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November 12, 2025

MEMORANDUM

TO: Council Members

FROM: Jennifer Light and John Ollis

SUBJECT: Results of Market Availability Studies

BACKGROUND:

Presenters: Jennifer Light and John Ollis

Summary: Staff will present the results of the market availability studies it conducted for the two scenarios included in the Council's Ninth Power Plan. As part of scenario modeling, the Power Division plans to conduct a separate market availability study for every sensitivity that has assumptions regarding changes to resource cost and/or availability, as well as changing assumptions around the existing system with a particular focus on transmission. At this meeting, staff will walk through the results of eight of the nine market availability studies currently planned.

At a high level, market availability does not change significantly across the various sensitivities. The biggest drivers in buildouts tend to be state policies and carbon pricing. This results in the majority of resources built across all sensitivities includes a mix of renewables, short-duration storage, and gas. That being said, there are some differences across the sensitivities based on availability and pricing, which staff will highlight.

Relevance: The wholesale market availability study develops a 20-year set of out of region market supply inputs that, in conjunction with out of region load, can be used in regional resource strategy analysis. This market availability forecast is an

important analytical step to informing economics of regional resource decisions and resource adequacy analysis.

Workplan: B.3.1. develop WECC-wide market availability studies to inform scenario modeling.

Background: The Council has periodically updated its wholesale market study using the AURORA model to help inform Council staff and regional stakeholder analysis. The Council relies on the System Analysis Advisory Committee to help provide expert feedback on market fundamentals and power system modeling assumptions related to all scenario modeling.

The Council's forecast is a Western Electricity Coordinating Council (WECC)-wide fundamentals-based forecast that reflects power system operation, relationships of supply and demand for, and transmission of electricity. In addition, understanding the underlying of wholesale electricity prices in this region requires an understanding of the operating characteristics of potential future and existing supply and demand-side resources, as well as unit commitment, ancillary services, fuel prices, hydro, wind and solar conditions both in this region and out of the region. The AURORA software captures many of these characteristics of the power system well and has a periodically updated WECC database, and thus, AURORA has been the Council's wholesale market electricity price forecasting model.

The Council aligns in-region and out-of-region assumptions around state and federal policies, existing system resources, new supply-side resource options, and transmission buildouts for each sensitivity. The Council relies on other entities to develop an out-of-region load forecast used in this study. This load forecast includes expected amounts of demand-side resources, and the Council does not model any additional demand-side resources in this study. Unlike the regional portfolio optimization analysis, this study does not include different futures to represent differences in loads, fuel prices, hydro conditions, or renewable uncertainty.

For the Ninth Power Plan, the Power Division will complete a separate market availability study for each sensitivity that assumes changes to assumptions regarding resource cost and/or availability, as well as changing assumptions regarding the transmission system. At this time, staff is estimating this to be nine separate market studies. This breaks out across the two scenarios accordingly:

Changing Hydro Operations Scenario

1. All sensitivities will have one study, as they contain consistent assumptions regarding new resource availability and costs, as well as transmission buildouts.

New Resource and Transmission Risk Scenario

2. Constrained World – This sensitivity assumes that supply-side resources are limited in the first 6-years of the study, emerging technologies are delayed 10-years, and the only transmission availability is the existing system.
3. Existing Transmission – This sensitivity does not assume any changes to resource assumptions, but does assume only the existing transmission system is available.
4. Transmission Plus – This sensitivity does not assume any changes to resource assumptions, but includes a transmission system with additional builds that align with the WestTEC 10-year study. This market study will also be used for the sensitivity that explores slower-demand side resource development.
5. Transmission Max – This sensitivity does not assume any changes to resource assumptions, but does assume additional transmission builds beyond those identified in Transmission Plus.¹
6. Slower Short-Duration Storage Availability – This sensitivity limits the availability of short-duration storage in the first 6-years of the study and assumes a Transmission Plus perspective for the transmission system.
7. Increased Emerging Technology Costs – This sensitivity assumes that the cost of emerging technologies are 50% higher.
8. Decreased Emerging Technology Costs – This sensitivity assumes costs of emerging technologies are 25% lower.
9. Evolving Federal Policies – This study assumes that tax credits for renewables and energy efficiency are in place again starting in 2030 and that there are policies for new natural gas consistent with 111(b) requirements.

More info: The following materials provide useful background on this study and some of the underlying assumptions:

- [Primer on Market Availability Study](#) (Presented at March 2025 Council Meeting)
- [Out of Region Loads and Resources](#) (Presented at April 2025 Council Meeting)
- [Generating Resource Reference Plan Workbook](#)

Staff presented the [draft market availability results](#) to the Council's System Analysis Advisory Committee on November 5th.

¹ Staff is still developing the Transmission Max buildout, working to align the assumptions with the WestTEC 20-year study to the extent practical given the different timelines of the Power Plan and that effort. Given this the results of this sensitivity are not yet available and will be shared with the Council at a later date.

Market Availability Results

Jennifer Light and John Ollis

November 18, 2025



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Presentation Outline:

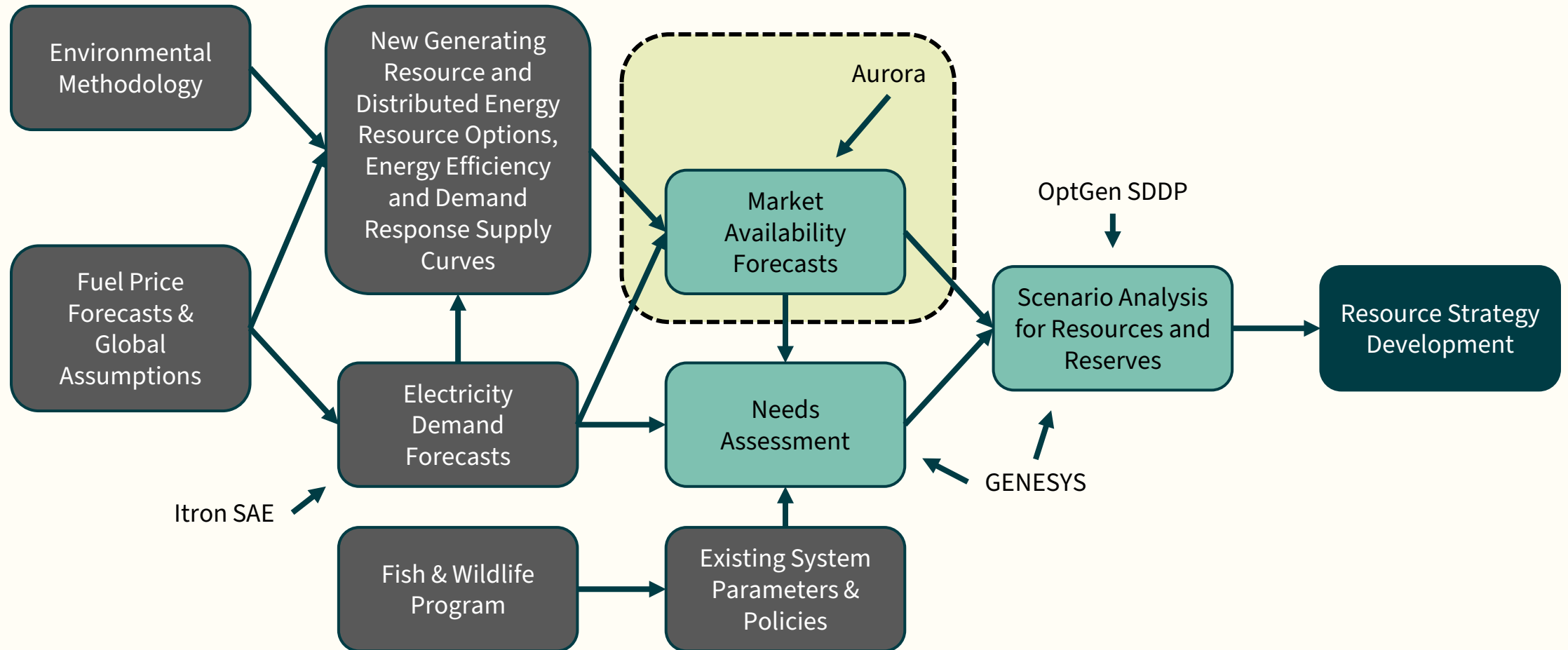
1. Role of Market Availability Study
2. Reminder of Sensitivities
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Roadmap to Building a Power Plan



What is the Market Availability Study?

This study provides a west-wide look of resource builds

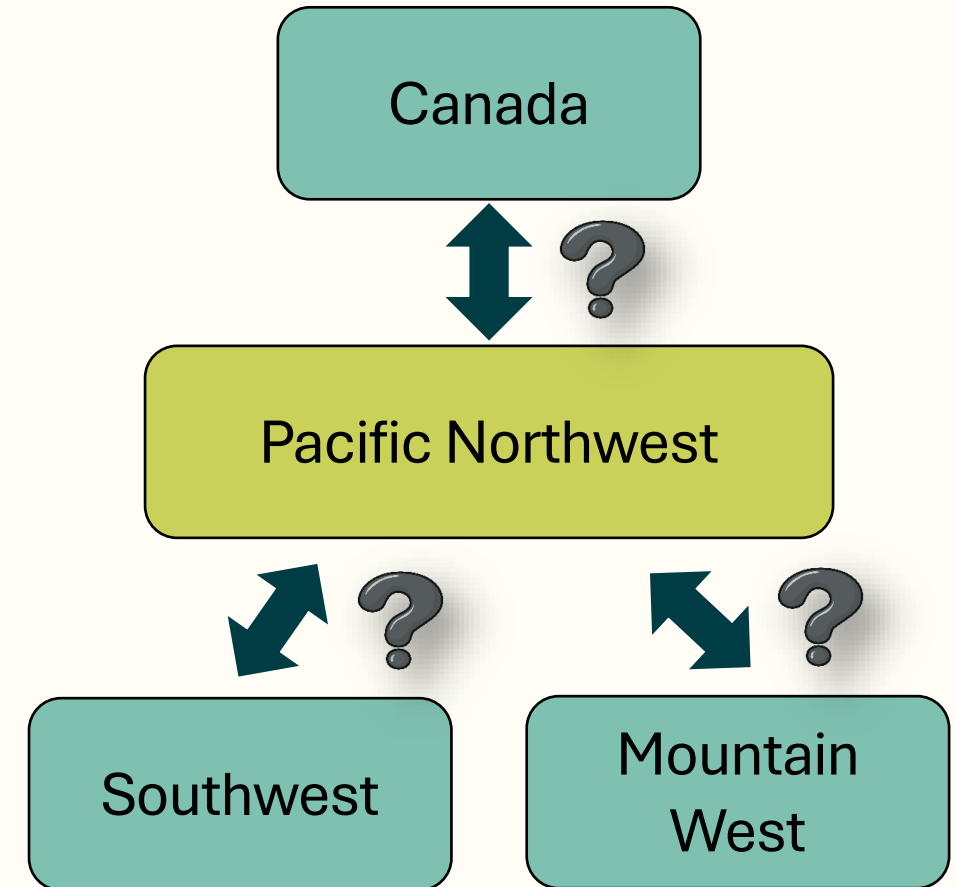
Economics

Even though we only plan for the region, the economics of every regional resource decision depends not just on the regional market fundamentals and policies, but on the market fundamentals and policies throughout the WECC

Adequacy

Even though regional adequacy depends primarily on regional resources, understanding what resources might be available outside the region during stressful times is also important for inform adequacy and keeping rates down

Purpose is to determine the market depth to inform later steps of in-region analysis



Key Assumptions in Market Studies

Policies

Existing state policies plus alignment of assumptions on federal policies with each sensitivity

Existing System Resources

Resources in place or under construction at start of plan plus owner announced retirements and conversions

Loads

Loads based on outside the region forecasts, including “expected” levels of demand-side resources



Supply-Side Resources

Same assumptions as in-region, aligning the assumptions across each sensitivity

Demand-Side Resources

No additional demand-side resources beyond what is assumed as expected in the load forecast

Transmission Buildouts

Three looks consistent with the frame of existing transmission, transmission plus, and transmission max

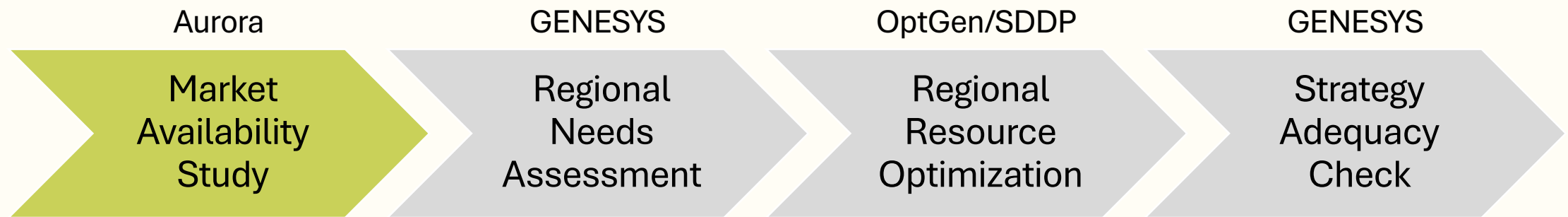
Note: Unlike in the regional optimization, these studies do not have different futures for load, fuel price, hydro condition, or renewable uncertainty

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Determining Number of Market Availability Studies:



Conduct a study for each sensitivity where **new supply-side resource** options and **transmission buildouts** change.

Sensitivities Included in Scenario Analysis

Changing Hydro Operations

- BiOp/Flex Spill Operations
- 2023 RCBA Operations
- Proposed MOP and Spill Operations
- Limited Daily Ramping

These all have the same assumptions on resource availability, transmission system buildout, and the treatment of federal tax credit and policies.

New Resource and Transmission Risk

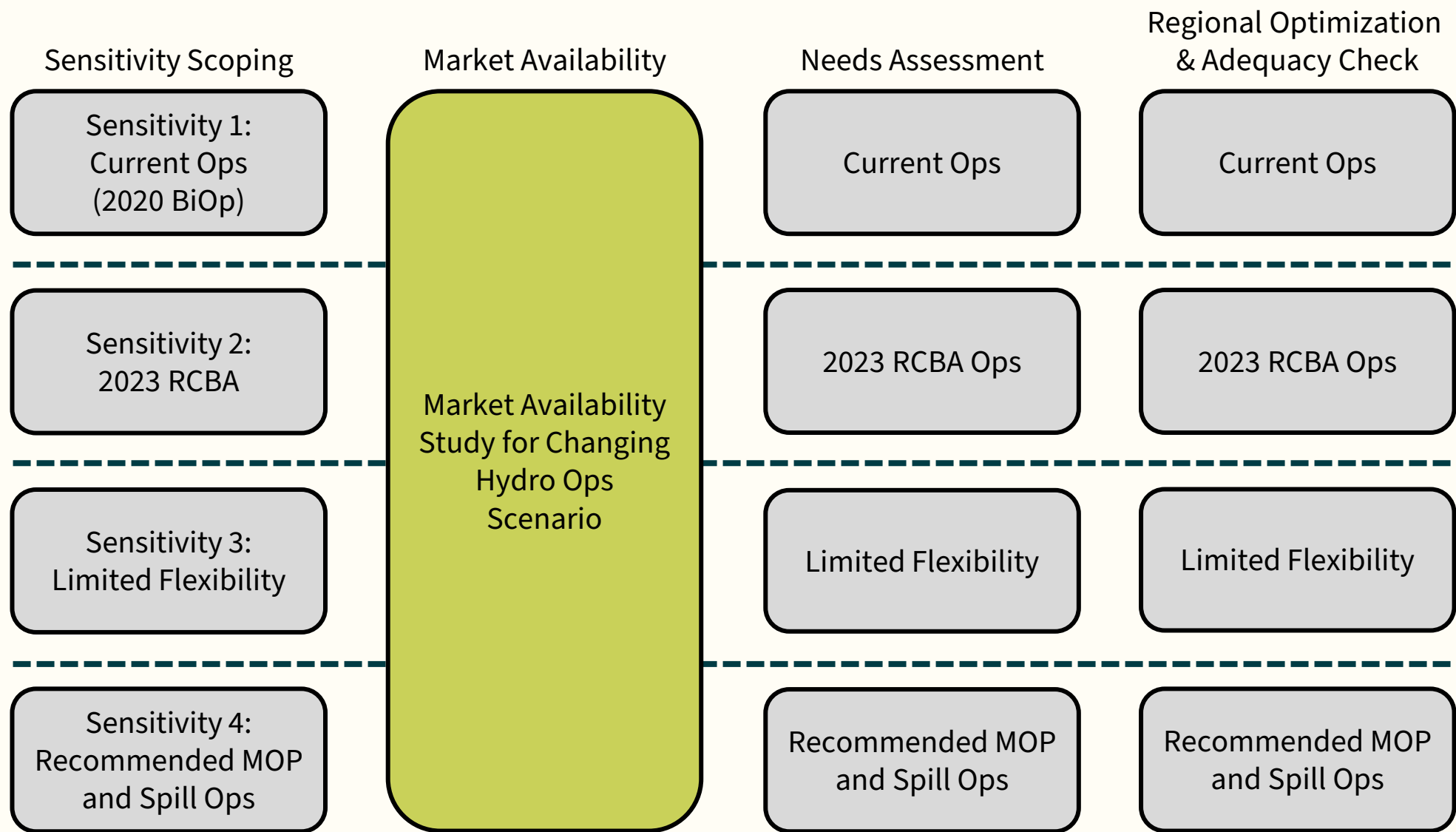
- Constrained World
- Emerging Tech Cost Uncertainty
- Transmission Availability
- Short-Duration Storage Limitations
- Demand-Side Resource Limitations
- Evolving Federal Policy Landscape

These have different assumptions on resource availability (as well as costs in some cases), the transmission system buildout, and the treatment of federal tax credits and related policies.

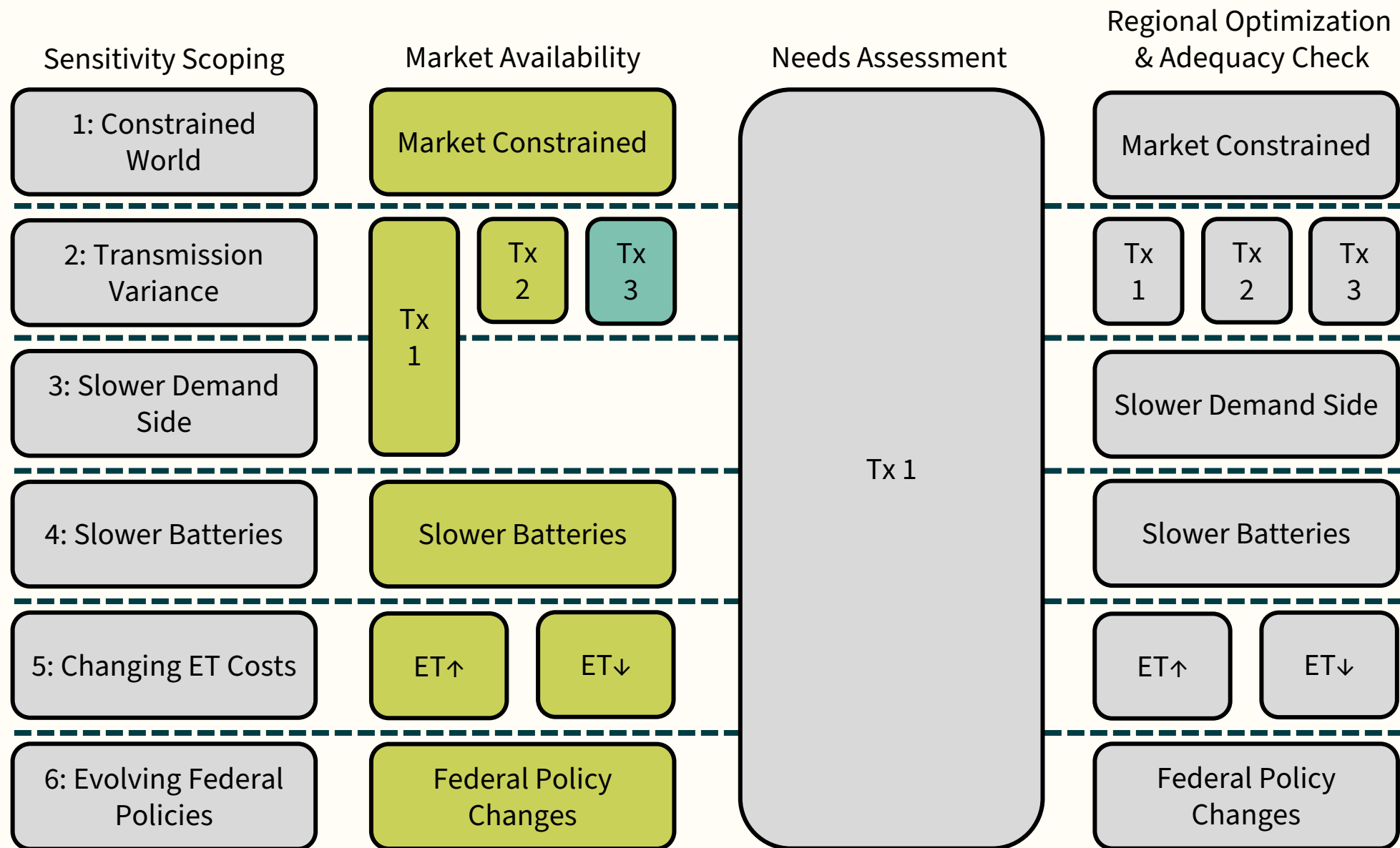
More info here:

Scenario	Resource Availability	Transmission Availability	Costs	Buildout
Baseline	Baseline	Baseline	Baseline	Baseline
Constrained World	Constrained	Baseline	Baseline	Baseline
Emerging Tech Cost Uncertainty	Uncertain	Baseline	Uncertain	Baseline
Transmission Availability	Baseline	Uncertain	Baseline	Baseline
Short-Duration Storage Limitations	Baseline	Baseline	Uncertain	Baseline
Demand-Side Resource Limitations	Baseline	Baseline	Baseline	Uncertain
Evolving Federal Policy Landscape	Baseline	Baseline	Uncertain	Baseline

Changing Hydro Ops



Resource and Tx Risk



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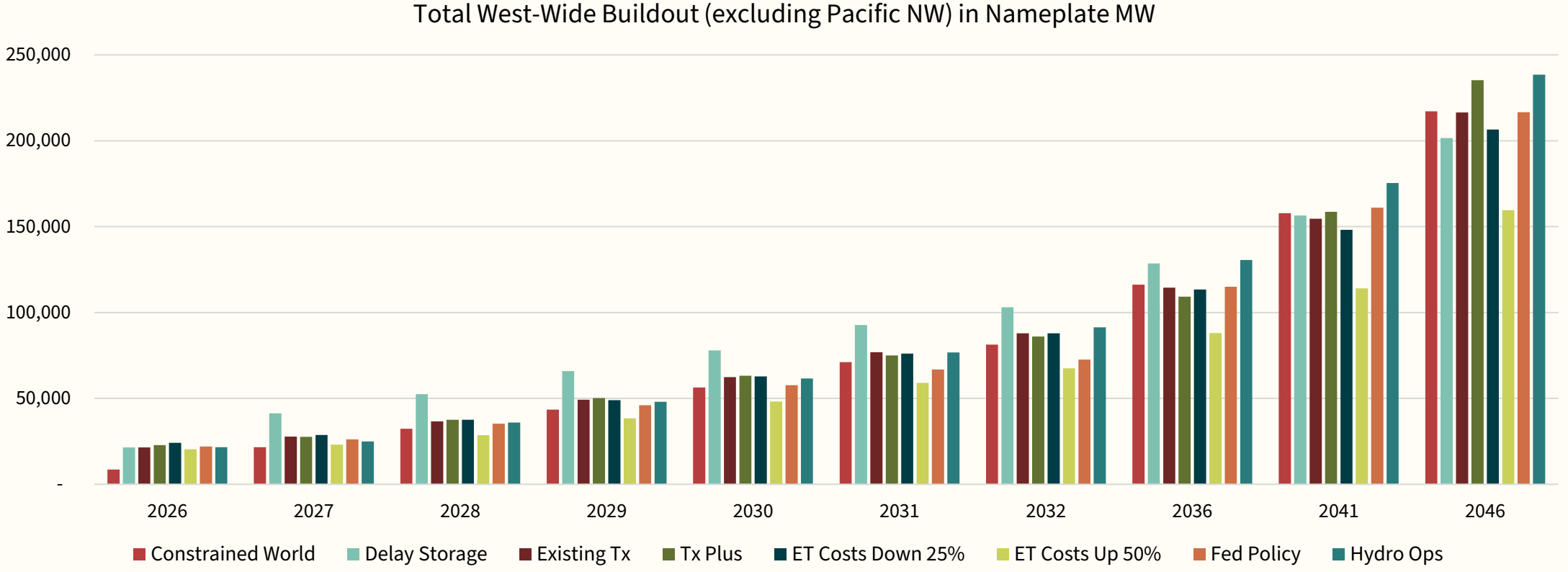
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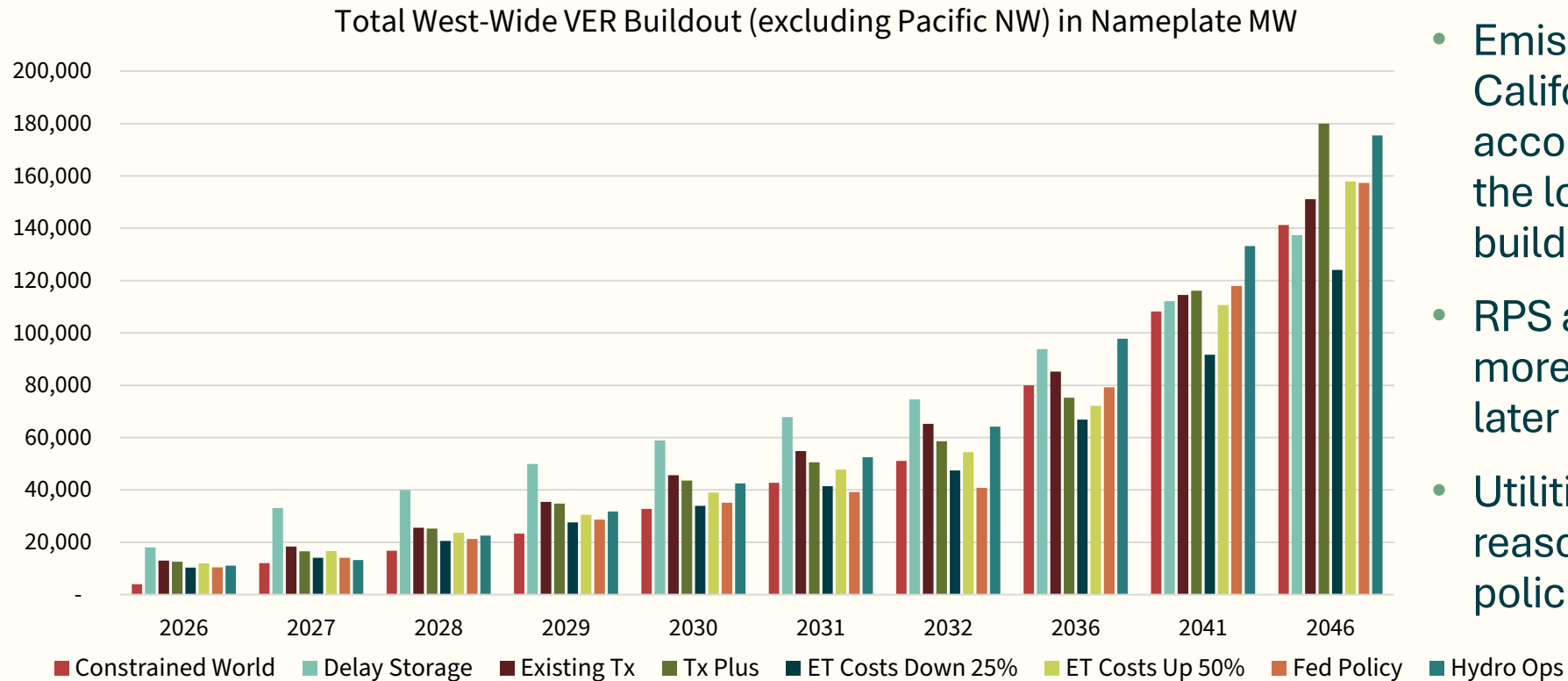
High-Level Findings

- Market availability does not change significantly across the various sensitivities
 - The 20-year buildouts are remarkably similar
 - The near-term buildouts shift a bit, primarily where there are limitations in resource (and particularly short-duration storage) availability)
- Key drivers of the builds are state policies, specifically carbon pricing in California, Washington, and Canada and demand growth
- Majority of resources built across all sensitivities are a balance of renewables, storage (both short and longer duration), and gas
- Buildouts and implied prices indicates that the economics of the market is likely to be very different from previous recent studies
- Given the similarity across buildouts, the differences in these market studies is not expected to be a significant driver of differences in regional resource buildouts in the next step

All Sensitivities



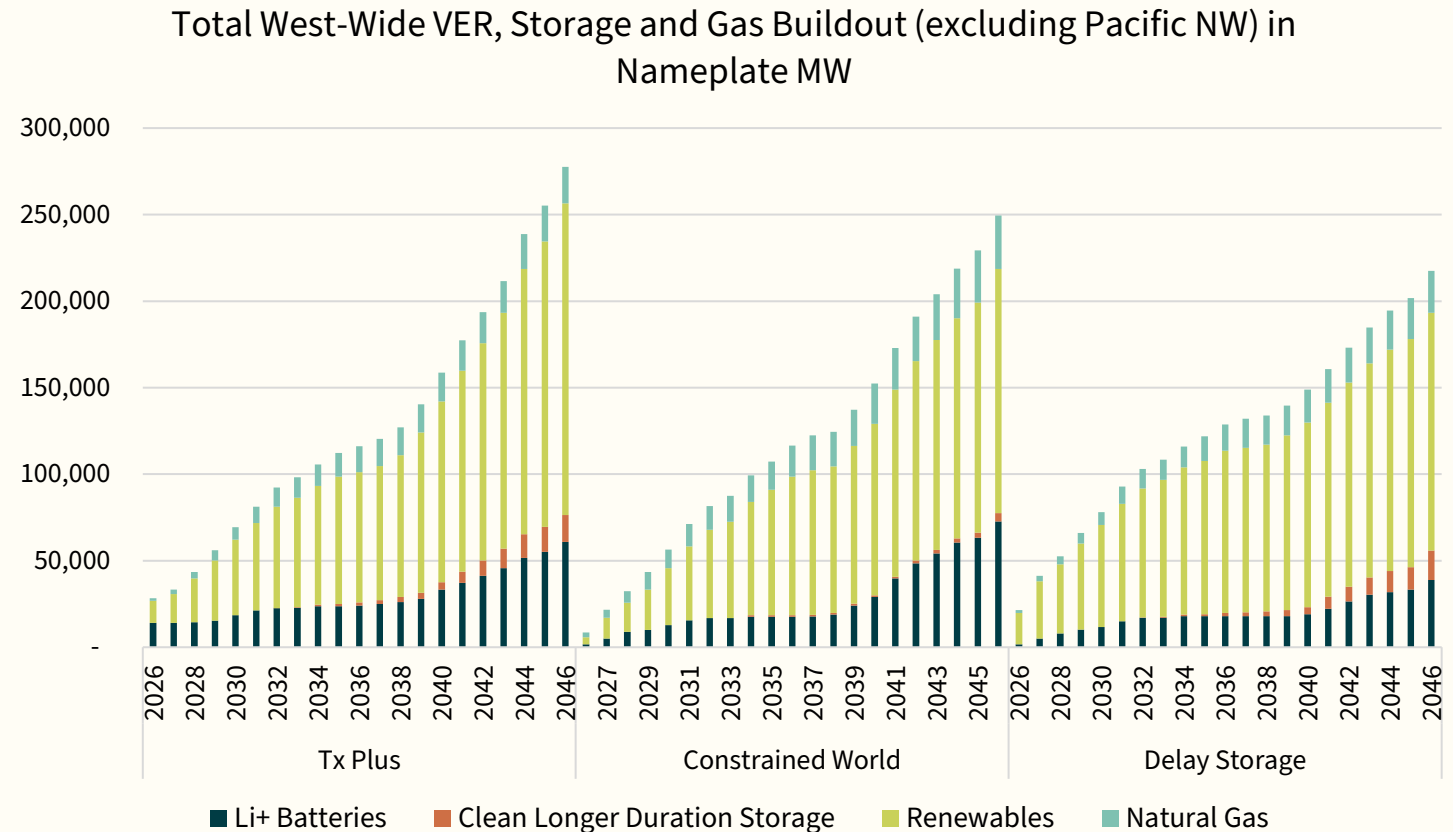
Variable Energy Resource Build Pace Depends on Policies



- Emissions pricing in Canada, California and Washington, accounting for around 60% of the load, drives most early VER build in the modeling
- RPS and clean policies become more binding for the model later in the study
- Utilities are building for these reasons as well, and may see policies as binding earlier

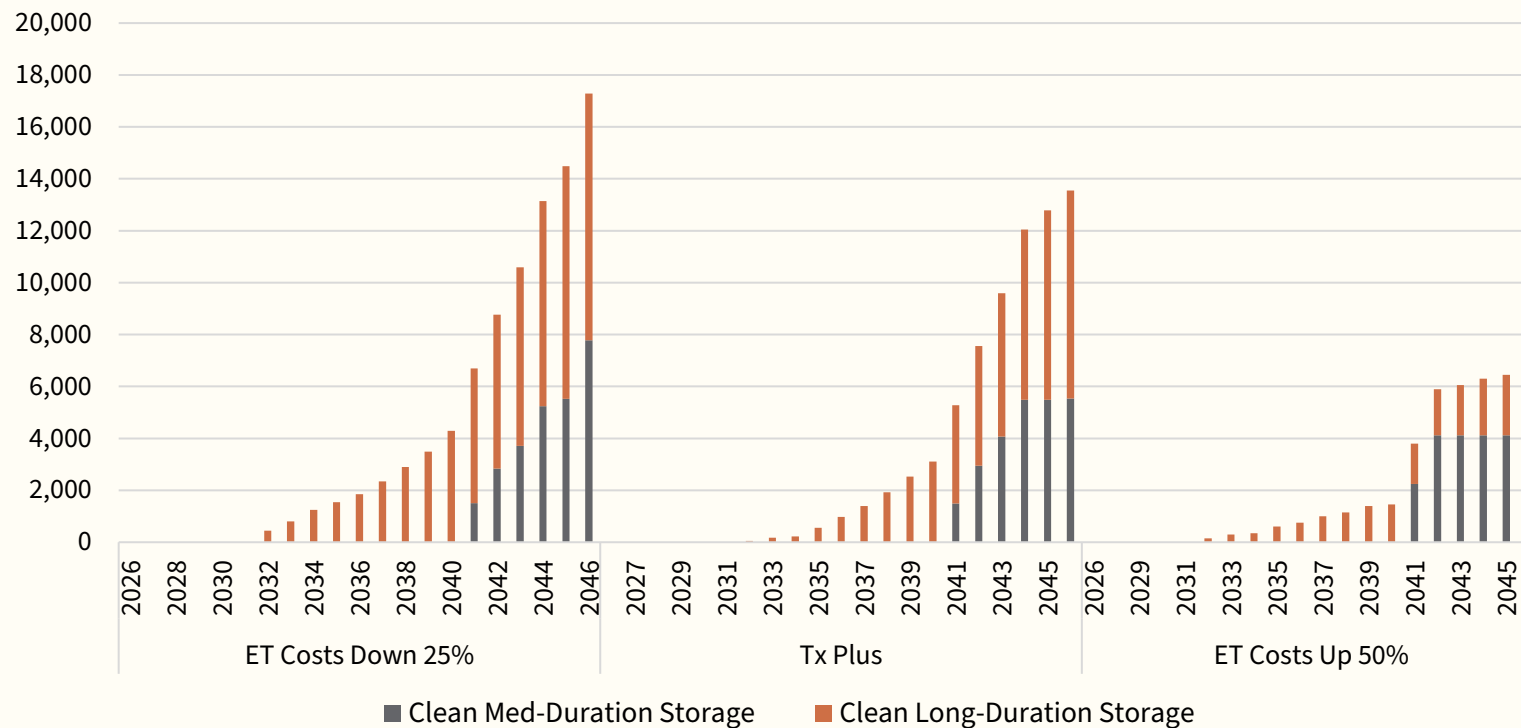
Early Delays in Availability of Short Duration Storage Increases Early VER Build

- Delays in short-duration storage increase VER build by more than 20% and gas build by 25% by 2032, but decrease VER builds by 25% by the end of the study
- Delays in long duration storage and less transmission availability increase gas build by 20% by the end of the study



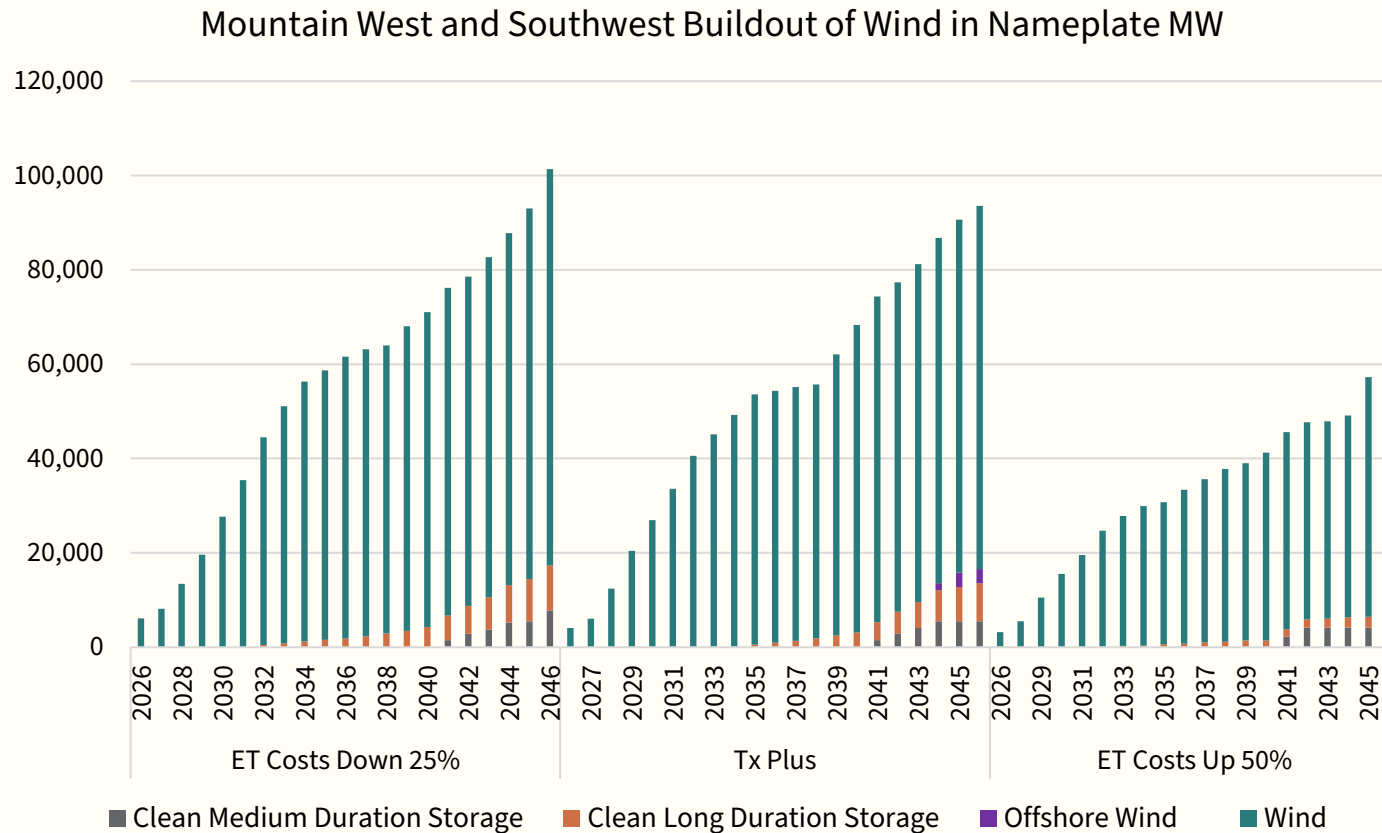
Emerging Tech Resource Acquisition While Limited is Sensitive to Cost Assumptions

Mountain West and Desert SW Buildout of ET Longer Duration Storage in Nameplate MW



- Long and mid duration storage resource acquisition is sensitive to fixed cost
- Lower emerging tech costs can lessen fixed cost investments required to maintain lower production costs

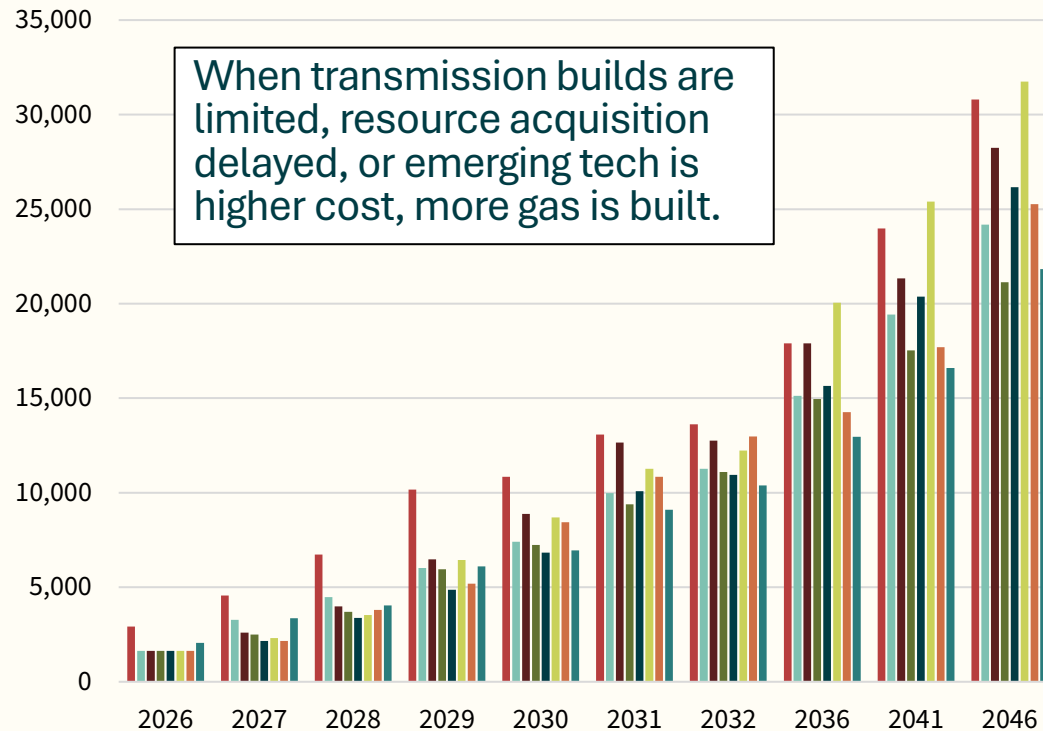
Emerging Tech Costs Change Strategy In Later Years



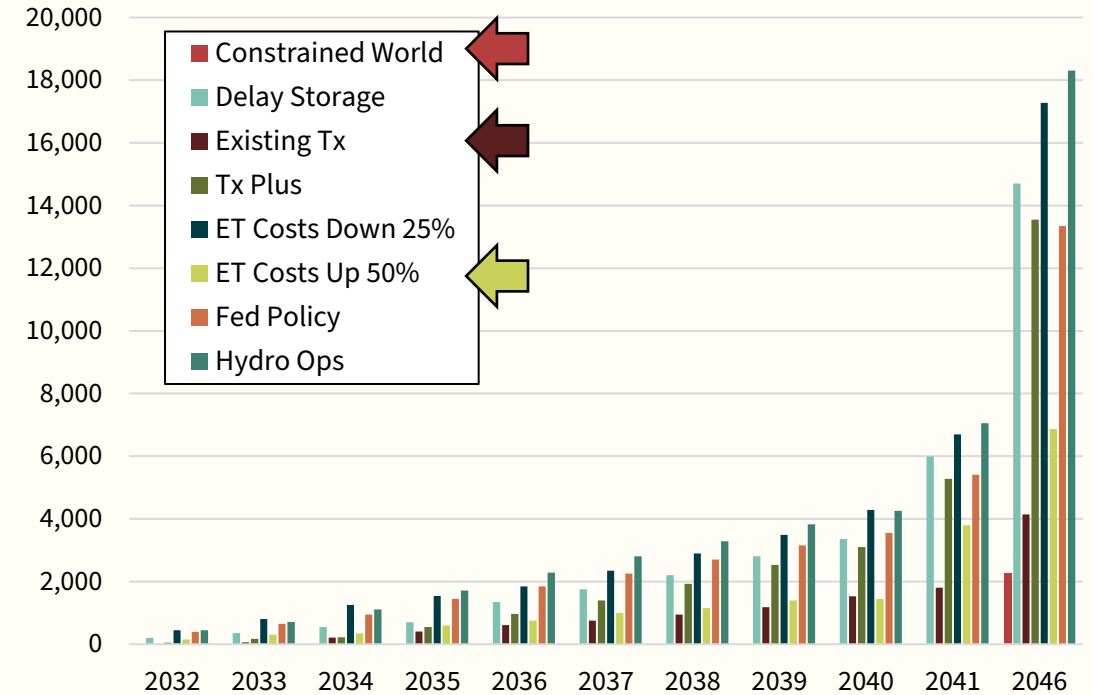
- Lower cost longer duration storage can decrease overall build size by allowing more wind to be built in Mountain West and Southwest which is more efficient at lowering costs
- Higher emerging tech costs force higher reliance on gas earlier (150% more by the end of the study) to maintain adequacy later and lowers value proposition of using VERs to limit emissions
 - This also lowers overall build size

Gas Resource Build Depends on Transmission and Resource Constraints

West-Wide Gas Buildout (excluding Pacific NW) in Nameplate MW

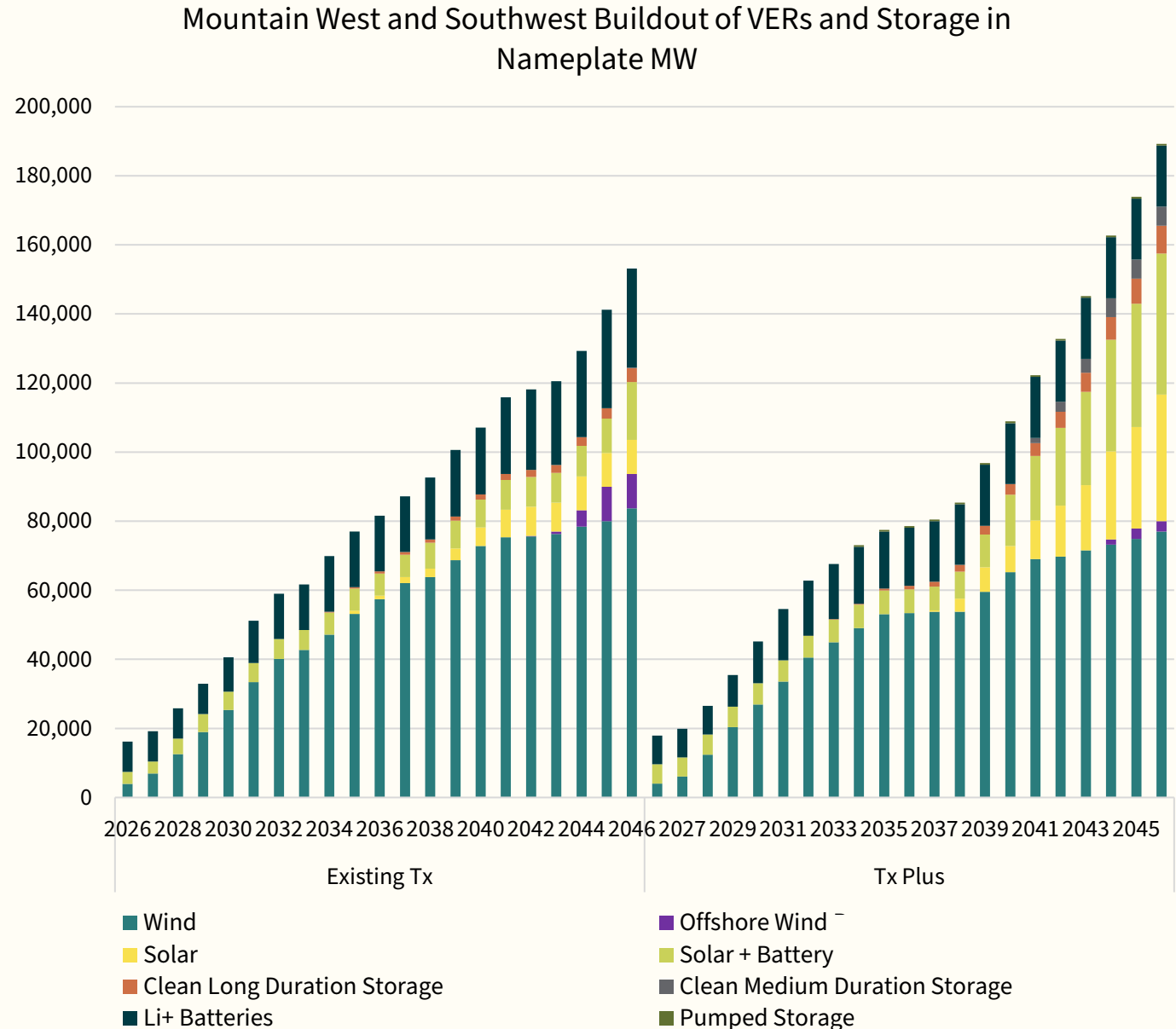


West Wide Long-Duration Storage Building (excluding PNW) in Nameplate MW



Transmission Availability Changes Builds in Mountain West and Southwest

- Wind generation in Mountain West and Desert Southwest primary VER investment until late 2030's
- When there is more transmission available California builds more solar in late 2030's and 2040's



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Next Steps

- Staff will complete the final market availability study for the “Transmission Max” look in the coming month
- Market availability study results will be next used in:
 - GENESYS for the needs assessment for the New Resource and Transmission Risk Scenario*
 - OptGen/SDDP for the regional portfolio optimization for all scenarios and sensitivities
- Staff will be transitioning to final stages of scenario modeling in December and through January, with a goal of presenting all regional portfolio optimization results to the Council in February

* Needs assessment for the Changing Hydro Operations scenario already incorporated the market study results presented today

Additional Slides

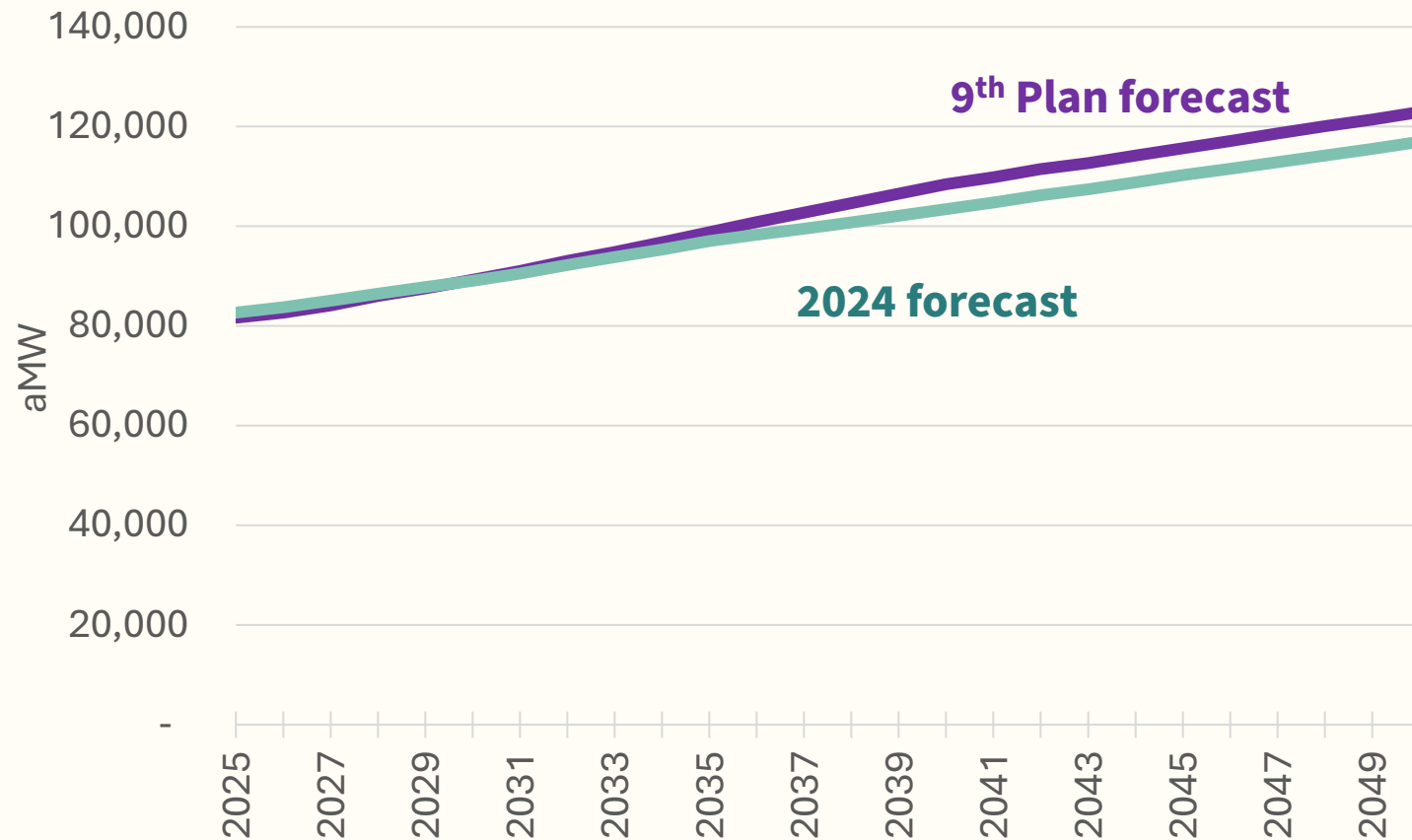
Out of Region Loads and Resources

From April 2025 Council Presentation

Assumption sources

- **Out-of-region loads:**
 - Utility integrated resource plans (IRPs) and other planning documents
 - The California Energy Commission
 - FERC Form 714
 - EIA Form 930
- **Existing resources:**
 - EIA: Form 860 & Form 892
 - WECC Anchor Dataset
 - S&P Global

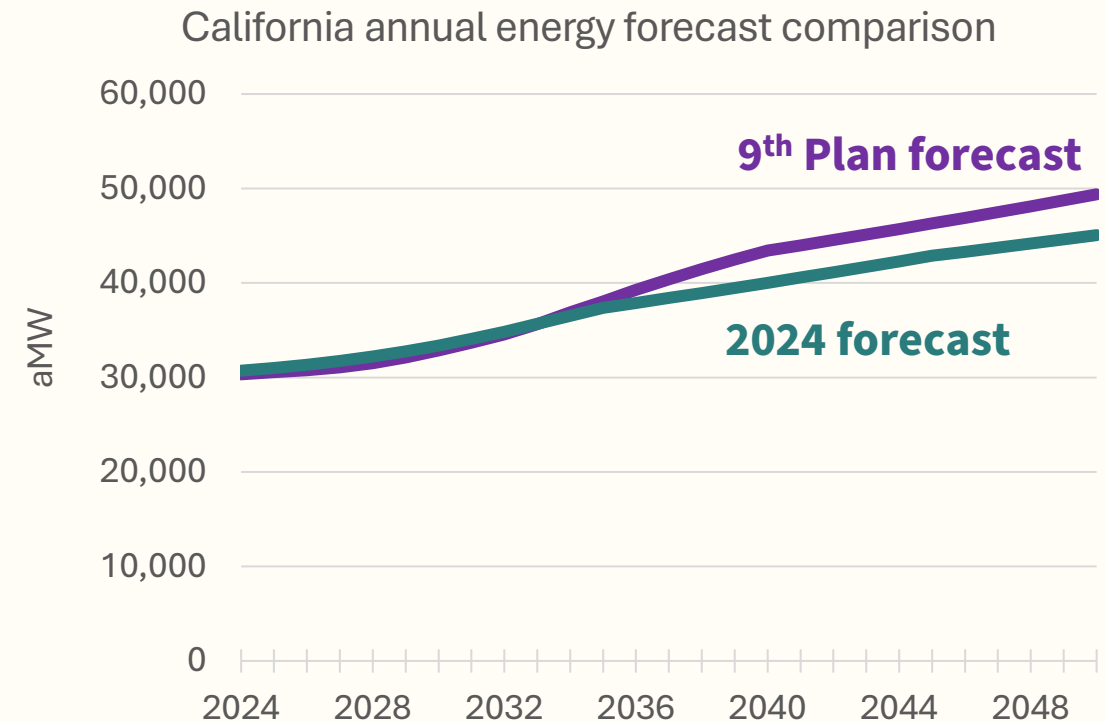
Forecast compared to last year's



- Forecast shown excludes the Northwest (~22,000 aMW today)
- Forecasts are similar through 2035
- By 2040 around 5,000 aMW increase in 9th Plan forecast
- Similar peak trends, slightly smaller peak gap (energy growth from 2025-2050 of 1.6%/year, peak growth at 1.3%)
- Similar load drivers to the Northwest (data centers earlier, electrification later)

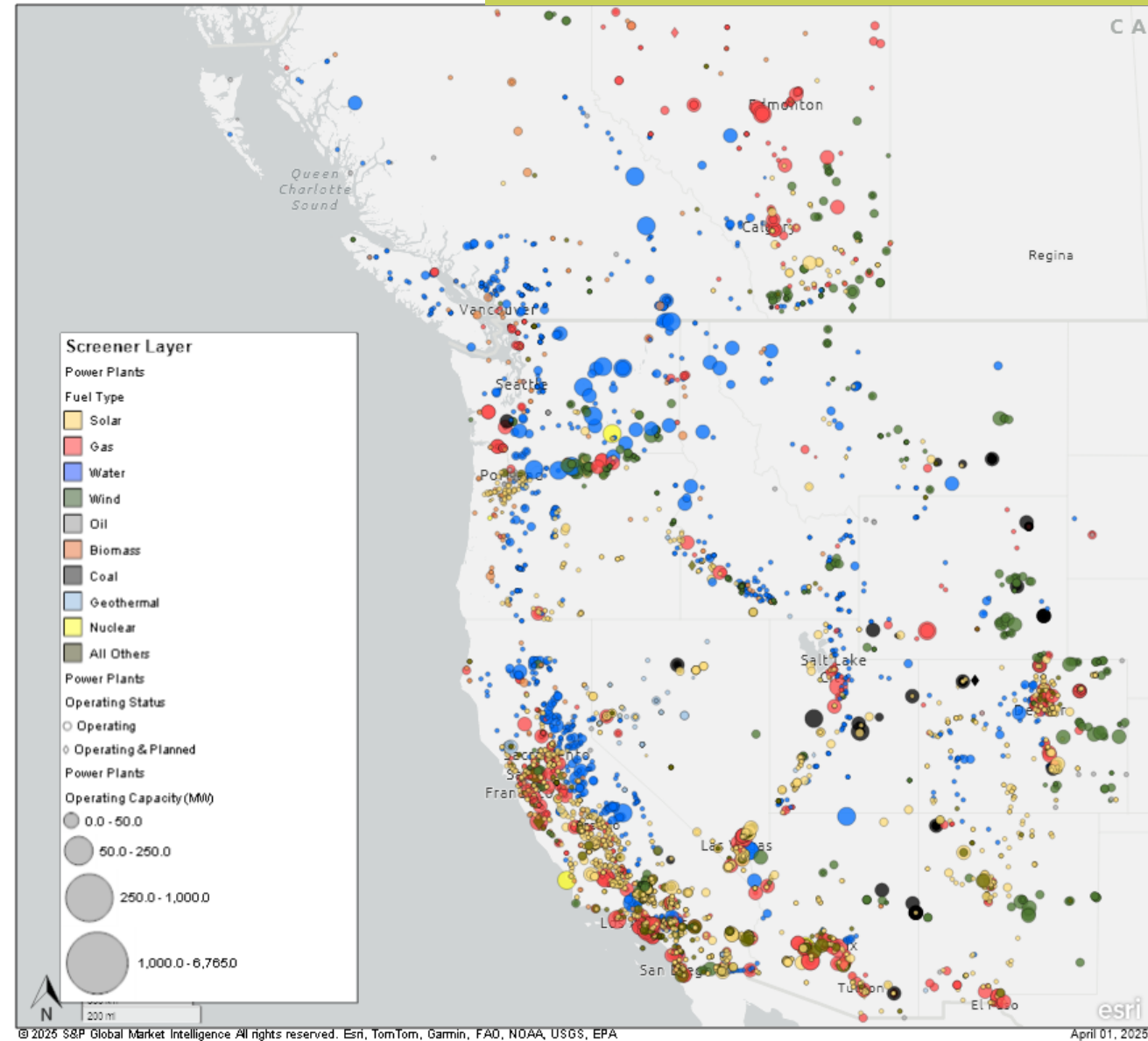
Main changes between 2024 & 2025 forecast

- California adds more energy load starting around 2035 (but peaks stay similar due to demand side measures)
- Increased loads in Nevada starting around 2030 due to data centers
- Increased loads in Utah due to data centers



The Existing System

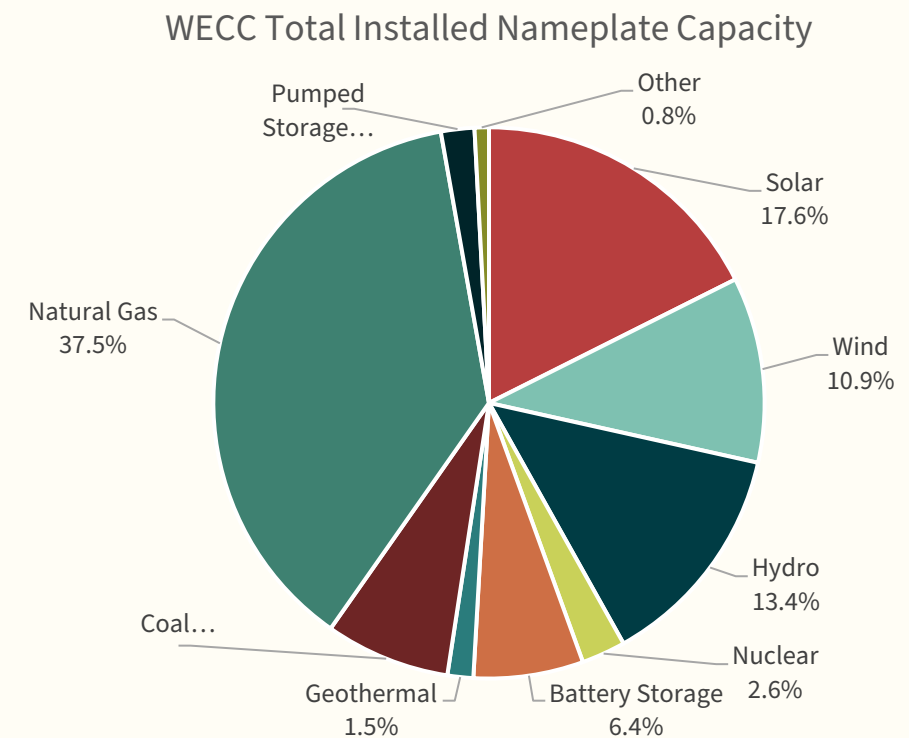
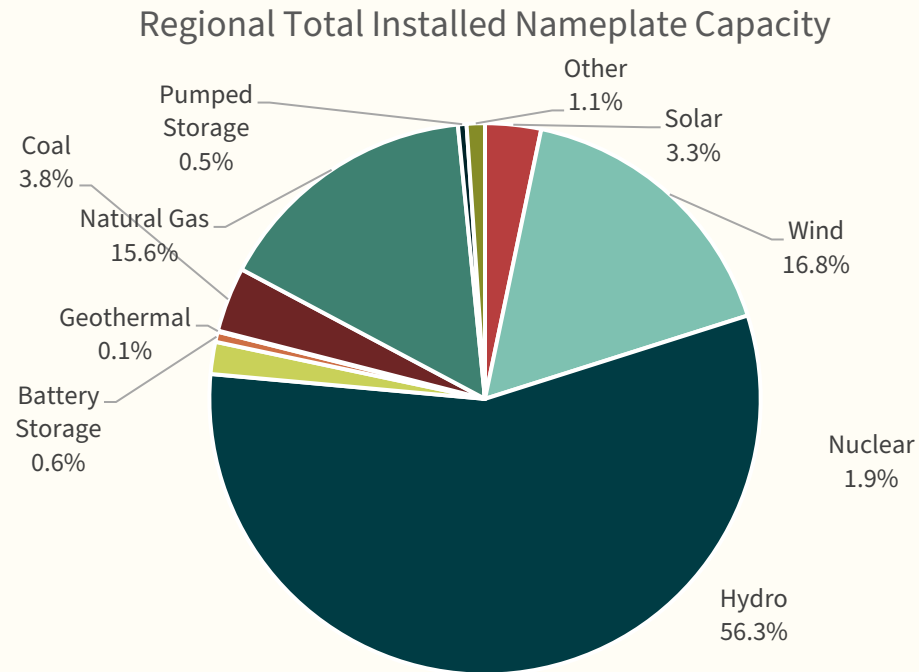
- Resources operating or under construction are input to the models to capture the existing system we're planning in (planned retirements/conversions are also represented)
 - New resources are selected by the models
- Splitting out the NW from the WECC
 - Why: Resources in vs out of the region are treated differently and represented in the model with a different level of detail
 - How: Not always a case of where the resource is built. Some resources are built outside the region but serve regional load or vice versa. We work with individual utilities to parse those plants as best we can



Total Resource Mix

- In-Region: ~62,000 MW

- Out-of-Region: ~242,000 MW



Details on Sensitivities

Resource and Transmission Assumptions

Scenario	Sensitivity	Fed. Tax Credits*	Availability					Costs	Tx Builds
			Renewables	Storage	Gas	ET	EE & DR		
Changing Hydro Ops	All Sensitivities	Yes	No delay	No delay	No delay	No delay	No delay	No change	Tx Plus
New Resource and Transmission Risk	Constrained World	No	6-year limits			10-year	No ET	No change	Existing
	Emerging Tech Cost Uncertainty	No	No delay	No delay	No delay	No delay	No delay	25% lower	Tx Plus
								50% higher	
	Changing Transmission Availability	No	No delay	No delay	No delay	No delay	No delay	No change	Tx Plus
									Existing
									Tx Max
	Short-Duration Storage Limits	No	No delay	6-year limit	No delay	No delay	6-year**	No change	Tx Plus
	Demand-Side Limits	No	No delay	No delay	No delay	No delay	Slower ramp	No change	Tx Plus
	Evolving Fed Policy	In 2030	No delay	No delay	No delay	No delay	No delay	No change	Tx Plus

* This column of Fed Tax Credits applies to renewables and EE, as well as the treatment of gas plants under 111(b). Existing tax credits for all other resources remain in place across all sensitivities

** This 6-year delay on the demand-side only applies to measures/products that connect to short-duration storage

Description of Changing Hydro Risk Sensitivities

BiOp	Spill operations as defined in the 2020 CRSO EIS Preferred Alternative; commonly referred to as Flex Spill.
2023 RCBA	Spill operations as defined in the 2023 Resilient Columbia Basin Agreement; provides a “steady spill” perspective
MOP + Spill Recommendations	Spring and summer minimum operating pool target elevations and spill as recommended by some entities in the Fish and Wildlife Program amendment process
Limited Daily Flexibility	Limiting the amount the lower Columbia and lower Snake projects can flex in a day to those amounts similar to current (2020-2024 actual) operations, and spill operations consistent with the BiOp

Description of New Resource and Transmission Risk Sensitivities

Constrained New Resource and Transmission Options	Limiting the near-term (6-year) availability of commercially available supply-side resources, pushing back availability date of emerging tech resource by 10-years, and limiting transmission to existing transmission only
Changing Transmission Availability	Assuming no delays to resource availability, but instead assessing three different transmission buildout perspectives: (1) existing transmission, (2) transmission plus aligning with WestTEC 10-year study, and (3) transmission max with more transmission
Changing Emerging Technology Costs	Two different looks at emerging technology costs: (1) 25% lower costs and (2) 50% higher costs. No other changes to resource availability and assuming a “transmission plus” buildout.
Limited Short-Duration Storage Availability	Limiting the near-term (6-year) availability of short-term storage options and related demand-side resources. No other changes to resource availability and assuming a “transmission plus” buildout.
Slower Demand-Side Resource Availability	Limiting the demand-side availability by using slower ramp rates for energy efficiency, demand response, and behind-the-meter solar. No other changes to resource availability and assuming a “transmission plus” buildout.
Evolving Federal Policy Landscape	Assuming that federal tax credits for renewables and energy efficiency return in 2030 (based on IRA assumptions) and that requirements for new gas plants outlined in 111(b) are also in place as of 2030.