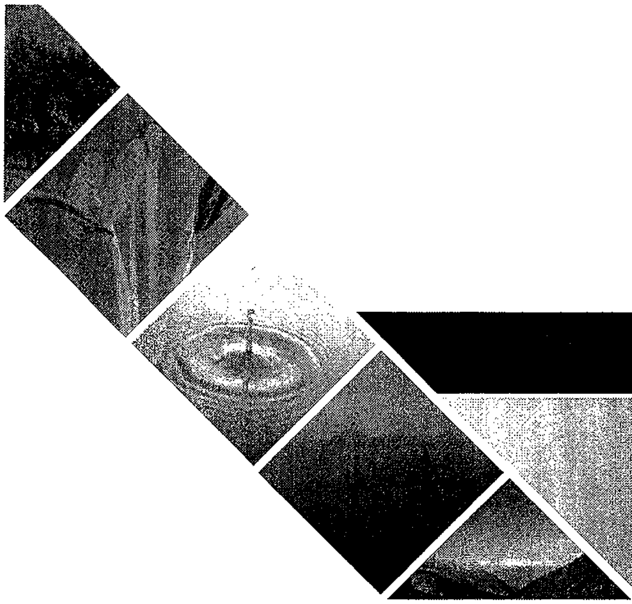

THE CADMUS GROUP, INC.

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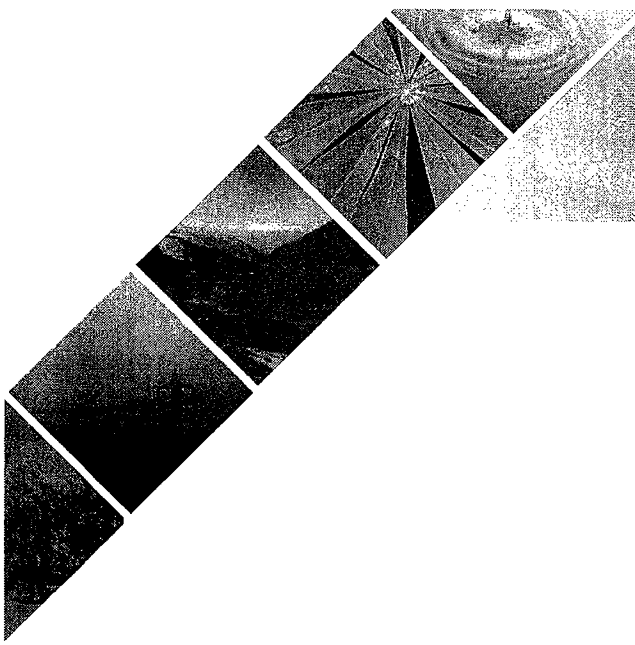
Comprehensive Assessment of Demand-Side Resource Potentials (2010-2029)

Volume I



July 10, 2009

FINAL REPORT

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APPENDIX B

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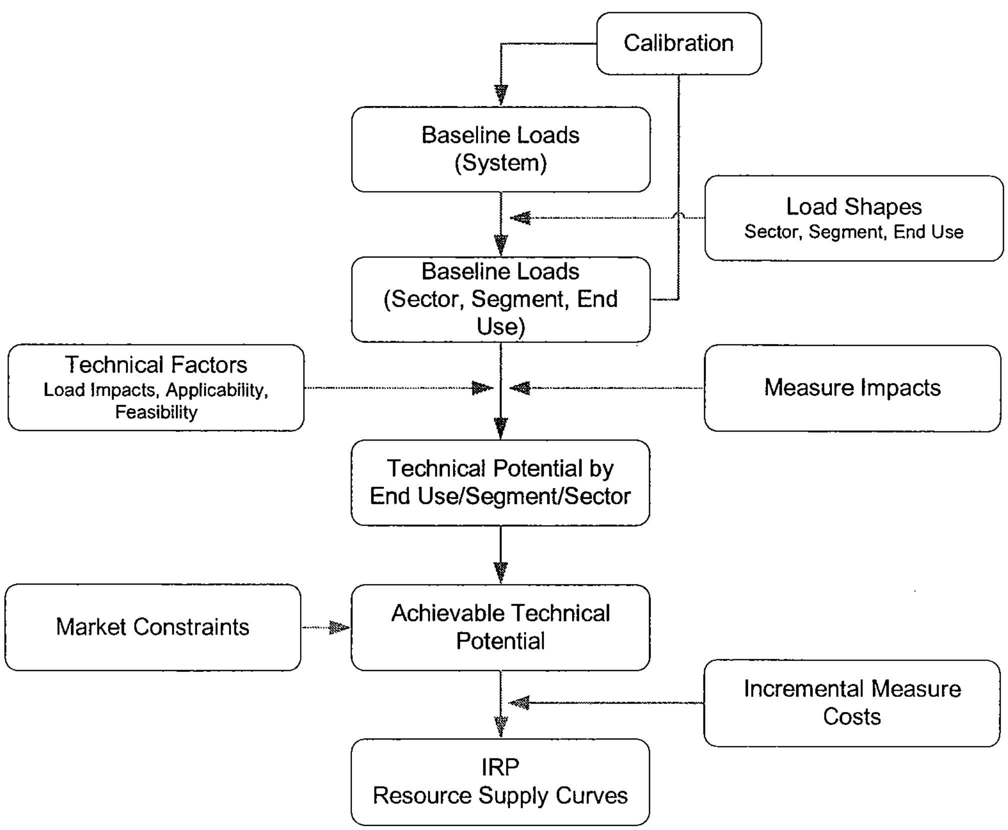
1. Introduction

General Approach and Methodology

The DSM resources analyzed in this study differ with respect to technology, availability, type of load impact, and target consumer markets. Analysis of their potentials, therefore, requires customized methods that can address the unique characteristics of each resource. These methods, however, spring from the same conceptual framework and the general analytic approach.

The general methodology is best described as a hybrid "top-down/bottom-up" approach. As illustrated in Figure 1, it begins with the current load forecast, decomposes it into its constituent customer-class and end-use components, and examines the effect of the range of demand-side measures and practices on each end use, taking into account fuel shares, current market saturations, technical feasibility, and costs. These unique impacts are then aggregated to produce estimates of resource potentials at the end-use, customer-class, and system levels.

Figure 1. General Methodology for Assessment of Demand-Side Resource Potentials



The standard methodology for determination of DSM potentials generally distinguishes four distinct, yet related, definitions of resource potential that are widely used in utility resource planning: naturally occurring conservation, "technical potential," "economic potential," and "achievable potential."

Naturally occurring conservation refers to gains in energy efficiency that occur as a result of normal market forces such as technological change, energy prices, market transformation efforts, and improved energy codes and standards. In this analysis, the market effects components of naturally occurring conservation are taken into account by explicitly incorporating changes to codes and standards and marginal efficiency shares in the development of the base-case forecasts.

Technical potential assumes that all resource opportunities may be captured, regardless of their costs or market barriers. For demand-side resources such as energy efficiency and fuel conversion, technical potentials further fall into two classes: "instantaneous" (retrofit) and "phased-in" (lost-opportunity) resources. It is important to note that the notion of "technical potentials" is less relevant to resources such as demand response and distributed generation—nearly all end-use loads may be subject to interruption or displacement by on-site generation from a strictly "technical" point of view.

Economic potential represents a subset of technical potential consisting of only those measures that are deemed cost-effective based on a cost-effectiveness criterion, usually the total resource cost (TRC) test. For each measure, the test is structured as the ratio of the net present values of the measure's benefits and costs. Only those measures with a benefit-to-cost ratio of equal or greater than 1.0 are deemed cost-effective and are retained for further analysis.

Achievable potential is defined as that portion of economic potential that might be assumed to be achievable in the course of the planning horizon, given market barriers that may impede customer participation in demand-side management programs sponsored by the utility. The assumed levels of achievable potentials are meant to serve principally as planning guidelines. Ultimately, the actual levels of achievable opportunities will depend on the customers' willingness and ability to participate in the demand-side programs, administrative constraints, and availability of an effective delivery infrastructure. The customer's willingness to participate in demand-side programs also depends on the amount of incentive that is offered.

For the purpose of the current IRP, the screening of energy efficiency resources will take place as part of the optimization process. Therefore, the measures included in the technical potential were not screened for cost-effectiveness. Instead, fixed ramp rates were directly applied to technical potential to create a supply curve for IRP modeling.

The methodology used for estimating the technical energy efficiency potential is based on standard industry practices and consistent wit the methodology used by the Northwest Power and Conservation Council (the Council) in its assessments of conservation potentials for the 6^{th} Northwest Regional Power Plan. Electric energy efficiency technologies and measures considered in this include those approved by the Northwest Regional Technical Forum (RTF) and measures used in the 6^{th} Power Plan. As described in Section 2, the ramp rates used to determine achievable potential for retrofit opportunities are comparable to – and in the case of phased-in, normal replacement higher than – those currently being proposed by the Council for calculating achievable potentials in the 6th Power Plan.

In compliance with the rules established in Chapter 480-109 of the Washington Administrative Code (WAC), this report fully describes the technologies, data inputs, data sources, data collection processes, and all assumptions used in calculation of technical and achievable long-term potentials. The results of the electric conservation potential reported here are reflected in PSE's upcoming IRP and will provide the basis for compliance with the requirements of WAC Chapter 480-109.

Comparison to 2007 IRP

Energy Efficiency

While the results of this study are similar to those presented in the 2008 IRP, there are a number of reasons why we would expect some differences. These include:

- Updated baseline data from primary and secondary data collection efforts (See Appendix A)
- Updated consumption estimates from building simulation and conditional demand modeling
- Changes in codes and standards
- New measures included in the analysis (Table 9).
- New information on measure costs, savings, and applicability

Table 9. Number of measures considered in 2008 and 2010 IRP

Sector	Electric Measures Considered		Gas Measures Considered	
	2007 IRP	2009 IRP	2007 IRP	2009 IRP
Residential	65	118	30	51
Commercial	73	105	32	51
Industrial	9	16	4	8

Changes in any of these factors can lead to significant changes in identified potentials, especially when comparing at a granular level, such as by end use or measure.

Table 10 presents a comparison of the electric and natural gas technical potentials from this study and the 2007 IRP. Because no economic screen was performed as part of this study, it is difficult to compare quantities of economic or achievable potential. Some of the key differences are:

- Air conditioning – the new saturation survey showed an increased saturation of residential cooling equipment. This, combined with changes in available efficiency levels, led to a significantly higher technical potential.

- Electric cooking and drying – no measures were analyzed for these end uses in the previous study.