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Tacoma Power 2024 IRP:
Introduction & Preliminary Findings

July 10, 2024

About our Integrated Resource Plan

About our Integrated Resource Plan (IRP)

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An integrated resource plan is:

- A plan for providing reliable and low-cost power in an uncertain future
- Required by Washington State law (19.280 RCW)
- Updated every two years
- Consistent with Tacoma Public Utility Board's guiding principles

Our last IRP was completed in 2022, and the current IRP is due September 1, 2024

Link to IRP webpage: https://www.mytpu.org/about-tpu/services/power/integrated-resource-plan/

What do we mean by “integrated”?

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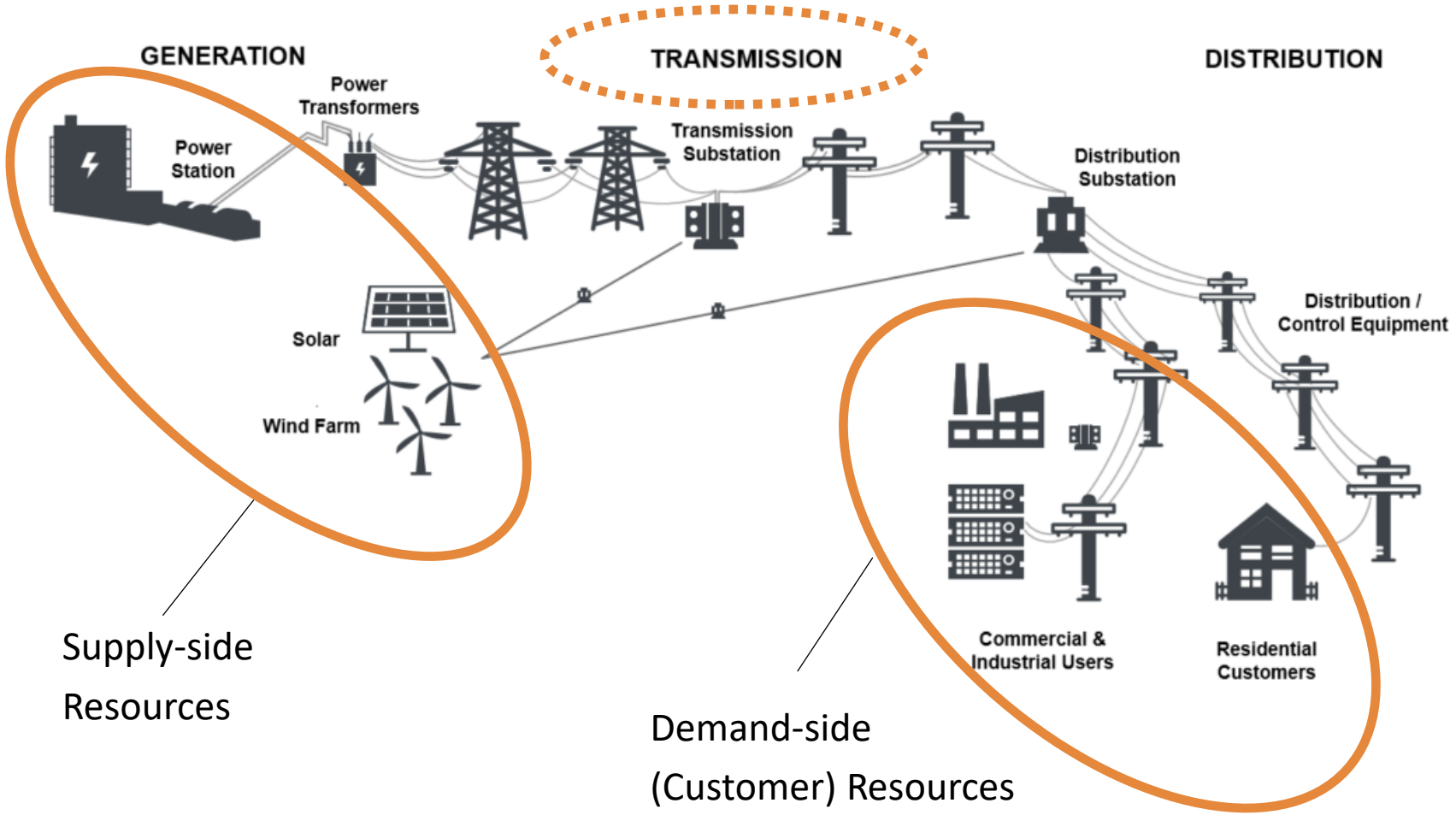
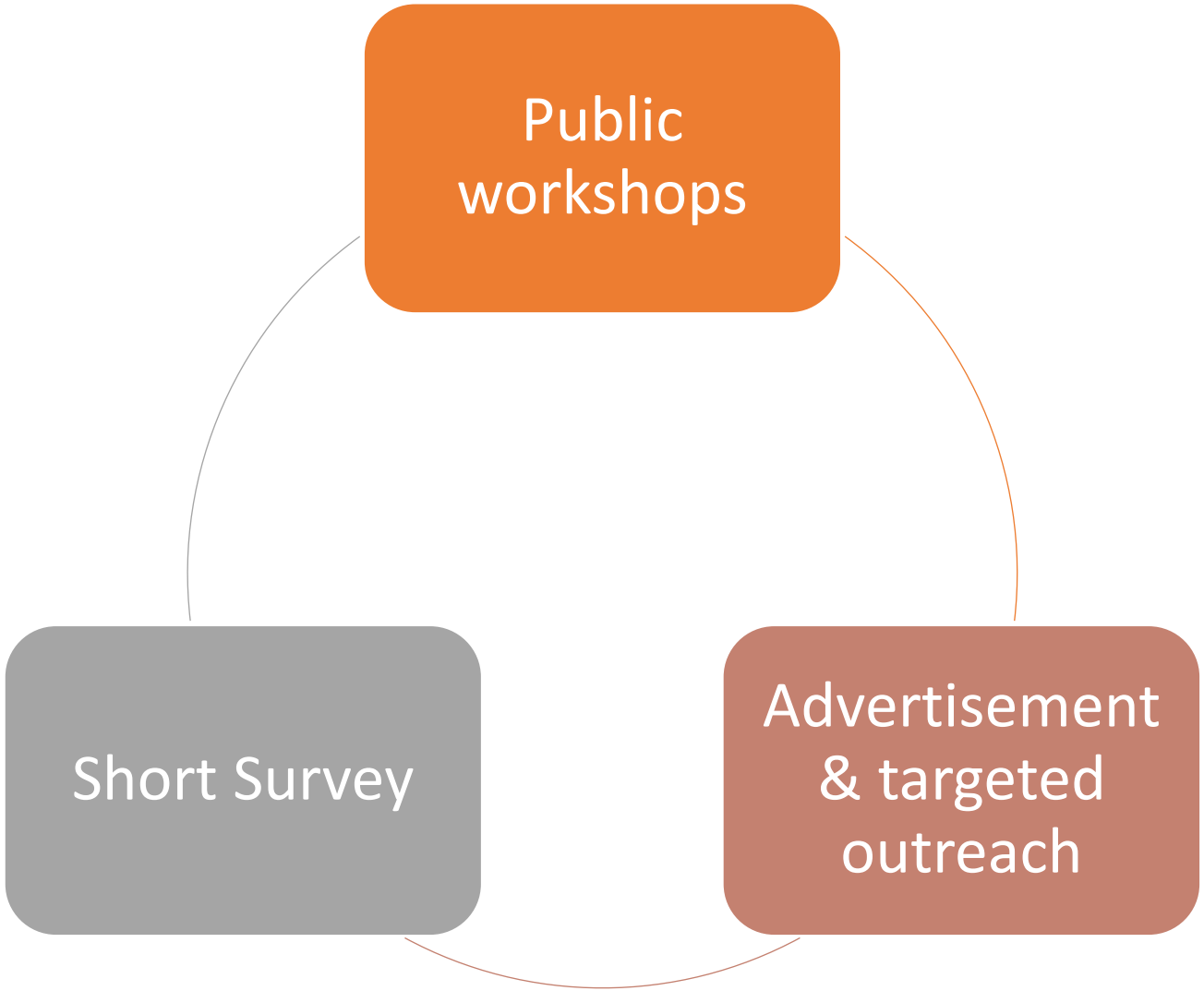


How do we engage with the community?



What did we hear at the IRP workshops?

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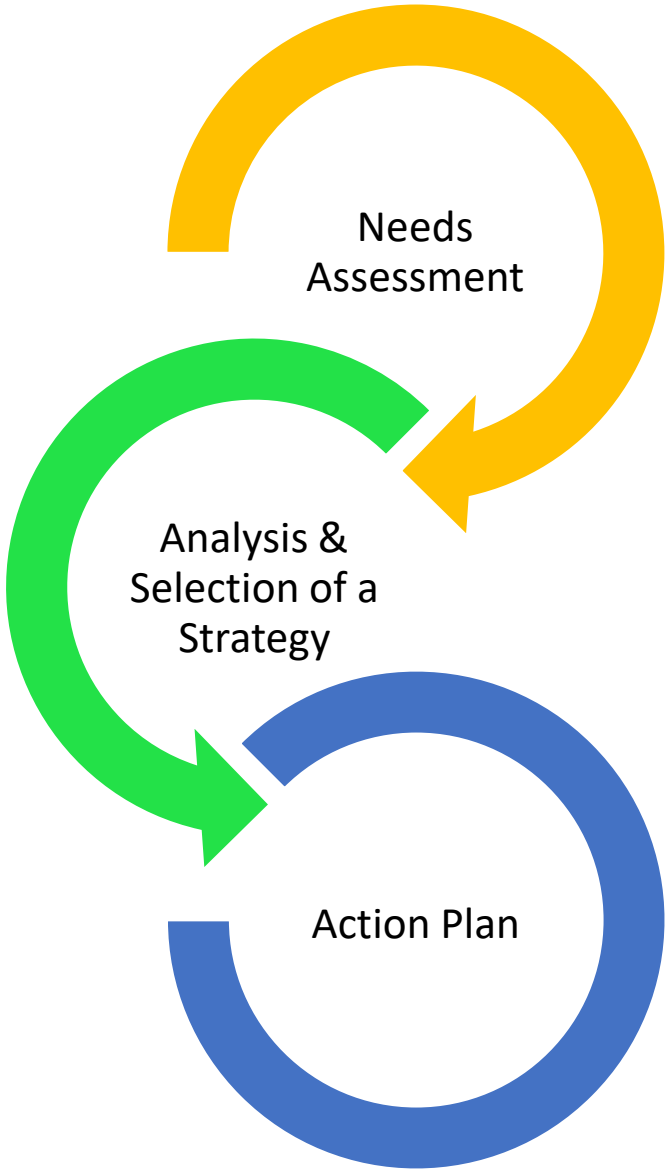
Feedback received

- Tacoma Pierce Health memo recommending additional indicators to embed health equity into resource planning process
- Interest in ensuring we incorporate other non-energy benefits and equity impacts into our analyses of demand-side resources (energy efficiency & demand response)
- Interest in official certification of clean energy supply

Opportunities for collaboration identified

- JBLM siting of resources
- Increased coordination between Tacoma Power energy efficiency programs and Tacoma Pierce Health

Overview of IRP Process



Do we have enough resources to meet our load under ***most*** conditions?

Which set of resources best meet our needs, risk tolerance and values?

What are our next steps?

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If you are sure of tomorrow, there is no fool greater than you!

Mehmet Murat ildan

Uncertainties we plan to address in our IRP

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Weather	• Multiple different water and temperature conditions • Accounts for climate change
Customer demand	• Different possible levels of building and vehicle electrification • Industrial load growth (e.g. data centers)
The grid	• Different levels of demand and supply of energy on the grid
Other risks	• What if restoration of Riffe Lake elevation takes longer than planned?

Spotlight on electrification

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What is electrification?

- Powering things with electricity – replacing an existing nonelectric fuel (heating systems, vehicles, etc.)

Why does it matter for the IRP?

- Electrification has potential to add significantly to customer demand
- Tacoma Power must be prepared to meet the demand

ELECTRIC VEHICLES

Buckle up: Climate law to turbocharge sales of electric trucks and buses

The Inflation Reduction Act's tax credits, grants and loans could accelerate commercial EV adoption and boost U.S. manufacturing.

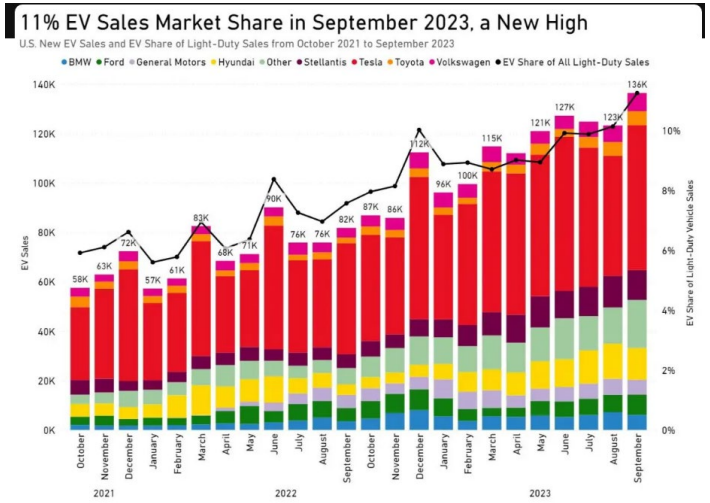
Washington legislators again mandate 100% electric new car sales by 2030

Published March 14, 2022

DIVE BRIEF

US residential heat pump sales pass gas furnaces for first time as interest in efficiency tech surges: IEA

Published June 7, 2023



Tacoma Power electrification study

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- Addresses multiple segments

Buildings **Industry** **Transportation**

- Considers multiple realistic scenarios

Current Landscape	Anticipated Electrification	Expansive Policy	Policy Regression
Possible low level of electrification	Possible high level of electrification	Unlikely high level of electrification	Unlikely low level of electrification

- Report completed in 2023 and available on IRP webpage

https://www.mytpu.org/about-tpu/services/power/integrated-resource-plan/

Spotlight on data centers

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Why does data center growth matter for the IRP?

- Has potential to add significantly to customer demand
- Tacoma Power must be prepared to meet the demand
- Size and timing of increases in Tacoma Power's service area is highly uncertain

Global data center electricity use to double by 2026 - IEA report

AI and cryptocurrency workloads are driving up demand

January 26, 2024 By: Matthew Gooding Have your say

U.S. Data Center Demand Will Double by 2030

Data center industry will grow to 35-gigawatt capacity to meet power needs of AI.

By **Jack Rogers** | January 11, 2024 at 07:08 AM

DIVE BRIEF

US electricity load growth forecast jumps 81% led by data centers, industry: Grid Strategies

Data from FERC Form 714 shows grid planners expect nationwide power demand to grow 4.7% over the next five years, compared to a previous estimate of 2.6%.

DIVE BRIEF

AEP faces 15 GW of new load, driven by Amazon, Google, other data centers: interim CEO Fowke

Load growth in Ohio is sparking talk of letting the state's utilities own power plants again, Ben Fowke, AEP interim CEO, said Tuesday.

Spotlight on Bonneville Power Administration (BPA) contract

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About BPA

- Federal power marketing agency for 21 US Army Corp of Engineer Dams, 10 Bureau of Reclamation Dams, Columbia Generating Station (nuclear) and several small wind generation contracts
- Has a federal mandate to sells power at cost to public utilities
- Offers a variety of power products that utilities can choose from

About our contract with BPA

- Current contract expires September 2028

About the next contract

- We are expected to sign a contract by December 2025
- Many contract terms will not be settled before completion of 2024 IRP

Our resource position

Early findings

Reminder of how we measure our position

Peaking capacity

- Ability to meet high demand for **a few hours**

Sustained capacity

- Ability to meet high demand **over multiple days**

Monthly energy

- Ability to meet demand **over the course of a month** under low water conditions

100 meter sprint

5,000 meter run

Marathon

Summary of findings

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Energy position

Marathon

Our **winter** energy position is nearly adequate under all electrification scenarios and entirely adequate after restoration of Riffe Lake elevation.

Our **summer** energy position is likely to degrade over time due to the impacts of climate change. Certain BPA product offerings will make our summer energy position worse.

Sustained capacity

5,000 meter run

Our sustained capacity is compromised by mid to late 2030's if Riffe elevation is not restored and/or we experience aggressive electrification

Peaking capacity

100 meter sprint

We pass our resource adequacy standard for physical capacity, but extreme event analysis indicates shortfall is possible (though rare).

The magnitude and likelihood of an extreme event shortfall is higher under certain BPA products, under higher electrification and if Riffe elevation is not restored

What does this all mean?

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1. We **do not** have an acute or imminent need for additional sources of power generation or storage if we select BPA Slice/Block product in next contract

- A potential need emerges only in mid to late 2030's and only under certain future conditions
- Occasional summer energy shortfalls are likely but may be handled at a lower cost through occasional wholesale market purchases
- Winter capacity shortfalls are possible under extreme conditions but would be better handled through increased preparedness

2. We **might** find we need additional sources of power generation or storage if we see:

- Undesirable BPA product offerings
- Extended difficulties with restoring Riffe Lake
- Accelerated electrification
- Data center load growth

3. We **do** need to be prepared

- Actively track our "risk factors"
- Find incremental "no regrets" opportunities to improve our position
- Improve our preparedness for low-probability, high-impact events

Resource Strategy Recommendations

Draft resource strategy recommendations

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BPA

- **Continue to purchase Slice/Block product if possible**
  - Puts us in the best summer energy position
  - Puts us in the best peaking capacity position
  - Lowest cost because we manage resource balancing risks with our own hydro resources
- **Lowest cost because we take on risk**

Add New Generation or Storage

- Wind
- Solar
- Short-duration battery
- Long-duration battery
- Nuclear
- Closed loop pumped storage
- **Explore pumped storage at Cowlitz River Project**
- **Explore incremental capacity additions at existing dams during generator rebuilds**

Demand-side Management

- **Help customers save even more energy (conservation)**
- **Help customers shift when they use energy (demand response)**
- Help even more customers generate their own energy (rooftop solar)

Other Options

- **Continue to adjust wholesale marketing practices to be more risk averse and preserve more water/generator capacity for our own customers' demand**
- **Rely on wholesale market for occasional summer energy needs in medium run and evaluate continuing this strategy in long-run**

Next steps

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July 24

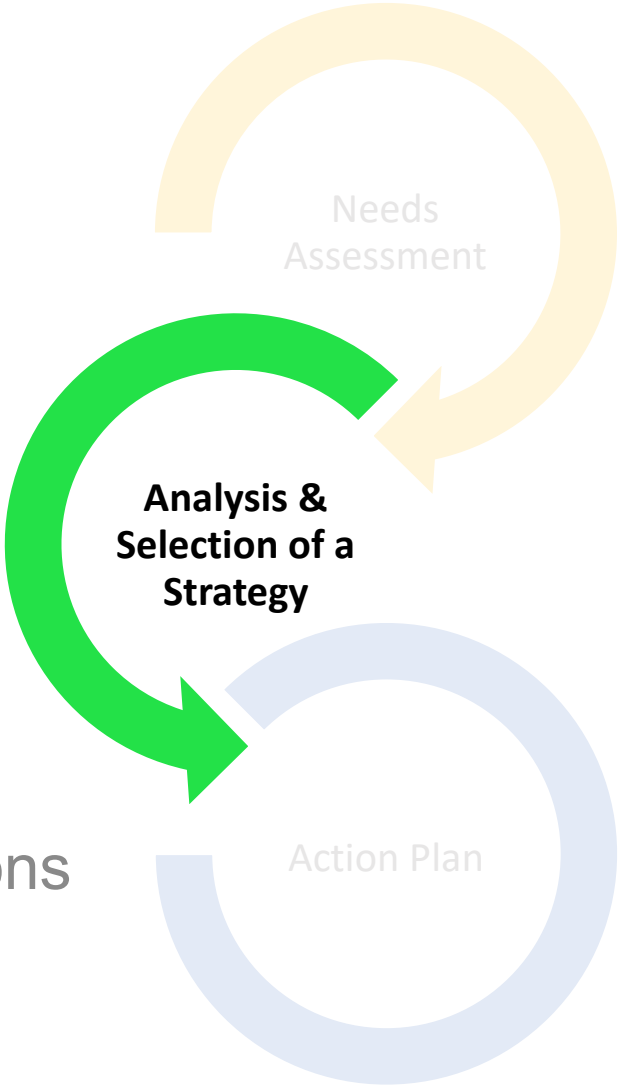
Study session:
Updated recommendations + draft action plan

August 14

PUB Meeting:
Request formal approval of IRP

September 2

Submit IRP to Department of Commerce



Appendix

Overview of supply and demand-side resource options

Resource options available today or with promise of being available within the next 10 years

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Utility-scale Generating Resources	Utility-scale Storage Resources	Demand-side (Customer) Resources
• Wind • Solar • Nuclear	• Short-duration battery • Long-duration battery • Pumped storage	• Rooftop solar) • Energy efficiency/ Conservation • Demand response

Characteristics we care about

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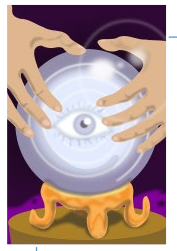

Predictability

- Do we know when it will be available?

Dispatchability

- Can we control when it is available?

Sustained Peak Availability

- Is it available for a long time during peak demand?

Winter availability

Summer Availability

Emissions Profile

- How little carbon (or other pollutants) does it emit?

Community Acceptance

- Will Tacoma Power community or host community welcome it or resist it?

Transmission requirement

- How easy is it to get the power to Tacoma Power?

Technology Readiness

- Is the technology widely available today? Is it likely to be ready soon?

Cost

There are many components to the overall cost of each option

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- Build cost
- Financing costs
- Operations and maintenance
- Fuel (if it uses fuel)
- Transmission
- Cost to “firm up” intra-hour variability of supply
- Social cost of carbon (if it emits carbon)

These costs are reflected in the following slides

Plus a few benefits that add value

- Avoided costs of complying with WA Energy Independence Act
- Expected revenues from selling power at times when we have more than we need

Utility-Scale Generating Resources

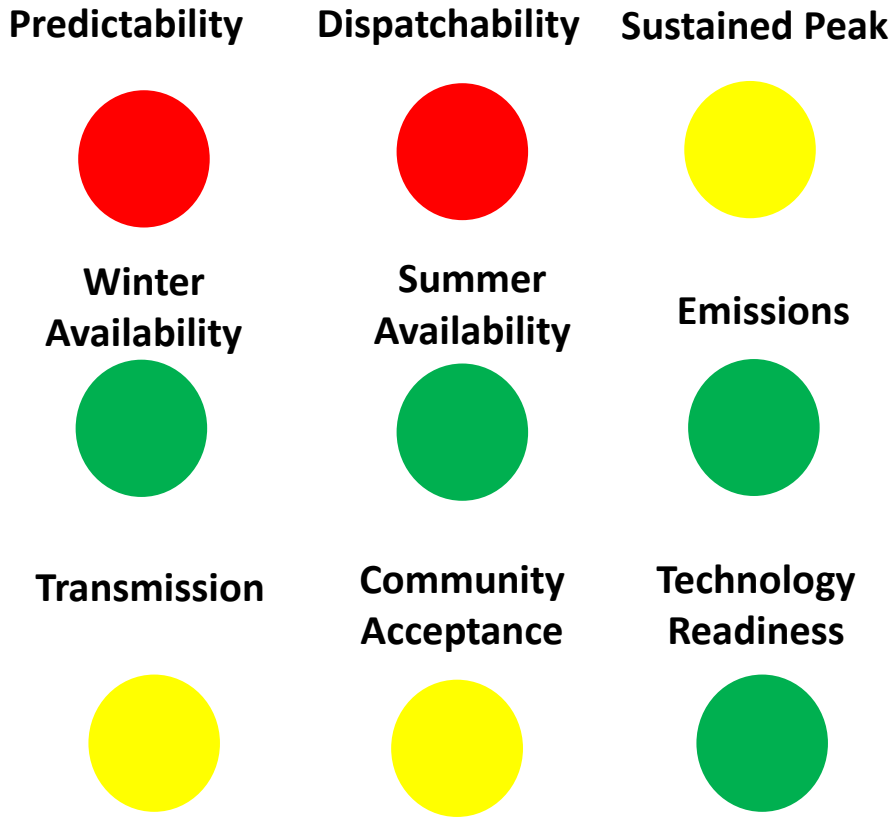
Appendix

Onshore wind

Creative Commons image

Cost Type	Cost ($/MWh)
Energy	$56
Transmission	$9
Firming	$47
Total Cost	**$112**

*Costs are approximate based on publicly available data.

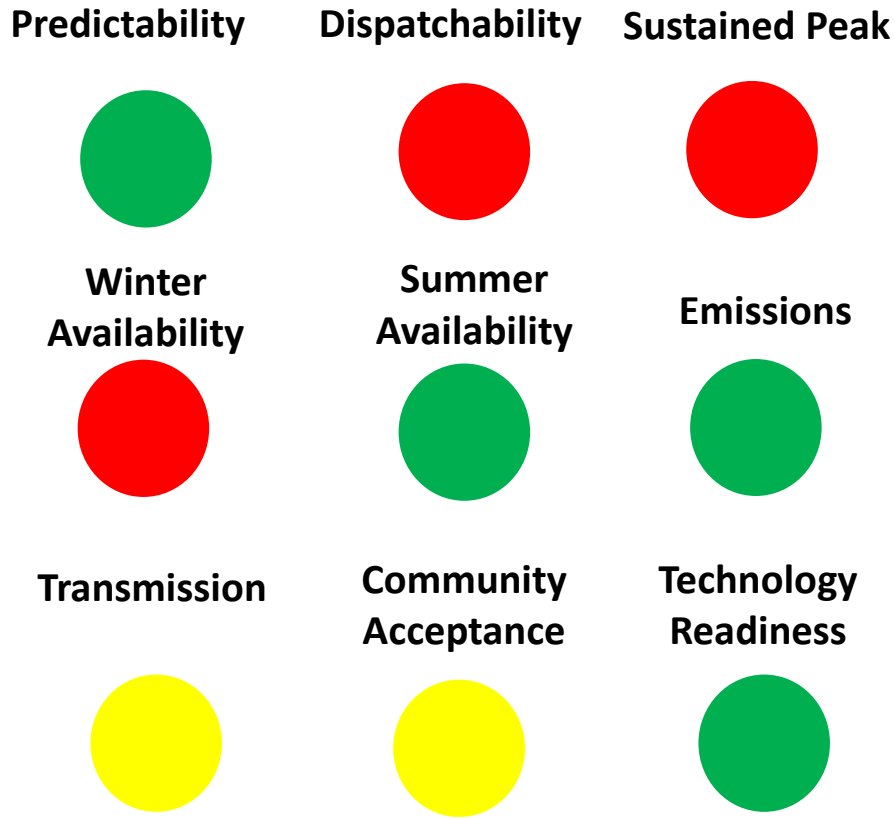


Large (utility-scale) solar

Creative Commons image

Cost Type	Cost ($/MWh)
Energy	$46
Transmission	$11
Firming	$34
Total Cost	**$91**

*Costs are approximate based on publicly available data.



Small modular reactors

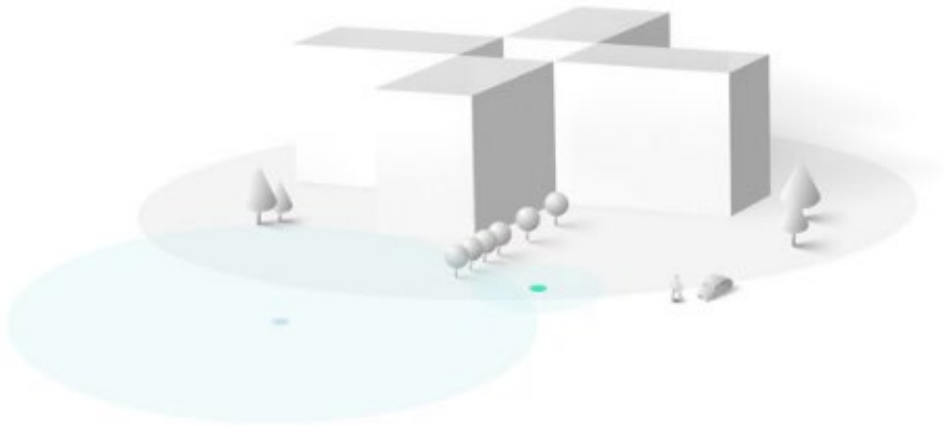
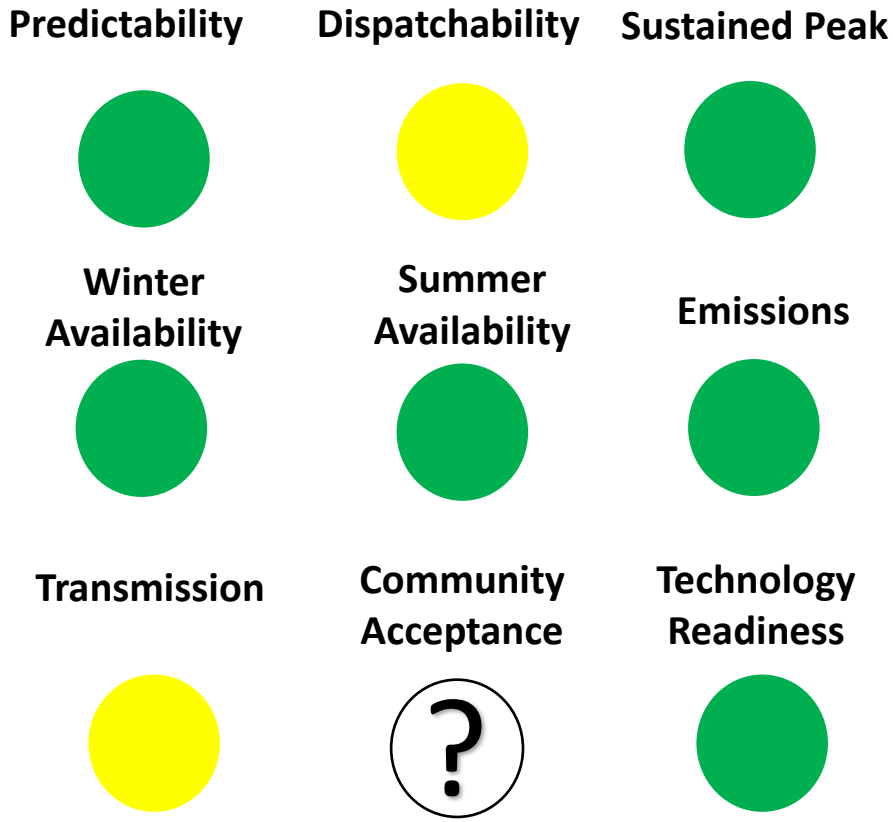


Image from Xenergy website (https://x-energy.com/reactors/xe-100)

Cost Type	Cost ($/MWh)
Energy	$99
Transmission	$3
Firming	$0
Total Cost	**$101**



*Costs are approximate based on publicly available data and highly uncertain.

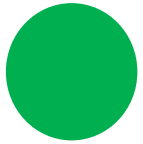
Utility-Scale Storage Resources

Appendix

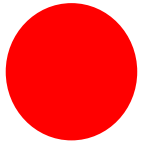
Short duration (4 to 8 hour) battery storage

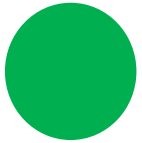
Image from energysage website: https://www.energysage.com/business-solutions/utility-scale-battery-storage/

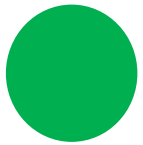
Cost Type	Cost ($/kW-year)
Resource	$264
Transmission	$0
Total Cost	**$288**

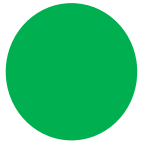
Predictability 

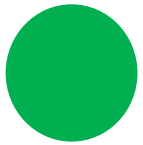
Dispatchability 

Sustained Peak 

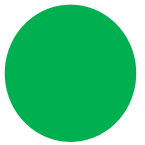
Winter Availability 

Summer Availability 

Emissions 

Transmission 

Community Acceptance 

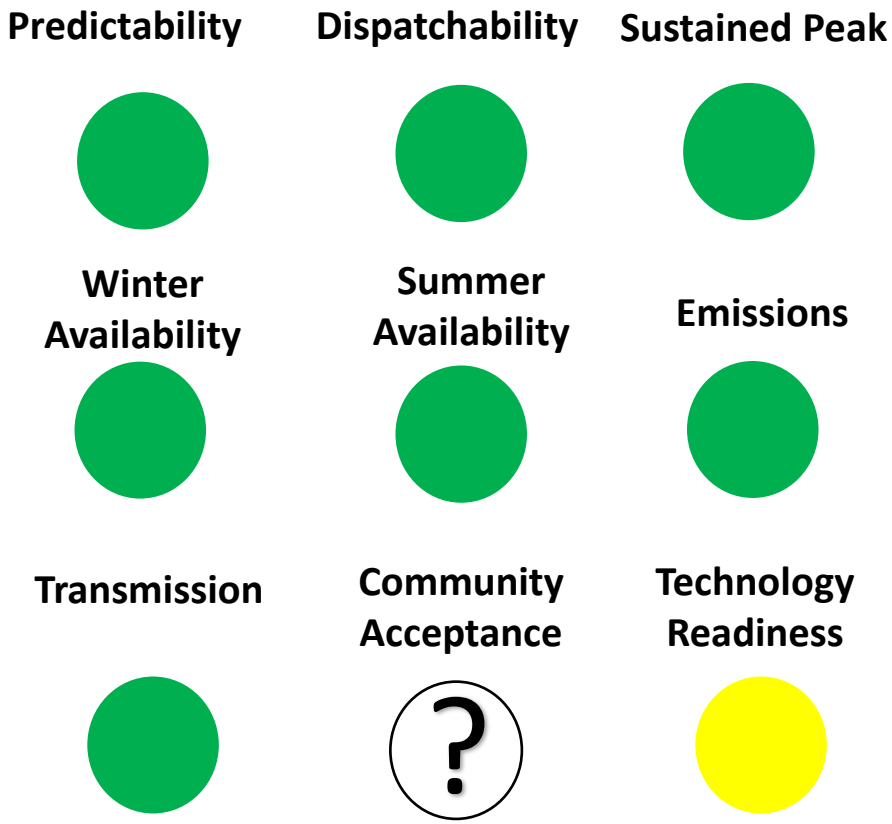
Technology Readiness 

*Costs are approximate based on publicly available data and vary depending on how battery is operated.

Long duration (100 hour) battery storage

Image from Great River Energy White Paper submitted to Minnesota Public Utilities Commission

Cost Type	Cost ($/kW-year)
Resource	$119
Transmission	$0
Total Cost	**$119**



*Costs are based on Form Energy's targets for the future and based on publicly available data.

Pumped storage (~8 hours)

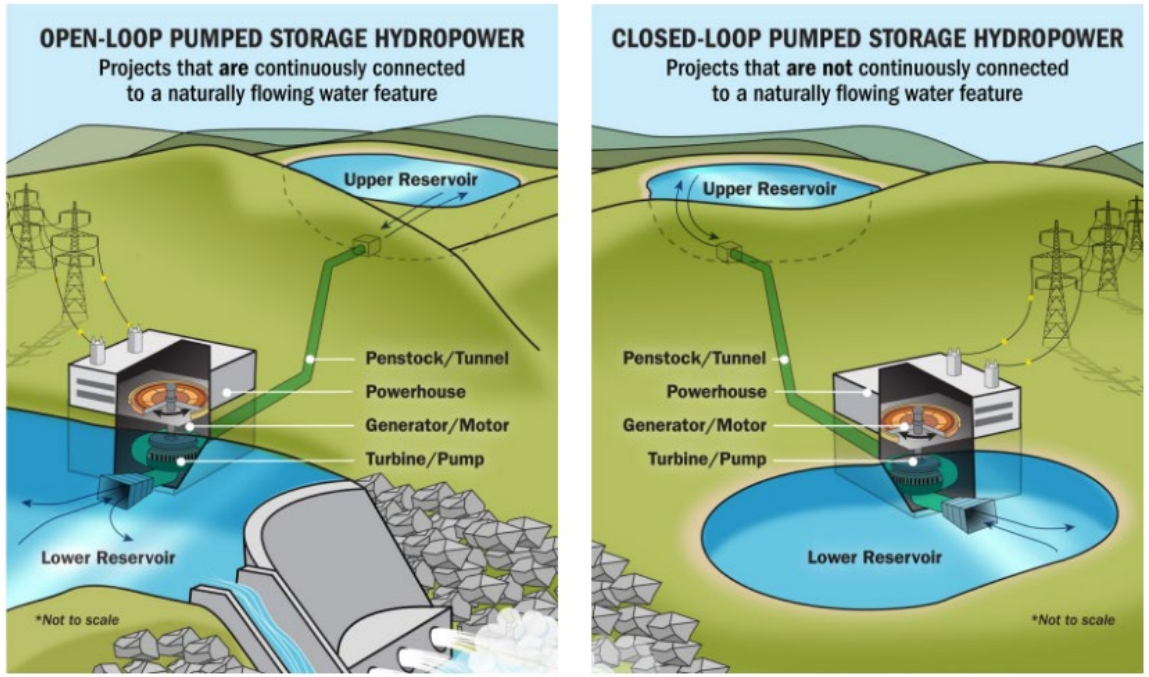
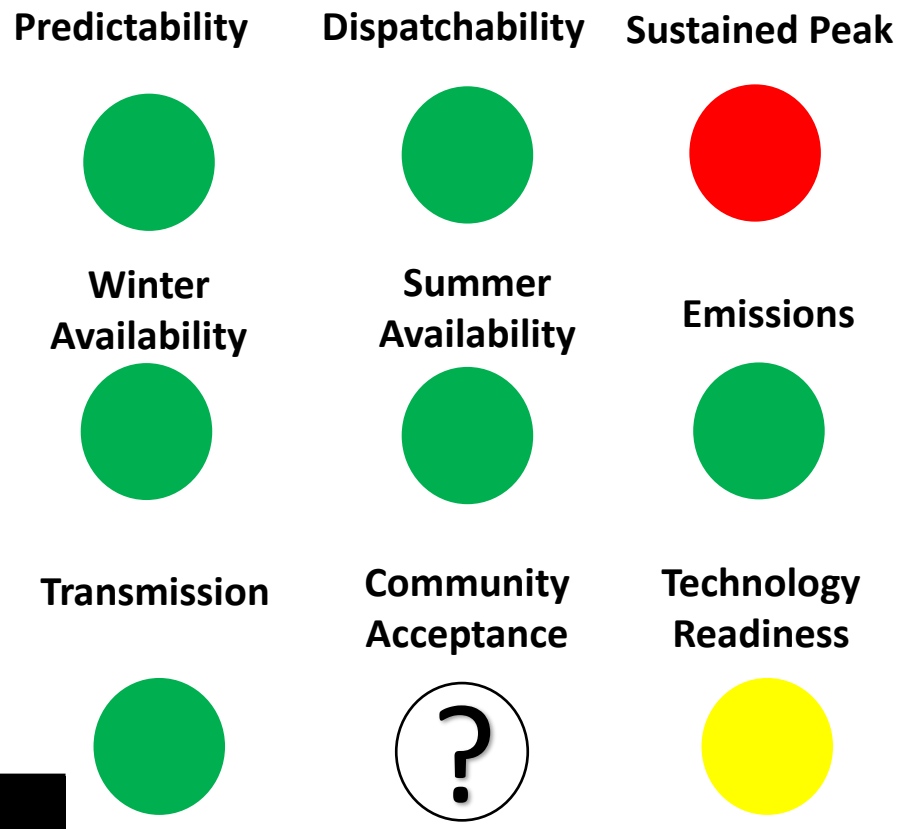


Image from Department of Energy website: https://www.energy.gov/eere/water/pumped-storage-hydropower

Cost Type	Cost ($/kW-year) Cowlitz	Cost ($/kW-year) Offsite closed loop
Resource	$120	$167
Transmission	$0	$24
Total Cost	**$120**	**$190**

*Costs are uncertain, especially for Cowlitz. Estimates provided are based on publicly available data and discussions with developers.



Demand-side (Customer) Resources

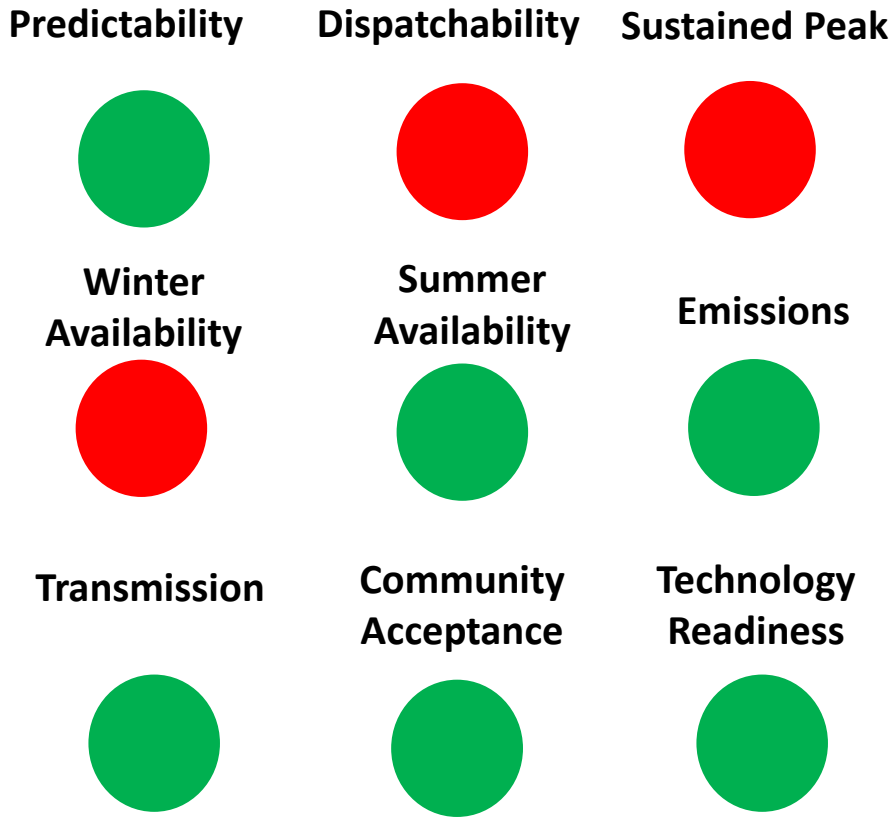
Appendix

Rooftop solar

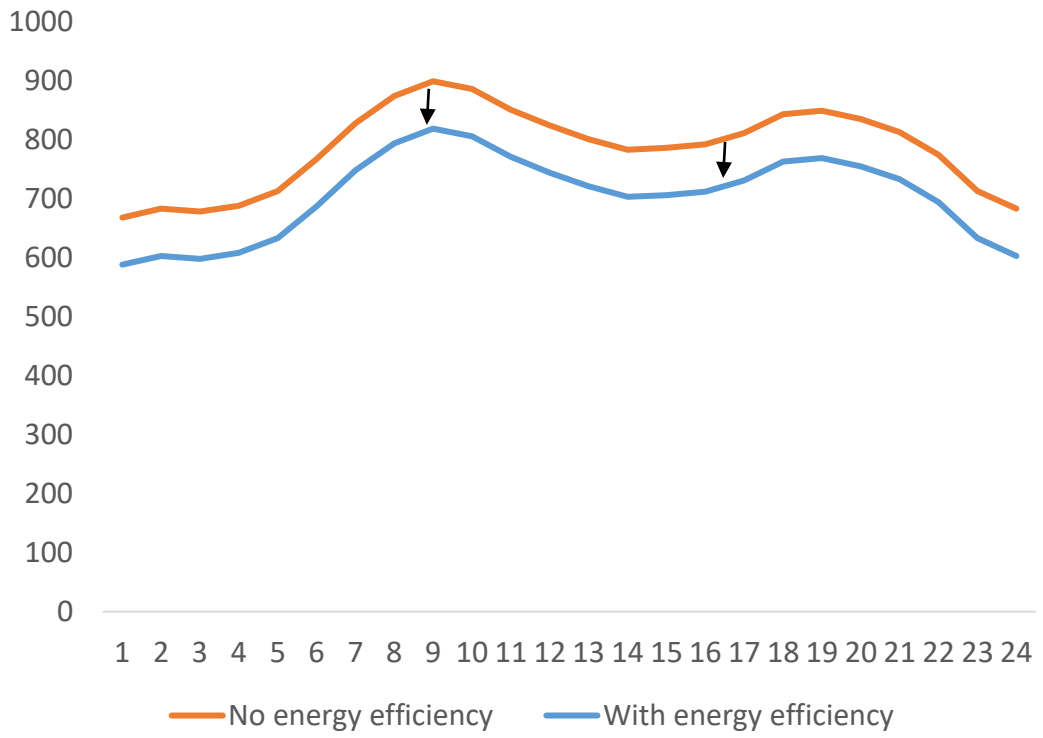
Creative Commons image

Cost Type	Cost ($/MWh)
Energy	$170
Transmission	$0
Firming	$21
Total Cost	**$190**

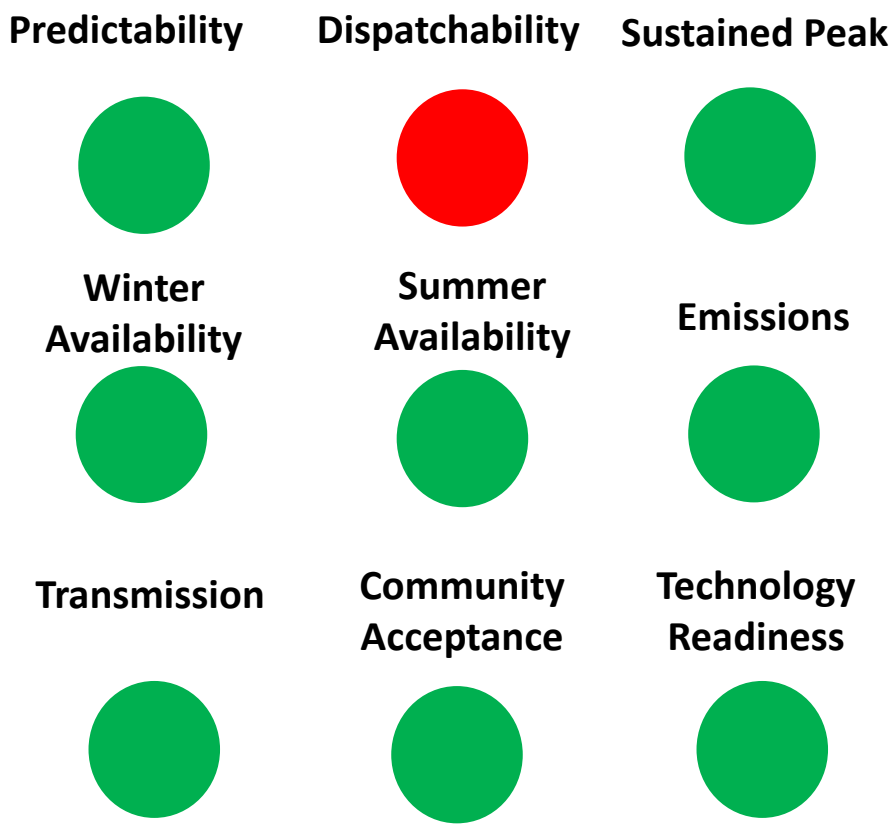
*Costs are approximate based on publicly available data.



Energy efficiency

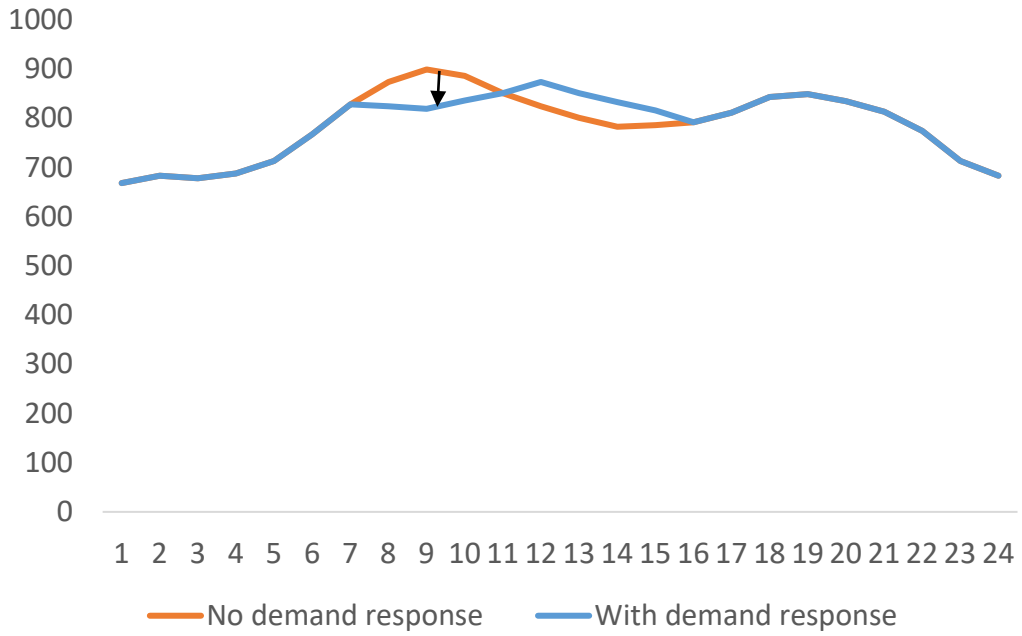


Cost Type	Cost ($/kWh)
Resource	$34 - $155
Transmission	$0
Total Cost	**$34 - $155**

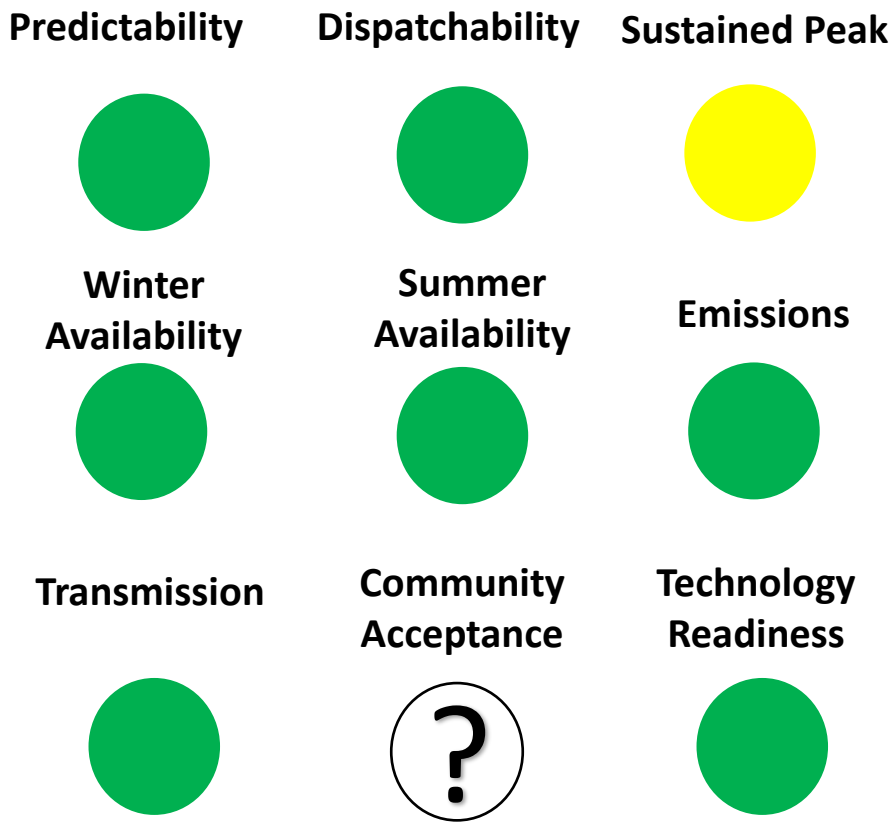


*Costs are approximate based on Tacoma Power 2024-2043 Conservation Potential Assessment. Costs vary by specific energy efficiency measure.

Demand response

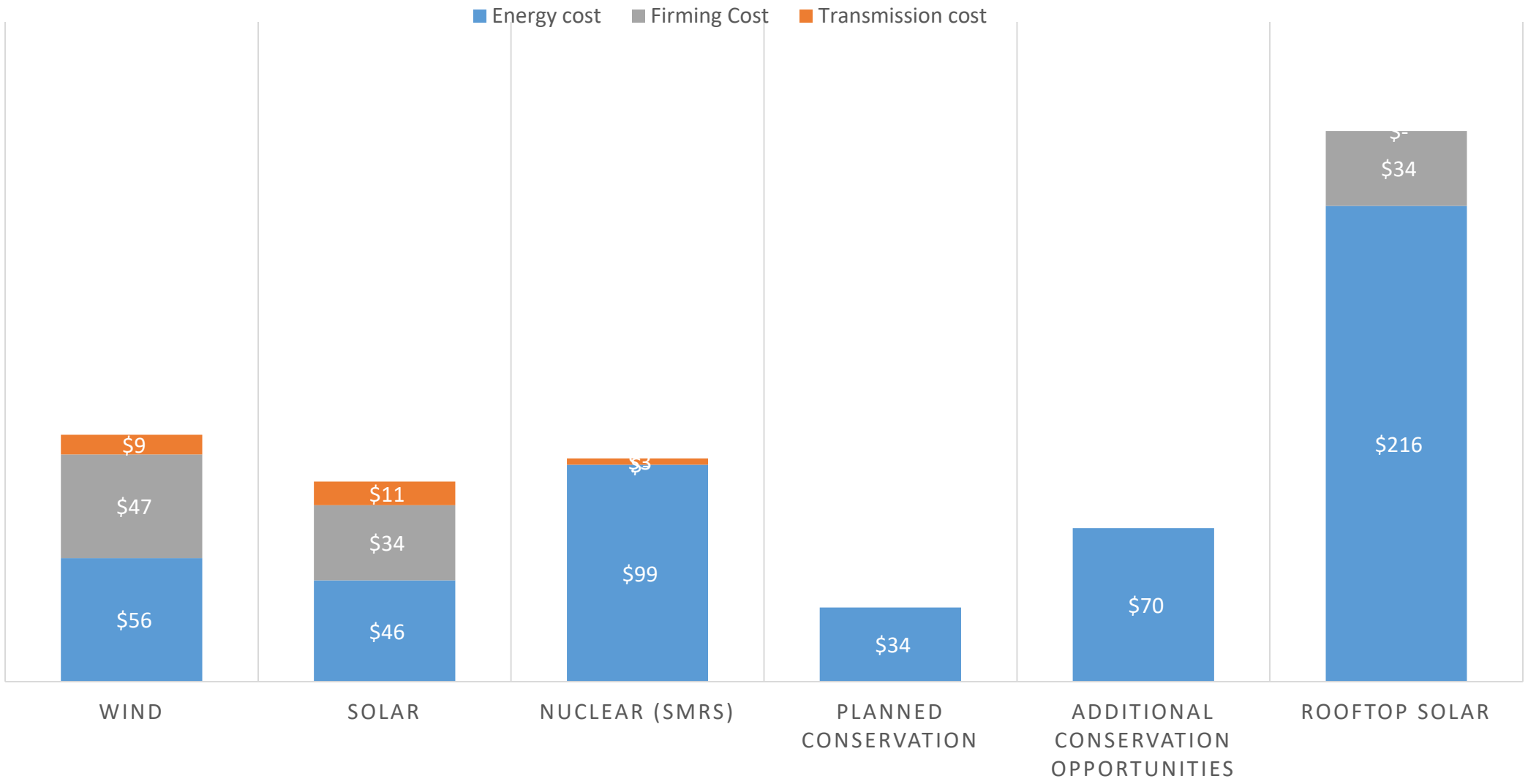


Cost Type	Cost ($/kW-year)
Resource	$156 - $372
Transmission	$0
Total Cost	**$156 - $372**



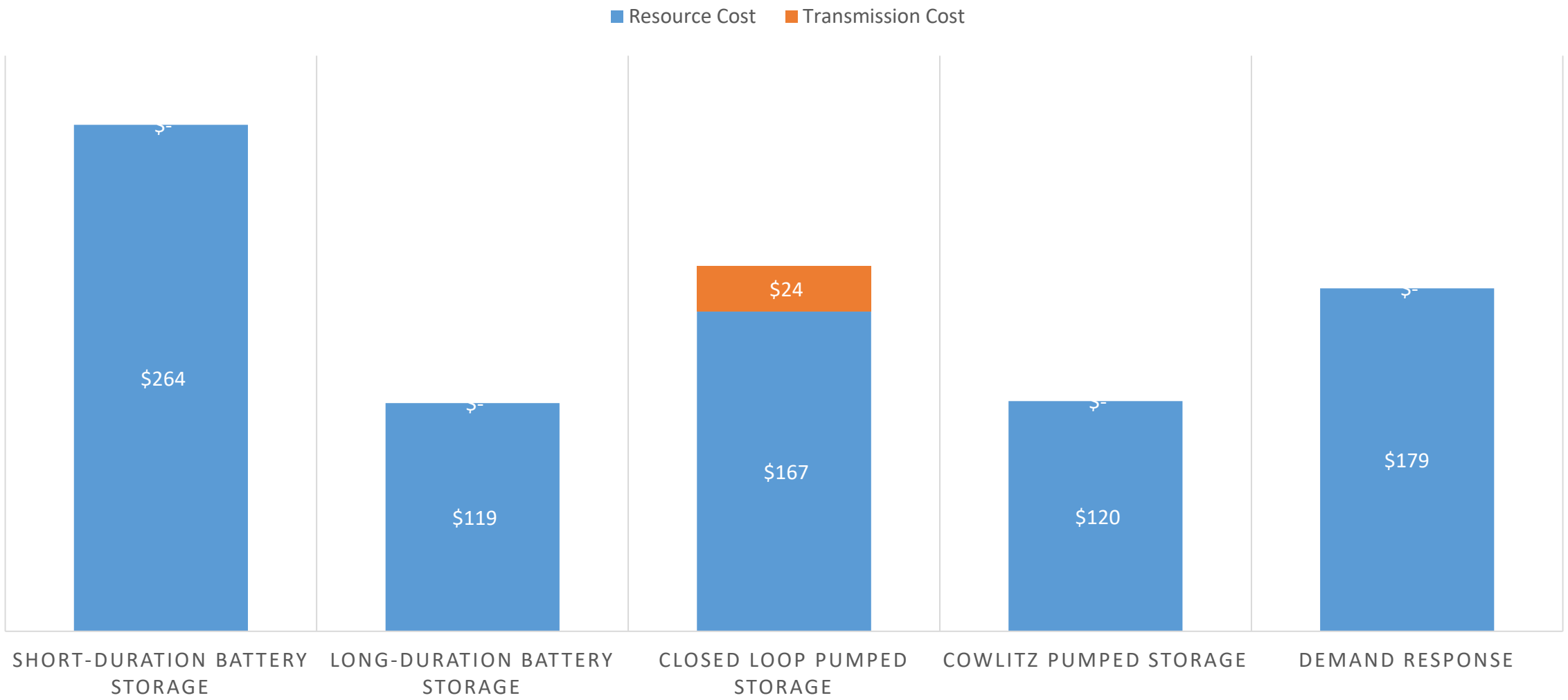
*Costs are approximate based on publicly available data. Costs vary by specific demand response measure.

Summary of approximate $/MWh cost of generating resources



*Note: Average cost of additional conservation opportunities will depend on the specific measures we pursue.

Summary of possible $/kW-year cost of capacity resources



*Notes:
(1) Average cost of additional demand response opportunities will depend on the specific measures we pursue.
(2) Cost estimates for supply-side options are highly uncertain