Technical Appendix Q: Analysis of Dual Versus Single Target for Conservation

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Introduction

This technical appendix provides analysis comparing a “dual target” and a “single target” for conservation, within the agreed to resource portfolio as proposed in the draft Ninth Power Plan (see Action Item RES-1 in Chapter 4 for the recommended resource strategy).[1] The conservation target recommended in the draft Plan is 1,060 aMW regionally by 2032.[2] The question that the Council wrestled with in the development of the target was whether and how to allocate those aMW across the region. Should the Council create multiple sets of avoided costs across the region reflecting the

[1] The regional resource strategy includes 1,060 aMW of conservation, 590 MW of demand response, 220 MW of voltage regulation, 9,000 MW of renewables, 5,200 MW of storage, and 2,100 MW of natural gas. The analysis in this technical appendix assumes the amounts for all those resources remain the same.
[2] The level of investment assumed under the dual target included in the draft Plan would result in 3,950 aMW by 2046.

locational value signal from scenario modeling, or should the Council assume one set of avoided costs under a single target approach?

The draft Power Plan puts forward a "dual target" that creates two different sets of avoided costs for the region: one set for Oregon and Washington and another set for Idaho and Montana. This approach of a dual target is a shift away from the Council's historical approach of a single, regional conservation target. During the development of the draft Plan, the Council received comments from many entities expressing concern regarding the inclusion of a dual target for conservation. Before releasing the draft Power Plan, the Council asked staff to develop this technical appendix to explore some of the trade-offs between a dual versus single target, assuming the overall proposed regional resource strategy remains the same.

The Council is interested in continuing this conversation during the public comment period. This technical appendix aims to support those conversations. The appendix starts with a discussion of the Council's enhanced modeling framework that provided improved information around the locational value of resources. It then walks through the locational signal for resources from the scenario modeling and how the Council used those results to develop the dual target approach included in the draft Plan. The final section walks through staff's analysis of the implications on costs and adequacy of shifting to a single target approach.

Context of Proposed Dual Conservation Target

Enhanced Modeling Framework

The inclusion of a dual target in this draft Power Plan started with the Council's enhancements to its modeling infrastructure. For the Ninth Power Plan, the Council upgraded its suite of modeling tools, which provides more granularity in analysis. This includes more granularity in the timescale of analysis (i.e. the ability to model hourly dynamics of the power system), as well as increased geographic granularity.[3] The sections below provide more context around the value of more geographic granularity in power planning.

Load Forecasting

One of the enhanced tools was the use of Itron for the development of the Council's load forecast. This allowed the Council to develop different load forecasts for the region's 13 balancing authorities.[4]

[3] Technical Appendix A – Global Assumptions outlines the modeling zones assumed in the load forecasting and scenario modeling. More information about the development of specific locational assumptions can also be found in other technical appendices, including Technical Appendices G through J that describe the development of regional resource potential estimates.
[4] Technical Appendix F – Electricity Demand Forecast provides details of the Ninth Plan load forecast, including locational differences driving differential load growth.

The ability to forecast loads at a more granular level is a critical enhancement of the Council's Ninth Power Plan, as new forecasted loads are coming in different forms to different parts of the region.

The Ninth Plan pulls together forecasts from all the different load sectors. Core to the forecast is the growth in the residential, commercial, industrial, and agricultural sectors. Changes in these loads are driven by changing populations and economics, among other factors. The Ninth Plan forecast shows the largest growth rates for these sectors in Idaho and Montana.

In addition to these core loads, the Ninth Plan forecast also includes growth of new sectors, including the electrification of end uses and the addition of more data center and high-tech loads. These sectors show different trajectories across the region. Driven in part by policies, electric vehicles and the electrification of other end uses is mostly occurring in the states of Oregon and Washington. This growth tends to be concentrated in urban centers, particularly impacting the Puget Sound and Portland areas. Of all the load growth, the electrification of transportation and buildings contributes most significantly to peak load impacts by the end of the 2046 forecast period. Concentrated growth of electrification loads will create unique resource needs relative to other parts of the region with slower or flatter load growth.

The other area of significant growth is data centers and the high-tech industry. These new loads are large and relatively flat in profile. The Ninth Plan forecasts these loads in specific zones, primarily Central Oregon, the Portland area, the Mid-Columbia utility zones, and in Idaho Power territory. The concentrated growth drives up energy needs for these specific zones in a way that is unique from other zones of the region not experiencing this load growth.

Taken collectively, the Ninth Plan shows significant load growth in the states of Washington and Oregon, driven by a mix of data centers and electrification. The Ninth Plan also shows significant growth in parts of Idaho, impacting both energy needs and peaks.

Resource Potential

Just as loads are not uniform across the region, neither is the potential for new resources. On the demand side, the potential for new resources is tied directly to the loads. The forecasted growth in homes and businesses in a specific zone directly impacts the forecasted demand-side resource potential of that zone. The Council also had data to support different within zone transmission and distribution deferral values (T&D deferral) for the west and the east sides of the region.[5] This analysis showed increased value for conservation to defer T&D on the west side of the region compared to the east side of the region. Those assumptions were included in the Council's supply curves for demand side resources and had the impact of slightly lowering the levelized cost of resources on the west side relative to the east. Beyond the different T&D deferral values, the Council did not have data to further differentiate demand-side resource potential by zone (e.g. differential baseline assumptions or costs), but such data would improve estimates of technical potential in the future.

[5] Technical Appendix A – Global Assumptions provides more details on the analysis behind the T&D deferral values.

On the supply side, resources may be limited by policy, land, transmission, fuel, and other factors.[6] The Council's Ninth Plan captured that diversity by only allowing resources in specific zones. For example, new natural gas was excluded from the Oregon zones based on policy. While new natural gas beyond Oregon was not limited by policy, the Ninth Plan analysis excluded it from heavily urban zones such as Seattle and Tacoma for practicality reasons. Renewables were similarly limited in the model. New wind was excluded from urban areas, including the Puget Sound and Portland area zones. New large, utility-scale solar was excluded from the most densely populated urban areas (e.g. Puget Sound zones), with small scale solar being the only renewable option for these zones.

In addition to resource availability, the Ninth Plan also captured differences in the shape of resources driven by fuel availability. The Council created five different wind reference plants to account for the varied availability and quality of the wind resource across the region. The Council also created three different solar reference plants to account for the diversity of the solar resource across the region. This provided important information to the model around the timing and availability of these resources, which impact the economics and value of the resource.

Taken collectively, there are certain portions of the region with more limited access to generating resources. Particularly the urban zones with limited land have fewer new resource options available. This in turn requires an understanding of transmission capability, and the ability to develop remote resources and deliver that energy to the load centers. The zonal modeling therefore also included information on transmission capacity and overall connectivity between zones.

Results from Scenario Modeling

The scenario modeling for the Ninth Plan demonstrated the locational value for several resources, including conservation. This section provides a high-level discussion on the location-specific results. More information on the scenario modeling results is available in Technical Appendix N.

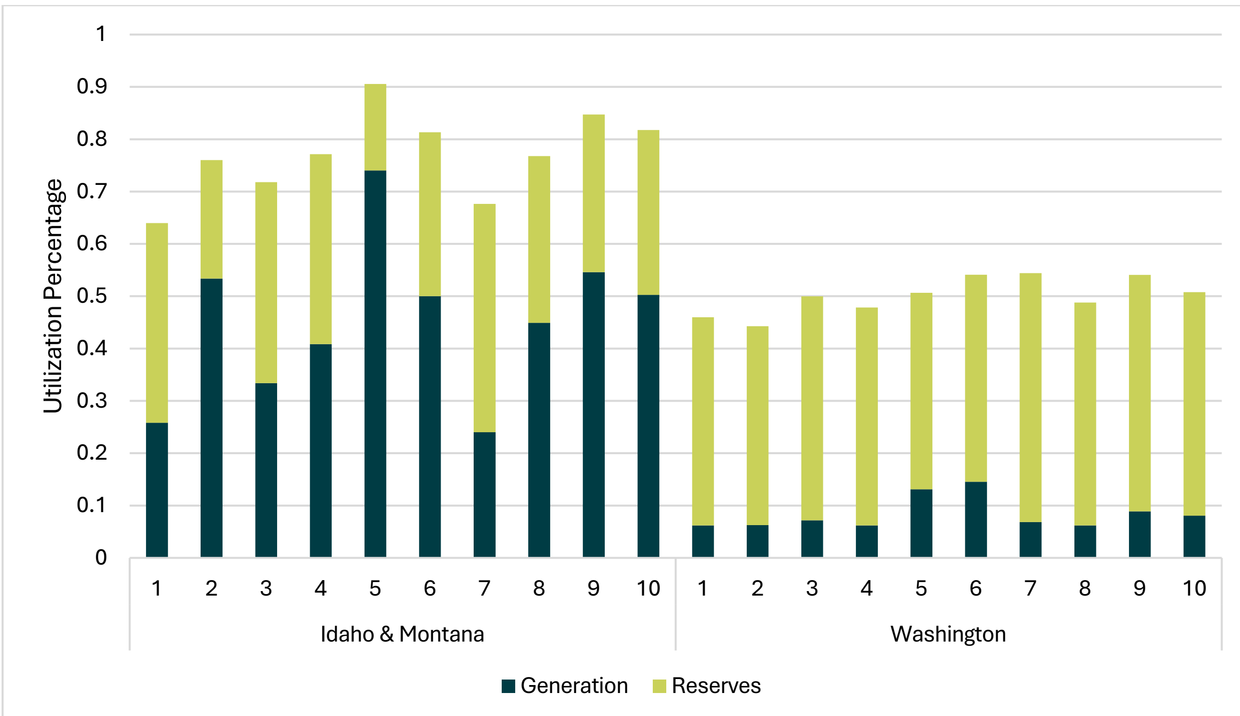
Locational Value of Supply Side Resources

On the supply side, the modeling showed different signals for the selection and operation of resources based on location. The model primarily acquired new natural gas in zones in Idaho and Montana, with fewer units acquired in Washington zones. Once acquired, the utilization of those new thermal units also varied. The bulk of new natural gas acquired, particularly in the near-term, was peaking plants. These plants were generally utilized more to provide seasonal reserves, generating more in the modeled futures with low hydro. That amount of generation varied by zone, with greater generation in Idaho and Montana as compared to Washington. One driver for this is the carbon market in Washington, which increases the cost of natural gas generation. Figure Q - 1 shows the utilization of

[6] More discussion on the locational differences for generating resources is available in Technical Appendix G – New Generating Resources.

new thermal units in 2032, grouped by new units in Idaho and Montana versus those in Washington.[7] This provides a clear example of how new resources are utilized differently across the region, given differences in economics and policy.

Figure Q - 1: Utilization of New Thermal Units in 2032 Across Sensitivities



This translates to differing levelized costs of energy for the new natural gas resources. The new natural gas in the Idaho Power zone is generally utilized the most for generation (instead of reserves). This brings down the levelized cost of the resource, with levelized costs as low as $50/MWh and going up to $75/MWh. The costs in broader Idaho and Montana zones were a bit higher, ranging between $80-$100/MWh. The carbon market in Washington both drives up the cost of generation and reduces the amount of generation. The resulting levelized cost of energy for new gas in Washington ranges between $120-$170/MWh.

The modeling also showed locational differences for solar. The bulk of standalone solar was acquired east of the Cascades, where the solar resource is better. Solar is acquired in zones west of the Cascades, but that was generally either more expensive smaller scale solar (because the large scale solar was not available in a zone) or hybrid solar plus storage resources where the added storage helps to expand the value of the solar in zones with generally less sunshine.

[7] The data in Figure Q - 1 is averaged across all 13 sensitivities. In other words, Future 1 represents the average utilization for all Future 1s in each of the 13 sensitivities. This was done as the general trend in utilization is consistent across sensitivities, with greater variability being the difference across zones and futures.

The wind acquisition was different. Rather than concentrating all new wind in those zones with the best shape (and therefore economics), the model acquired wind more broadly across the region. This demonstrated the value in the diversity of the wind resource. This finding is consistent with other studies, including market studies conducted by the Council, which show the value in diversity of renewables across a footprint.

Locational Value of Conservation

On the demand side, conservation was the one resource that showed locational value. Throughout development of the draft Plan, several entities have asked why other demand side resources do not also show a locational value. This appears to be based on the overall value of those other resources as seen in the scenario modeling. For example, voltage optimization is one of the lowest cost resources available to the model and is therefore seen as economical in all zones being acquired in the full amount available to the model in every sensitivity. The model did show locational differences in how this resource was utilized, with the model preferring more of a conservation approach to this resource on the west side and more of a demand response approach on the east. Behind-the-meter solar is one of the more expensive resources and is therefore only selected in the one sensitivity when other resources are significantly limited (the Constrained World). Demand response is selected in some amount in every sensitivity, but generally just the lowest cost bin is acquired. The modeling of this resource does not capture a strong economic value for the resource generally, thereby minimizing a signal for the locational value for the resource. Additionally, the model does not capture within zone constraints, contractual challenges, or other barriers that might change the value for demand response for certain jurisdictions.[8]

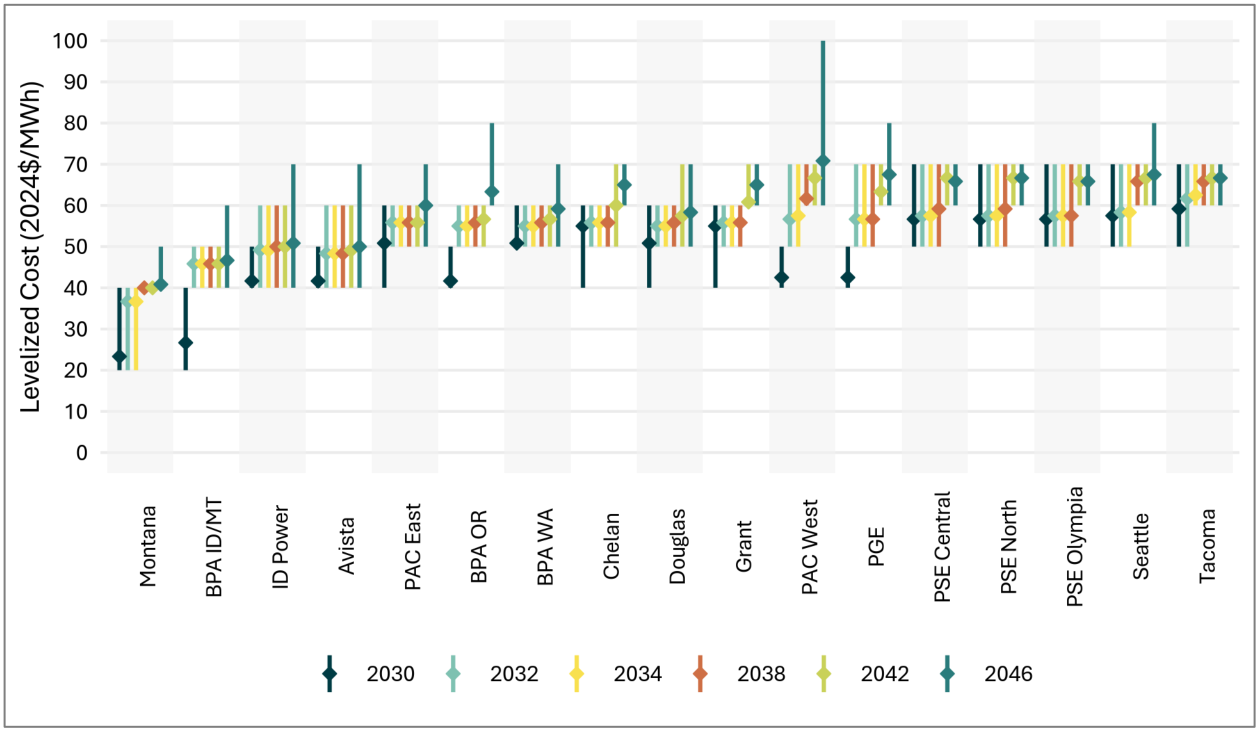
Conservation on the other hand showed a clear signal for locational value. This, in part, is likely due to the nature of the resource. With levelized costs ranging from $0 to over $250/MWh, the model had a wide range of potential conservation to select from. Additionally, the scenario modeling showed a strong preference for resources that both provide energy and support the planning resource margins, which conservation does. Taken together, there is a strong signal for the value of a resource like conservation, and the range in available costs allowed the model to select that conservation that is economic for each zone relative to other resources.

The scenario modeling shows a consistent signal of a varied value for conservation across the region. Figure Q - 2 provides information on the range and average levelized cost of conservation acquired across the zones for the different sensitivities. For each zone, the range captures the difference between the sensitivity with the lowest cost of conservation acquired and the sensitivity with the highest cost of conservation acquired. The diamond marks the average cost acquired across the 13 sensitivities for that zone. For example, the first range in the Montana zone shows that for 2030, the model purchased up to $20/MWh on the low end and up to $40/MWh on the high end, with an average

[8] The modeling of demand response is discussed elsewhere in the draft Ninth Plan including Chapter 4 and Technical Appendix N – Scenario Modeling Results. Please refer to those areas for a deeper discussion on the limitations of demand response modeling for this Power Plan.

of around $22/MWh. Whereas the Tacoma zone for that same 2030 year, purchased up to $50/MWh on the low end and $70/MWh on the high end, with an average around $60/MWh. In other words, in 2030, on average, conservation was economic in the Montana zone at around $22/MWh and economic in the Tacoma zone at around $60/MWh.

Figure Q - 2: Average Levelized Cost Per Zone, Across Sensitivities



As shown in Figure Q - 2, Montana consistently showed the lowest value for conservation, meaning less costly conservation was economical in Montana to meet needs relative to other resources. The load growth in Montana, while still significant relative to their current loads, is relatively smaller than in other parts of the region. The Council's forecast does not assume significant loads from electrification or additions of data centers. At the same time, Montana has one of the best wind resources in the region, with the levelized cost of wind for those zones coming in around $35/MWh.

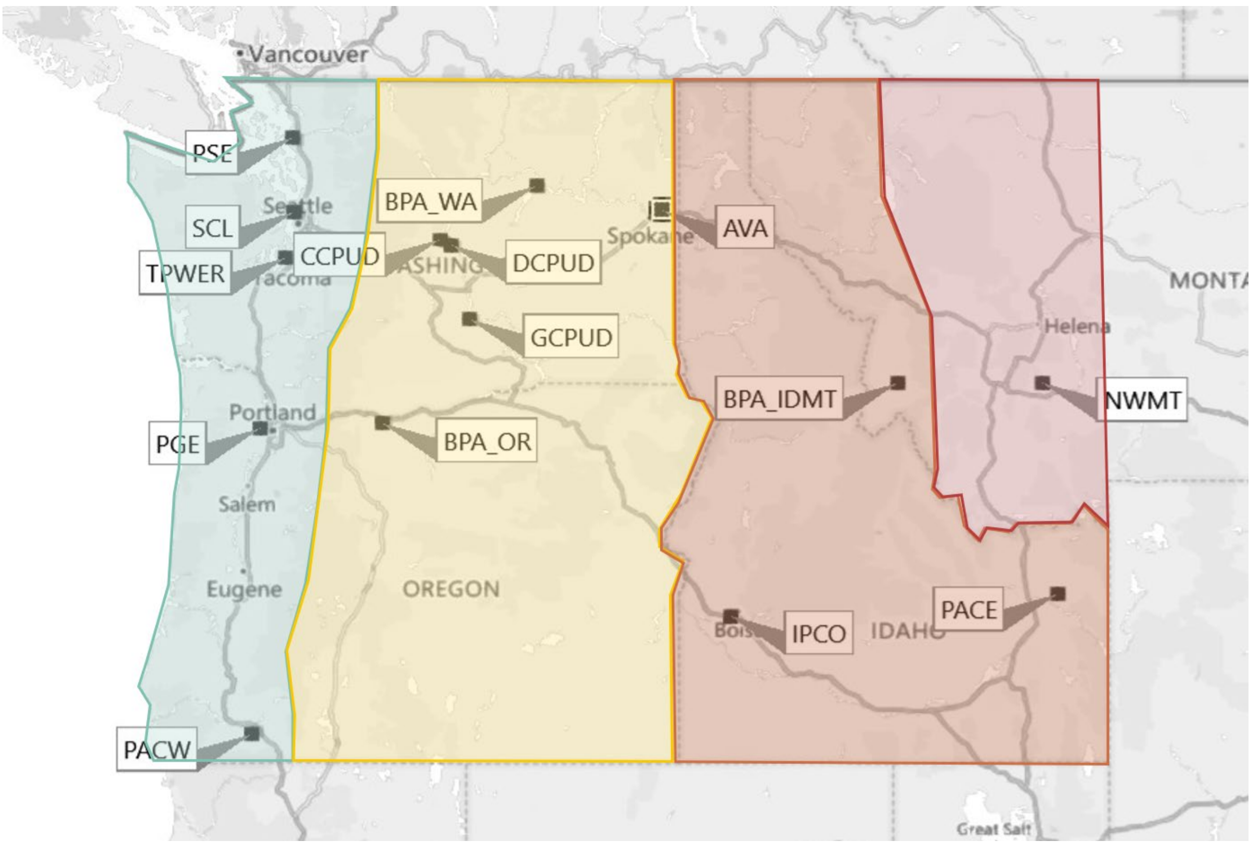
On the other side of the region, the Puget Sound Area zones (PSE Central, PSE North, PSE Olympia, Seattle, and Tacoma) consistently showed the highest value for conservation, particularly in the early years. While these zones are not experiencing forecasted growth from data centers, electrification is driving up the loads (particularly peaks) in these areas. Additionally, as discussed above, there are fewer supply side resources available to directly serve these zones, meaning resources need to be developed remotely and delivered to load via transmission. Constraints in transmission capacity also increases the value in acquiring conservation to lower loads.

Another differentiating factor between conservation locations is clean policies and goals. The Ninth Power Plan includes policies and utility goals for carbon reduction throughout the western grid. For Washington specifically, the model includes planning with the social cost of carbon due to the Clean

Energy Transformation Act (CETA) requirements. These requirements can be offset by Washington-based conservation in the model, providing additional locational value.

The scenario modeling also showed different market prices across the region, suggesting differential value for resources that defer the need for market purchases. The market prices are highest in some of the Puget Sound area zones and lowest in the Montana zones. A weighted average market price across the sensitivities for the west side (Oregon and Washington) is around $34/MWh and the weighted average market price for the east side (Idaho and Montana) is around $26/MWh.

Figure Q - 3: Relative Value of Conservation Across the Region



The locational results generally group into four zones: West of the Cascades, East of the Cascades in Oregon and Washington, Idaho, and Montana (see Figure Q - 3). These results are consistent with the realities on the ground.

- **West of the Cascades:** These zones are experiencing load growth driven by electrification, and in some cases tech loads (around Portland). The availability of new generating resources is limited, particularly around the Puget Sound area and in urban centers. New natural gas cannot be built in Oregon, and the carbon market in Washington makes new natural gas less economic. Additionally, there are transmission constraints across the Cascades that limit the viability of developing lower cost resources remotely to serve loads.
- **East of the Cascades in Oregon and Washington:** These zones are also experiencing load growth driven by electrification, albeit less than in the urban centers on the west side of the

Cascades. Rather, the biggest driver of loads in these zones is from high tech loads. On the resource side, more resources are available. Additionally, there are fewer transmission constraints limiting the ability to bring resources to load. One key factor that sets this area apart from the zones further east is policy: new natural gas cannot be built in Oregon, and the same policy drivers limiting natural gas west of the Cascades in Washington impact the east side of Washington. As noted above, the levelized cost of energy for new natural gas in Washington is between $120 and $150/MWh, making more conservation cost-effective at these levels as compared to Idaho and Montana.

- **Idaho:** There is significant forecasted load growth in Idaho, particularly in the Idaho Power zone in and around Boise. This is driven by growth in the high-tech sector, as well as growth in the residential and commercial sectors, which are increasing both energy and peak needs. There are more resources available that can be developed closer to loads to meet this growth in Idaho. Also, without a carbon market, new natural gas becomes more economic. Idaho has greater transmission connectivity to the broader WECC, increasing the ability to bring remote resources to load.

- **Montana:** As discussed above, while the Council's load forecast estimates significant load growth for Montana, the overall amount continues to be less than the other states. Neither electrification nor new high-tech sector loads are forecasted in large amounts in this part of the region. At the same time, similar to Idaho, there are more resources available that can be developed closer to meet load growth, and these resources are generally more economic than the higher cost conservation.

These factors result in conservation being cost competitive only up to the comparable price of competing natural gas and renewable resources. The Council used this analysis to inform the proposed conservation target approach for the draft Power Plan, as discussed more below.

Council Analysis

The Council is required to put forward a scheme of new conservation and generating resources to meet future needs, prioritizing cost-effective resources. The scenario modeling demonstrated that conservation is cost-effective at different amounts across the region, driven by differences in load growth, resource availability, and policy. Striving to prioritize cost-effectiveness, the Council developed a proposed conservation target to reflect at least some of these locational differences.

Council staff discussed the scenario modeling results with the Council's Conservation Resources Advisory Committee (CRAC) and sought feedback on how best to use the locational information in developing the conservation target to be included in the draft power plan. The CRAC members expressed a range of perspectives. There was some support for leveraging the locational signal in developing a target. One member suggested that any differences in the target be connected to state boundaries as driven by policies. At the same time, several CRAC members expressed concerns about risks of moving towards a multiple target approach, particularly noting concerns around implementation challenges for Bonneville and NEEA.[9] As a whole, the CRAC generally recognized that there were pros and cons with pursuing either a single target or multiple target solution.

Considering this feedback and the Power Act requirements, staff proposed pursuing a two-target approach defined by state boundaries. While the analysis suggested more potential zones (four or five), staff were cognizant of the implementation concerns raised at the CRAC. The two-target approach was proposed to provide some balance between leveraging the locational information from the scenario modeling results while seeking minimizing the implementation challenges. Aligning the target by states provides cleaner boundaries for implementing the target, while also recognizing the real policy differences across the region that are driving some of the cost-effectiveness results of the conservation modeling.

The Council recognizes that there are other ways it could use the locational information to develop a dual (or more) conservation target. For example, given the very strong signal for conservation west of the Cascades, the Council could set a target for those jurisdictions. This geographic boundary has a strong logical basis, given the transmission constraints across the Cascades and the limited land availability for renewables west of the Cascades. A geographic boundary, such as the Cascades, may be more challenging to implement, but the Council could develop an approach to support the region in assessing whether an entity is in that zone or not (similar to the Regional Technical Forum's development of heating and cooling zone mapping for relevant conservation measures).

Building on this approach, the rest of the region could be put into a single zone, or further split based on other boundaries. A single zone east of the Cascades recognizes that implementation of conservation for entities in Washington and Oregon on the east side of the Cascades is similar to those in Idaho and Montana. At the same time, it glosses over real differences between the resource needs in Oregon and Washington, as compared to Idaho and Montana, in response to decarbonization policies. The modeling also supports different targets for Idaho and Montana, largely driven by different load growth forecasts and needs. Much of the Idaho signal is likely driven by the significant load growth in Idaho Power's territory from high-tech loads, suggesting perhaps further bifurcation. The point being, there are many ways the locational information could be leveraged to capture the on the ground realities of the region's diversity. Additionally, any approach carries some challenges with no single zone being uniform in needs and would require shifts in implementation from a single target approach.

Another factor in developing the conservation amount included in the draft Plan was the overall scenario modeling results. The scenario modeling showed that more conservation is part of a cost-effective portfolio when resources are constrained on the supply side. (This is consistent with the

[9] Since this discussion at the CRAC, Bonneville has shared more information at the Council regarding their concerns about the implementation challenges associated with a dual target. These include restructuring to operations and tools, with potential to increase administrative and infrastructure cost increases. At this time, the Council does not have enough specificity to analyze these considerations with other factors discussed elsewhere in this appendix. The Council continues to have conversations with Bonneville, and will do so throughout the public comment period, with a goal of better understanding the specific concerns and working to identify potential paths forward.

locational information described above, where more conservation is acquired in those zones with fewer resource options.) The scenario modeling also showed that, universally, more expensive conservation is required over the long-term to support adequacy (i.e., conservation has generally more value by 2046 than it does in 2032). The Council developed a conservation target for this draft Plan that provides a hedge for both the near-term supply side risks and long-term adequacy needs.

Assessing Implications of a Single Target

This section walks through considerations of a single target from a resource planning perspective. As discussed earlier in this appendix, the assumption underlying this analysis is that the same level of conservation would be part of the resource strategy (e.g. 1,060 aMW). The only difference is that rather than having two different avoided costs as defined by the dual target, the single target assumes a single avoided cost for the region. In other words, conservation has the same value in all parts of the region.

Shift in Conservation

The dual target as recommended in the draft Ninth Power Plan assumes two different levelized costs for conservation: up to $150/MWh for Washington and Oregon representing an average cost of around $45/MWh and up to $70/MWh for Idaho and Montana representing an average cost of around $32/MWh. Shifting this to a single conservation target means moving to a single assumed levelized cost for the region. At 1,060 aMW of conservation in 2032, a single target would be up to $107/MWh of conservation regionally, which equates to an average cost of around $40/MWh.

Shifting Cost-Effective Conservation Eastward

A single target shifts cost-effective conservation potential from the west side of the region to the east. Since the underlying assumption of this analysis is to maintain 1,060 aMW of conservation regionally, the reduction in conservation on the west side of the region exactly equals the increase on the east side. By lowering the cost-effectiveness threshold from $150/MWh to $107/MWh, the west side loses around 40 aMW of cost-effective conservation. This 40 aMW is then added to the east side, representing the difference of the increased threshold from $70/MWh or $107/MWh.

Table Q - 1: Amount of Cost-Effective Conservation by Zone in 2032

Zone	Dual Target	Single Target
Oregon and Washington	860 aMW	820 aMW
Idaho and Montana	200 aMW	240 aMW
Regionally	1,060 aMW	1,060 aMW

Reduction in Long-Term Investment in Conservation

Assuming continued investment at the levels proposed under the dual target in this draft Power Plan, the overall conservation acquired at the regional level by 2046 would be 4,220 aMW. Under a single target, this amount is less. The lower investment level on the west side of the region (up to $107 instead of up to $150) results in around 270 aMW less conservation by the end of the plan. That is offset slightly by the increased investment on the east side of the region, with an increase of around 160 aMW. Overall, this results in a reduction of 110 aMW of conservation regionally by 2046.

Table Q - 2: Amount of Cost-Effective Conservation by Zone in 2046

Zone	Dual Target	Single Target
Oregon and Washington	3,530 aMW	3,260 aMW
Idaho and Montana	690 aMW	850 aMW
Regionally	4,220 aMW	4,110 aMW

More Cost-Effective Measures in Idaho and Montana

This shift in the amount of cost-effective conservation available in each part of the region drives a change in the specific measures that are available as cost-effective. The additional 40 aMW of cost-effective conservation in the east results in more measures becoming available. In many cases, this increase does not represent an entirely new measure becoming available, but rather expanded applications of the same measure.

The bulk of the additional measures available between $70 and $107/MWh are in the residential sector. Table Q - 3 summarizes these available measures. Most of this is in additional weatherization applications, specifically insulation measures for attics, walls, and floors.

Table Q - 3: Residential Measure Additions in Idaho and Montana Under Single Target

Measure	Available Up to $70/MWh	Additional Available Up to $107	Single Target Total
Air Source Heat Pump Upgrade		6.69	6.69
Central Air Conditioning		0.40	0.40
Weatherization	6.84	11.1	17.94
Refrigerator	0.75	1.20	1.95
Freezer	0.28	0.38	0.66
Residential Total	**7.78**	**19.67**	**27.55**

Additional measures and measure applications also are available in the commercial, industrial, and agricultural sectors when going from $70/MWh to $107/MWh. This is a mix of heating and cooling measures, lighting, pumps, and grocery measures.

The total technical potential for conservation in Idaho and Montana estimated for 2032 is around 320 aMW. Of this, the dual target recommends that 200 aMW of that technical potential is cost-effective, leaving roughly 120 aMW as not cost-effective. Shifting to a single target, the addition of 40 aMW means that 240 aMW would be cost-effective, with only 80 aMW of the total technical potential being not cost-effective at the measure level. This equates to about 75% of the technical potential being cost-effective on the east side. The bulk of the remaining non-cost-effective potential (around 65 aMW) is from residential measures, primarily heating and cooling measures. This includes air source heat pumps and ductless heat pumps.[10]

Fewer Cost-Effective Measures in Washington and Oregon

The lower cost-effectiveness threshold on the west side of the region means that fewer measures are cost effective. The bulk of this reduction (around 75%) comes in the loss of measures for the commercial sector. Table Q - 4 shows the reduction in commercial conservation measures, focusing on the end uses. The bulk of the loss (close to 14 aMW) comes from heating, cooling and ventilation (HVAC) measures. The next big difference is in measures for grocery refrigeration.

Table Q - 4: Commercial Measure Reductions in Oregon and Washington Under Single Target

End Use	Available Up to $150/MWh	Reduction between $150 and $107	Single Target Total
Appliances	2.50	0.01	2.49
Compressed Air	0.79	--	0.79
Electronics	25.05	--	25.05
Food Preparation	3.95	0.23	3.71
HVAC	150.54	13.71	136.83
Lighting	28.12	3.52	24.60
Motors/Drives	5.66	0.67	4.98

[10] These measures (air source heat pump upgrades and ductless heat pumps) are not currently cost-effective at the measure level under the 2021 Power Plan, nor would they be under either the Council's proposed dual target approach for the Ninth Plan. This means that acquiring these resources costs more than otherwise acquiring an alternative similarly available and reliable resource, whether that be conservation or a generating resource. Technical Appendix H – Conservation Methodology and Potential provides more details on the estimated levelized cost of the conservation potential for the region.

End Use	Available Up to $150/MWh	Reduction between $150 and $107	Single Target Total
Other	0.46	0.13	0.32
Refrigeration	35.85	7.75	28.10
Vehicles	10.98	--	10.98
Water Heating	13.03	1.35	11.69
Whole Building	26.81	--	26.81
Total	**303.72**	**27.37**	**276.35**

Additional measures in the residential, industrial, and agricultural sectors also become not cost-effective. This includes applications of residential weatherization (insulation primarily) and some central air-conditioning measures.

The total technical potential assumed for the west side is around 1,200 aMW by 2032. Of this, 860 is cost-effective under the dual target with 340 aMW not being cost-effective. Shifting to the single target approach results in 820 aMW of cost-effective conservation, with 380 aMW being not cost-effective at the measure level. This equates to roughly 68% of the technical potential on the west side being cost-effective. Also, similar to Idaho and Montana, the bulk of the remaining non-cost-effective measures are in the residential sector. This includes the same air source heat pump and ductless heat pump measures that are not considered cost-effective for Idaho and Montana.[11]

Portfolios Costs

Council staff assessed the difference in portfolio costs between a dual target approach and a single target approach. As noted earlier in this appendix, this analysis assumed that all other elements of the regional resource portfolio remained the same, with the only difference being in conservation. Specifically, the key difference was analyzing the costs assuming the 40 aMW shift of conservation from the west side of the region to the east side of the region.

Fixed Costs

There are two cost elements as part of a portfolio. The first is the fixed costs. These costs represent the annual investment for acquiring the resources, as well as fixed operations and maintenance cost based on the portfolio, including the existing system, previous investment, and current investment. There is one set of fixed costs for any portfolio based on the resources that make up that portfolio.

[11] Technical Appendix H – Conservation Methodology and Potential provides more information on the technical potential for the region.

When comparing the fixed costs of the portfolio for the dual versus single target for conservation, the only difference is in the costs for the conservation itself. This includes the reduced investment on the west side (the direct cost of the 40 aMW reduction of conservation between $107/MWh and $150/MWh) and increased investment on the east side (the direct cost of the added 40 aMW of conservation between $70/MWh and $107/MWh). Regionally, this shift results in a reduction in the annual fixed costs of around $18 million dollars for year 2032 (in 2024 dollars). That is approximately a 0.8% reduction in fixed costs in 2032 for the portfolio.

Since fixed costs for conservation can be directly attributed to the utilities acquiring the resource, it is possible to assess how changes to the fixed cost impact the region differentially. Analysis shows that while the overall fixed cost of the portfolio decreases, the decrease is not universal. The reduction in 40 aMW of conservation on the west side reduces annual direct costs for those utilities by around $47 million in 2032. Shifting that conservation to the east side results in an increase in the direct costs for those utilities by around $29 million. It is that net difference that results in the $18 million reduction in direct costs regionally.

It is worth noting that this analysis just explores the difference in the fixed cost of the conservation. What is not included is who is assumed to pay the fixed costs associated with other resources in the portfolio, as these can be developed remote from load. As cost-effective conservation shifts from the west side of the region to the east side of the region, west side utilities will be required to acquire other resources in the resource strategy to meet needs. Similarly, more conservation acquired on the east would likely reduce the need for those utilities to acquire other resources in the strategy. Without knowing those specific shifts for each utility, the Council cannot provide a full analysis of how the overall fixed costs between a dual and single target for conservation would impact any utility or zone.

Variable Costs

The variable costs are the second element of portfolio costs. These costs represent the production costs of the portfolio, which include the variable costs associated with fuel, transmission, policies, and variable operations and maintenance. Unlike the fixed costs, the variable costs change for the portfolio depending on the future tested. For example, in years with low hydro conditions, the system relies more on natural gas generation to maintain adequacy. This will increase the variable costs in that year relative to a high hydro generation year, due to increased costs for fuel and for compliance with policy.

When comparing the variable costs of the portfolio for the dual versus single target, the variable costs are much closer between the portfolios, with the annual 2032 variable costs of the dual target being roughly $3.7 million dollars less than those of the single target. A portion of this ($3.4 million) is driven by a difference in operations costs (e.g. fuel and transmission) and the remaining is connected to a very slight increase in emissions-related costs. This shows that, on average, there is slightly more thermal generation under a single target portfolio than under the dual target, although this is within the range seen across the futures assessed for either portfolio.

Given all costs incorporated in these portfolio variable costs, it is not possible to do an analysis of how those will impact different utilities within zones. For example, because part of the variable costs are connected to natural gas fuel costs, without knowing where and who is responsible for those costs, it is not feasible for the Council to connect those costs to specific utilities.

Total Costs

Combining the fixed and variable costs, the single target portfolio annual cost is approximately $14 million less than the dual target portfolio. Putting this into perspective, $14 million represents less than 0.5% of the overall annual cost for the portfolio.[12] This is also significantly less than the difference in overall portfolio costs across the futures tested in the scenario modeling. In that context, Council staff find that these two portfolios have similar total costs.

Regional Adequacy

The final element of this analysis for this technical appendix was to test the proposed regional resource strategy, but assuming a single target, for adequacy. To do this, the Council set up a full adequacy check consistent with the check for the proposed strategy, with the only difference being in the location of conservation as informed by the single target and discussed above.[13] Both assessments focused on 2031, assumed the same additions of generating resources, used the same hydro operations for fish and wildlife, and analyzed the same range of future load trajectories and hydro and variable energy resource availability.

The Council uses a multiple metric approach to test for adequacy. These metrics seek to ensure that modeled shortfalls are not too frequent, nor are they too long or too large.[14] Table Q - 5 compares the adequacy results for the regional resource strategy with the proposed dual target as compared to a potential single target.

[12] Modeled portfolio costs do not include variable operations and maintenance costs for hydro or variable energy resources, non-power related utility costs, new transmission build costs, fixed operations and maintenance costs associated with the existing system and potentially other costs.
[13] More information on the adequacy check for the proposed regional resource strategy is included in Technical Appendix N – Scenario Modeling Results. As discussed in that technical appendix, the Council completed a full adequacy check for the proposed resource strategy assuming two different sets of hydro operations for fish and wildlife. The first is the operations as described in the Council's 2026 Columbia River Basin Fish and Wildlife Program and the second is the operations as described in the preliminary injunction issued by the federal district court in Oregon in March 2026. Technical Appendix N provides more details on the differences between these two operations, but the key differences relate to the spill levels in the fall and ramping of the system in spring and summer. For this analysis of the single target, the Council only conducted the adequacy check assuming the 2026 Fish and Wildlife Program.
[14] Technical Appendix M – Needs Assessment Results provides more details on the Council's multi-metric approach to assessing resource adequacy.

Table Q - 5: Adequacy Check Results

Metric	Frequency			Extreme Deficits		
	Annual LOLEV (events)	Winter LOLEV (events)	Summer LOLEV (events)	VaR Duration (hr)	VaR Peak (MW)	VaR Energy (MWh)
Study/Criteria	0.2	0.1	0.1	8	1,200	9,600
Proposed Strategy (dual target)	0.068	0.053	0.006	1.8	582	1,452
Shift to single target	0.136	0.118	0.016	3	1,237	3,505

The results show that shifting the conservation amount from the dual target approach to a single target approach, while keeping all other elements of the regional resource strategy the same, is not an adequate resource portfolio. Specifically, the single target strategy violates the Council's winter frequency and peak metrics, highlighted in the orange cells.

The Council's frequency metric avoids having adequacy events too frequently. It accounts for both seasonal limits (winter and summer) and an annual limit. A winter frequency metric of 0.1 loss of load events (LOLEV) means that the Council is planning for no more than 1 winter event in 10 years. A 0.118 LOLEV suggests slightly more frequent events than 1 in 10 years. The Council's peak metric (value at risk or VaR peak) is trying to protect against high-capacity shortfalls that are too large. Specifically, 39 out of 40 years, the Council wants to ensure that the maximum single-hour peak shortfalls do not exceed 1,200 MW. The 1,237 MW peak VaR found in the single target strategy test slightly violates that threshold.

While these violations are slight, it is important to keep in mind that the Council's approach to assessing resource adequacy is a binary approach. Under the standard used for the Ninth Power Plan, if one metric is violated, the portfolio is considered to be inadequate.

This finding demonstrates an important point regarding the proposed resource strategy in the draft Ninth Plan. The proposed strategy, including the dual target, while adequate, does not overly build towards the high loads. In other words, it is not a "gold plated" system overbuilding resources. If the strategy was in fact gold plated, a shift of 40 aMW of conservation from the west side of the region to the east would not likely be significant enough to make the strategy inadequate.

Should the Council develop a single target approach to conservation in its Final Power Plan, it will need to revisit the overall resource portfolio to ensure that there are sufficient resources to maintain adequacy. At this time, the Council has not determined what resources (and in what amounts) would be required for adequacy. Based on analysis conducted by staff in the development of draft Plan, the most likely approaches would be to increase either conservation, natural gas, or renewables recommendations by some amount.

Summary

This analysis focused on assessing the differences between including a dual versus a single conservation target in the regional strategy as currently defined in the draft Power Plan. The results show that, assuming the same level of conservation, moving from the proposed dual target to a single target would shift 40 aMW of cost-effective conservation by 2032 from the west side of the region (Oregon and Washington) to the east side of the region (Idaho and Montana).

This analysis also shows that from a regional perspective, that 40 aMW shift in conservation from west to east does not result in a significant difference in the overall portfolio costs. The shift in costs is not uniform across the region. Specifically, shifting cost-effective conservation from the west to the east results in a shift in investment from the west to the east.

Moving to a single target, assuming all else equal with the strategy, would result in a regional resource recommendation that is not adequate per the Council's adequacy criteria. To ensure that the Ninth Power Plan provides for an adequate, efficient, economical, and reliable power supply, the Council would need to consider other changes (specifically resource additions) to the overall resource strategy should the Council ultimately pursue a single target approach to conservation in the Final Power Plan.

Seeking Public Comment

This technical appendix was added to the draft Ninth Power Plan to provide more context around the inclusion of a dual target approach in the resource strategy for this draft plan, as well as some of the considerations from a regional planning perspective of a single target approach. The goal of providing additional context is to help the public when they are preparing comments on the Ninth Plan. The Council is interested in and seeking comments on all aspects of the draft Ninth Plan. Given the level of engagement in development of the draft Plan, the Council knows that the question around the shape of conservation target will be one area of significant discussion during the public comment period. The Council is interested in engaging in these discussions to become more informed on the issues, with a goal of ensuring the final power plan provides the most robust way for ensuring an adequate, efficient, economical, and reliable power supply.