Choosing a Strategy

Quantitative analysis delivers a great deal of information about how resource choices will perform over time and under different assumed conditions, but choosing a resource strategy also involves applying what we have learned from listening to our customers, operating in the marketplace, and observing regulatory developments. Here we explain the reasoning behind the recommendations in this resource plan.

I. Overview

Planning horizons as long as this one—a 20-year outlook—can be considered to have two distinct parts: a near-term "action window" and the longer period that follows**.** The action window is characterized by decisions and commitments that must be made in the near future to ensure reliable service for our customers. The later, longer term reveals the consequences of those choices and the impact they may have on decisions we will have to make in the future.

The length of the action window differs depending on which resources are being discussed. For example, the action window for some energy efficiency measures may be fairly short (one to two years), because programs can be ramped up quickly. But the action window for wind generation that requires transmission may be as long as five to seven years. (It can take three to four years to site and build the facilities, and up to seven years to build the transmission.) In general, the following discussion considers the next five years to be the action window, and presents snapshots of progress at 2020 and 2029.

Worldwide, economic conditions changed radically during the development of this IRP analysis. In the spring of 2009, PSE developed new demand forecasts and scenarios that allowed us to incorporate post-downturn information about economic conditions into our assumptions. One of these updates, the 2009 Trends scenario, was chosen as the basis for these plans. This scenario is based on the updated 2009 Low Growth demand forecast, which resembles PSE's subsequent comprehensive forecast update more than any other modeled in this IRP.

II. Electric Resource Plan

Figure 8-1 illustrates PSE's draft 2009 Electric Resource Plan. The plan integrates demand-side resources with renewable and nonrenewable supply-side resources to arrive at the lowest reasonable cost portfolio capable of meeting PSE customer needs reliably and responsibly over the next 20 years. It is based on the 2009 Trends scenario, which enabled us to incorporate up-to-date assumptions about economic conditions, and on the lowest cost portfolio for that scenario produced by the Strategist optimization analysis described in Chapter 5. The ways in which we modified the theoretical Strategist portfolio to better address real-world considerations is illustrated in Figure 8-3, and described in the following pages. It is notable that all of the portfolios produced by the analysis were very similar during the "action window" of the first five years of the planning horizon, as can be seen in Figure 8-4

Figure 8-1
Draft 2009 Electric Resource Plan
with Cumulative Resource Additions in MW

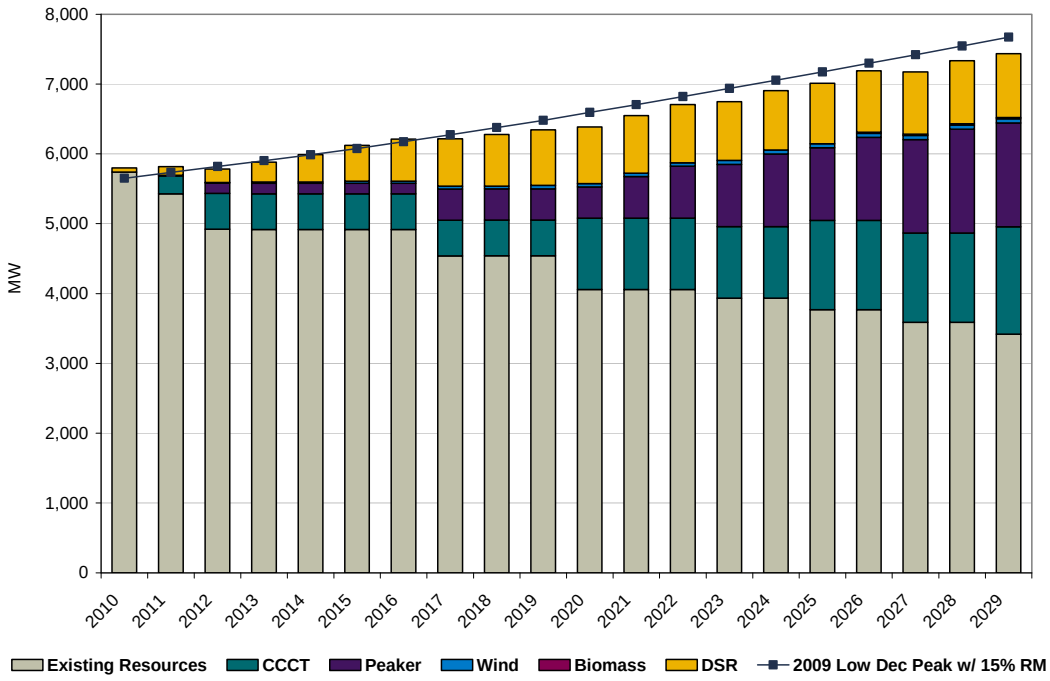


Figure 8-2
Cumulative Capacity Additions (MW)

	2012	2016	2020	2029
Demand-Side Resources	192	605	808	1030
Wind	200	600	1000	1200
Biomass	0	0	0	20
CCCT w/Duct Firing	550	550	1100	1650
Peakers (Reciprocating Engines)	160	160	480	1600

Figure 8-3
Cumulative Resource Additions Compared
(Strategist vs. Resource Plan)

Strategist 2009 Trends Portfolio Cumulative Resource Additions (MW)

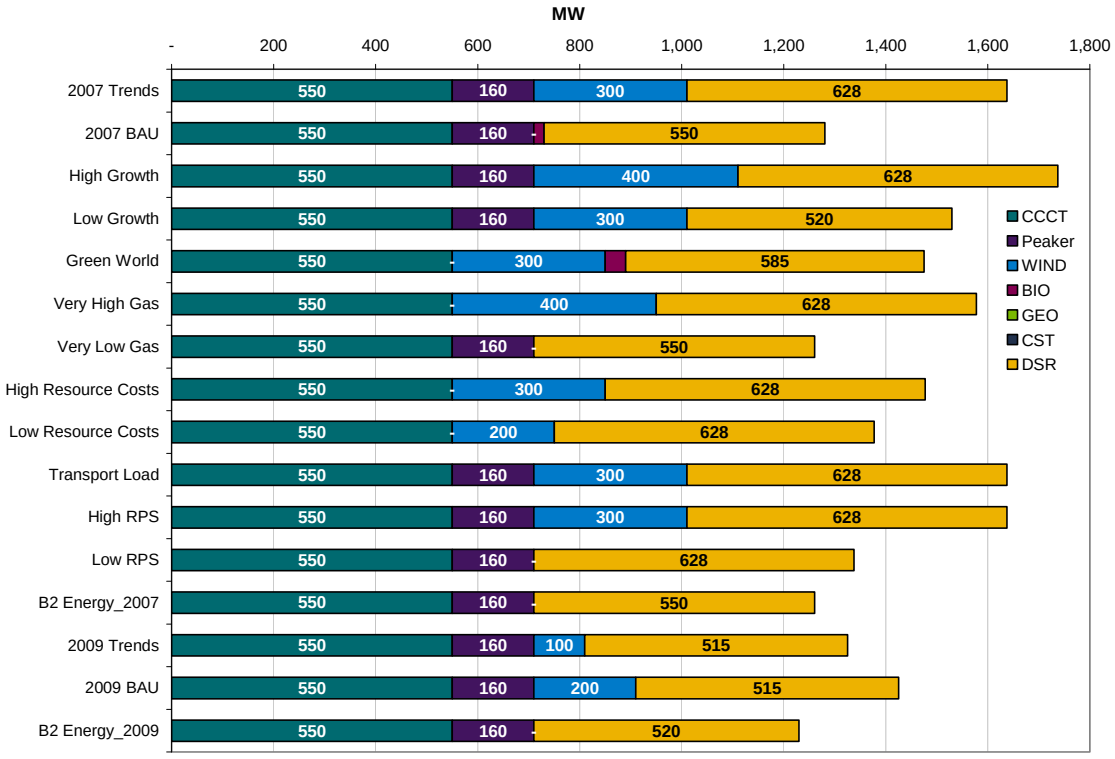
	DSR	Wind	Other Renewable	Peakers	Base Load
2012	225	200	-	160	550
2016	680	300	50	160	550
2020	915	700	120	480	825
2029	1,030	800	170	1,600	1,100

2009 Electric Resource Plan Cumulative Resource Additions (MW)

	DSR	Wind	Other Renewable	Peakers	Base Load
2012	192	200	0	160	550
2016	476	600	0	160	550
2020	808	1000	0	480	1100
2029	1,030	1200	20	1600	1650

Figure 8-4
Cumulative Resource Builds Across Scenarios by 2016 (MW of capacity)

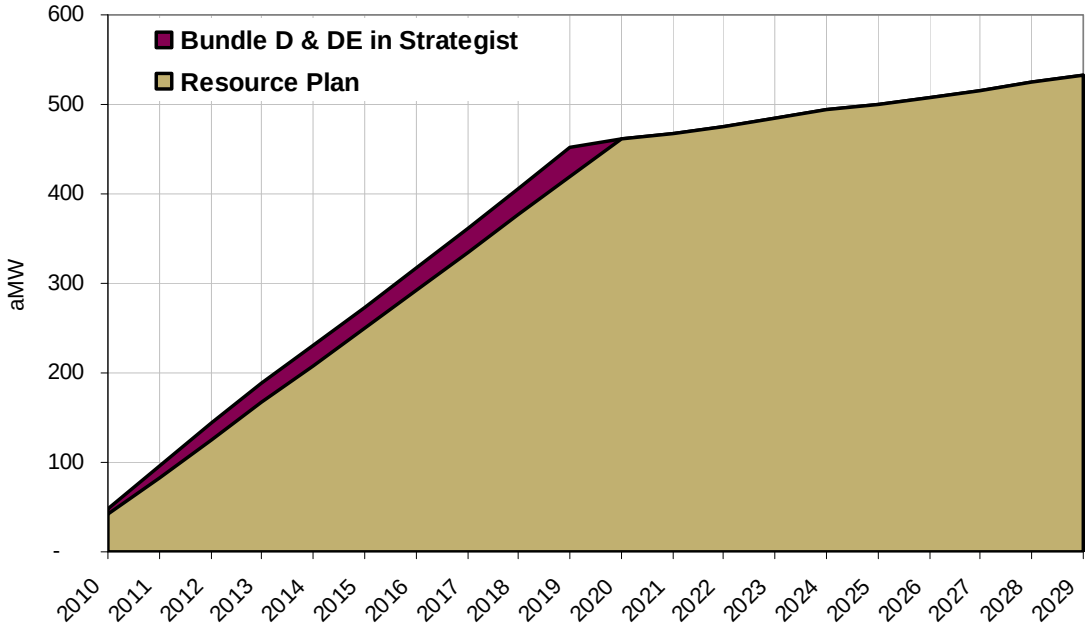
[Chart will be updated in final document to reflect 2016 builds.]



Mix of Demand-side and Supply-side Resources

This plan adopts the same amount of demand-side resource (DSR) additions identified as least cost by Strategist – 536 aMW at the generator over the next 20 years – but slightly modifies the timing of additions reflected in the optimization analysis. The analysis modeled an accelerated ramp-in rate of 45 aMW per year for 10 years; the plan adopts an accelerated ramp-in rate of 38 aMW per year for 11 years. This significantly exceeds PSE's proportional share of savings in the Northwest Planning and Conservation Council's Fifth Power Plan. Figure 8-5 compares the cumulative annual energy savings reflected in the resource plan with the annual savings modeled in Strategist. (In the analysis, this level of demand-side resources was labeled Bundle D.)

Figure 8-5
Cumulative Energy Savings Modeled in Strategist and In Resource Plan



The accelerated ramp-in rate was adjusted because of concerns about the practicality of achieving 38 aMW of demand-side resources in today's marketplace. Thirty-eight aMW per year represents a significant expansion of PSE's existing programs, and the people and resources that can implement such programs are highly sought-after. It will be challenging to achieve these savings, but we believe that we can do so cost-effectively. We are not confident that we can achieve more on an annual basis, especially in the next few years.

The level of achieved DSR affects the amount of supply-side resources for which we must plan and also the level of renewable resources we are required to build, so we must be able to count on the amounts in order to plan appropriately. The DSR level included here, for example, means that PSE will plan to NOT build or acquire the equivalent of nearly two combined-cycle gas-fired generation plants during the action window, by 2016. PSE may attempt to achieve higher rates of demand-side resource acquisitions, but we must be confident about the amount we *can* achieve because DSR has such a significant impact on other resources that must be acquired.

Supply-side Resources

Supply-side resources are divided into two categories for this discussion: renewable and nonrenewable. Note that this discussion does not address resource needs for the company's Green Power program; renewable energy for that program is acquired and managed separately from the portfolio addressed in the IRP.

Renewable Resources

Renewable resource decisions include the amount of renewable resources to build, the mix of renewable resources, and the timing of additions. Figure 8-6 compares the Strategist least-cost mix of renewable resources with those in the resource plan. The following discussion explains how and why we adjusted the Strategist result.

Figure 8-6
Comparison of Cumulative Renewable Resource Builds in MW of Capacity (Strategist vs. Plan)

	2009 Trends Strategist		2009 Resource Plan	
	Wind	Other Renewable	Wind	Other Renewable
2012	200	-	200	0
2016	300	50	600	0
2020	700	120	1000	0
2029	800	170	1200	0

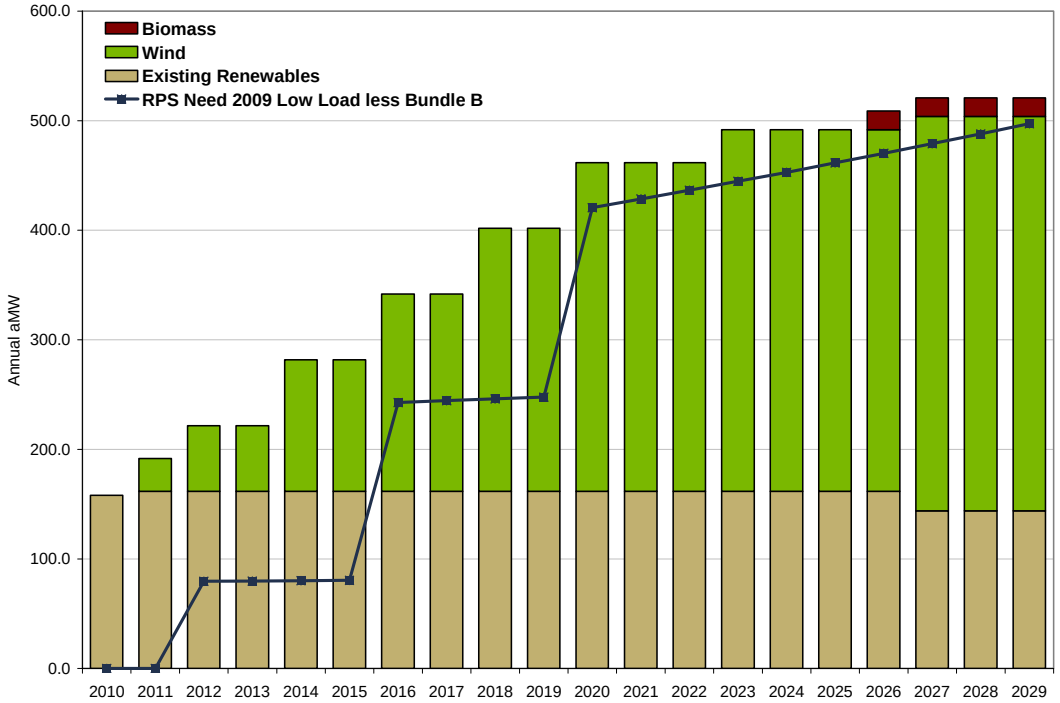
Amount of Renewable Resources. For this resource plan, PSE concluded that the lowest reasonable cost portfolio includes sufficient renewable resources to meet the requirements of RCW 19.285 in the long run. Strategist analysis for all of the scenarios and sensitivities, including 2009 Trends, illustrates that adding renewable resources beyond the level needed to meet the requirements of the law in the long run would not reduce cost or risk. As technology and markets evolve, PSE will continue to seek practical opportunities to drive down the cost of renewable resources.

Mix of Renewable Resources. This plan assumes that all of the renewable energy for the electric portfolio will come from wind power, even though Strategist selected some amount of biomass, concentrating solar thermal, and geothermal resources as desirable for all scenarios.

We must be able to count on the resources for which we will plan and build infrastructure, and our experience in the marketplace leads us to question when nonwind renewable resources will truly be commercially available and capable of delivering utility-scale power. PSE has earned a reputation for leadership among utilities in the region by aggressively pursuing renewable resources since 2003, but our pursuit of geothermal and biomass resources through the 2003, 2005, and 2007 RFP processes (and outside those processes) has not resulted in actual acquisitions. (Such resources contracted for the Green Power Program supply customers who volunteer to pay a premium for renewable energy.) PSE will continue to seek out opportunities to acquire or develop commercial-scale, cost-effective, nonwind renewable resources, but the plan must include resources that can be counted on.

Timing of Wind Development. Consistent with prior plans, this plan reflects steady progress toward developing enough wind to meet the target of approximately 1,000 MW of wind by 2020—about 200 MW every other year. Figure 8-7 compares the timing of wind energy in the Plan compared to RPS requirements. This schedule is slightly more accelerated than the timing calculated by Strategist as lowest cost.

Figure 8-7
Renewable Resource Additions



Analysis does identify accelerated development of wind as cost effective in scenarios where the production tax credit is extended (and PTCs were extended in the stimulus package), but the timing recommended here is based on the qualitative benefits that accrue from a steady, disciplined acquisition and development program. This approach allows PSE to retain a team of seasoned, wind development professionals capable of taking advantage of opportunities that will benefit our customers as they occur in the marketplace. The “just-in-time” recommendation produced by Strategist exposes the company and its customers to the risks and uncertainties of a boom-bust cycle that would create periodic scrambles to assemble qualified personnel and development opportunities, just so that requirements could be met at the last minute. In addition, “just in time” development of a wind facility (which takes three to four years to build) must be coordinated with “just in time” delivery of the related transmission facilities (which can take five to seven years to develop).

The timing of actual wind or renewable acquisitions may vary from that shown in the IRP if market opportunities move faster or slower than this schedule. However, we believe the concept of a steady development process is an important one for the company and its customers.

Nonrenewable Resources

The backbone of PSE's supply portfolio for the next 20 years is composed of gas-fired combined-cycle combustion turbines for baseload needs and gas-fired reciprocating engines with fuel-oil backup for peaking needs.

Mix and Timing of Nonrenewable Resources. The plan and the Strategist portfolio are identical during the near-term action window. By 2012 and 2016, both call for 160 MW of peaking plants and 550 MW of CCCT resources. By 2020, the mix begins to diverge slightly, and by the end of the planning period the resource plan recommends two more CCCT plants than the Strategist portfolio. Figure 8-8 compares the Strategist portfolio with the resource Plan.

Figure 8-8
Comparison of Thermal Additions (Strategist vs. Plan)

	2009 Trends Strategist		2009 Resource Plan	
	Peakers (Recip)	Base Load (CCCT)	Peakers (Recip)	Base Load (CCCT)
2012	160	550	160	550
2016	160	550	160	550
2020	480	825	480	1100
2029	1,600	1,100	1600	1650

Thermal builds in the resource plan are the result of an analysis that included constraints described above: Demand-side resources were added at a rate of 38 aMW per year in the early years, and only wind was used to meet the RPS. The resource Plan thermal additions are, therefore, the least-cost combination of resources given those constraints. The addition of two more base load plants by 2029 than in the Strategist calculation is reasonable, given the slightly slower base load additions from demand-side resources and the lower amounts of non-wind renewable resources.

III. Gas Resource Plans

PSE developed two gas resource plans for this IRP, one for gas sales and one for the company's total gas needs (gas sales and gas for generation combined). Electric generation will require increasing amounts of natural gas in the future, so looking at total gas resource need presents a more comprehensive picture of the challenges that will face the company and its customers in the years ahead.

The combined need perspective has led to recognition of the fact that a large majority of current PSE gas supplies come from a single supply basin, and that diversifying the source of supplies may be in the best interest of customers over the long term. A diversity strategy is not included in the plans presented below, however, because analysis indicated that it would increase portfolio costs slightly. PSE will continue to evaluate the costs and benefits of increasing pipeline capacity to diversify supply sources. A full discussion of this issue is included in Chapter 6, Gas Resources.

Gas Sales Resource Plan

Figures 8-9 and 8-10 illustrate PSE's draft 2009 Gas Sales Resource Plan. The plan integrates demand-side resources with supply-side resources to arrive at the lowest reasonable cost portfolio capable of meeting PSE customer needs reliably and responsibly over the next 20 years. It is based on the 2009 Trends scenario, which enabled us to incorporate up-to-date assumptions about economic conditions. The following discussion will explain the reasoning that supports the specific elements of the plan, with an emphasis on resources needed earlier in the planning horizon.

Figure 8-9
Draft 2009 Gas Sales Resource Plan

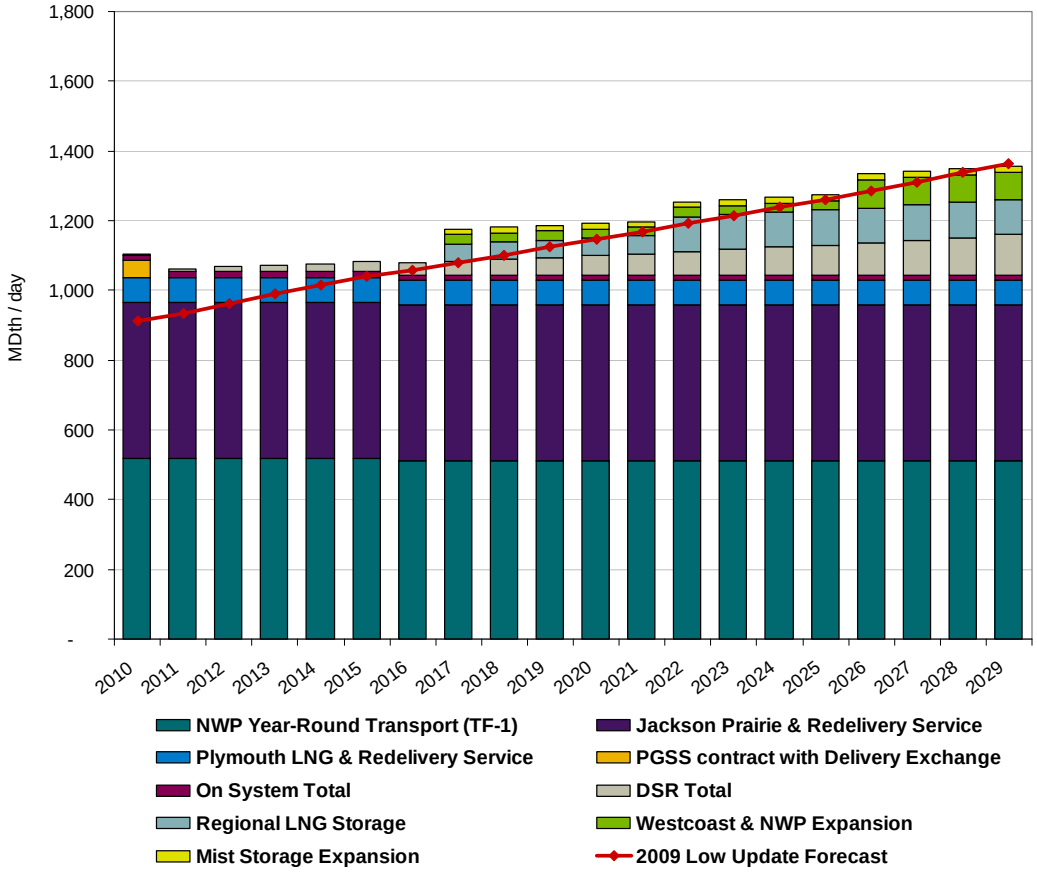


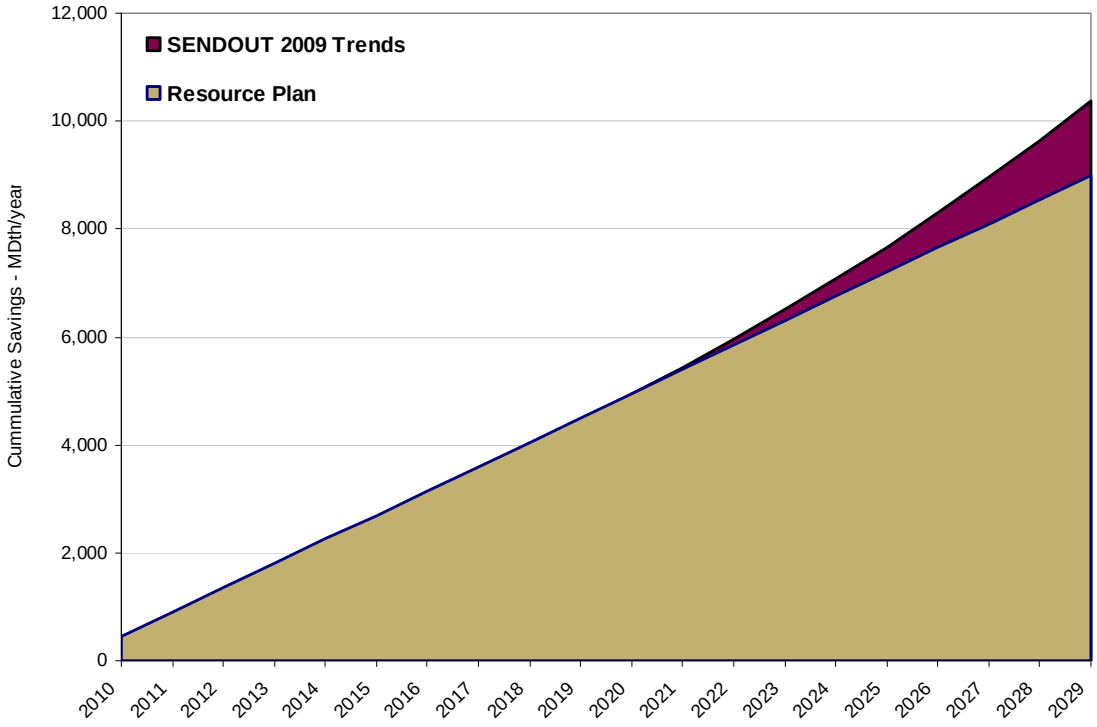
Figure 8-10
Draft 2009 Gas Sales Resource Plan Additions

	Additions in MDth/day				
	Cross Cascades Pipeline	Regional LNG Storage	Westcoast/NWP	Mist Storage & Pipeline	DSR
2012					13
2017		50	30	16	23
2022		50			24
2026			62		23
2029					21
Total Additions		**100**	**92**	**16**	**104**

Demand-side Resource Additions

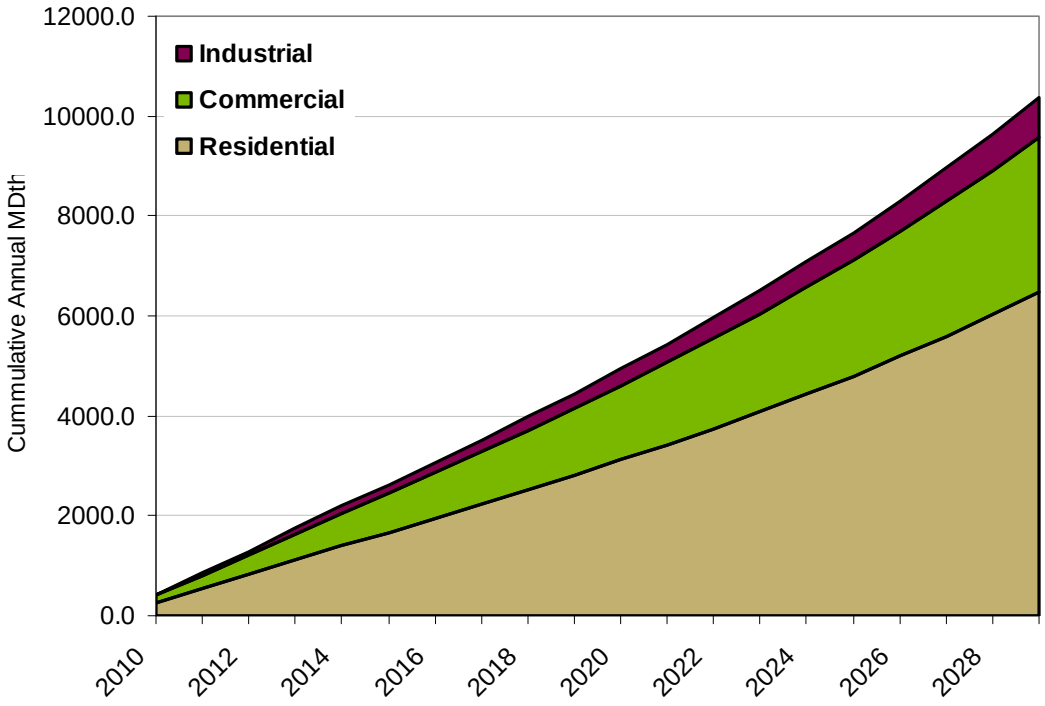
The draft 2009 Gas Sales Resource Plan includes about 2,700 MDth of demand-side resource savings by the year 2015 at an annual rate of 450 MDth/year, which translates to capacity savings of approximately 27 MDth/day. This is slightly lower than the 500 MDth/year level reflected in the SENDOUT optimization analysis for the 2009 Trends scenario, but it represents a significant increase from PSE's current acquisition rate of approximately 300 MDth/year. We are not confident that we could achieve more on an annual basis, especially in the next few years, given current marketplace constraints. In the plan, DSR peak capacity additions were reduced consistent with the achievable annual volumes noted above, and Westcoast/Northwest Pipeline capacity was increased by corresponding amounts.

Figure 8-11
Cumulative Energy Savings Modeled in SENDOUT Compared to Resource Plan



The demand-side resources in the plan include contributions from every customer segment, as Figure 8-12 illustrates.

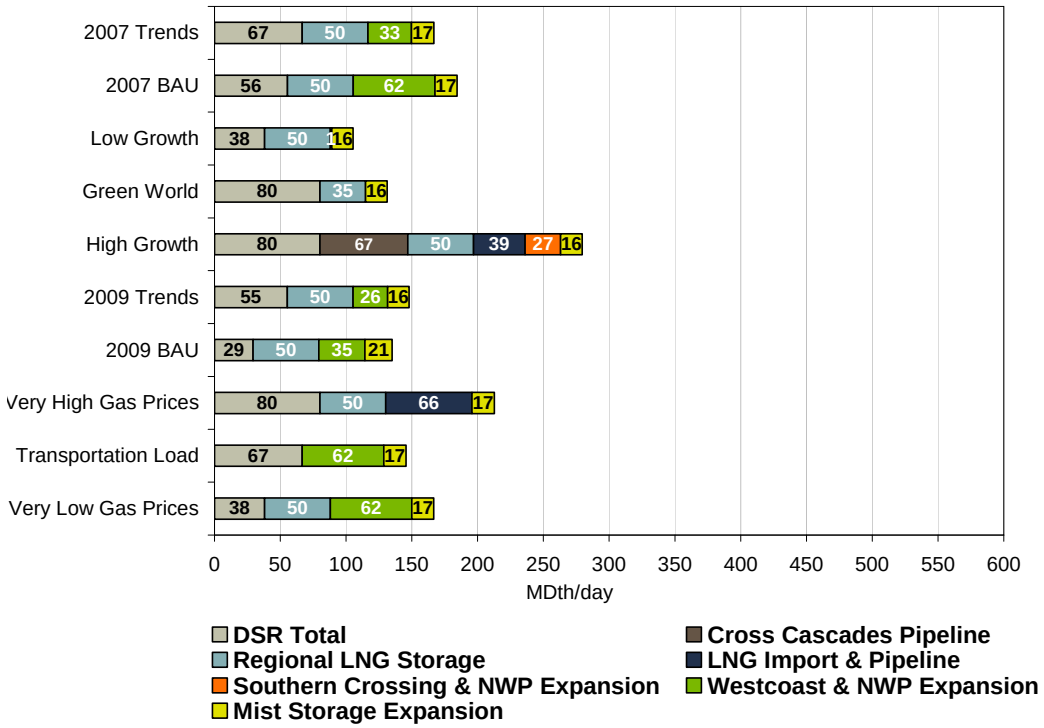
Figure 8-12
Customer Segment Contribution to DSR



Regional LNG Storage

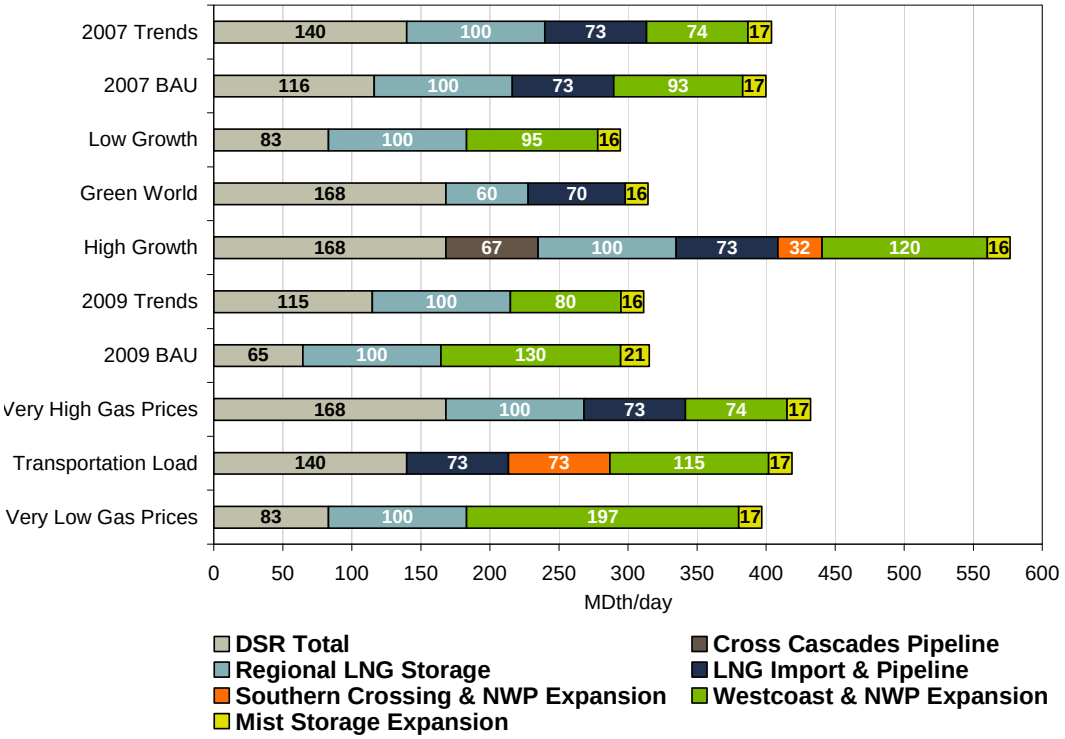
The plan includes 50 MDth/day of regional LNG storage capacity in 2017, and an additional 50 MDth/day of capacity appeared to be a least-cost resource addition by 2022.(If a major Rockies pipeline expansion were developed, these resources would most likely not be required.) Addition of the first 50 MDth of LNG storage in 2017 is a robust decision across the analysis. Figure 8-13 illustrates that this alternative was selected as part of the least-cost portfolio in nearly every planning scenario. The Monte Carlo analysis described in Chapter 6 also demonstrated that this alternative was part of the least-cost portfolio in 90% of the cases tested.

Figure 8-13
Gas Sales Resource Additions in 2020



Further ahead in the planning horizon, an additional 50 MDth of LNG storage is included, for a total of 100 MDth by the end of the planning period. Again, this is appears to be a robust resource least-cost addition across the various planning scenarios, as Figure 8-14 illustrates.

Figure 8-14
Gas Sales Resource Additions in 2029



Westcoast and Northwest Pipeline Expansion: Northern B.C. Gas Supply

The gas sales plan calls for a 30 MDth/day expansion of Westcoast/Northwest pipeline capacity in 2017 and an additional expansion of 32 MDth/day around 2026. Smaller, incremental expansions along this route appear more feasible than expansion to the Rocky Mountain basin at this time. Figure 8-14, above, illustrates that the addition of 30 MDth/day of capacity is a robust decision across the various planning scenarios. Notice that several of the portfolios that do not include this alternative also model demand-side resources at significantly higher annual penetration rates than PSE believes can count on achieving. Monte Carlo results for the 2009 Trends scenario indicate that this alternative is selected in about 53% of the draws by Dec. 2017.

Mist Storage and Pipeline Capacity

A relatively small amount of Mist storage and Northwest Pipeline transportation capacity – 16 MDth/day – is included in the plan. Figure 8-14, above, illustrates that a small amount of Mist would be part of the least-cost portfolio in every planning scenario.

Not Included in Gas Sales Plan—Honorable Mention

Although not included in the plan, three resources were shown to be least-cost in some planning scenarios. They include: the addition of Cross Cascades pipeline capacity that would increase access to supplies in the Rocky Mountain basin; imported LNG with related Northwest pipeline capacity; and the Southern Crossing and related Northwest pipeline capacity. The company chose to follow the least-cost analysis guidance for the 2009 Trends scenario with regard to these resources. The following briefly explains why they were excluded.

Cross-Cascades/Rockies Expansion. Supply diversity is a concern; however, analysis in this IRP did not fully explore the value of expanded access to the Rockies basin. We will continue to quantify the costs and benefits associated with such diversity and may adapt resource strategies if we are able to make the assessment that a major Rockies expansion would be lowest reasonable cost.

Import LNG and Northwest Pipeline Expansion. This alternative does appear to be least-cost in several of the planning scenarios shown in Figure 8-13, but the timing of the addition is sufficiently distant that we can wait to see if an LNG import facility becomes commercially operational, and whether natural gas prices will make this a cost-effective resource. So far, pricing assumptions in 2009 updates do not support such a judgment. PSE will continue to monitor market developments.

Southern Crossing and Northwest Pipeline Expansion. Similar to the Rockies pipeline expansion, this resource was only selected in scenarios that assumed high growth rates and when assumptions about other resource expansions had been met. This alternative would not provide as much supply diversity benefit as expansion to the Rockies.

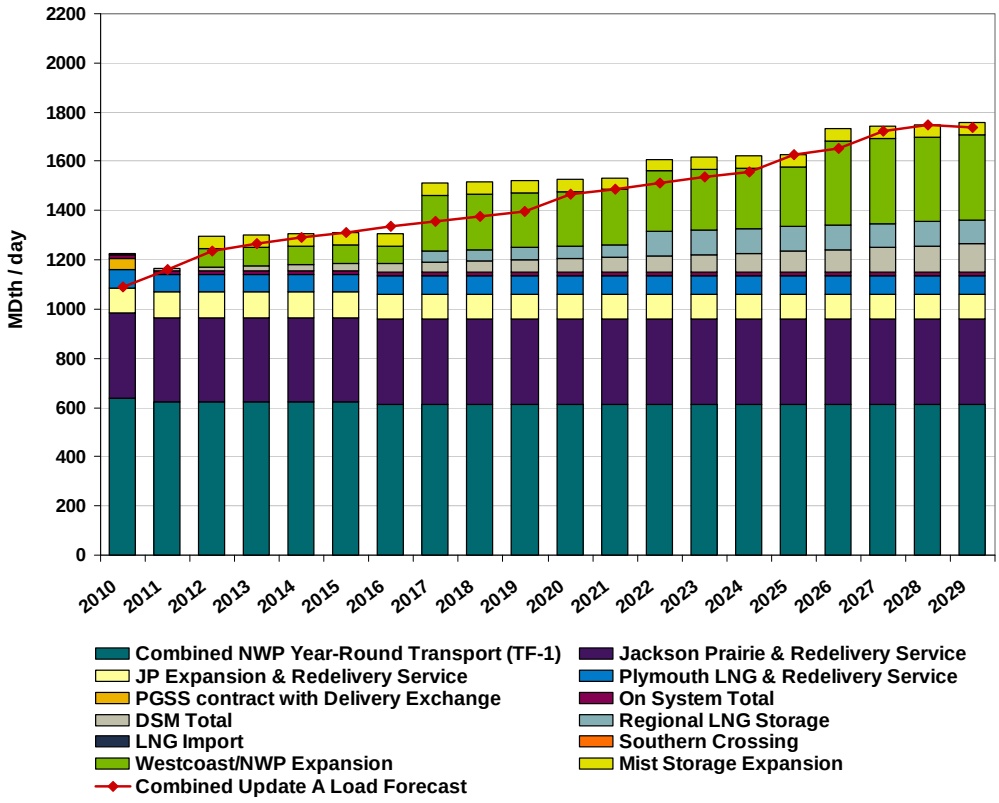
Combined Gas Resource Plan

The draft 2009 Combined Gas Resource Plan, summarized in Figures 8-15 and 8-16, addresses PSE's total natural gas need – gas required to fuel electric generation as well as gas for retail sales customers. This plan is also based on least-cost analysis for the 2009 Trends scenario.

Figure 8-15
Draft 2009 Combined Gas Resource Plan

	Additions in MDth/day				
	Cross Cascades Pipeline	Regional LNG Storage	Westcoast/NWP	Mist Storage & Pipeline	DSR
2012			76		13
2017		50	153	50	23
2022		50	23		24
2026			105		23
2029			0		21
Total Additions		100	357	50	104

Figure 8-16
Draft 2009 Combined Gas Resource Plan



Impact of Adding Generation Fuel to Gas Sales Resource Plan

Figure 8-17, below, compares the resource additions included in the Gas Sales Resource Plan with those in the Combined Gas Resource Plan. Reflecting the growing reliance on natural gas to fuel electric generation, the combined plan expands capacity to Northern B.C. sooner than the gas sales plan, and also adds capacity in larger amounts than the gas sales plan throughout the 20-year study period. It also includes more Mist storage and related transportation. Regional LNG storage, a needle-peaking resource, is the same in both.

Figure 8-17
Comparison of Resource Additions
Gas Sales Resource Plan vs Combined Gas Resource Plan

	Additions in MDth/day					
	Regional LNG Storage Sales	Regional LNG Storage Combined	BC/NWP Sales	BC/NWP Combined	Mist & Pipeline Sales	Mist & Pipeline Combined
2012				76		
2017	50	50	30	153	16	50
2022	50	50		23		
2026			62	105		
2029				0		
Total Additions	100	100	92	357	16	50