Washington State Commerce & UTC Resource Adequacy

Rick Dunn, General Manager

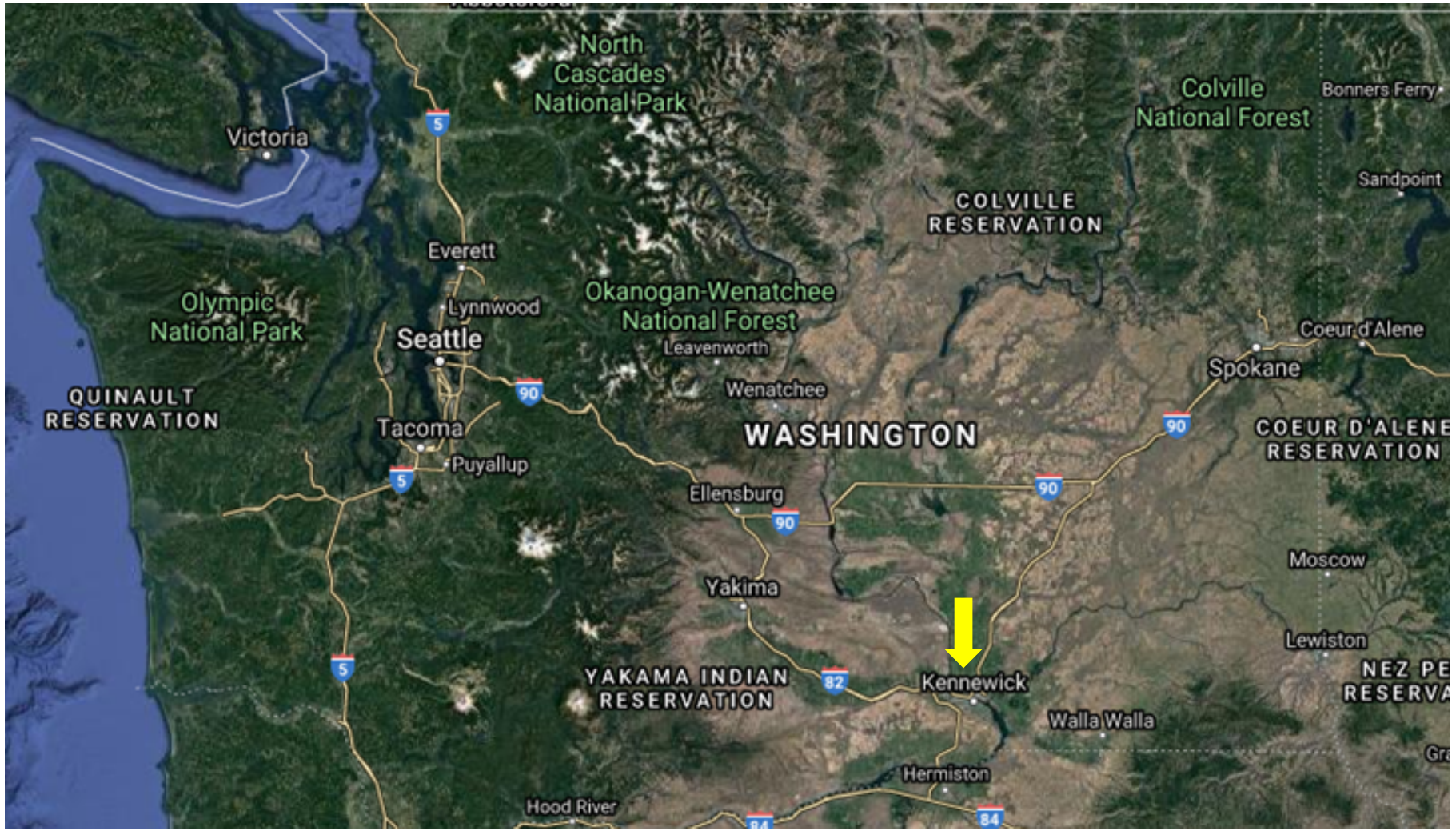
May 11, 2021

BENTON P·U·D

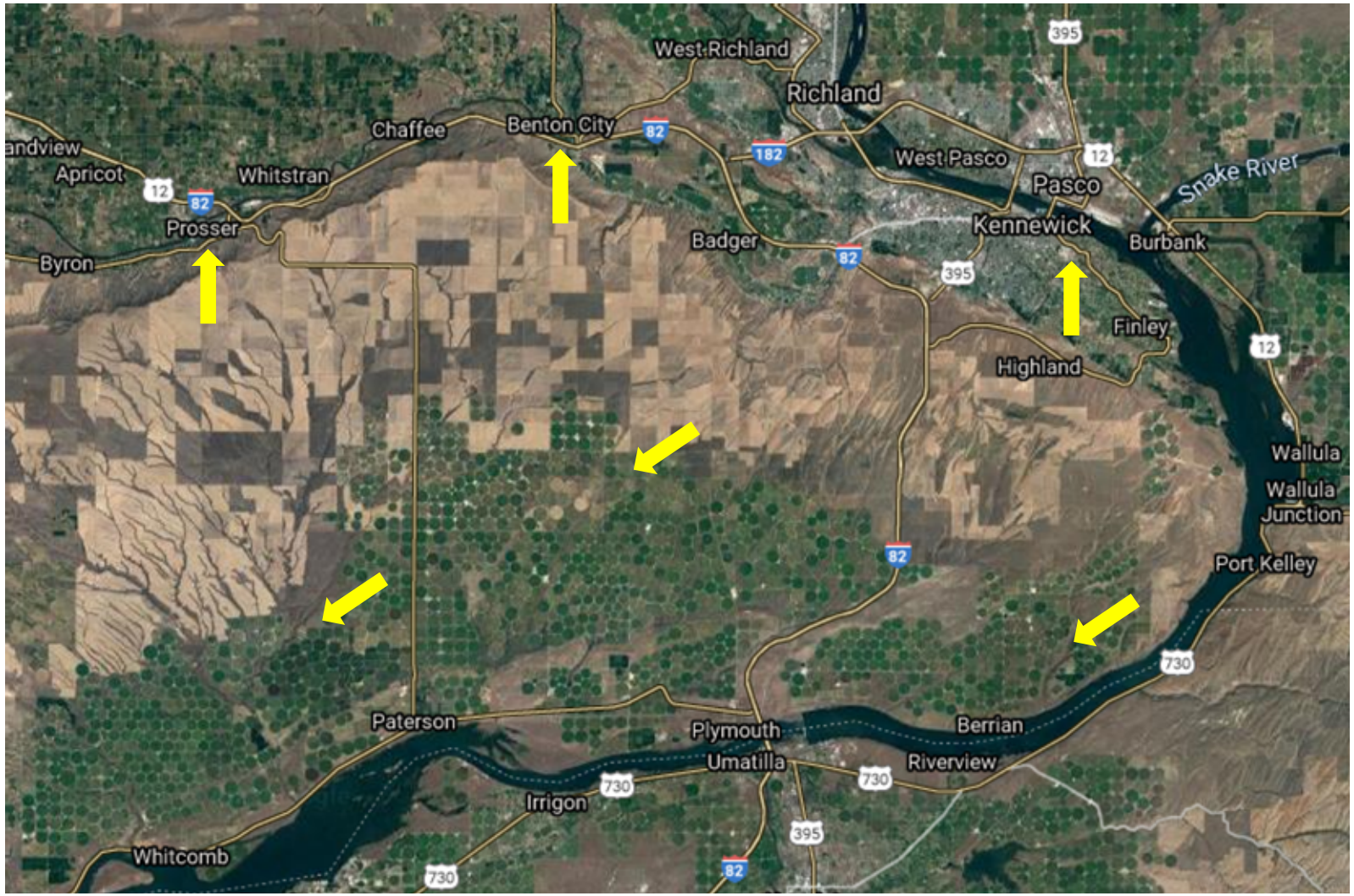
Reliable Public Power Provider

Your Trusted Energy Partner

Benton PUD – Who/Where are We?

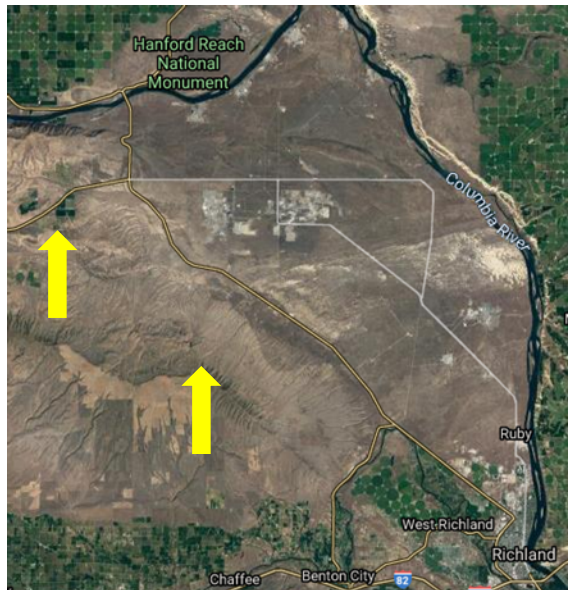


Benton PUD – Who/Where are We?

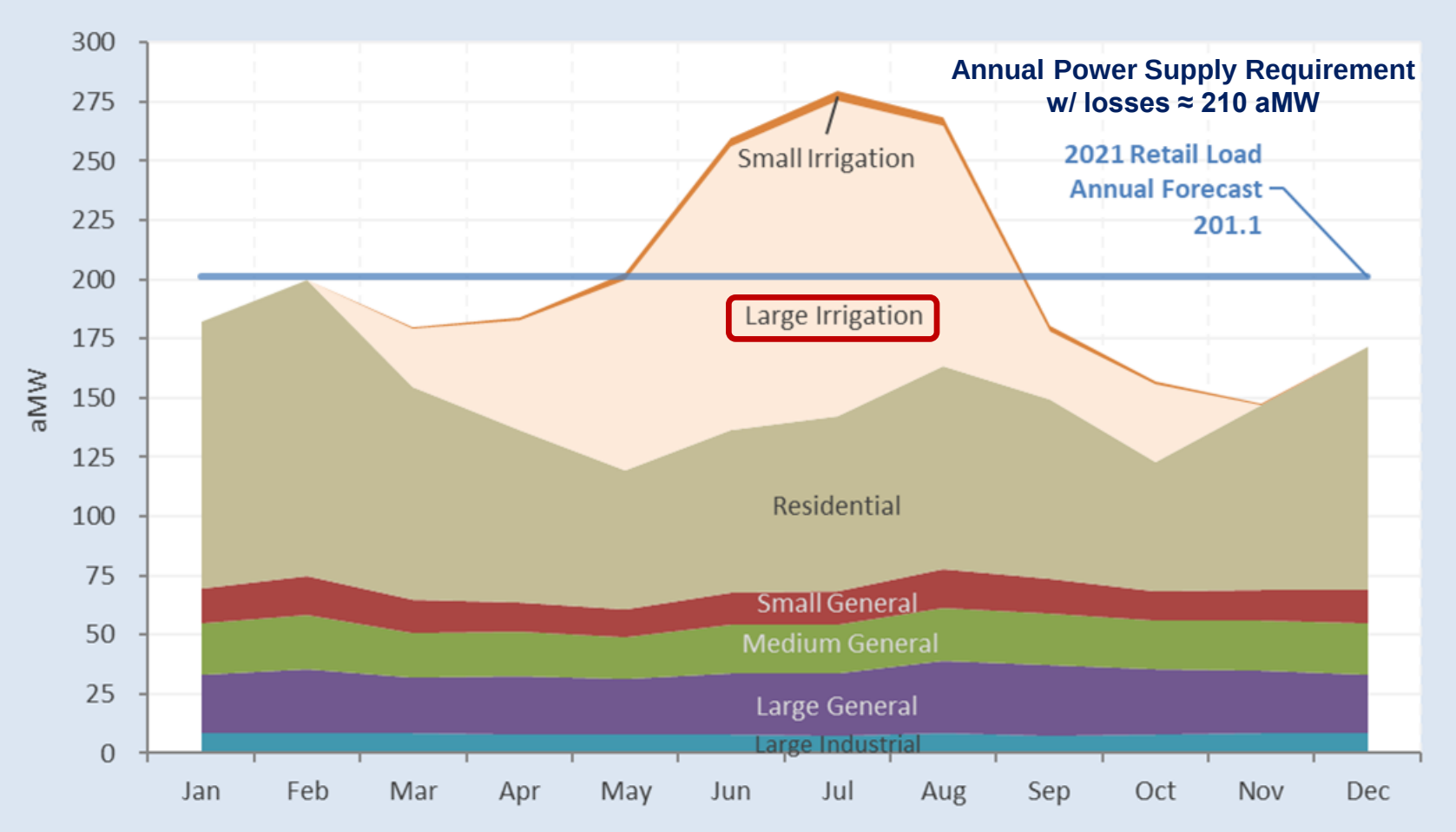


Service Connections: 55,725

- 939 Square Miles
  - Kennewick
  - Finley
  - Benton City
  - Prosser
- Irrigated Agriculture (24% of MWh)
- DOE Hanford – Minor Presence



Retail Load Shape – Very Summer "Peaky"



System Peak Hourly Load

Summer: 437 MW (2020)

Winter: 371 MW (2017)

BPUD Generation Resources

Natural Gas CCCT
50 MW Capacity Resource
Runs When Economic

FREDERICKSON
Capacity 250MW
Contract Expires 2022

Small Hydroelectric
3.7 MW
0.92 aMW

Packwood Lake Hydro
Capacity 27.5 MW
Terminates w/ 2 year notice

COLUMBIA GENERATING STATION
Capacity 1,207 MW
Included in BPA Generation Portfolio

BPA Slice/Block Contract
2.85% of FCRPS
192 aMW Firm Tier 1

Columbia River System Operations EIS
Reduced allocation by 8 aMW

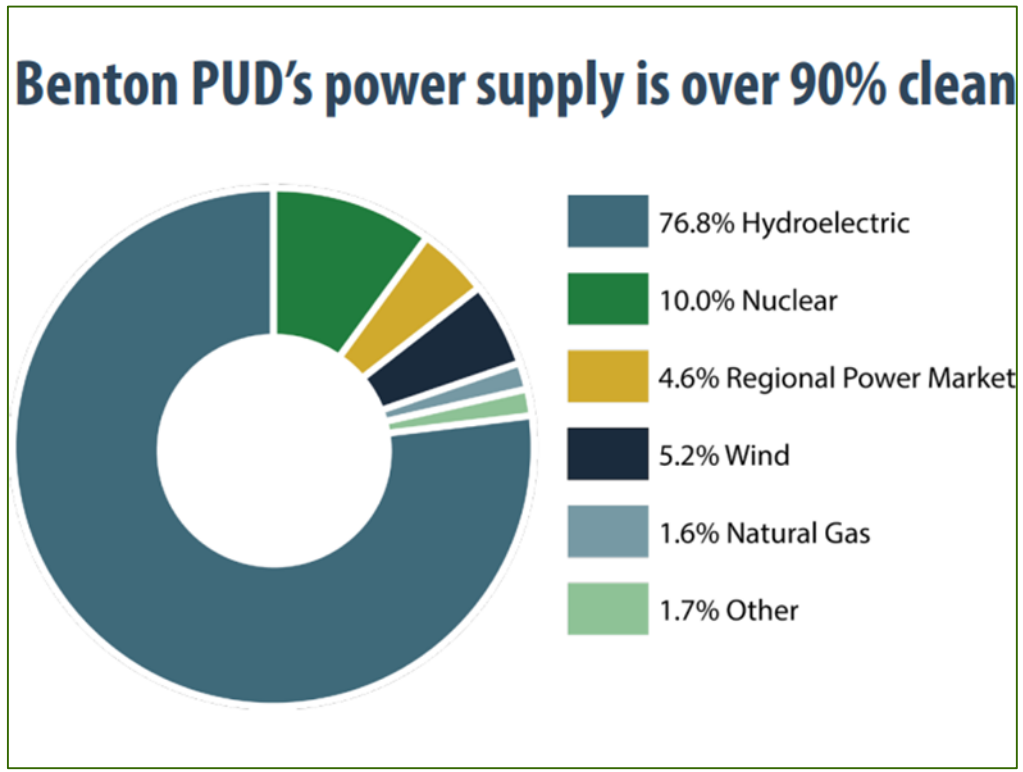
WHITE CREEK
Capacity 205MW
Contract Expires 2027

FEDERAL COLUMBIA RIVER POWER SYSTEM DAMS
Capacity 22,000+ MW
Contract Expires 2028

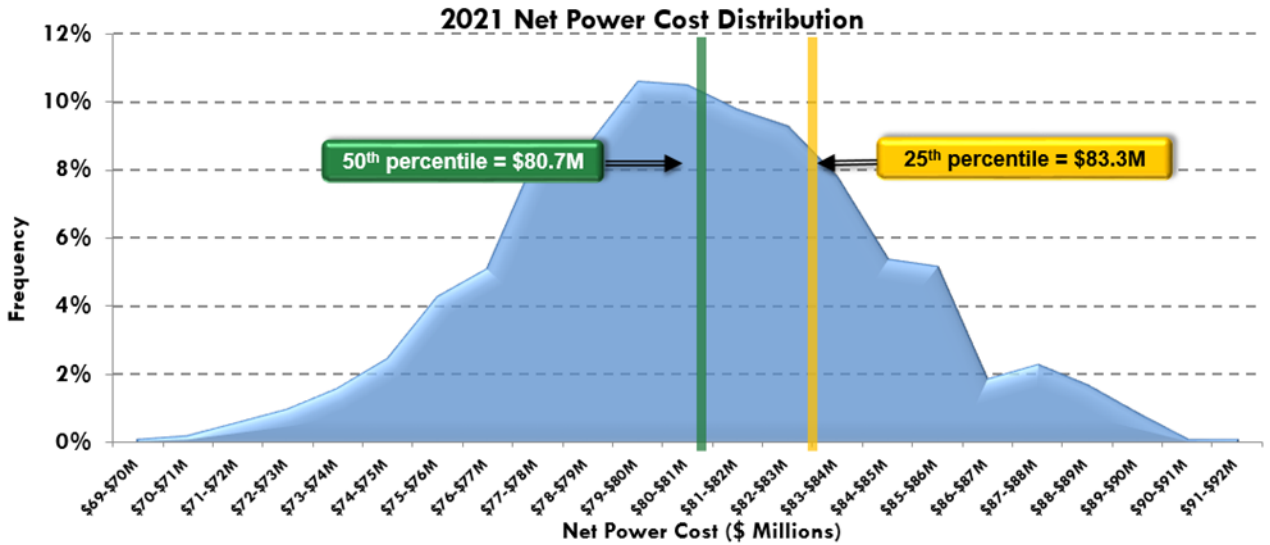
NINE CANYON
Capacity 96MW
Contract Expires 2030

Wind Power
18 MW
5.4 aMW

Current Fuel Mix and Net Power Costs



Net Power Cost = $80 to $90 million annually



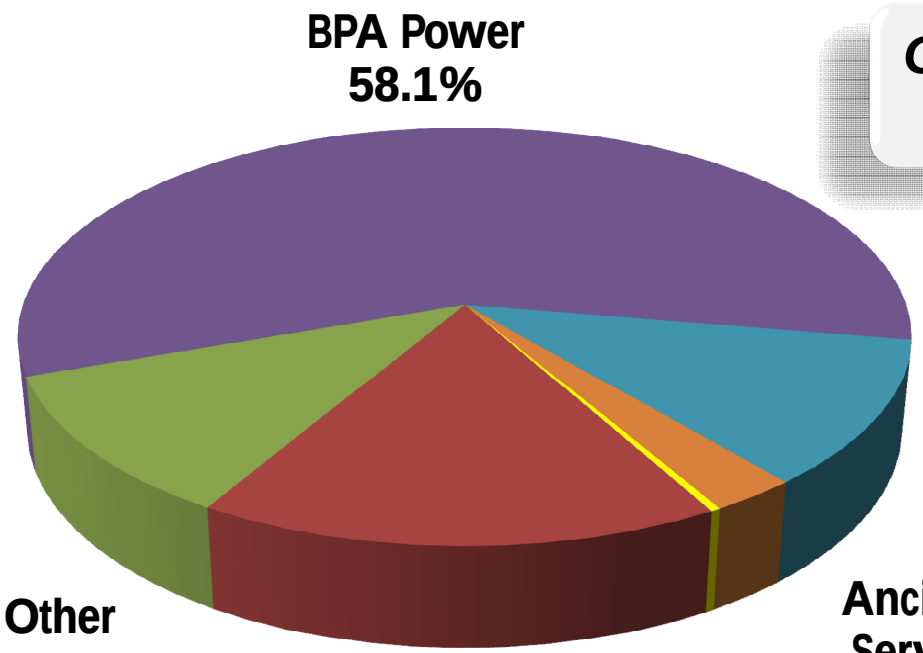
Realized costs depend on

- ✓ water for hydro
- ✓ shape of runoff
- ✓ load
- ✓ power market prices

Power Supply Cost by Source

Description	Amount
BPA Power	$60.9
BPA Transmission	11.8
Gross Fredrickson*	17.3
Renewables & Other	11.7
Ancillary & Net Conservation	3.2
Gross Power Supply	**$104.9**
Less: Secondary Market Sales	(22.5)
Less: Transmission Sales	(0.9)
Net Power Expense	**$81.5**

Usually, net seller on annual basis
- **Hydro & Frederickson NG Plant**
- **Buys down gross power costs**



Gross Power Supply
$104.9 million

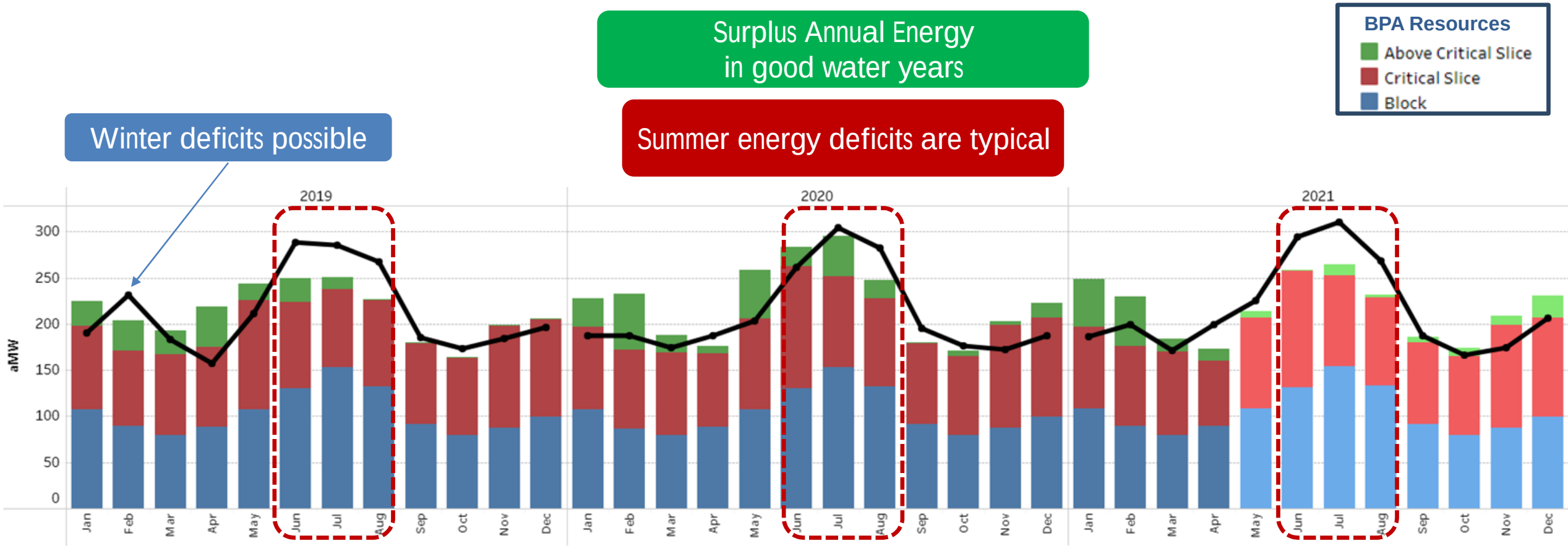
** Gross cost excludes the estimated secondary market sales from Frederickson (energy & gas) of $13.2 million resulting in net Frederickson costs of $4.1 million, which is 5.0% of net power expense.*

BPUD Load vs. BPA Resources: Monthly 2019-2021

Surplus Annual Energy
in good water years

Summer energy deficits are typical

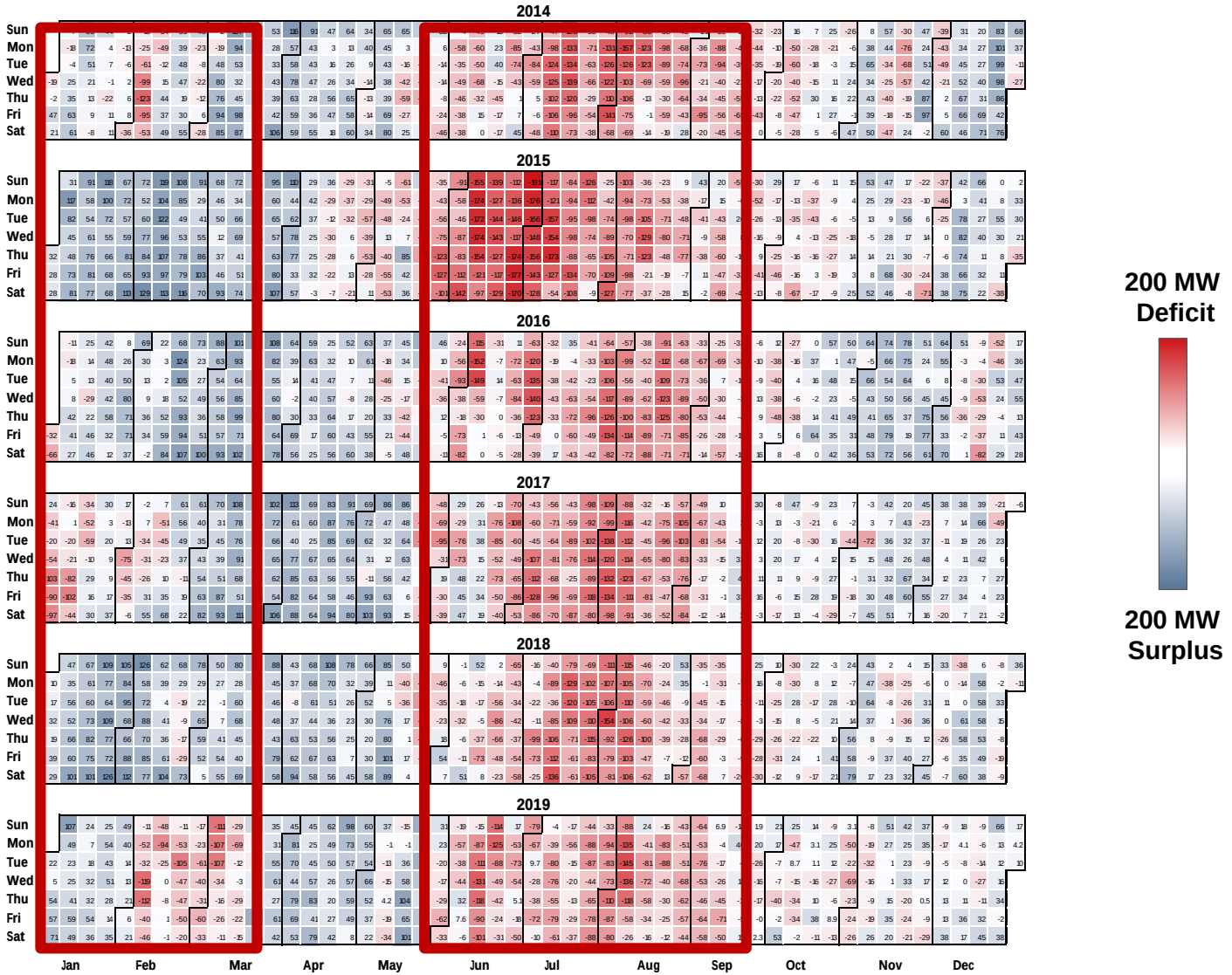
Winter deficits possible



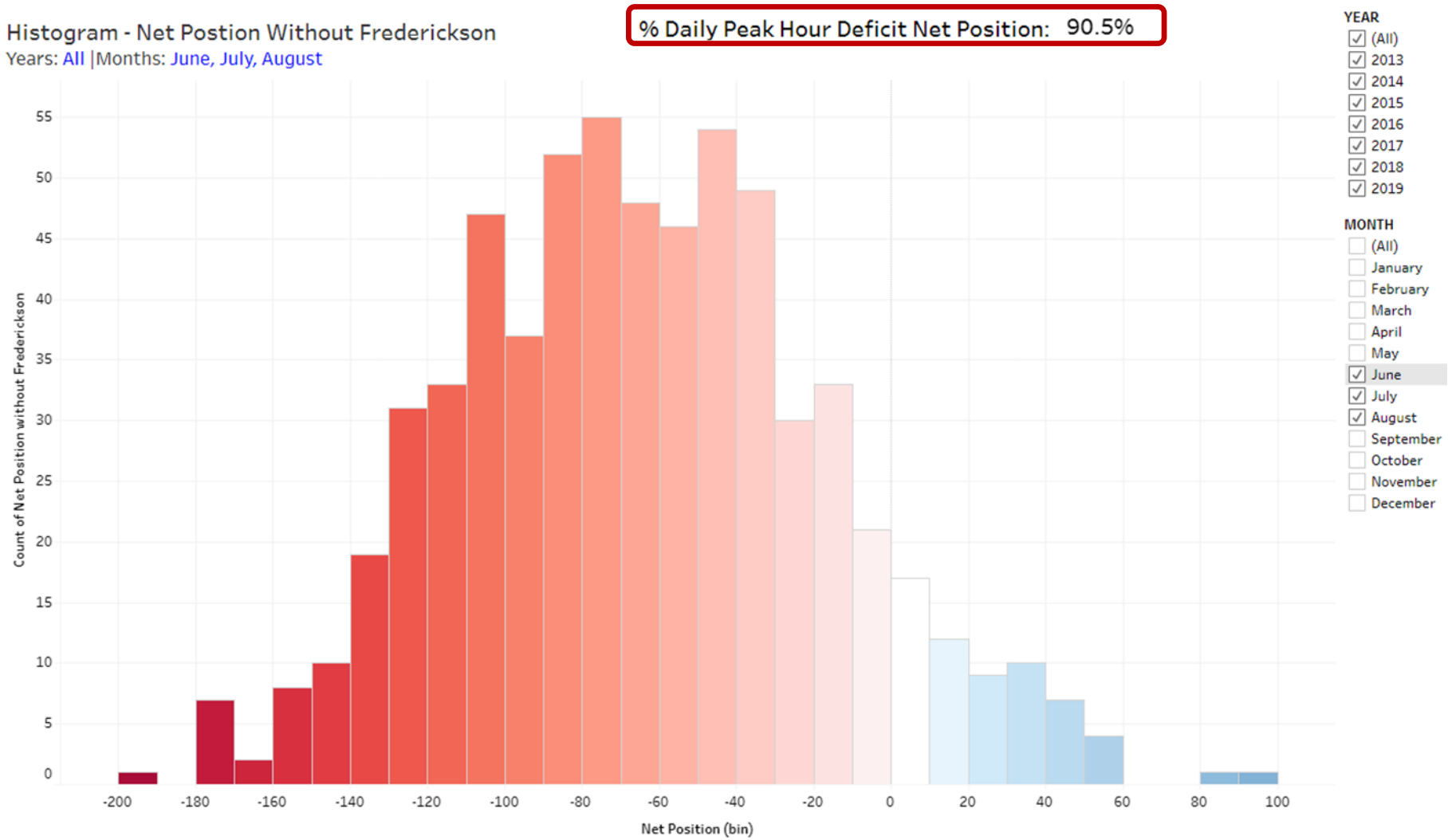
Capacity Needs – Daily Peak Hour Heatmap

Without existing or new capacity contracts

Significant and frequent summer deficits and periodic winter deficits



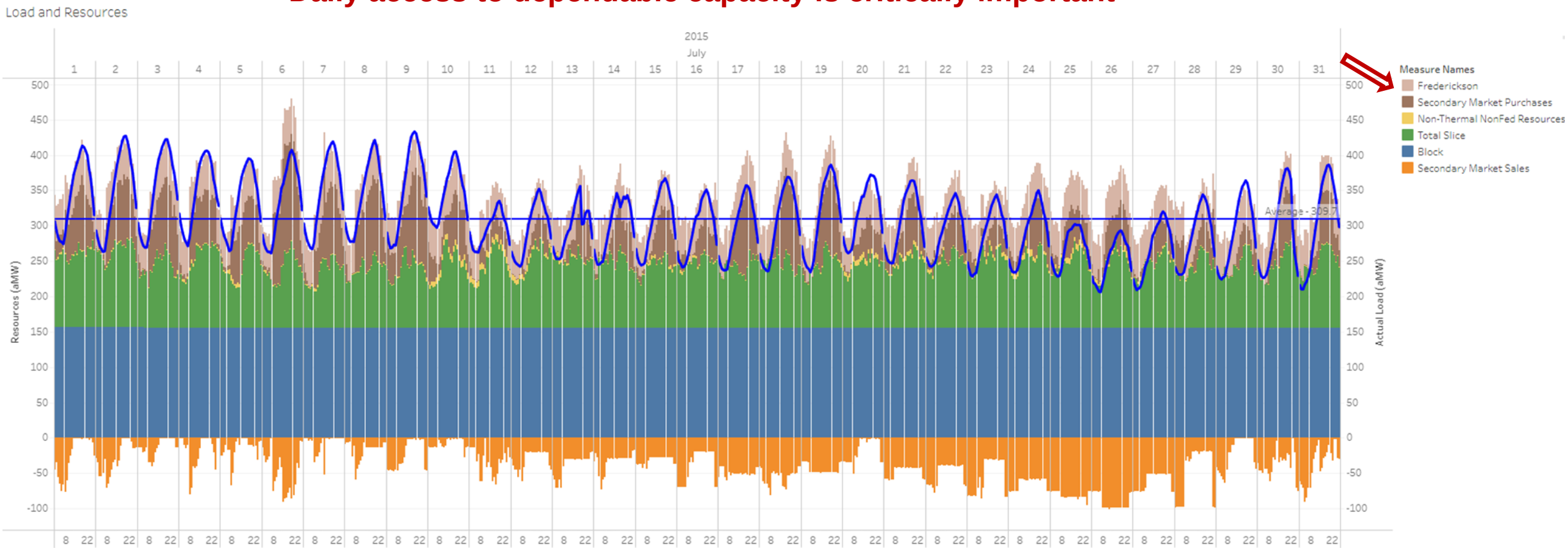
BPUD – Summer Peak Hour Capacity Deficits



- 90% of summer days have had capacity deficits

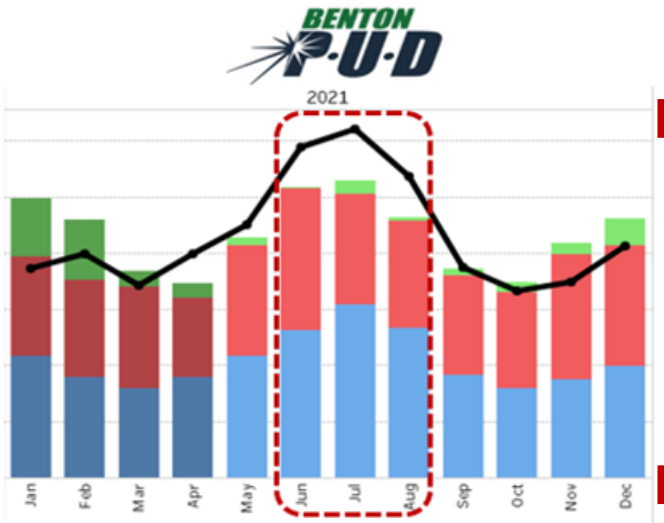
Capacity Planning for Worst Case: Drought/Heat

Daily access to dependable capacity is critically important



Managing Capacity Deficits: Existing Approach

BPA Slice/Block Contract +20-Year Process



Physical Load/Resource Balance

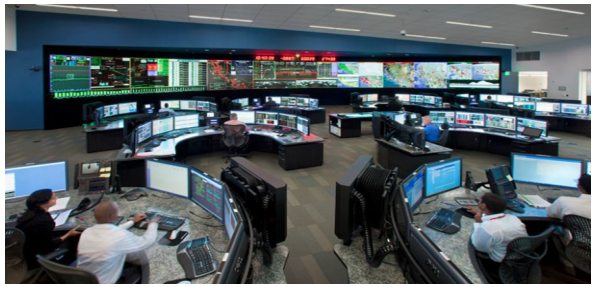
TEA THE EnergyAuthority

Financial Hedges

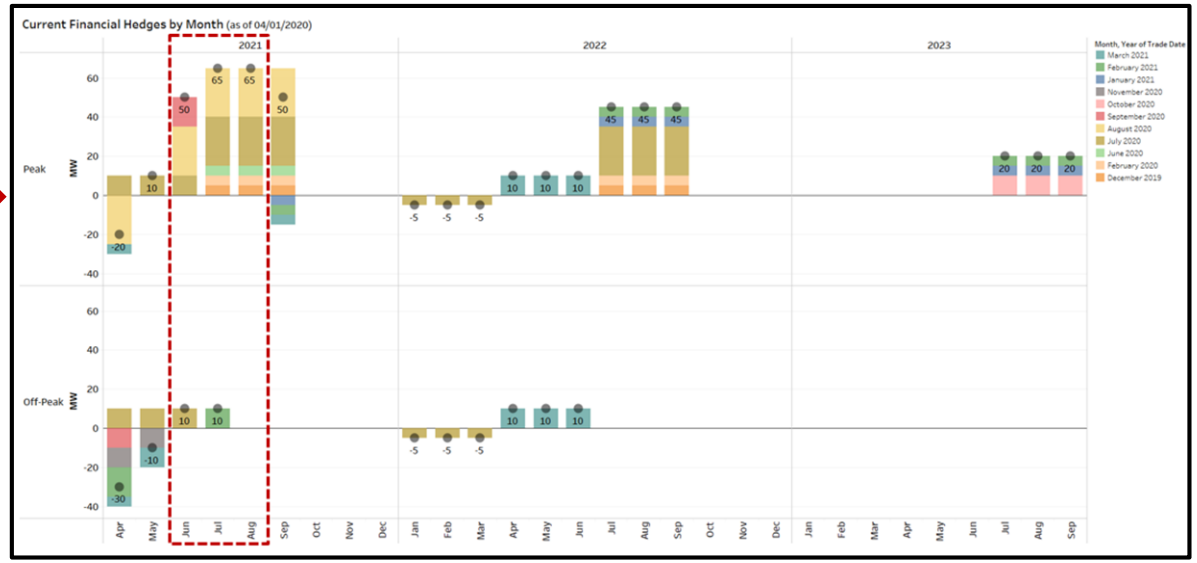
Forward Contract

Agreement

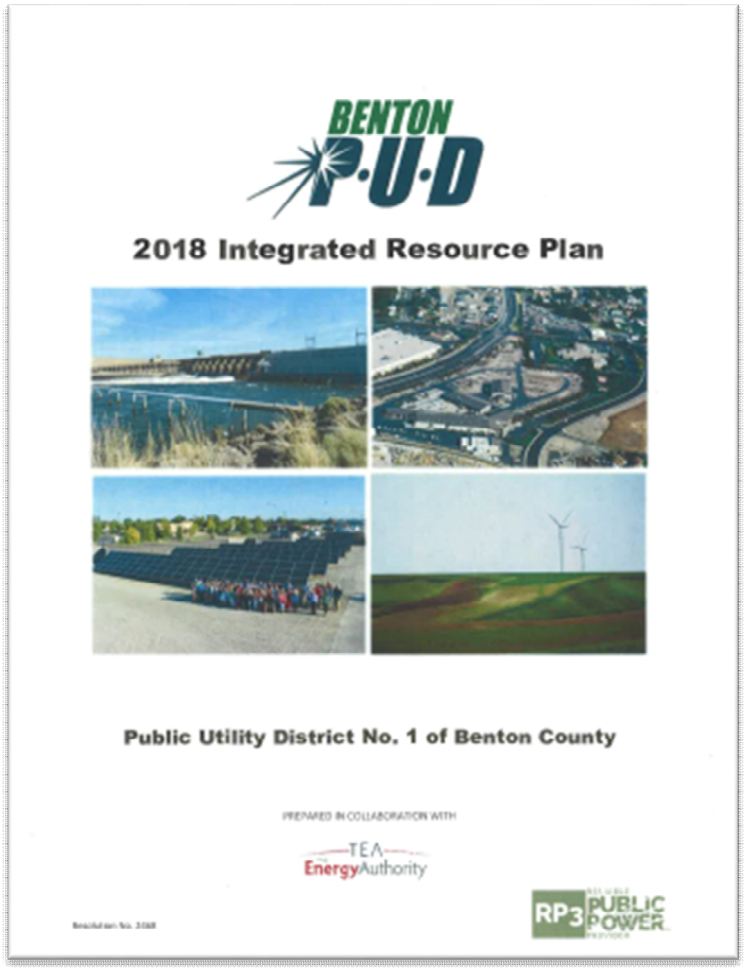
50 MW Call Option: Frederickson CCCT Contract Expires 2022



Unspecified Market Purchases



Capacity Planning Strategy: Integrated Resource Plan



- ✓ The District will continue to monitor the regulatory environment and modify its resource strategy as necessary.
  - The District will closely monitor proposed Washington State carbon initiatives and/or legislation and develop an analysis of the timing, impacts, and magnitude of any resulting carbon regulation.
- ✓ The IRP continues to identify the District's summer capacity deficits as an item to closely monitor as the region's coal plants are retired.
  - Develop a tactical plan for the future purchase of capacity products from the market that addresses timelines, products, counterparties, etc.
  - Monitor the Council's LOLP studies and consider longer term (3-5 year capacity products) in periods where the LOLP increases above 5%. See **Chapter 7: Capacity Requirements, Energy Storage, and Demand Response** for more detail about the possible actions listed below:

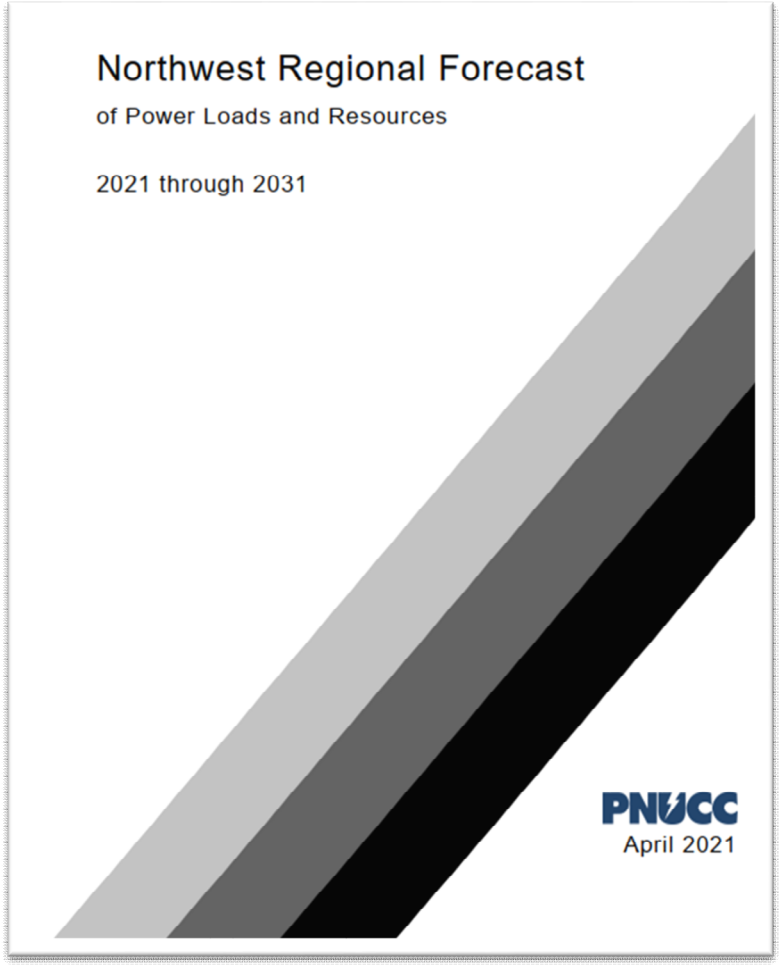
  - Monitor regional utilities plans to construct dispatchable resources. If plans to build lag what is recommended in their current IRPs, consider longer term capacity products.

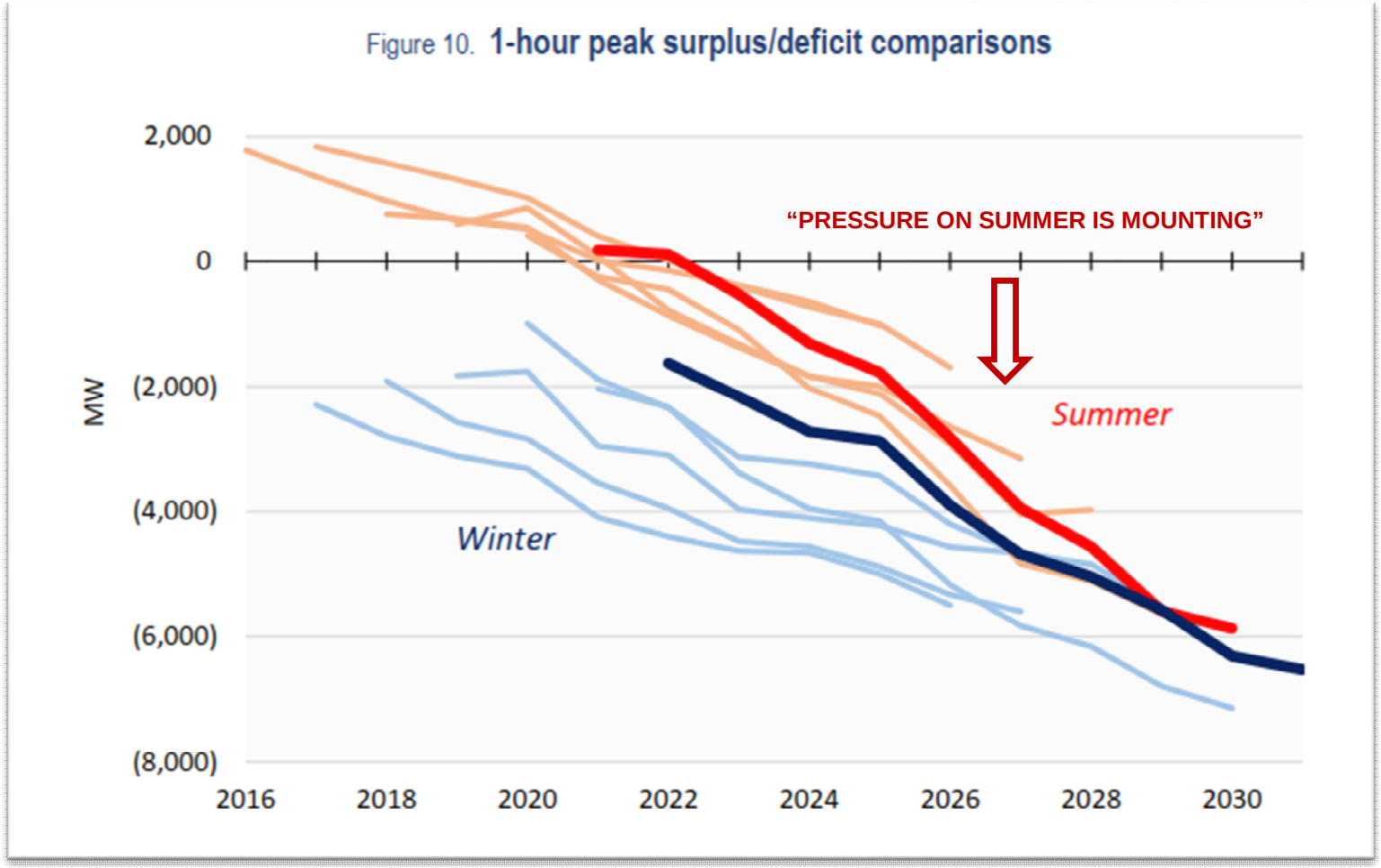
Capacity Planning Strategy: LOLP > 5%

- *"The earlier retirement of the Jim Bridger 1 coal plant increases the 2024 reference case LOLP from 8.2 percent to 12.8 percent and increases the 2026 LOLP from 17 percent to 26 percent."*

- *"Regardless of the analytical tool used to assess power supply adequacy, it is safe to say that the region will be facing a huge resource gap over the next decade."*

Capacity Planning Strategy: Another Warning





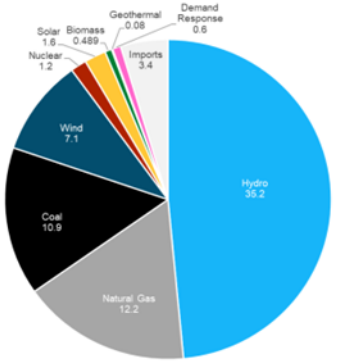
Capacity Planning Strategy: Another Warning

PacNW Existing Resources
2018

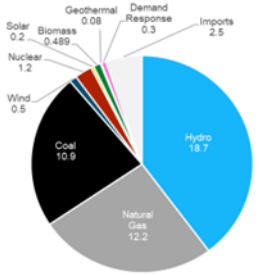
Load + Resource Balance (Greater NW = WA, OR, ID, parts of UT, WY)

Load			Load GW
Peak Load			42.1
Firm Exports			1.1
PRM (12%)			5.2
Total Requirement			**48.4**
Resources	**Nameplate GW**	**Effective %**	**Effective GW**
Coal	10.9	100%	10.9
Gas	12.2	100%	12.2
Biomass & Geothermal	0.6	100%	0.6
Nuclear	1.2	100%	1.2
Demand Response	0.6	50%	0.3
Hydro	35.2	53%	18.7
Wind	7.1	7%	0.5
Solar	1.6	12%	0.2
Storage	0	—	0
Total Internal Generation	**69.1**		**44.7**
Firm Imports	3.4	74%	2.5
Total Supply	**72.5**		**47.2**
Surplus/Deficit			
Capacity Surplus/Deficit			**-1.2**

Nameplate GW



Effective GW

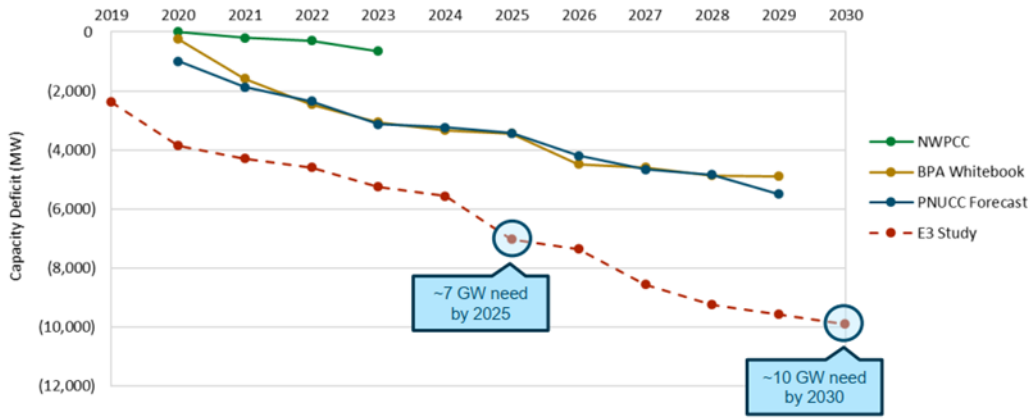


Fossil units are 1/3 of nameplate but 1/2 of effective GW

Source: E3 Resource Adequacy in the Pacific Northwest, 2019
Note: other top-down analyses (e.g. NWPCC) suggest need starting in the 2020-2021 timeframe.

PacNW Near to Mid-Term Capacity Need
Top-Down Forecast

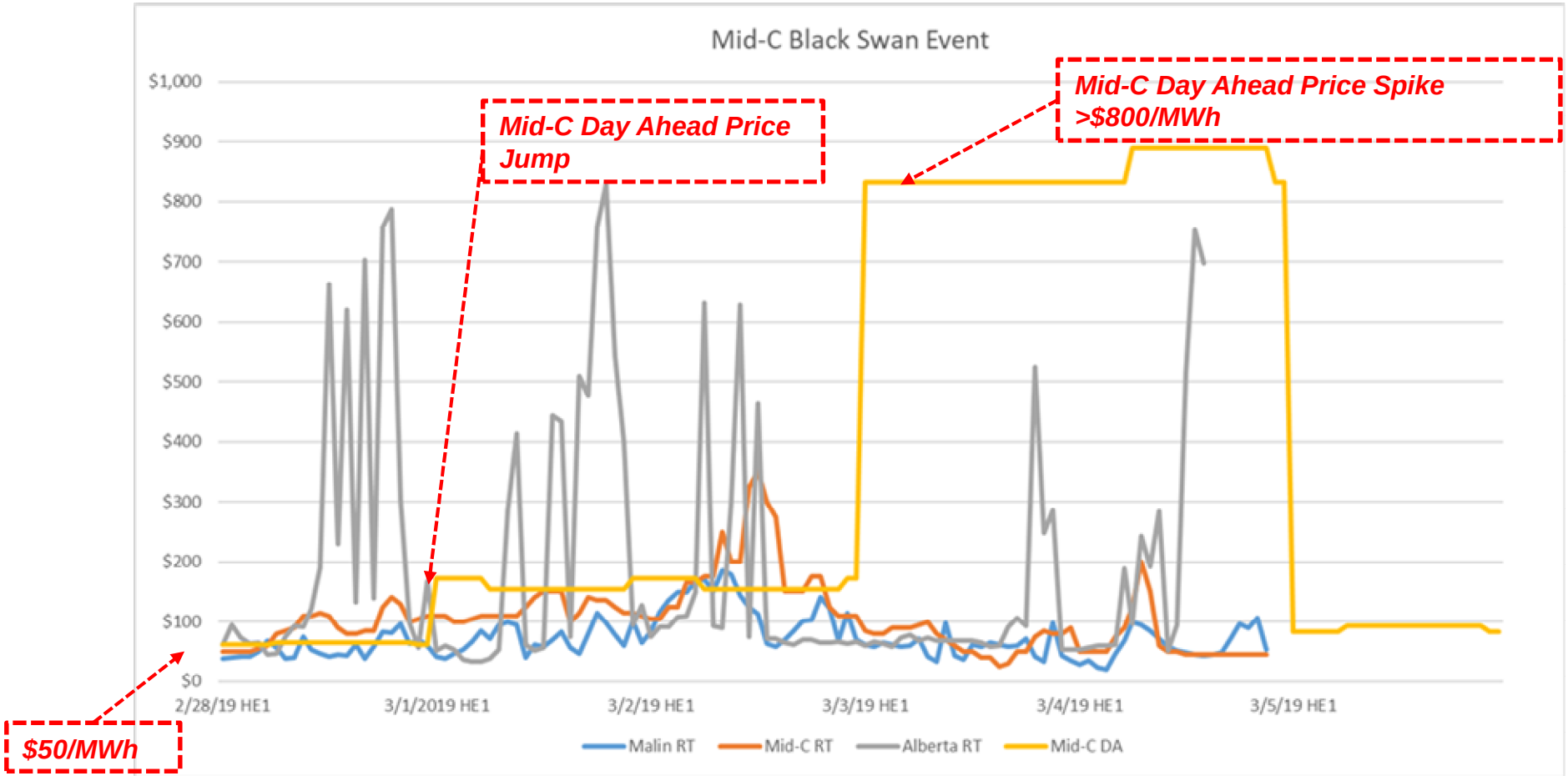
+ **Multiple regional assessments point to a near-term shortfall of winter-peaking physical capacity in the Northwest region**
  - Shortfall grows to ~5,000-10,000 MW over next 10 years



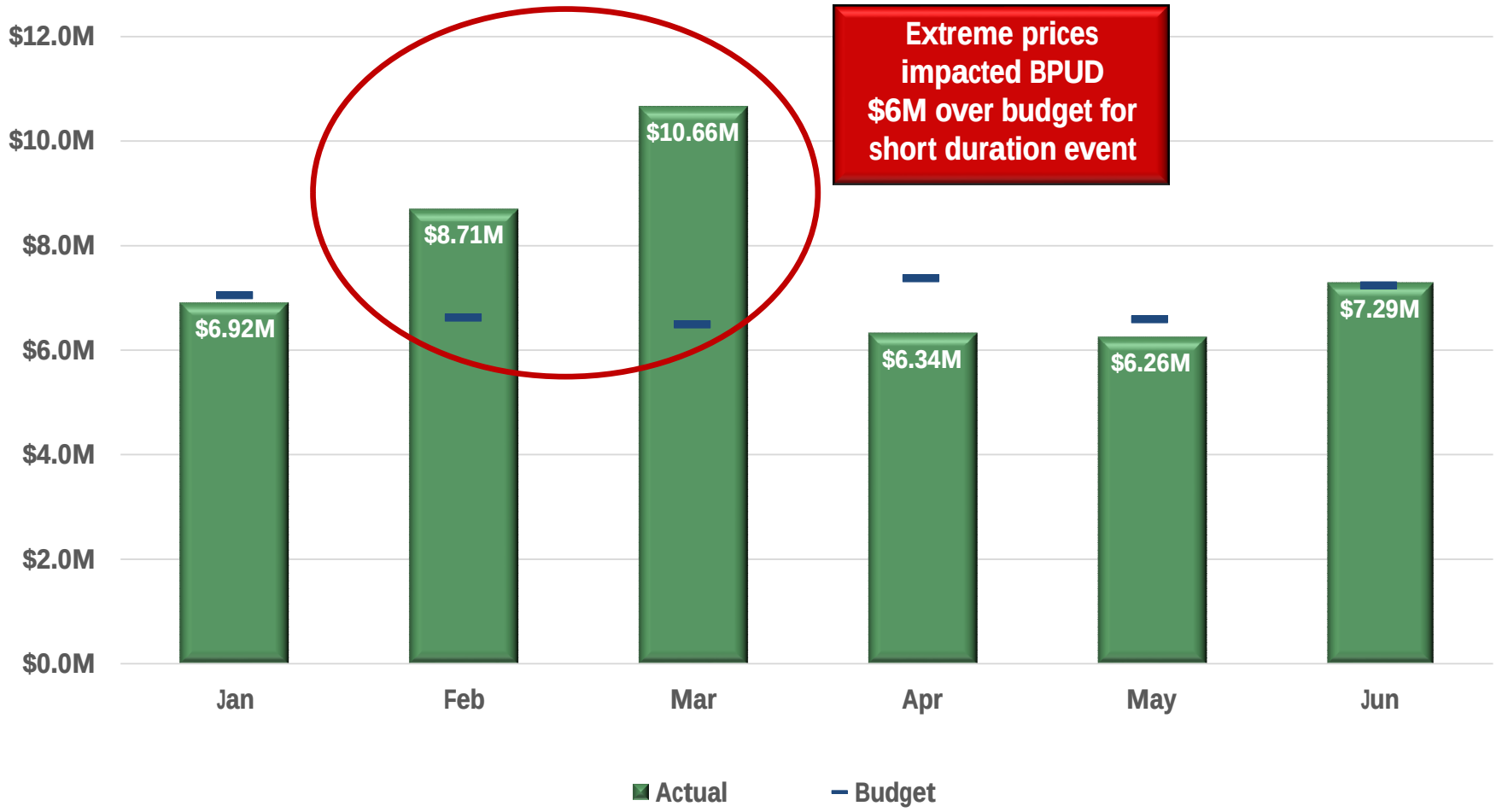
- Key differences are driven by PRM requirements, capacity counting methodologies, and resource additions (*see appendix for comparison of key assumptions*).
- E3 and NWPCC are truly "top-down" stochastic views, while PNUCC and BPA are closer to regional "bottom-up" analyses of utility IRPs.
- E3 study based on 2018 and 2030 RECAP LOLE modeling, shaped between those years based on forecasted coal-retirement schedules. This study updated previous analysis to include coal retirements from PacifiCorp's 2019 Draft IRP. E3's need does not incorporate any planned additions.

Capacity Planning Strategy: Defining Event

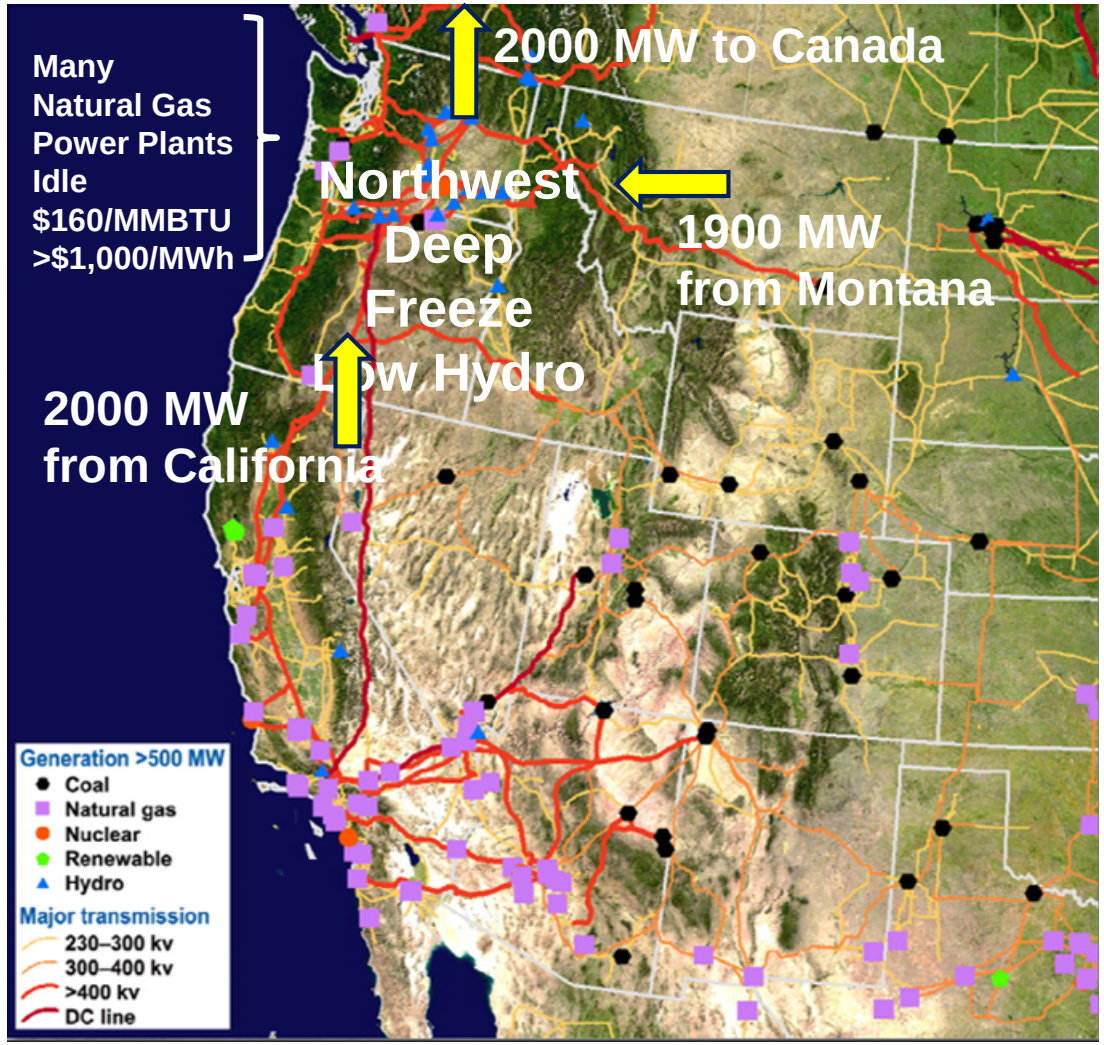
Winter 2019 Mid-C Price Spike



Power market volatility: Will summer look like winter soon?



2019 Power Market Spike: What would this look like without coal?



COAL-FIRED POWER PLANT STATUS		
Plant Name Capacity MW	**March 1 to 6 Power Production MW**	**Retirement Year**
Centralia (1/2) 1,340	500 – 1,250	2020/2025
Boardman 585	475	2020
Colstrip 2,094	2,000	2019 (614 MW)

Capacity Planning Strategy: CETA Impacts

Clean Energy Transformation Act (CETA)

On May 7, 2019, Governor Jay Inslee signed into law the Clean Energy Transformation Act (CETA) (E2SSB 5116, 2019), which commits Washington to an electricity supply free of greenhouse gas emissions by 2045.

- ✓ Effectively eliminates investments in new dispatchable generation (natural gas) by Washington utilities
- ✓ Increased sense of urgency to consider securing forward physical capacity from existing inventory
- ✓ New capacity must come from wind, solar, batteries and demand response

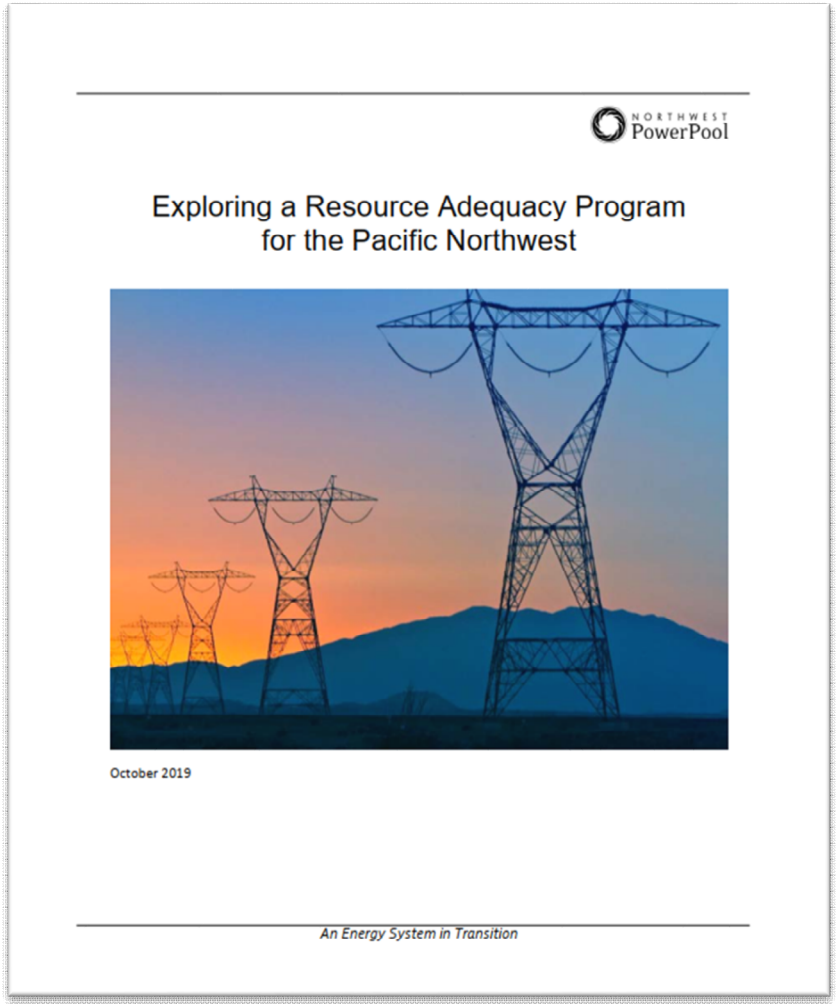
Capacity Planning Strategy: BPUD Takes Action

- ✓ **Request for Proposals Issued**
  - October 2019 & September 2020
  - Ultimate goal to cover capacity deficits of: **150 MW** July/August HLH & **50 MW** Winter HLH
  - Three or five-year terms (Fall 2022 through Fall 2028)

- ✓ **Solicited Marketers, Independent Power Producers, Utilities**
  - No direct responses from utilities
  - 4 combined total responses to both RFPs

- ✓ **Signed contract**
  - 75MW heavy load hours (HLH) July/August
  - 25MW HLH December/January/February
  - Term: December 2022 through August 2025

Capacity Planning Strategy: NWPP RA Program



- Highly supportive of effort – Great people & minds
- Qualifying Capacity Contribution (QCC) for each resource
  - Wind and Solar Effective Load Carrying Capability (ELCC)
  - E3 Study for 2018 Expanded Northwest Resource Mix
    - Wind ELCC = 7%
    - Solar ELCC = 12%
  - NWPP will assign monthly QCC by zones (**critically important**)
- Replacing thousands of megawatts of dependable coal capacity will require tens of thousands of megawatts of wind and solar
  - $ investments in the tens of billions
  - Project development, permitting and construction time
  - What about new transmission lines?
  - Land use issues (NIMBY)
- Will RA program deliver new generation resources in time to avoid blackouts?
  - LOLP already too high

Capacity Planning Strategy: NWPP RA Program

- Solving capacity deficits with “energy resources” like wind and solar presents significant challenges

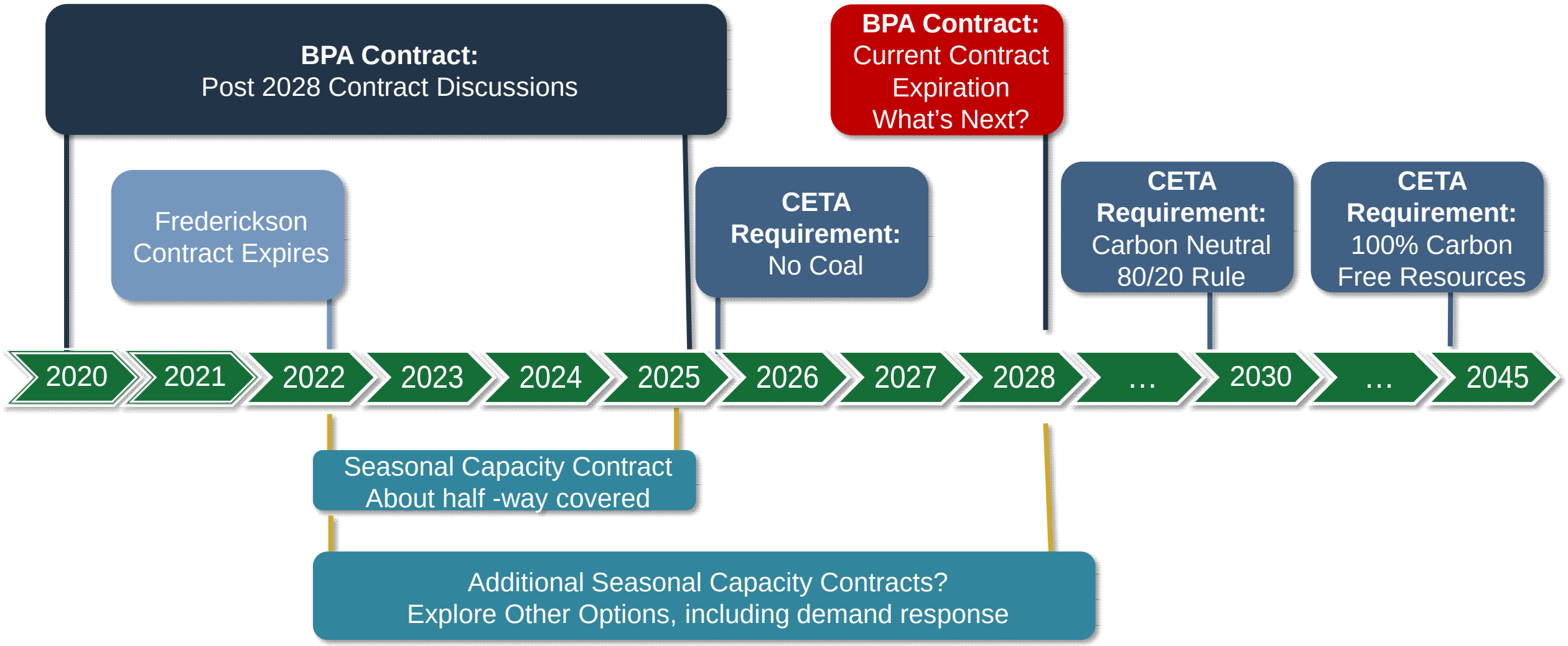
- How will Benton PUD access QCC credits from wind and solar without buying all-year, long term energy we don’t need?

  - 150 MW @ ELCC = 15% requires 1,000 MW Investment (CapX > $1 billion)
    - Wind @ 30% C.F. = 300 aMW of annual energy
    - Solar @ 20% C.F. = 150 aMW of annual energy

- Hard to believe seasonal QCC credits will be available for purchase from existing natural gas or hydro

  - Studies have already shown need for new natural gas
  - 7 month forward showing means next summer season capacity must be procured by October 31st of prior year (before water year has begun)
  - BPUD initial seasonal capacity RFPs provide some indication (but we are a small player & were early)

Benton PUD Path Forward



Final Thoughts

- Hard to accept double digit LOLP % and an increasingly fragile northwest grid
  - In part to reduce Washington state electricity sector GHG emissions by an amount representing 0.35% of national inventory
- Commerce should consider report to legislature prior to January 1, 2024
  - NWPP RA analysis should answer many questions
    - Including potential role for natural gas
    - It would be best to start the debate sooner than later

Pray for Rain and Mild Weather

"Murphy's law predicts that the next low water year in the PNW will arrive in 2025 as peak coal plant retirement occurs and the PNW IRPs defer decisions on construction of new resources waiting for the next cost reduction in carbon free capacity."

Randy Hardy and Larry Kitchen, July 2019

Questions?