Tacoma Power 2022 IRP Workshop 3

Preliminary Findings

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The Plan

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Metrics refresher

Near-final list of portfolios

Resource adequacy results

Electrification impacts

Next steps

Metric Refresher

Refresher on our portfolio metrics

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Primer

What do we mean by “portfolio”?

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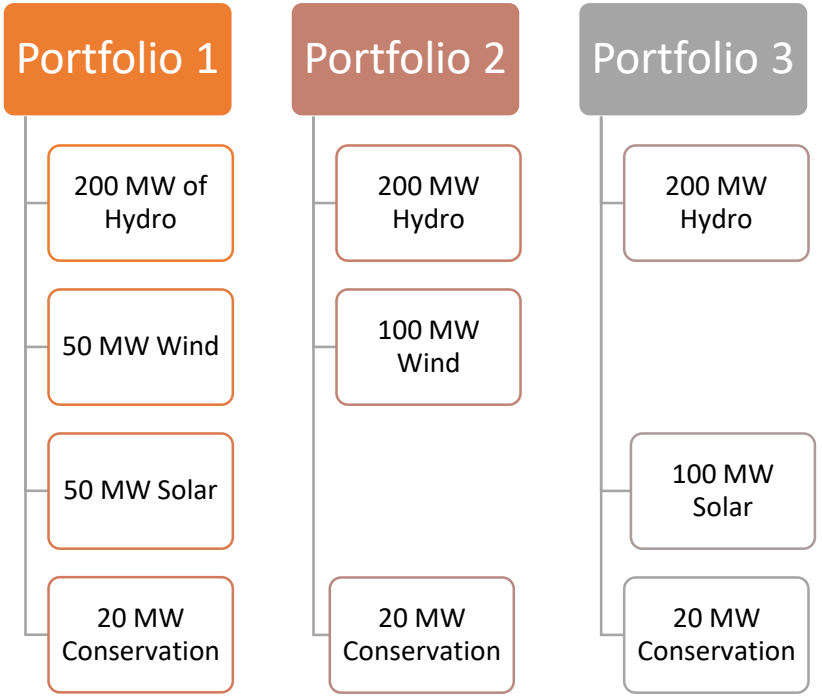
A **resource** is what we use to generate electricity or reduce electricity demand.

- Hydro
- Wind
- Solar
- Conservation

A **portfolio** is a specific combination of resources.



What input can we still incorporate?

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Type of input	Can be incorporated in 2022 IRP?	Can be incorporated in 2024 IRP?
Metrics we use to assess portfolios	NO	YES
Scenarios of the future that we consider	NO	YES
Resources we consider and/or how resources are modeled	NO	YES
Resource cost assumptions	NO	YES
Portfolios we consider (i.e. how we combine resources)	YES	YES
IRP action items	YES	YES

Our Metrics

Refresher on our portfolio metrics

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Pass/Fail Criteria

Resource Adequacy	CETA compliance

Metrics for Comparing Portfolios

Expected costs	Financial risk	Carbon emissions	Equity

Resource adequacy standard

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- What is Resource Adequacy?

✓ Having enough resource to serve customer demand.

- What is a Resource Adequacy Standard?

✓ Metric + Maximum Threshold

Example

Number of hours per year when we're short ← Metric

can be no more than 2.4 ← Threshold

Our resource adequacy standard

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DURATION

- **Metric:** Loss of Load Hours (LOLH)
- **Standard:** No more than 2.4 hours of shortfall per year on average

MAGNITUDE

- **Metric:** Normalized Expected Unserved Energy (NEUE)
- **Standard:** No more than 0.001% of total load unmet across the year on average

FREQUENCY

- **Metric:** *Loss of Load Days (LOLD)*
- **Standard:** No more than 0.2 days per year

ADEQUATE if all three standards are met

What are we evaluating?

Near-final list of portfolios

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Reminder: 2022 IRP focus areas

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- BPA Contract Renewal
  - Should we renew?
  - Which product will best meet our needs if so?
  - What are the risks to renewal?
  - Should we diversify?
- How will we ensure we have enough resources under accelerated vehicle & building electrification?
- How might we supply a large electrofuel load?
- How will climate change impact our resource position?

Portfolios we've analyzed

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Renew BPA @ current levels

- Slice/Block
- Block with Shaping Capacity (BWSC)
- Slice/Block + available DR
- Slice/Block + battery storage
- Slice/Block + 100 MW Wind
- BWSC + available DR
- BWSC + 100 MW Wind
- Slice/Block + 100 MW Solar
- BWSC + 100 MW Solar

Renew BPA @ reduced level

- Reduced Slice/Block + 100 MW Wind
- Reduced BWSC + 100 MW Wind
- Reduced Slice/Block + 100 MW MT Wind
- Reduced BWSC + 100 MW MT Wind
- Reduced Slice/Block + 100 MW Solar
- Reduced BWSC + 100 MW Solar

Uncertainty about what this might look like

Don't renew BPA

- 2,300 MW Wind + 100MW Solar + DR + 300 MW Pumped Storage
- 2,300 MW Wind + 100 MW Solar + DR + 300 MW Small Modular Reactors (SMR)

Hypothetical portfolios that are not technically feasible today

Note: All portfolios also include Tacoma Power-owned hydro resources and conservation

How do portfolios perform?

Resource adequacy results for core scenarios

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Scenarios we've considered

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Core scenarios considered for all portfolios

Cruise Control
Minor load decline

Carbon Policy Accelerates
High load growth

Reliability Reigns
Some load growth & tight markets until 2030

Technology Solves Everything
Ample market supply & large load decline

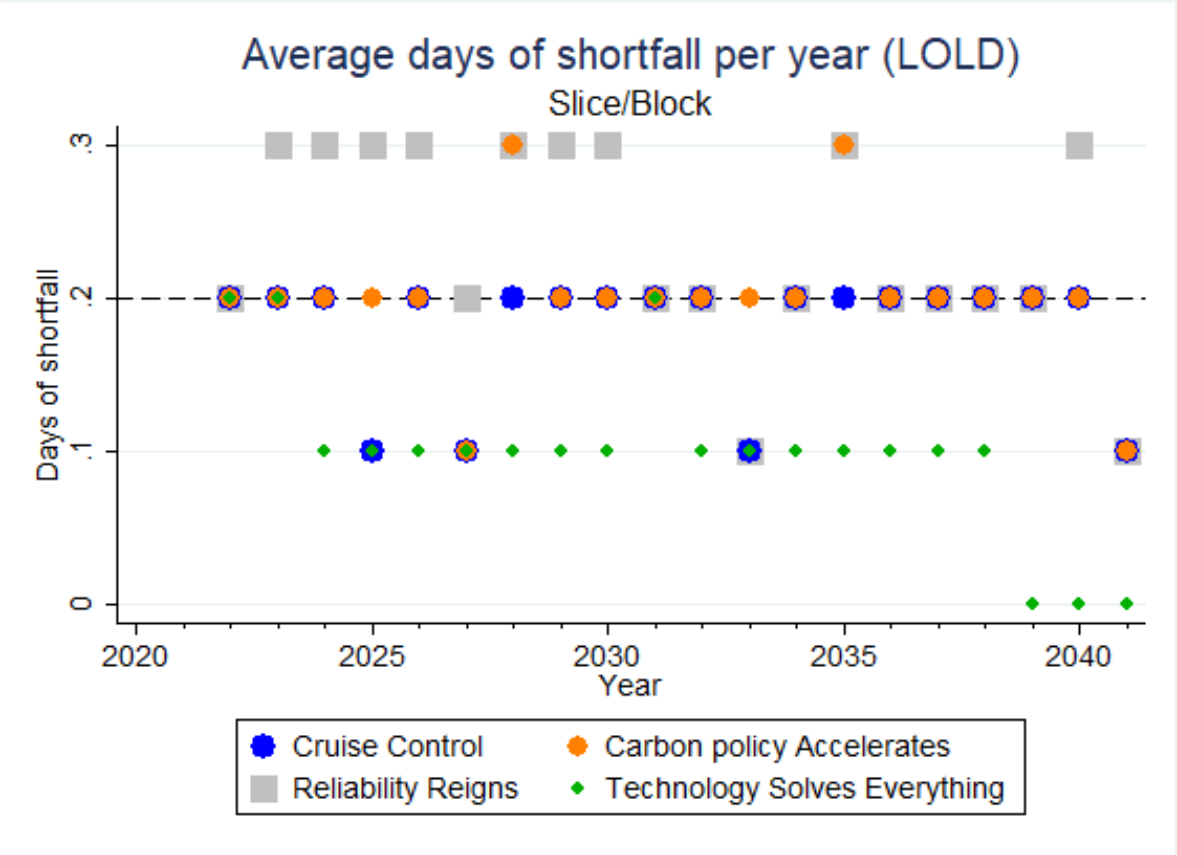
Sensitivities considered for preferred portfolio

Vehicle & building electrification

Large electrofuel load

Climate change

Slice/Block Portfolio (Current Portfolio)



We have enough resources under most scenarios, but NOT ALL.

We do not pass our adequacy standard in a world where grid supply is limited and wholesale markets are tight.

Slice/Block Portfolio (Current Portfolio) - more

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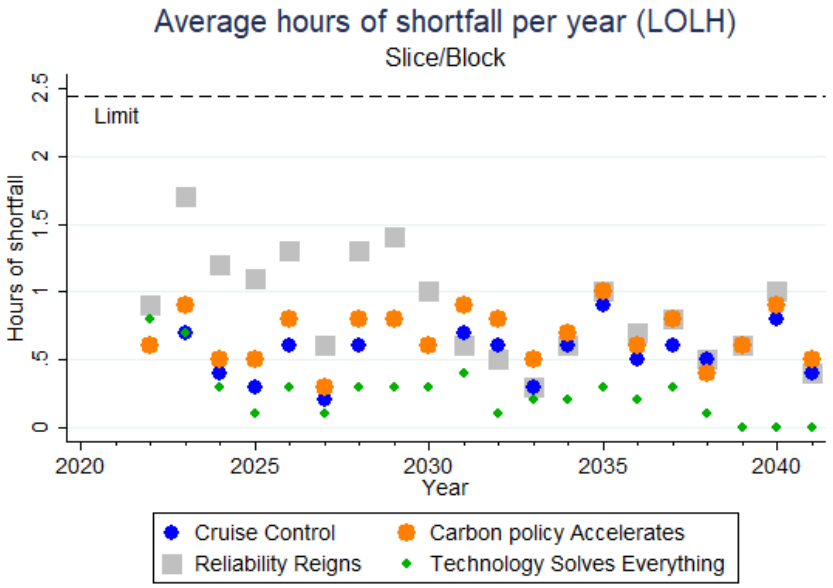
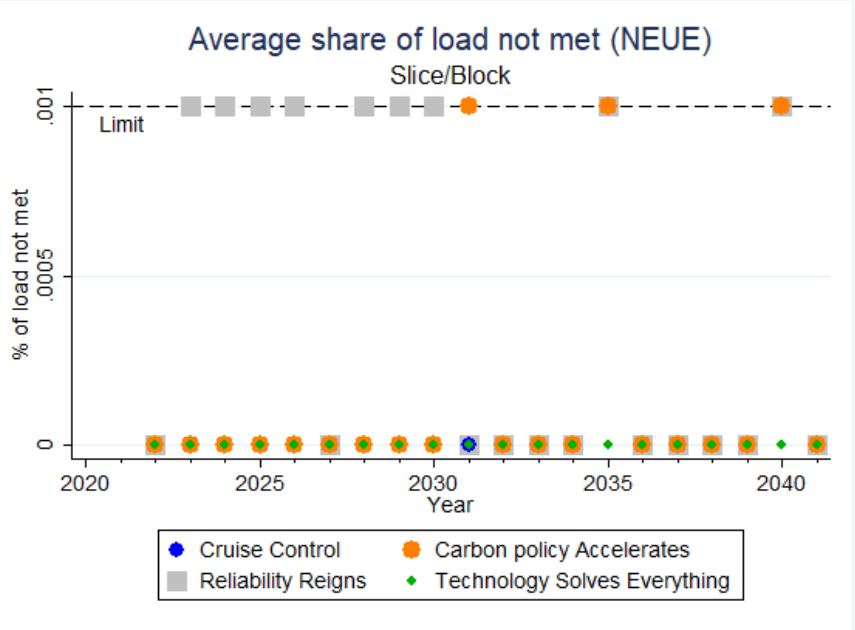
Frequency standard (LOLD) is most difficult for us to meet, while duration standard (LOLH) is easiest.





When are we most at risk?

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Wintertime

Conditions of low water & high loads combined

Times when we can't rely on the wholesale market

BPA product comparison post-2028

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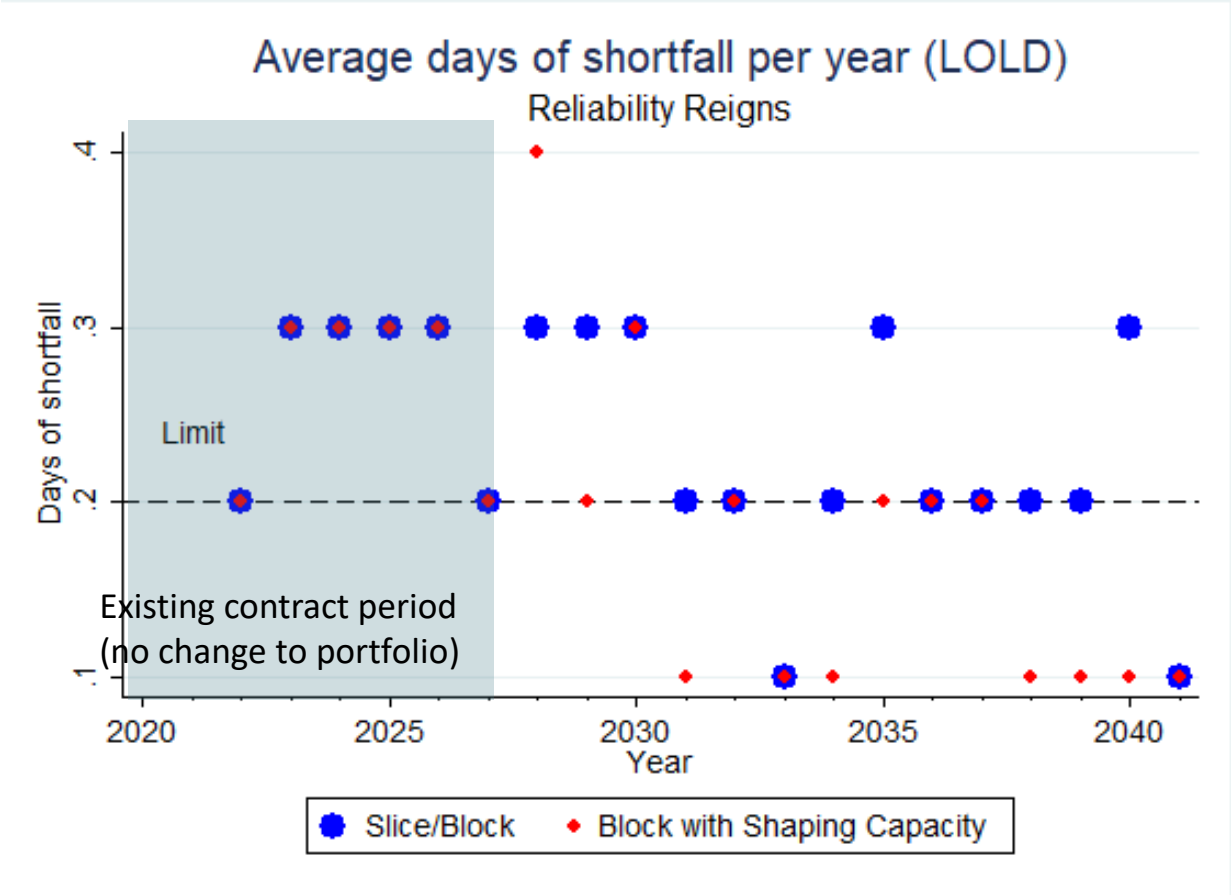
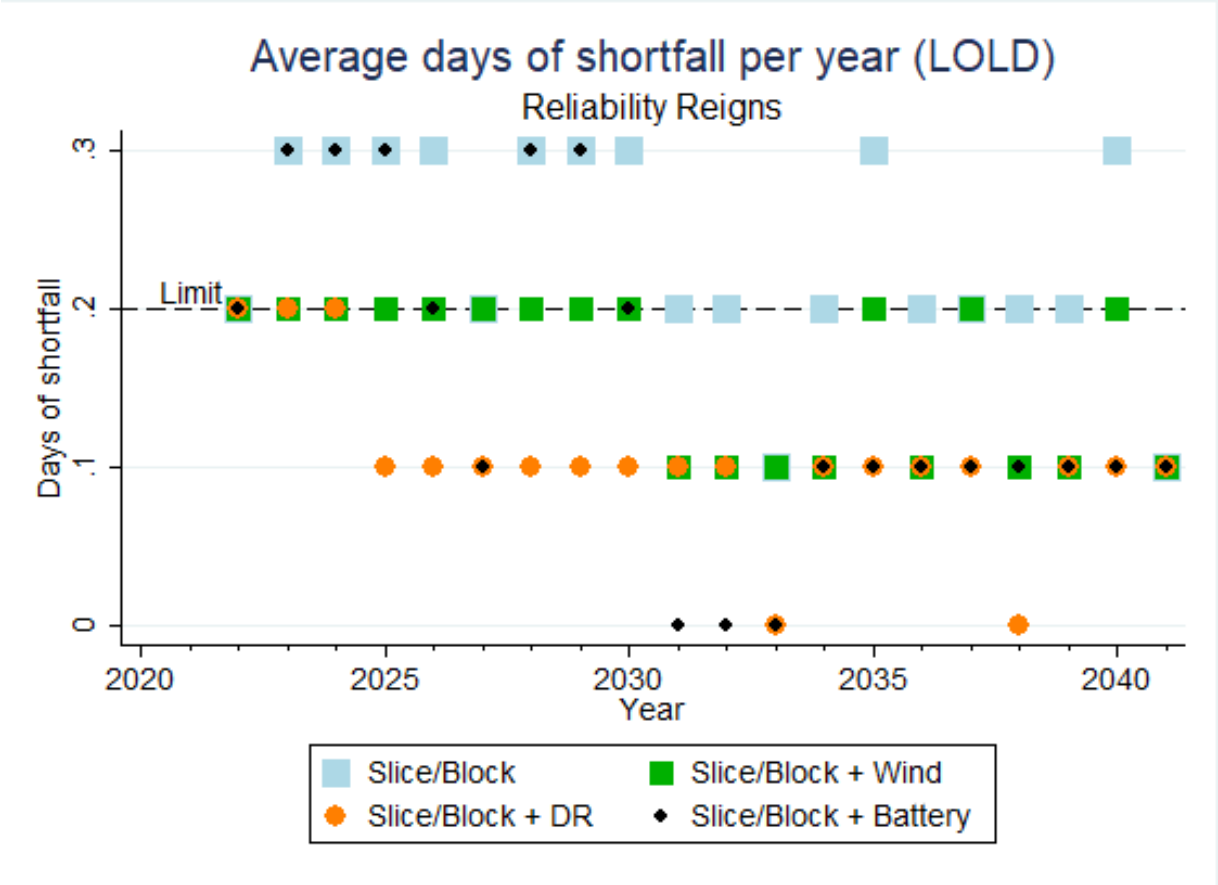


Block with Shaping Capacity sometimes improves adequacy, but we still fail our adequacy standard in some years.

Assumes post-2028 BPA contract looks similar to our contract today

Options to enhance Slice/Block



Adding either 100MW wind or available demand response (DR) would achieve resource adequacy.

Battery results require further investigation.

Assumes post-2028 BPA contract looks similar to our contract today

BPA renewal: Preliminary answers & action items

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Preliminary Recommendations

Should we renew?

- Yes. No good alternatives today.

Which product will best meet our needs if so?

- TBD after cost analysis completed
- Both leave us adequate most (but not all) of the time

Should we diversify?

- Probably not but TBD after cost analysis completed

Do we need additional resources?

- In order to ensure adequacy when markets supply is tight, YES
- TBD which option is lowest-cost way to ensure adequacy

Preliminary Action Items

Continue active participation in BPA post-2028 contract discussions

Continue support of WRAP to avoid market scenario that puts us at risk

TBD next steps for acquiring resource to shore up adequacy risk (demand response/battery/wind)

Investigate short-term options to reduce adequacy risk in near-term

Electrification Impacts

Slice/Block

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Reminder of electrification cases

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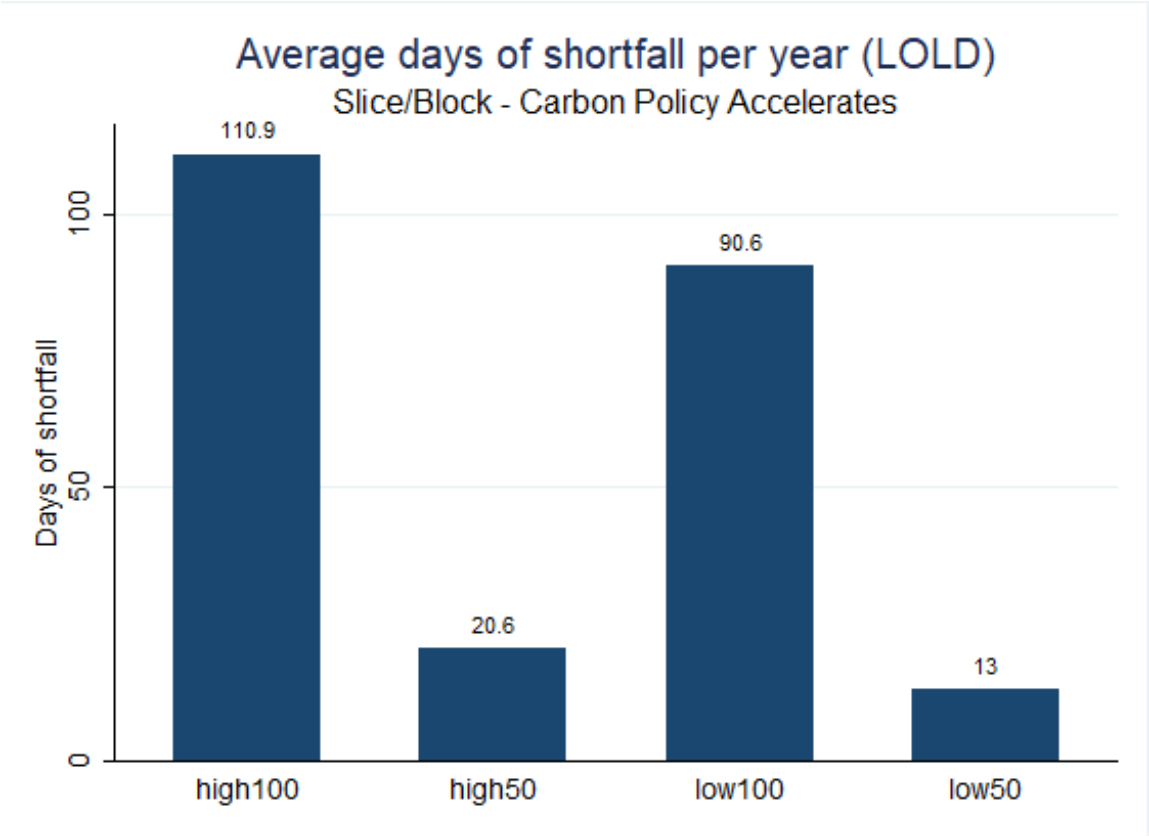
High Demand, 100% Saturation	Low Demand, 100% Saturation
High Demand, 50% Saturation	Low Demand, 50% Saturation

- All scenarios include light & medium-duty vehicles and residential & commercial building electrification
- Analysis for single year (2041)
- Assume *Carbon Policy Accelerates* scenario for WECC

Resource adequacy position with current portfolio



We would fail our adequacy metrics even under our lowest demand case.

Assumes post-2028 BPA contract looks similar to our contract today

Energy position with current portfolio

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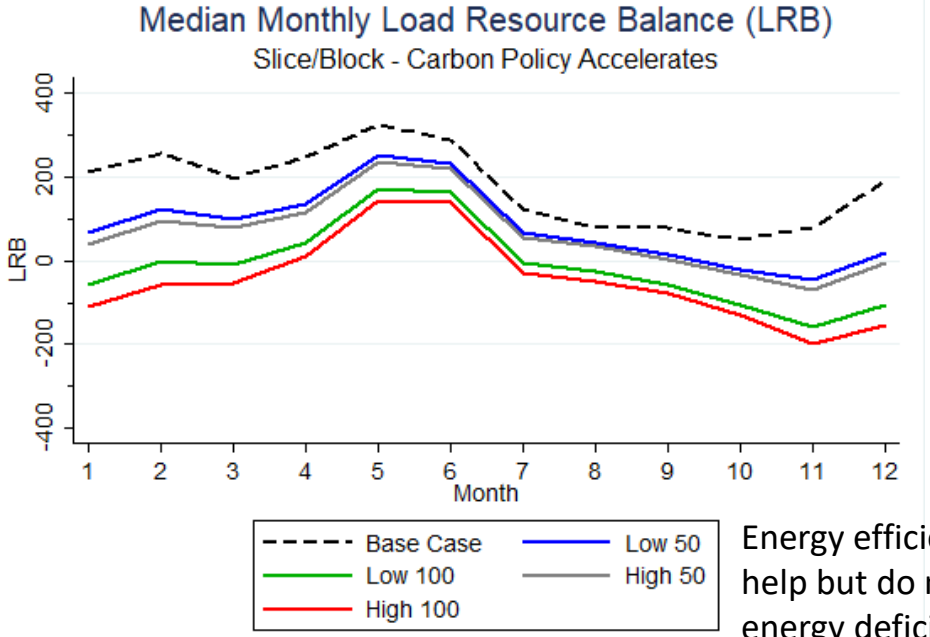
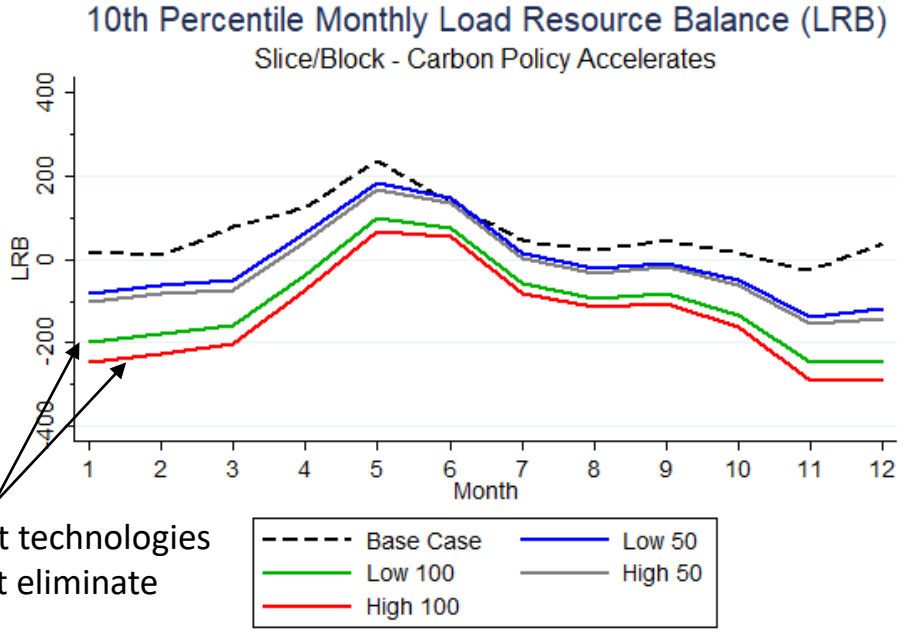
Normal water conditions: We would have enough energy in most months under 50% adoption scenarios but not 100% adoption scenarios.

Low water conditions: We would not have enough energy in most months in all cases.





Energy efficient technologies help but do not eliminate energy deficits

How could we serve the additional load?

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Demand Response

Batteries

Pumped Storage

Small Modular Reactor (SMR)

Wind

Next steps for electrification analysis

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2022 IRP	ID portfolios to meet electrification needs
	Portfolio cost analysis
Action Item(s)	In-depth electrification projections

Next Steps & Wrap Up

Rachel Clark

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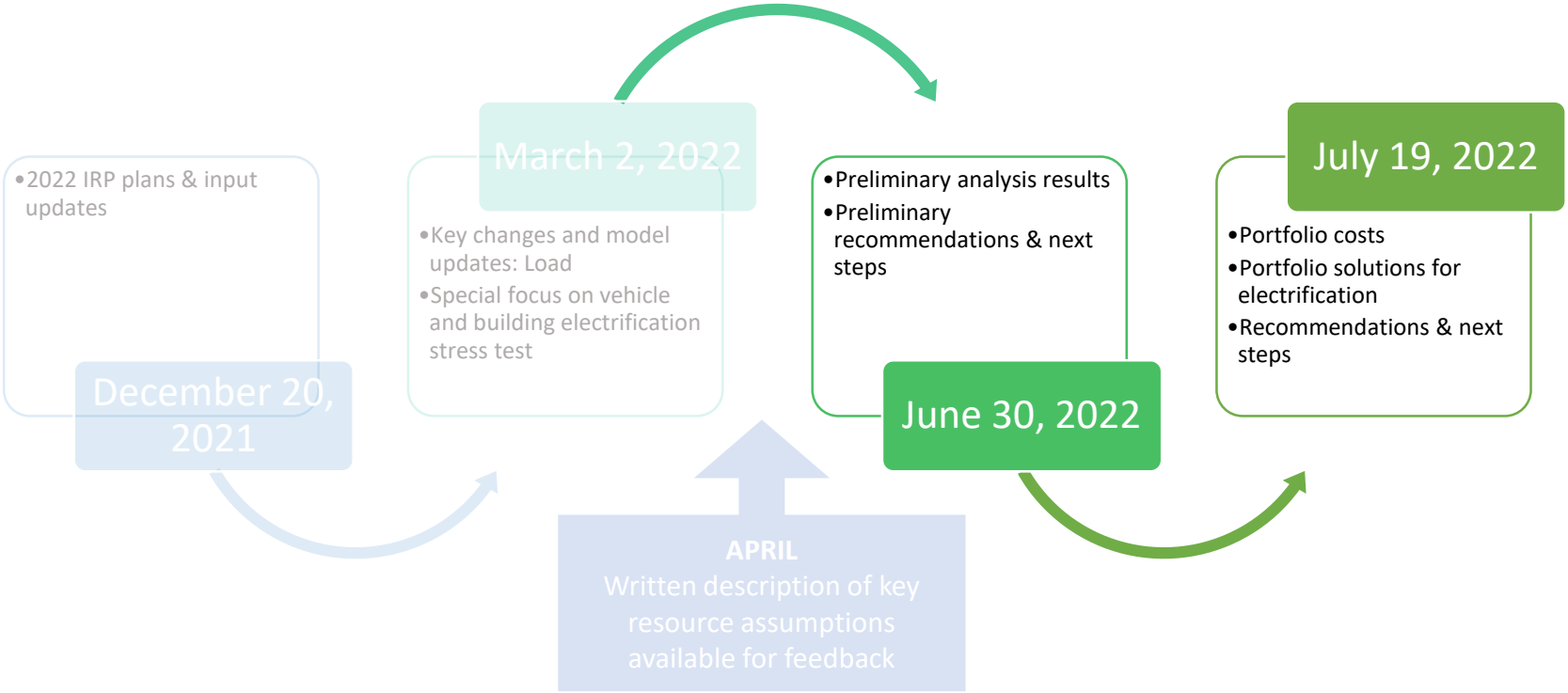
Workshop schedule



Final Thoughts

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Is there any information you're not getting from these workshops that you would like addressed at future workshops?

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Additional Slides

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Deeper Dive into Specific Periods of Risk

Deeper Dive into Specific Periods of Risk

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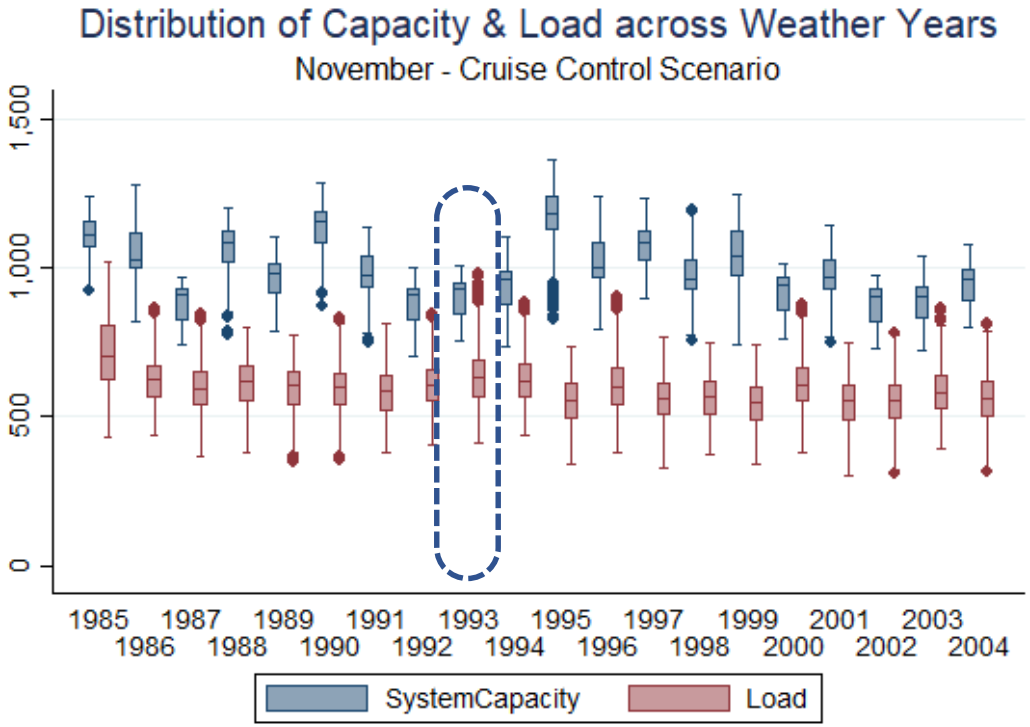
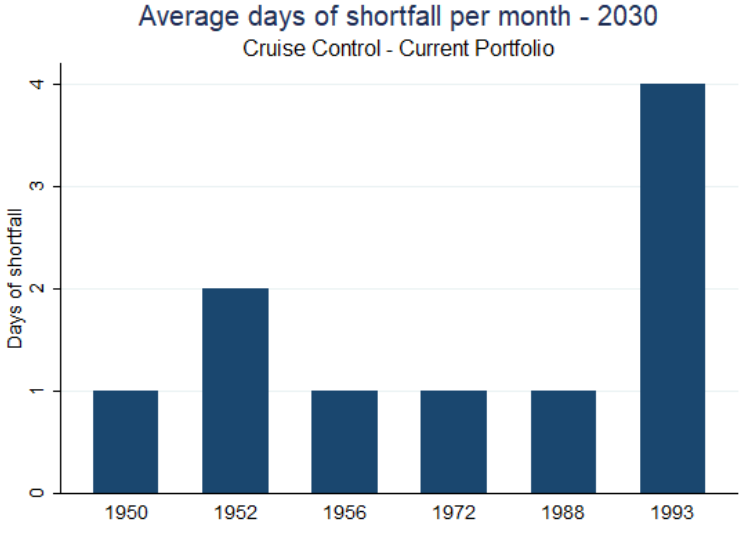
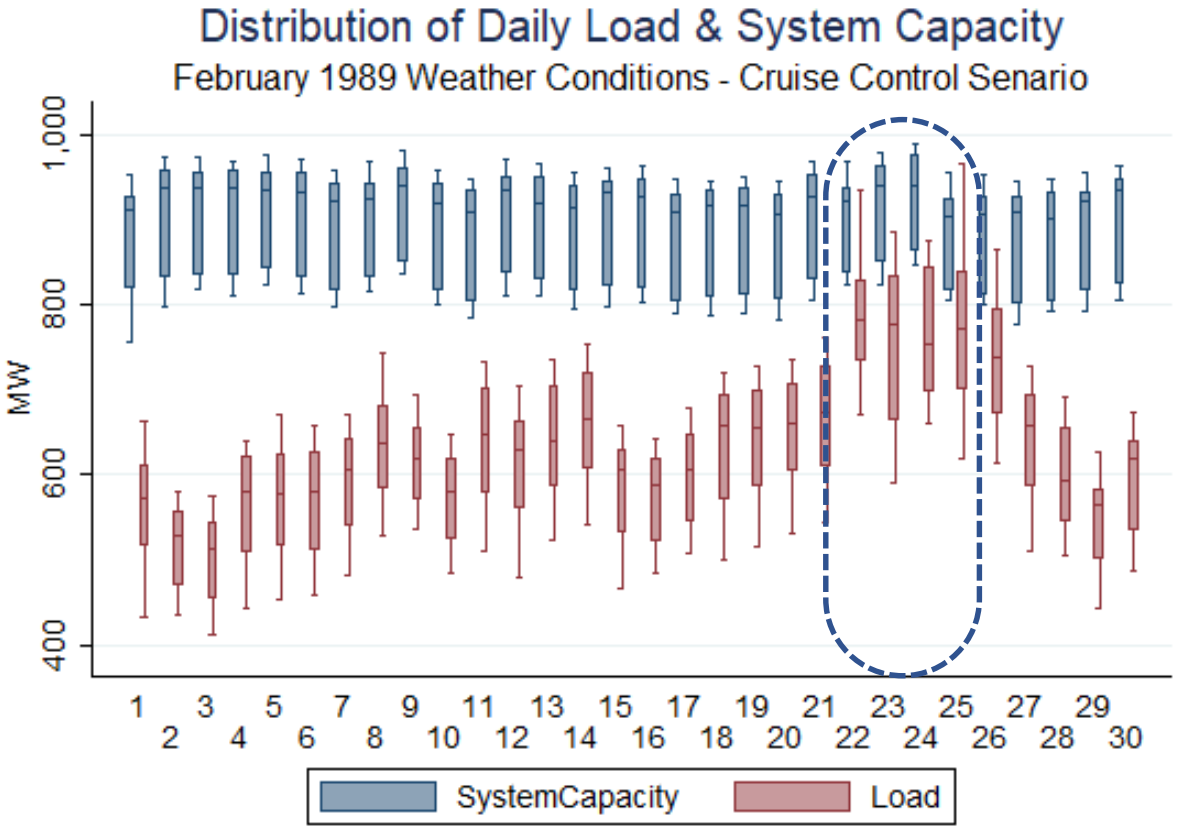


1993 has most days of shortfall but 1952 has larger shortfalls (concentrated in Nov)



November 1993 Example – High Load Days



- Even though our capacity is lower in November 1993 than other years, we have plenty of capacity to spare most of the time
- Risk is when the low water is combined with load spikes

November 22, 1993 – Hourly Look

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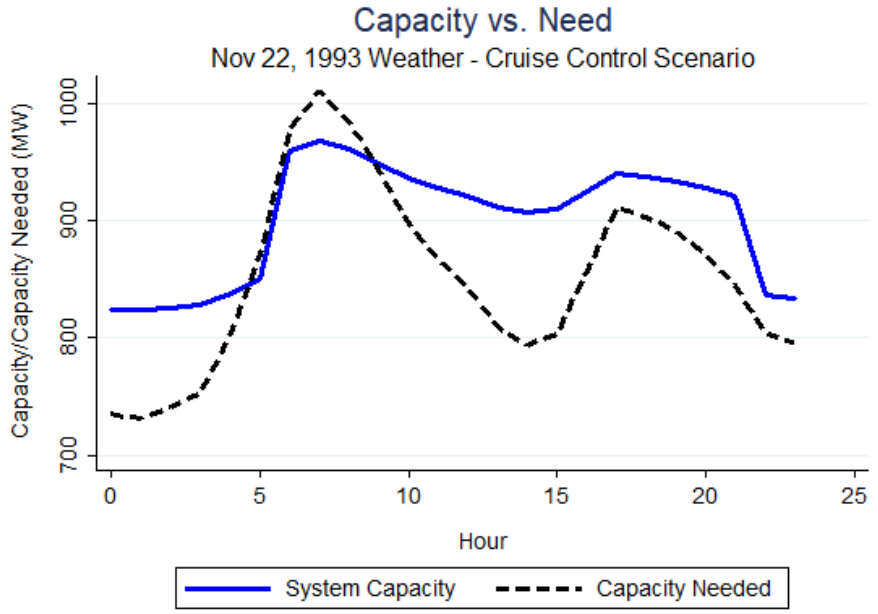

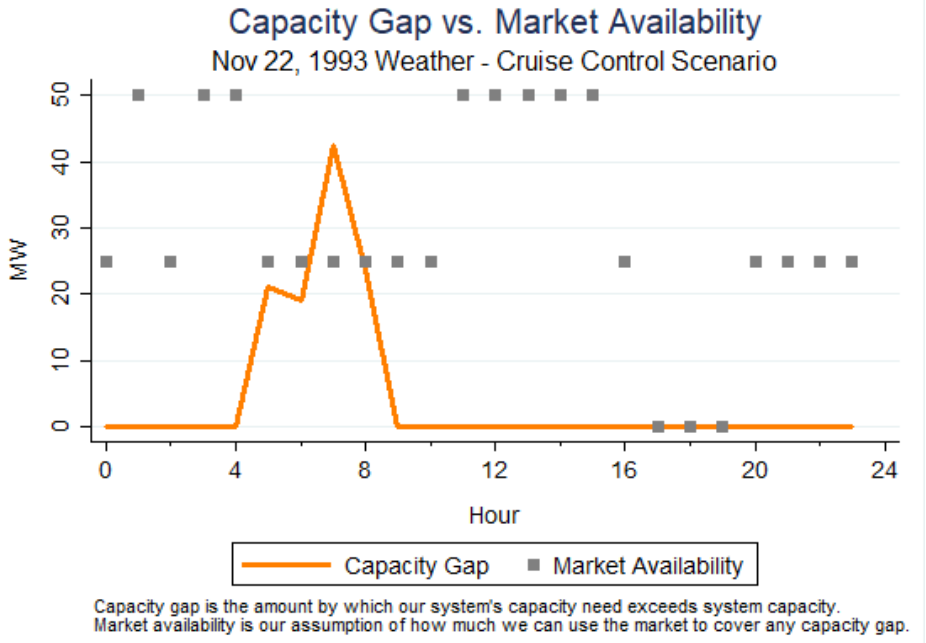

Capacity gap is the amount by which our system's capacity need exceeds system capacity.
Market availability is our assumption of how much we can use the market to cover any capacity gap.

BPA Renewal and BPA Diversification

What would happen if we didn't renew BPA?

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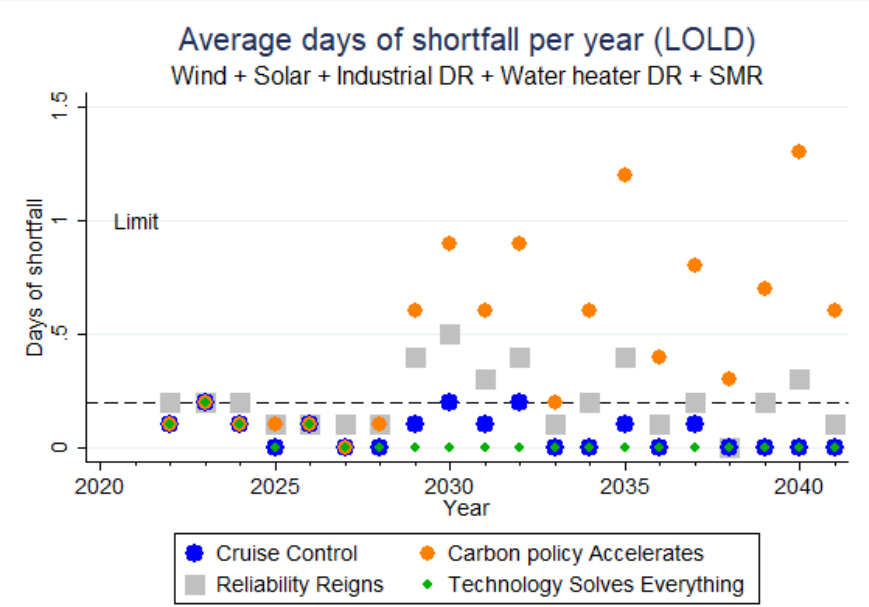
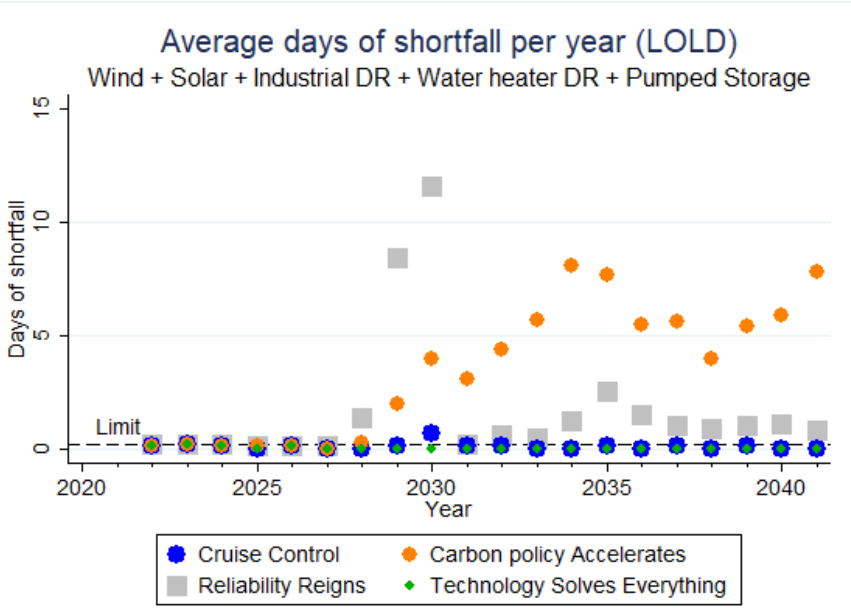
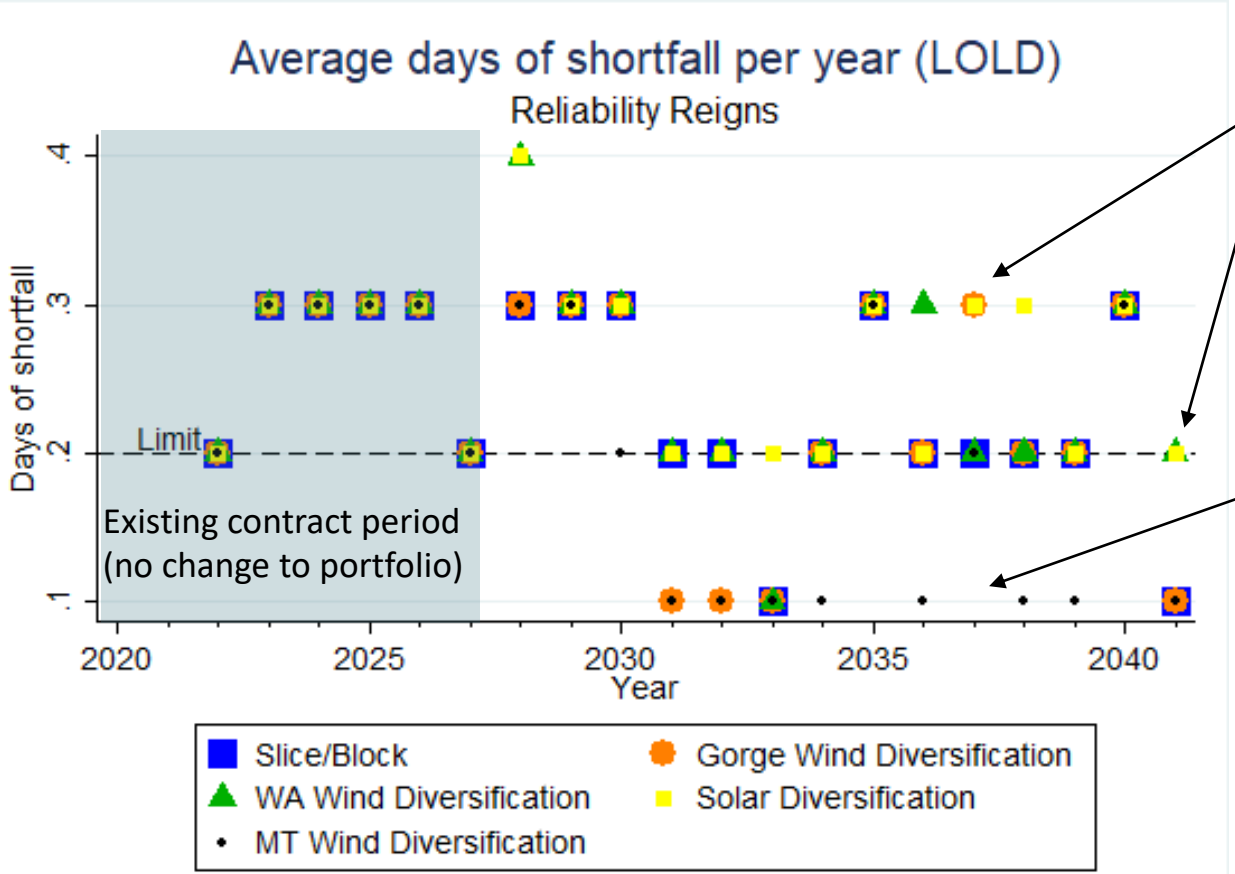
Even with unrealistic quantities of wind and solar and 300 MW of additional capacity, we would still not have enough resources in high load growth scenarios.





Diversification



Diversification with solar & WA wind tends to worsen adequacy.

Diversification with MT wind tends to improve adequacy but not enough to always meet our standard

Diversification with WA wind does not change our adequacy position.