

CHAPTER IX. LONG TERM ELECTRIC RESOURCE STRATEGY

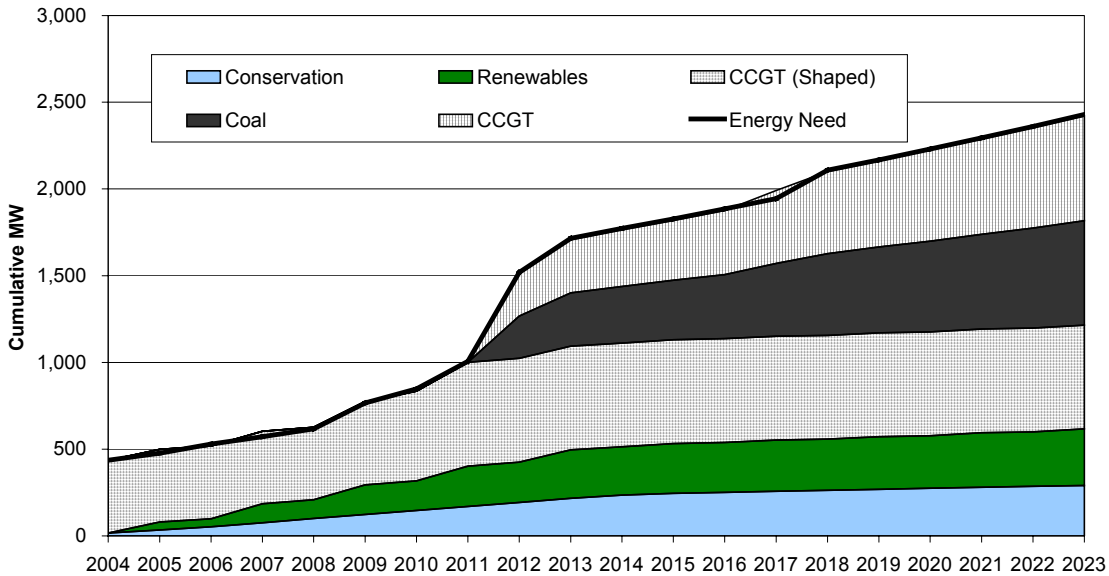
A. Updated Long Term Electric Resource Strategy

For this Least Cost Plan Update, PSE has adopted an integrated electric resource strategy that includes the following major components:

1. Establishment of a long-term goal to acquire conservation at levels consistent with the Accelerated Lighting Case, including a total of 203 aMW during 2004-2013 and a total of 273 aMW during 2004-2023.
2. Affirmation of PSE's goal, established in the April 30 Least Cost Plan, to acquire renewable resources to meet 10 percent of annual customer energy loads by 2013.
3. A diversified mix of thermal generation resources to meet the remaining need for new electric resources. These resources include combined-cycle gas-fired combustion turbine (CCGT) generation, single-cycle gas-fired combustion turbine (SCGT) generation, and coal-fired generation. Gas-fired resources meet a larger proportion of the overall need, particularly during the earlier part of the planning horizon. Starting later in the first half of the 20-year resource planning horizon, coal-fired generation is also added to meet a portion of the need.
4. New resources, including gas-fired generation are "shaped" seasonally as needed to reduce the costs relating to summer surplus capacity.

The following chart provides a graphical representation of PSE's updated long-term electric resource strategy.

**Exhibit IX-1
Electric Resource Strategy**



As noted in Chapter VII PSE has used the “B2” resource adequacy standard that it adopted in the April 30 Least Cost Plan. The resource additions shown in the chart above are sufficient to meet the energy portion of the B2 Standard.

B. Environmental Considerations for the Electric Resource Strategy

Avoided Air Emissions Resulting from New Renewable Resources and Conservation

PSE’s integrated electric resource strategy adopted in this Least Cost Plan Update includes both renewable resources and conservation resources. The goal for renewable resources is to meet 10 percent of retail load by 2013 with renewable resources. The goal for conservation is to acquire approximately 203.5 aMW during 2004-2013, and a total of 273 aMW over 20 years. As a result, conservation and renewable resources could meet most or all of PSE’s load growth during 2004-2013.

PSE also assessed some of the environmental implications of the integrated resource strategy adopted in this Least Cost Plan Update. The portfolio screening model was used to evaluate air emissions from PSE’s electric resource portfolio under two scenarios:

- a no-conservation, no-renewable resources “strategy” that meets PSE’s need for new resources entirely with thermal resources (this scenario includes an additional and 371 aMW of natural gas-fired combustion turbine generation and 353 aMW of new coal-fired generation.)
- the integrated resource strategy adopted in this Least Cost Plan Update (discussed in section A. above), including both conservation and renewable resources

The difference in air emissions between the two scenarios quantifies the amount of air emissions from PSE’s electric resource portfolio expected to be avoided under the resource strategy adopted in this Least Cost Plan Update.

The table below provides estimates of the air emissions in PSE’s electric resource portfolio under both scenarios, along with the estimated net reduction in air emissions as measured by the difference between the two scenarios.

Exhibit IX-2

Avoided Air Emissions with Renewable Resources and Conservation Goals

20 Year Cumulative Emissions (Tons)	CO2	NOX	SO2
No Conservation/No Renewables	281,526,755	262,466	167,402
Resource Strategy for Least Cost Plan Update (including new conservation and renewable resources)	229,451,371	248,098	153,160
Reduction in Emissions	52,075,384	14,368	14,242
Percent Reduction	18%	5%	9%

(Note that these scenarios do not include avoided air emissions from existing conservation that PSE has acquired prior to 2004.)

Environmental Impacts of Generating Resources

An important conclusion in the April 30 Least Cost Plan and this Least Cost Plan Update is that no single electric resource is without drawbacks (cost, risk, etc.). Hence PSE’s strategy is to rely on a diversified mix of resources. PSE’s resource strategy for this Least Cost Plan Update sets an aggressive long-term goal to acquire conservation resources. However, because conservation alone will not meet all of PSE’s need for new electric resources, supply side

resources will also need to be added, both in the near-term and over time. One issue of great importance is the environmental impacts associated with acquisition of new electric generating resources. Each form of electric generation has different environmental impacts that should be considered and evaluated, including costs and risks. Below are brief discussions on utility-scale energy production technologies that are included in PSE's electric resource strategy.

Natural Gas-Fired Generation

Natural gas refers to methane (CH₄) which is considered a relatively clean fossil fuel at the point of combustion. Use of natural gas in combined-cycle combustion turbines produces about half as much CO₂ as coal, a third of the NO₂ and one percent of the SO₂. Nevertheless, methane is a greenhouse gas that can be released into the air during the drilling, production, transportation and combustion processes. Power plants that consume natural gas may also require significant amounts of water for cooling. (Dry cooling is possible, but is less efficient and more costly.) As the demand for natural gas grows there will be growing adverse environmental impacts in potentially sensitive areas. Methane exploration and production requires large areas of land and may lead to opening up lands in the Intermountain West currently excluded from development, as well as off-shore developments on the Atlantic, Pacific and Gulf coasts. Natural gas development in Alaska could lead to another pipeline and the opening up of the Arctic National Wildlife Refuge to development. The introduction of liquefied natural gas (LNG) on a large scale to the U.S. requires the development of new ports, pipelines and other infrastructure along with their attendant environmental costs.

Wind Power

Wind power generation does not have any of the air emission problems of fossil fuel plants. Nevertheless, wind requires large land resources for the placement of the wind turbines. Some communities have also taken issue with the visual impacts. If a wind farm is situated far from an urban center (load) then new high-voltage transmission lines may be required. Because wind power is intermittent and not dispatchable, it may also require backup based on other forms of generation sources, including hydro projects, gas-fired generation and coal-fired generation, with their known environmental impacts.

Coal-Fired Generation

Coal-fired electric generation is associated with its emission of the greenhouse gases, CO₂, and NO₂, and for methane released during the coal extraction process. Coal combustion is also a

cause of SO₂ production. In addition to air emissions, water quality needs to be managed in the coal production and combustion processes. Some coal mining techniques can disrupt land resources, creating land reclamation recovery costs.

Geothermal

Mixing water with the heat of the earth creates steam that can be used to turn turbines. If the steam is continually extracted it can eventually deplete the source. The steam may contain heavy metals that need to be extracted and disposal of this condensate has costs and ground water threats. Alternatively, the steam can be cooled and cycled back into the earth for reheating. A binary system uses a heat exchange mechanism to keep the earth's water cycle separate from the plant's water cycle. The binary method is less efficient and costs more but it can alleviate some of the water quality concerns. Many geothermal sites are located in remote areas and would require substantial investments in transmission facilities, with associated costs and environmental implications.

Municipal Solid Waste

The burning of municipal solid waste (MSW) is sometimes considered a renewable resource since it uses no new fuel and the waste would otherwise go into a landfill. The "quality" of the waste determines the level of various pollutants emitted. When items such as plastics, tires and batteries are burned toxic chemicals are released. Sorting the waste before burning can add to the costs. The typical MSW plant produces more CO₂ and NO₂ than a coal burning plant according to the U.S. Energy Information Agency.

Current Activities on Environmental Issues

PSE believes that the environmental issues associated with emissions (whatever the source) are important. Accordingly, PSE will continue to collaborate with others as the issues are developed. Currently, the Washington State Energy Facility Site Evaluation Council (EFSEC) is active in a rule making process that will explore opportunities to reduce CO₂ emissions from new generation projects over 350MW that are sited in Washington State. Both the Puget Sound Clean Air Agency (PSCAA) and the Washington State Department of Ecology (WDOE) have also indicated their plans to pursue a comparable rule making effort for new generation projects sited in Washington State that are less than 350MW. PSE believes these discussions serve as

a healthy means to weigh a number of considerations including but not limited to public policy concerns, sound scientific analysis, and the energy needs in PSE's service territory.

Since EFSEC announced its exploration of the formal rule making process this summer, PSE has participated in the hearing, submitted comments, and testified. Equally important, PSE has participated in meetings with a variety of interests on the subject to fully understand and explore the environmental issues associated with its Least Cost Plan strategy. PSE continues to explore the appropriate range of technologies to meet its growing need. Renewable resources and conservation alone won't satisfy both the growing demand and the loss of resources PSE will experience over the next two decades. Likewise, a generation strategy that focuses solely on meeting increased demand with a single technology will bear certain price, risk and environmental costs.

Environmental Considerations in Resource Planning

PSE's analysis of alternative resource portfolios for this Least Cost Plan Update included the regional-standard 10 percent environmental credit for conservation. The April 30 Least Cost Plan also included sensitivity analyses to identify cost tradeoffs between coal-fired generation and natural gas-fired generation under varying potential levels of CO₂ costs. PSE will continue to monitor and participate in discussions on environmental topics related to energy resources, including at the national and state level. As further developments occur, PSE will reflect them in its resource planning.

PSE intends to continue enhancing its analytical capabilities to identify and assess environmental costs and tradeoffs for various resource strategies. These will include assessments of air emissions costs and risks from an integrated resource portfolio perspective. Such analyses will require development of cost values for various forms of emissions including CO₂, NO_x, and SO₂. PSE believes that such integrated analytical approaches can provide more useful information than is currently represented by the 10 percent environmental credit methodology. Work on these topics will be included in implementation of the Two-Year Action Plan for PSE's Least Cost Plan.