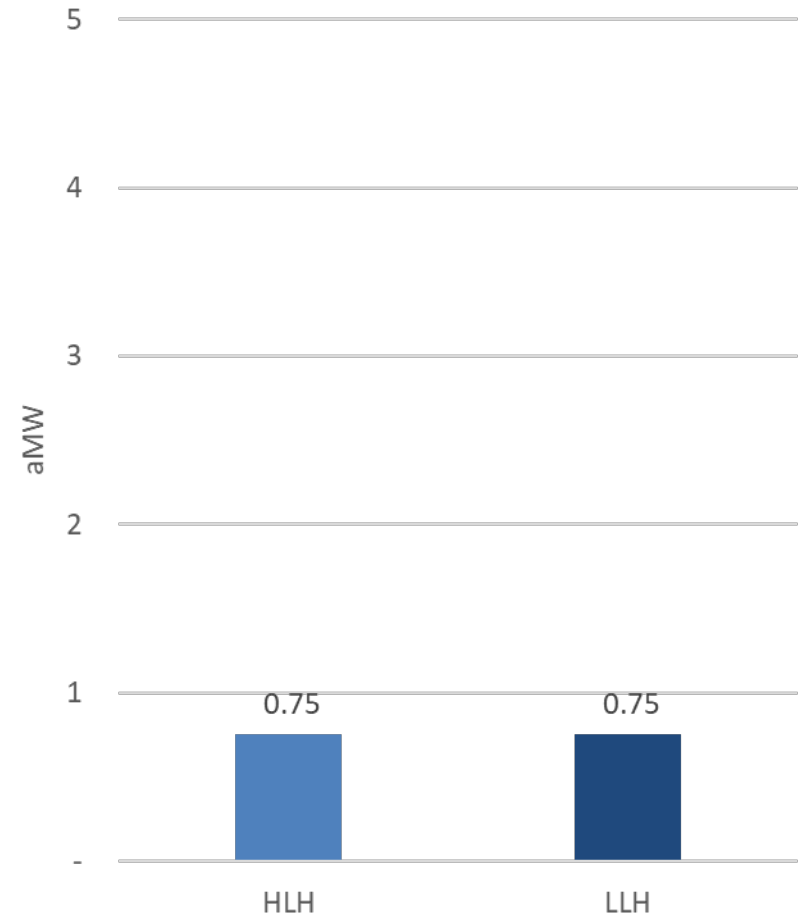
# Packwood Hydro

- Packwood is owned and operated by Energy Northwest
- District contracted 10.5% of the output from the project, about 3MW of capacity
- It does not qualify as a Washington State renewable resource
  - Cannot be used to fulfill the District’s I-937 obligations



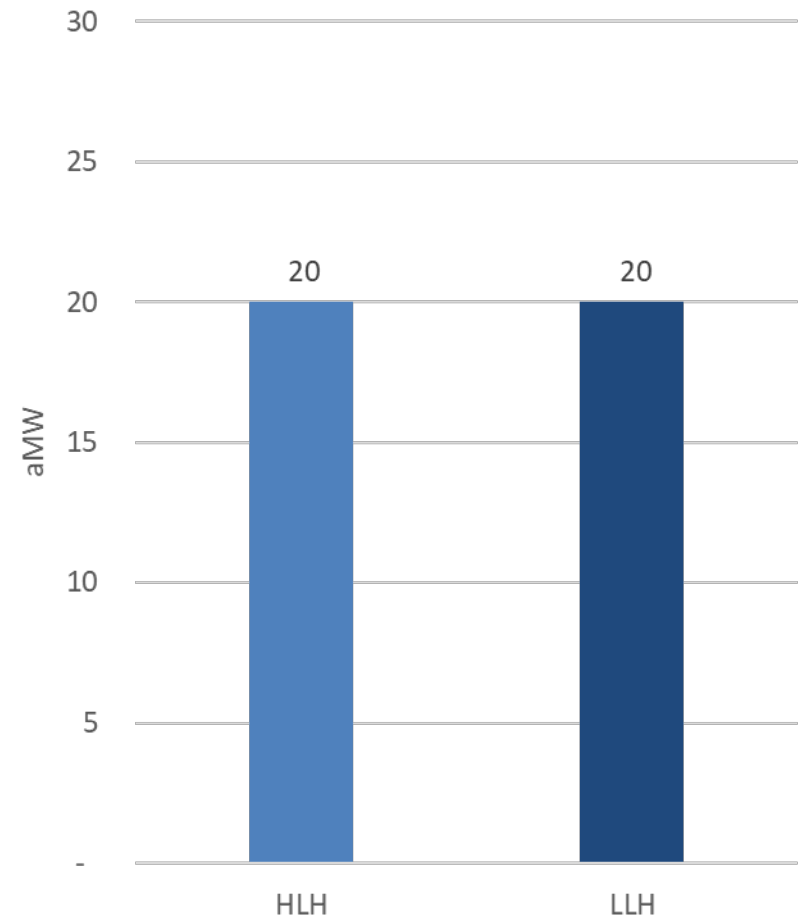
# Esquatzel Hydro

- Water is diverted from the Esquatzel Canal into a powerhouse at the confluence of the Columbia River
- District has rights to 100% of the project, about 0.9MW
- It does not provide capacity as it is a run of the river project
- Since it is a small hydro facility, its RECs count double towards meeting the District's I-937 obligations



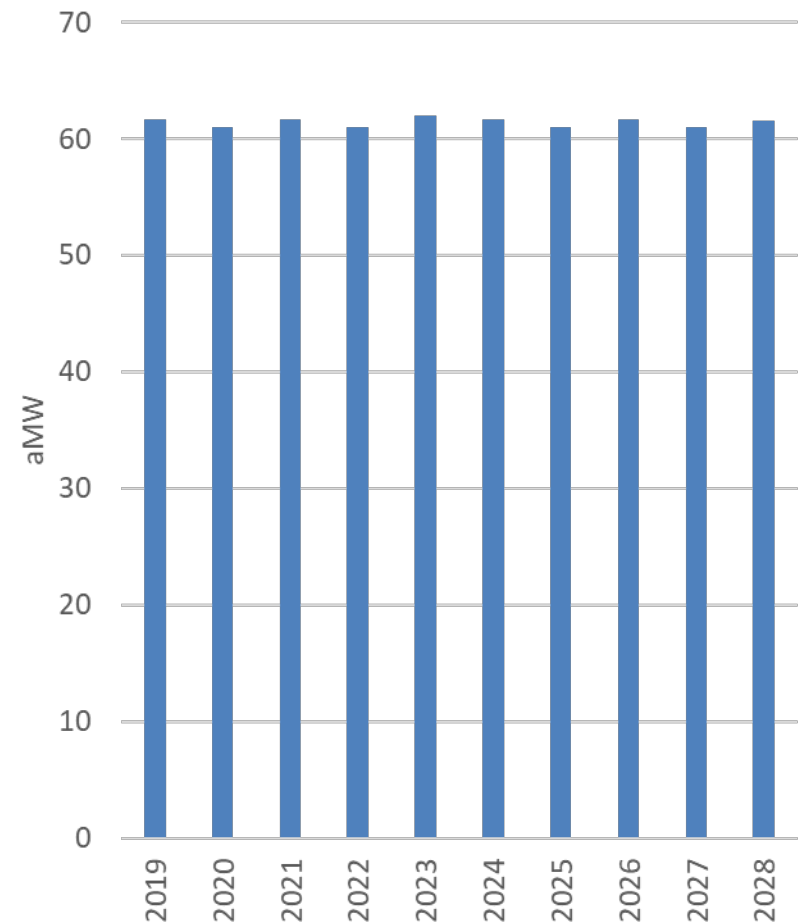
# Frederickson

- The District has rights to 30MW of capacity, though dispatch of the plant must be coordinated with the 3 other owners: Benton PUD, Grays Harbor PUD, and Puget Sound Energy
- The plant is generally dispatched when it can produce energy at lower cost than market
- Provides the District with energy and capacity during winter/summer months
- Contract runs through August 2022



# BPA Block

- The District's Block allocation is limited by its Contract/Rate Period High Water Marks
- District's needs exceed its BPA allocation and are forecasted to do so indefinitely
- Block allocations vary slightly depending on Columbia Generation Station outage schedules



# BPA Slice

- The District's Slice % is contractually fixed at .78655% but varies slightly from year-to-year based on system adjustments
- Critical System capability also fluctuates slightly each year based on unit availability and other considerations such as spill
- Difference between critical and average Slice is about 15aMW





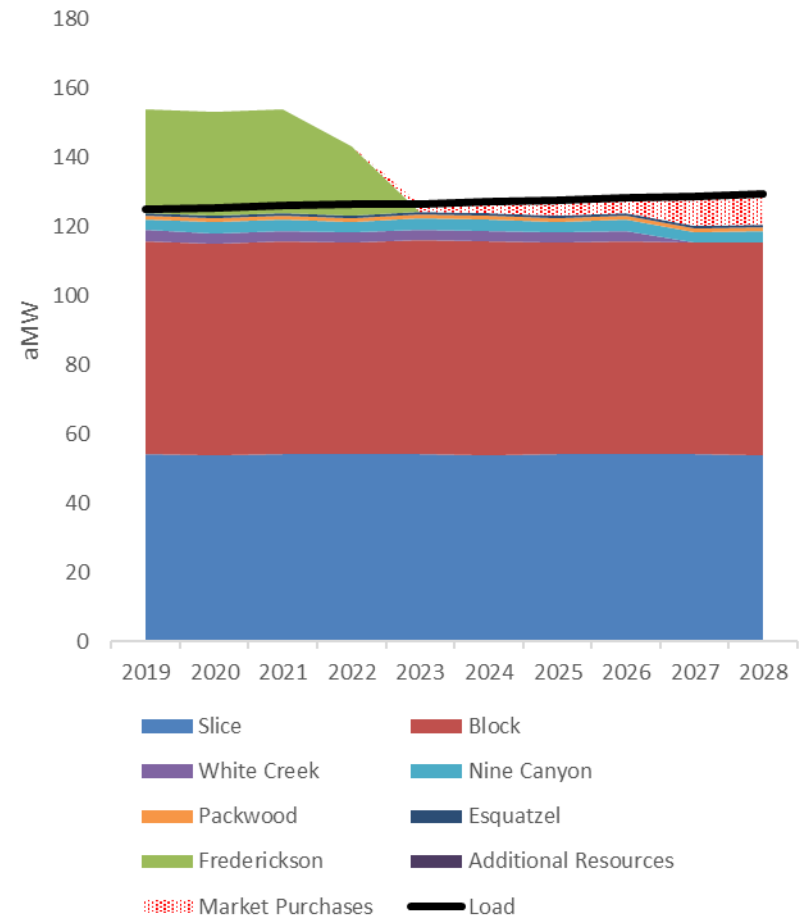
# Critical Resources, Capacity, and Renewable Portfolio Compliance

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## SECTION 3

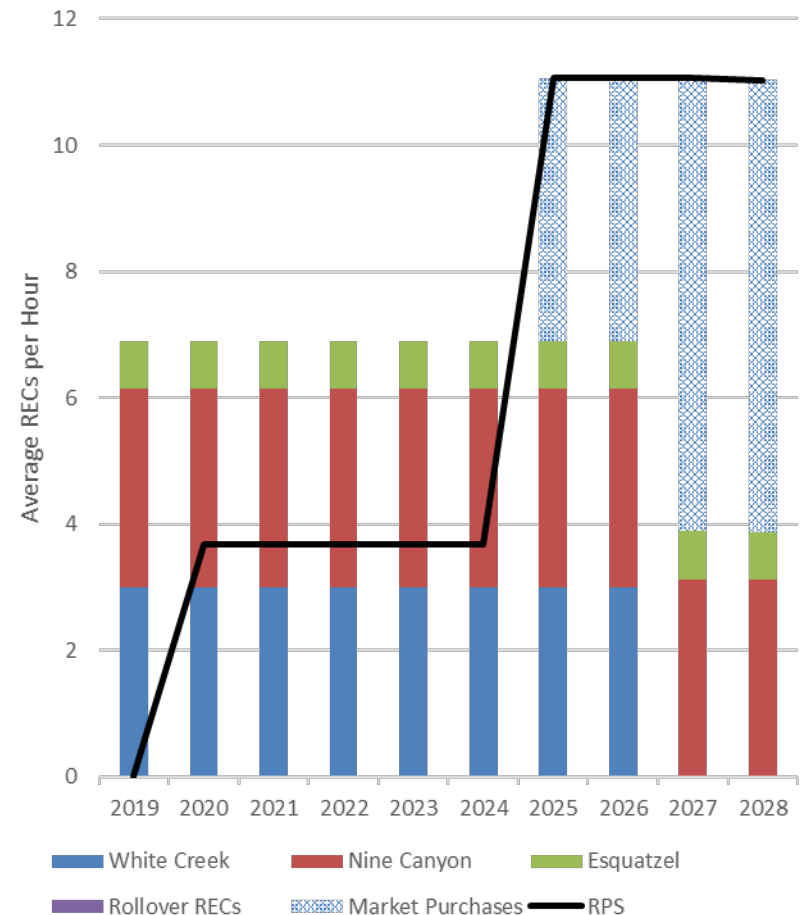
# 2018 10 year Critical Energy Forecast

- Annual critical energy surpluses continue until 2022 when Frederickson expires
- Deficits continue to grow as long as load growth continues
- White Creek Wind contract terminates in 2027, increasing the annual energy deficit



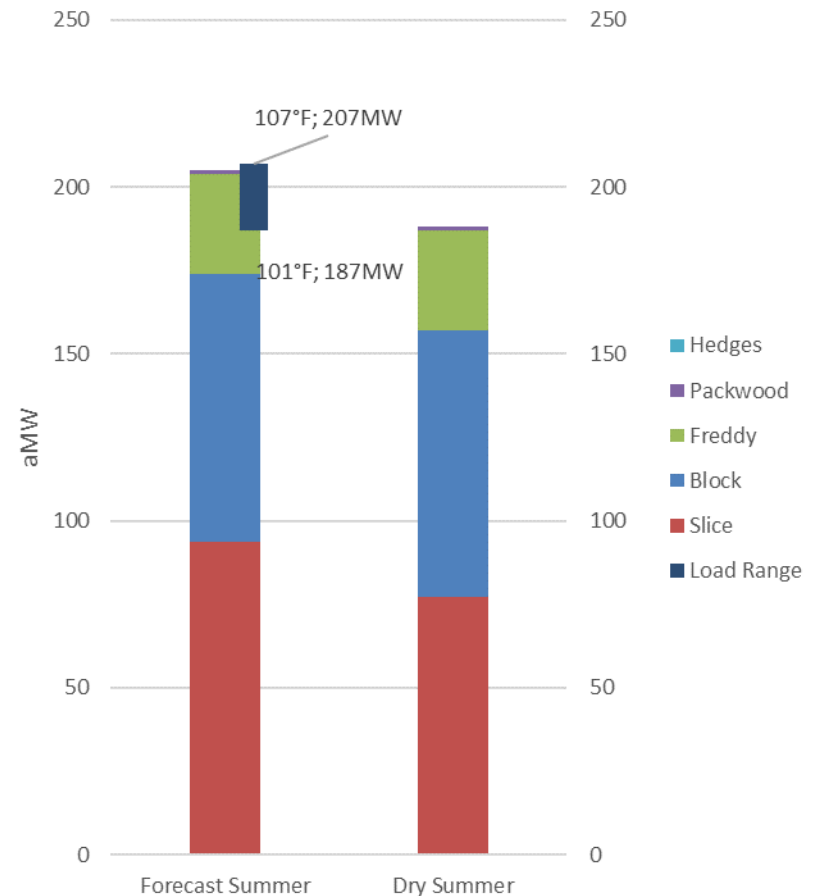
# 2018 RPS Compliance Forecast

- The 2018 study shows enough RECs to satisfy the District's requirements through 2024, when RPS requirements ramp up from 3% to 9%
- New REC resources may not be necessary until after 2025, as the District can bank RECs for future use – study did not forecast when the REC bank will be exhausted



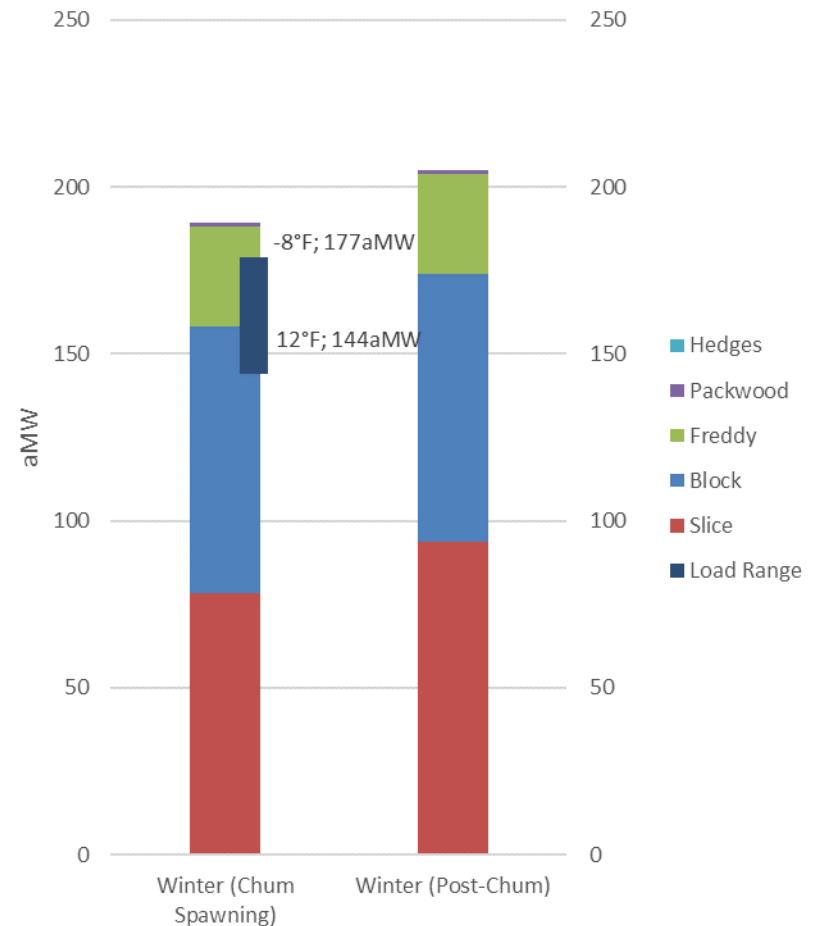
# Summer Peaking Capacity

- As a result of the financial risk associated with a potential shortfall in the District's portfolio, the RMC adopted a conservative capacity planning scenario
- Key capacity months in summer and winter are regularly reviewed leading up to and through the season
- During hot periods, Slice system also ramps up generation to meet loads
- With Freddy, District generally has sufficient resources to meet load, unless
  - Water conditions are particularly bad
  - It is particularly hot



# Winter Peaking Capacity

- The District is a summer peaking utility and winter capacity is less of a concern
- With Frederickson, the District should be in at least load/resource balance through the HLH period
- Capacity was analyzed during more restrictive chum spawning Slice operations period



# Preferred Portfolio

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## SECTION 4

# Selecting Portfolios

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- In 2017, the District projected:
  - Small REC deficits that materialized in the mid 2020's
  - Seasonal summer energy and capacity deficits that appear when Frederickson contract expires
- District staff examined a variety of resource types and ultimately narrowed the analysis down to
  - Status quo scenario that relied on market purchases
  - Renewing or replacing Frederickson in late 2022
  - Solar purchase to meet future RPS needs
  - Contracting with a small modular reactor to fill future energy and capacity deficits
- Uncertainty regarding resource costs and low market prices led District staff to conclude that utilizing market purchases was the most prudent way forward, with continued monitoring of market conditions

# 2017 Resource Cost Projections

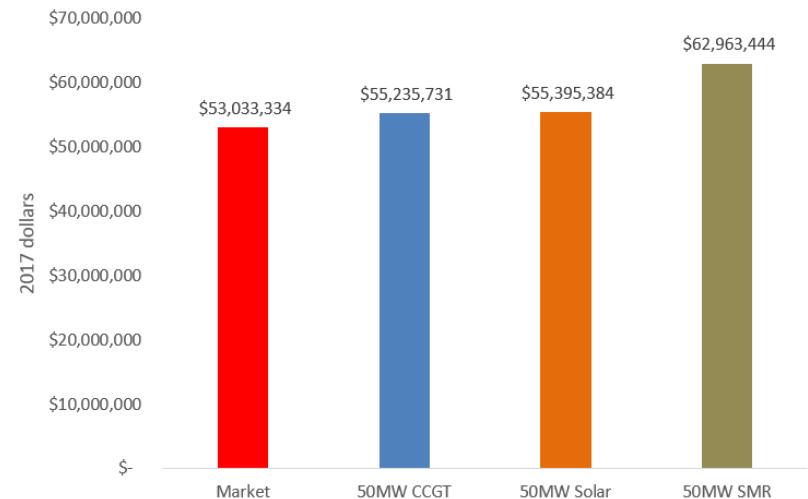


- A. The combined cycle resource was analyzed as an alternative to market to meet peak capacity needs. It's high reliability and ramping capability made it an appealing option
- B. Solar was selected due to the projected renewable need and it's potential to compliment the wind generation shape, which tends to generate more during the evening than daytime
- C. Small modular reactors were selected to provide the District with reliable, carbon-free, baseload power



# 2017 Results: Stay the Course

- At the time of the study, the “status quo” portfolio, which uses market purchases to meet energy, capacity, and renewable portfolio requirements, was deemed the best option
- It represented the lowest long term cost portfolio option
- Additionally, using market transactions to meet needs was deemed the most flexible alternative, allowing the District to enter into shorter term commitments rather than making expensive long-term investments, particularly given the small projected deficits and the long lead time to further evaluate longer term solutions to meet the RPS obligations
- At the time, the addition of a small modular reactor resource was deemed too expensive and risky to pursue



# 2018 IRP inputs update

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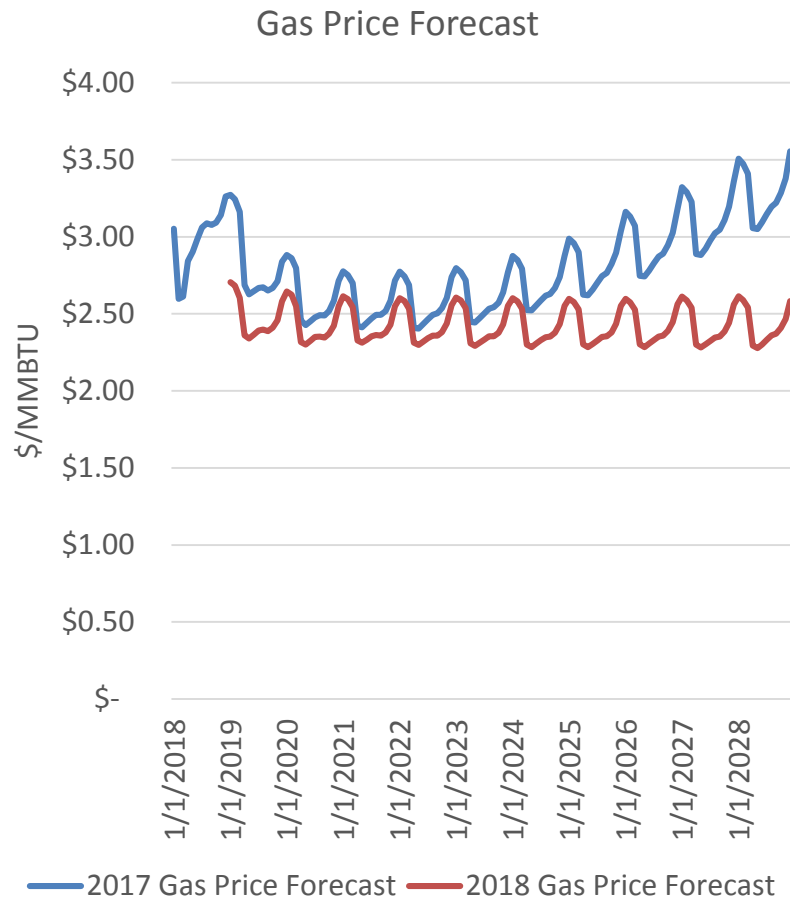
## SECTION 5

# Overview

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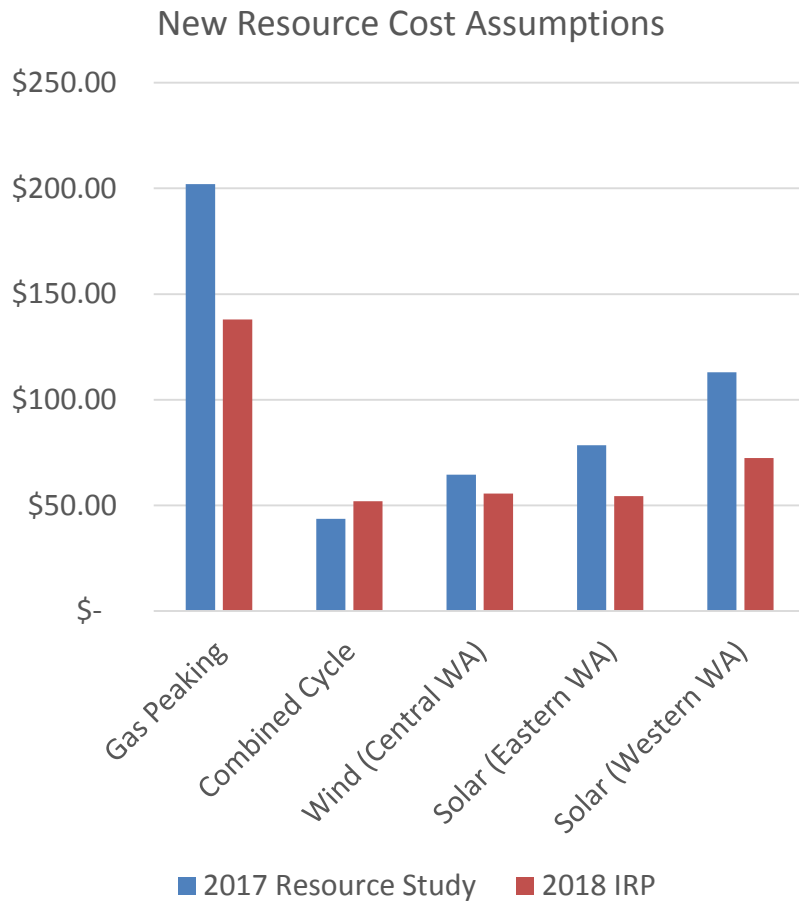
- In the 2017 Resource Study, the District concluded that market purchases were the best path forward given best available information at the time
- In order to refresh our view in 2018, we must evaluate whether our future view of the world has changed enough to consider an alternate recommendation
- This section will highlight the changes in assumptions given what we know today and discuss how that may change the recommended path forward

# Gas Price Forecast



- 2018 gas curve is almost flat
- 2017 forecast used a blend of NYMEX near term, blending to PIRA in the long term
- This IRP relied solely on forward curves
  - Woodmac/PIRA fundamental forecasts suggest higher prices than markets are current showing
- Reason for change: fundamental forecasts are often black boxes, while forward curves are inclusive of information from all market participants

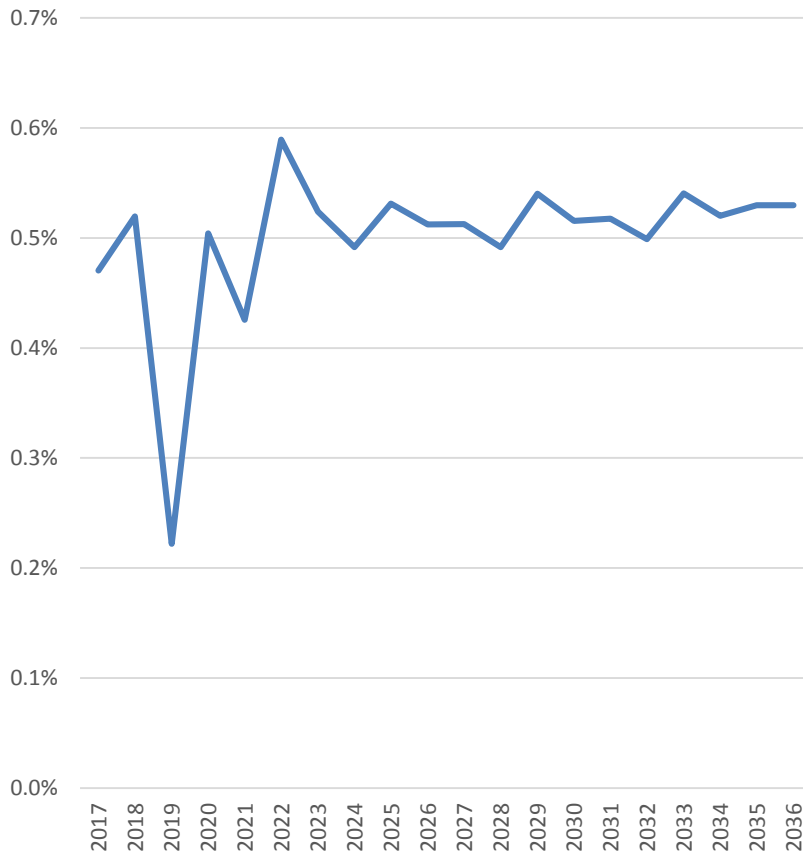
# Levelized Cost of Energy



- What happened since 2017?
- Combined cycle capacity factor assumption reduced from 80% to 50%
  - Despite lower gas prices, combined cycle total costs increased
- Wind, solar capacity factors are up due to evolving technology
- Solar costs saw significant declines in the past year

# Regional Load Forecast

2017 Load Forecast

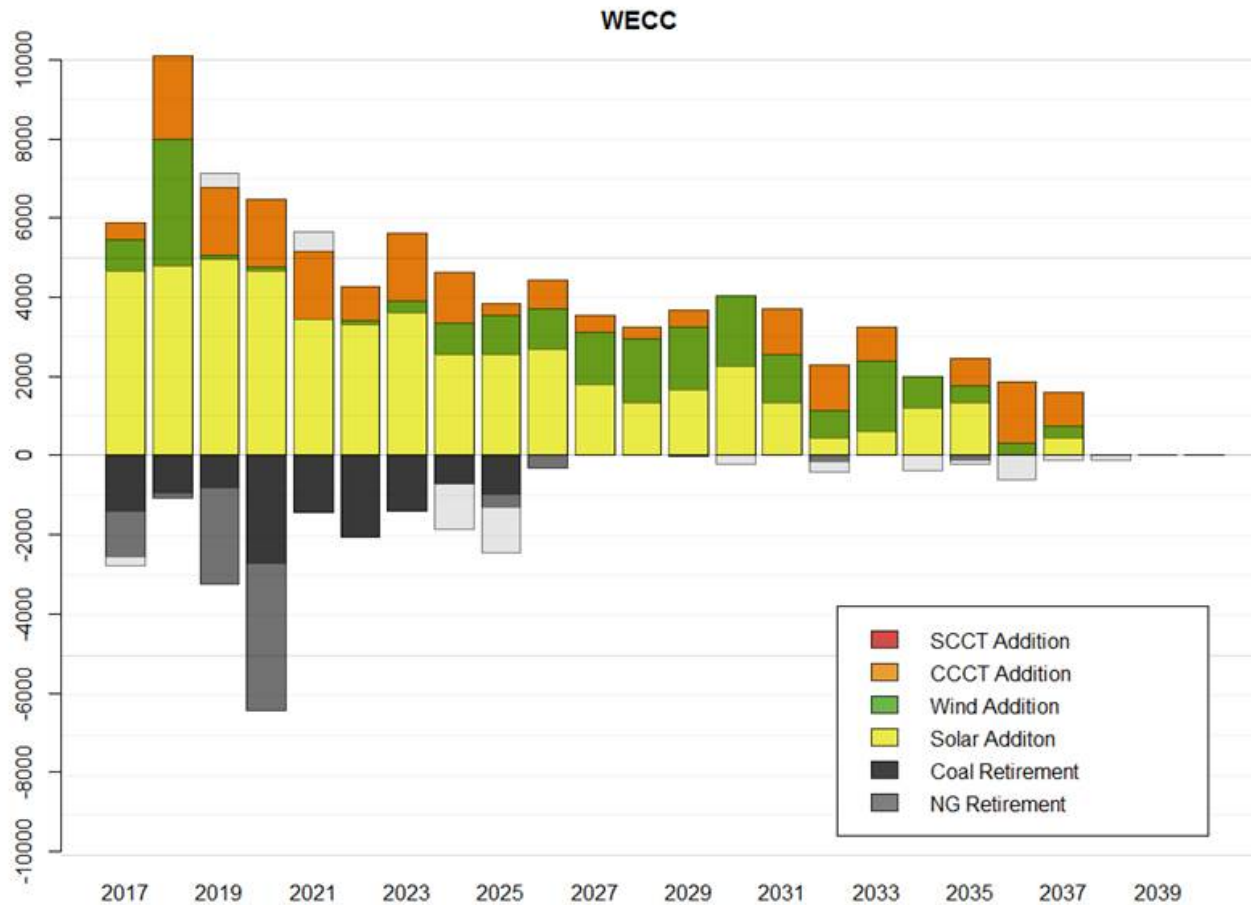


2018 Load Forecast

Year	Forecast of loads net of conservation targets (Annual average MW)		
	Lowest	Median	Highest
2019	18,422	19,873	21,315
2020	18,344	19,754	21,230
2021	17,726	19,605	21,447
2022	17,253	19,464	21,601
2023	17,010	19,320	21,736
2024	16,543	19,157	21,766
2025	16,513	19,049	21,790
2026	15,644	18,881	21,648
2027	15,630	18,805	21,909
2028	15,203	18,699	21,981
2019-2028 Average Annual Growth rate	-2.11%	-0.67%	0.34%

# Capacity Expansion Results

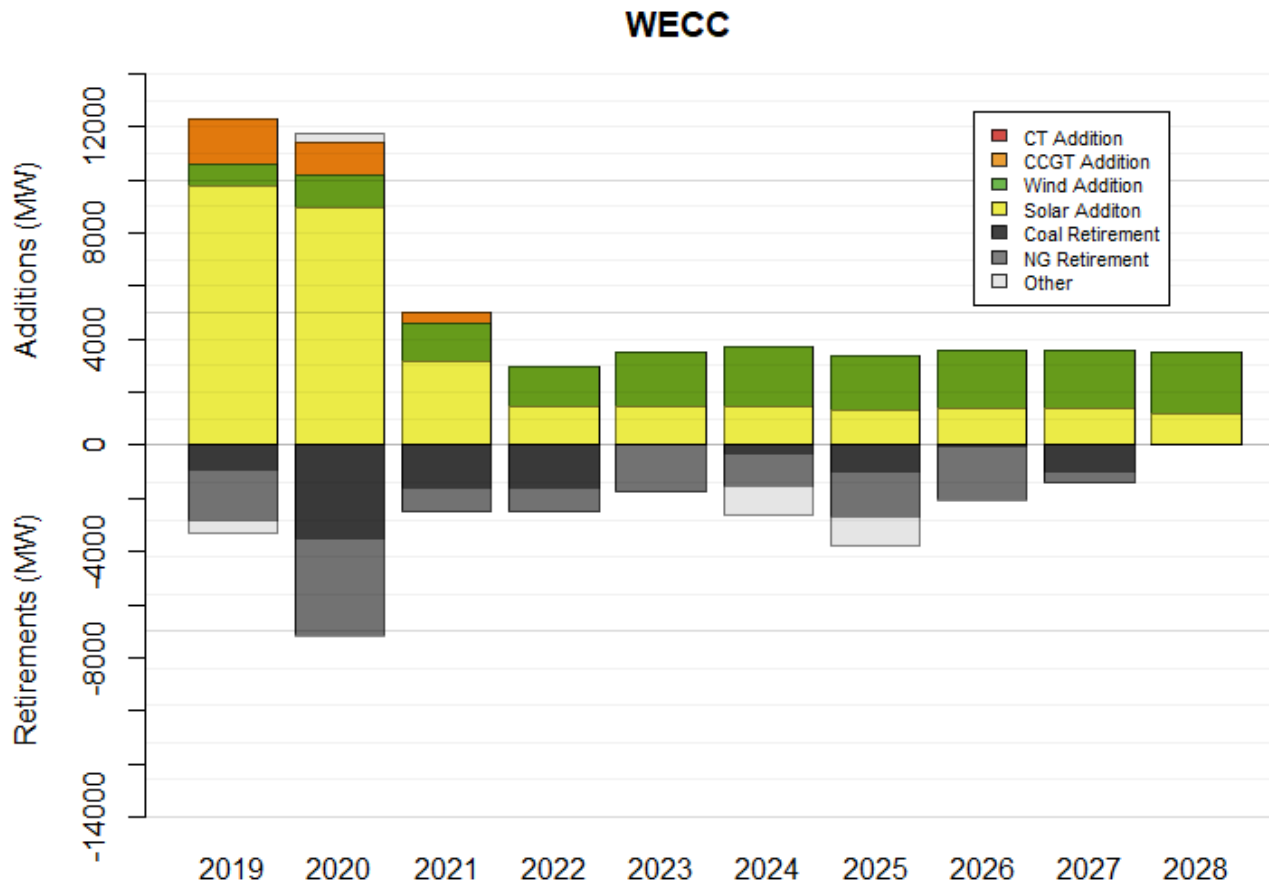
## 2017 IRP



- Renewable capacity built primarily to meet RPS needs
- Still significant thermal generation construction
- Thermal retirements in early years
  - Announced coal retirements
  - CA once thru cooling units

# Capacity Expansion Results

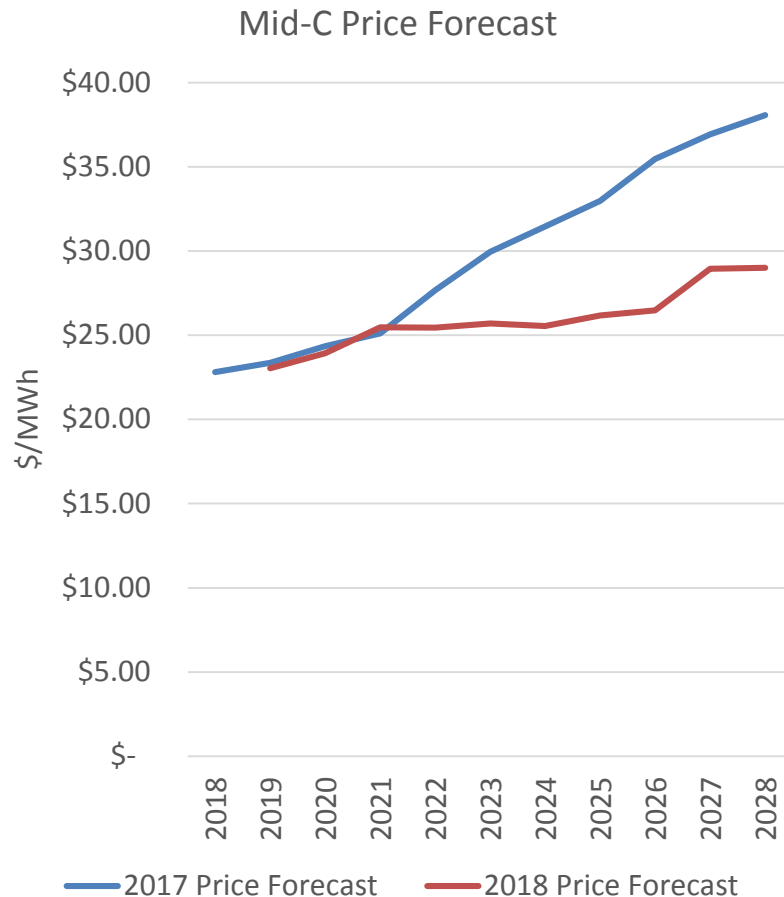
## 2017 IRP



- Negative load growth regionally and WECC wide suggests that new capacity will be built primarily to achieve RPS targets
- Thermal generation forecast is scaled back relative to 2017
- Thermal retirement forecast remains similar to 2017

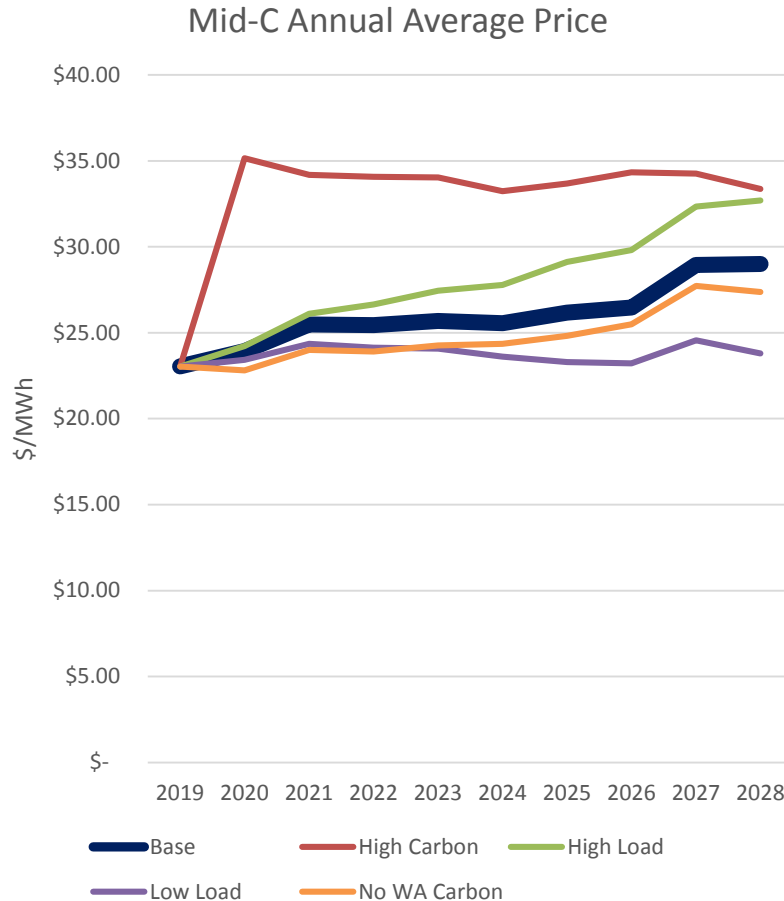


# Power Price Forecast



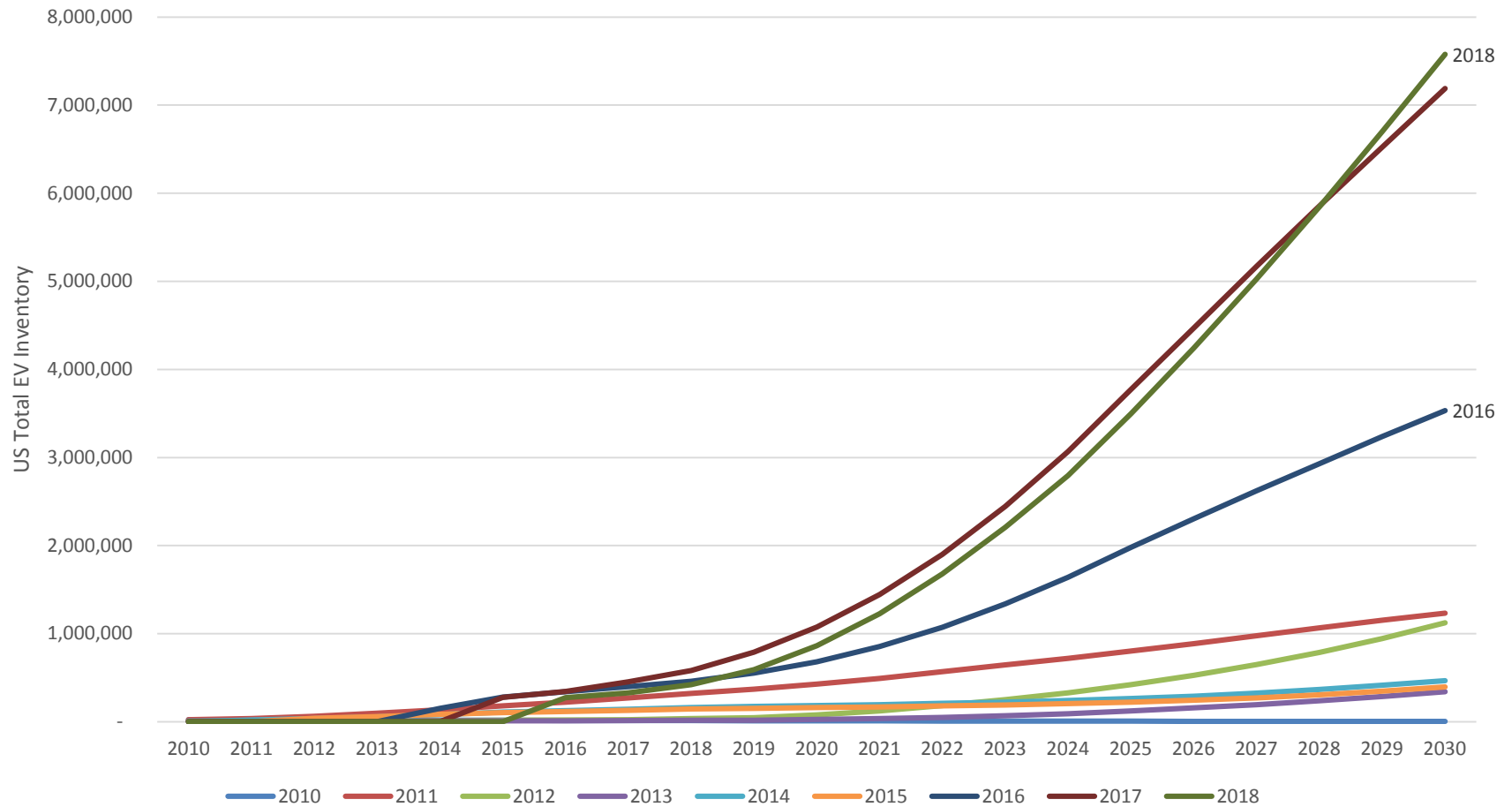
- Power price forecast closely resembles gas price forecast
- Prices become more volatile in outer years as impact of solar duck curve becomes more pronounced
- Aurora may be understating impact of renewable generation
  - Model has difficulty producing negative price scenarios that occur in the spring during high runoff and high wind periods

# Scenario Analysis: Power Price Forecast

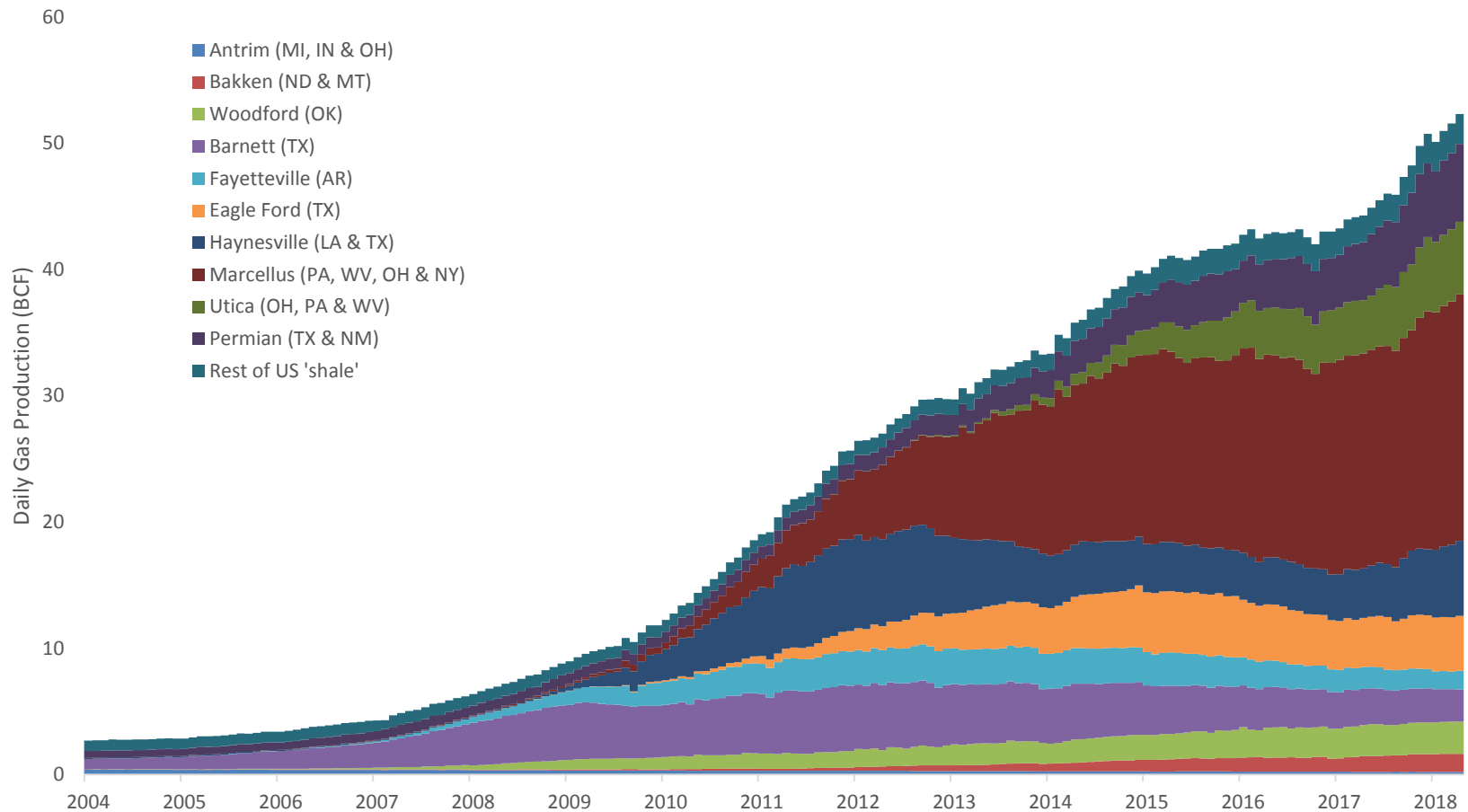


- High Carbon: \$100/ton in WA, OR, CA beginning 2020
- High Load: 0.34% growth
- Low Load: -2.11% growth
- No WA carbon: status quo

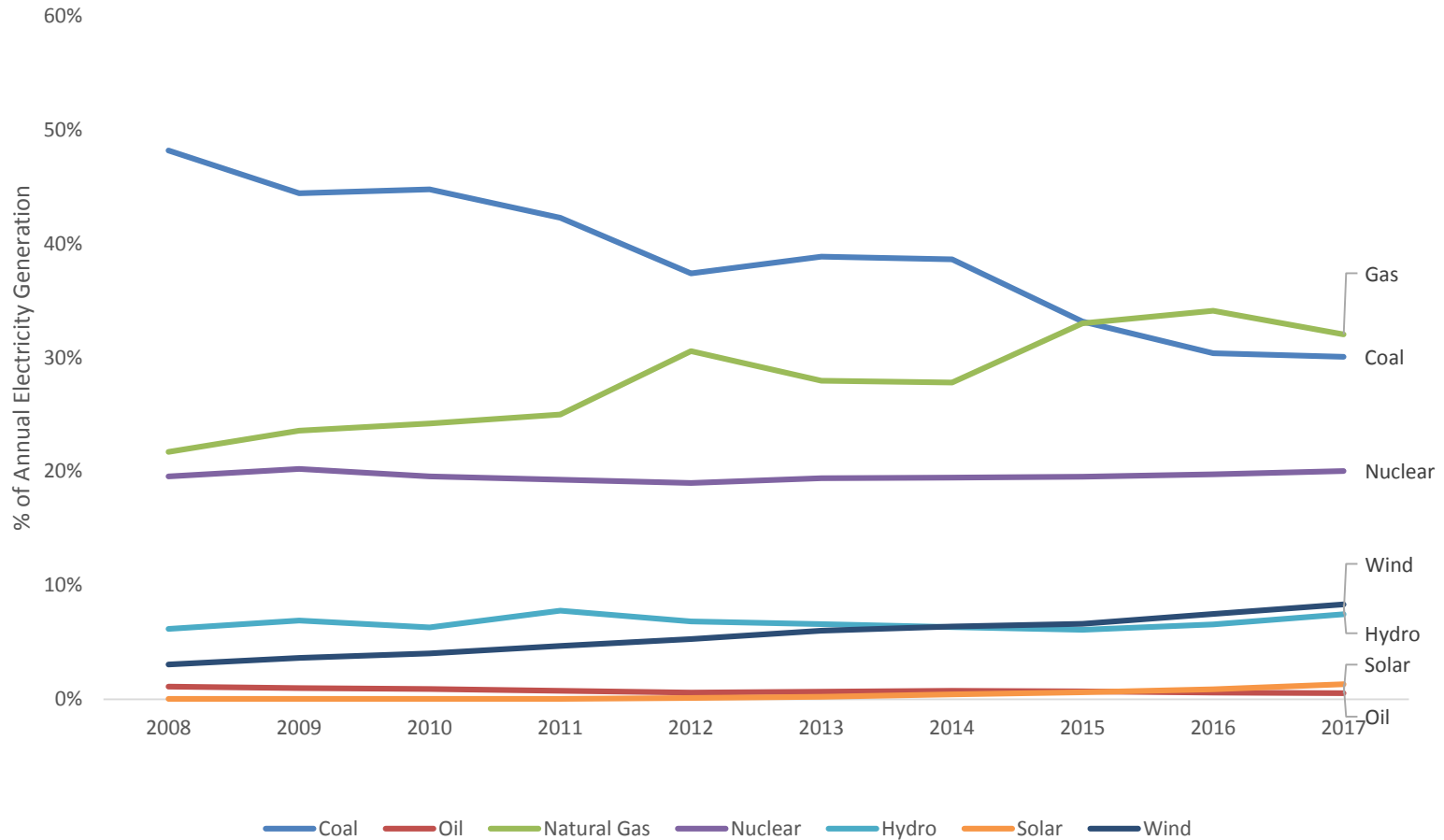
# EIA EV Adoption Forecast thru Time



# Shale Gas Production Over Time



# Nationwide Gen Stack Evolution



# Conclusion

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- In 2017, detailed analysis concluded that the best path forward was to rely on targeted wholesale market transactions to meet forecasted supply needs
- In 2018, we are forecasting lower long term market prices, cheaper renewables translating to lower REC prices, and the expiration of the Frederickson contract in 2022
  - Frederickson expiration will allow the District to more effectively shape power/option purchases to fit seasonal needs
- Franklin PUD continues to forecast load growth, but regionally loads are forecasted to decline
  - Aurora builds out less capacity as a result
- Given these, District staff recommends continuation of utilizing market purchases to meet short term needs
  - Capacity, summer in particular is still a concern
  - District already purchased 20MW HLH in Jun-Sep 2019
- Staff will continue to monitor regional capacity
  - As long as regional supply remains sufficient, market should be available as a resource to serve load
  - District will continue improving its tactical plan on capacity purchases

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