Strategic Resources Assessment

Seattle City Light

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Seattle City Light

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I. Introduction

In April of 1996, Seattle City Light (SCL) published its draft Strategic Resources Assessment (SRA), the purpose of which was to examine "the implications of alternative resource acquisition policies that might be adopted by the City of Seattle". The resource acquisition policies addressed in the draft SRA were:

- how (and whether) we account for environmental externalities;
- our level of commitment to conservation in the face of reduced external funding;
- our level of reliance on the Bonneville Power Administration (Bonneville or BPA) for a portion of our firm resources; and
- whether we should include gas-fired dispatchable resources (or their contractual equivalent) as part of our portfolio.

Its main conclusions and recommendations are summarized in Section II of the draft, and are repeated here as appropriate.

The purpose of this document is to update and extend, where necessary, the analysis of the draft SRA. It is not intended to stand alone, and a copy of the draft is included as an integral part. The draft contains detailed discussions of many of the terms and concepts used here, and provides a useful glossary.

Since publication of the draft SRA, SCL has embarked on a significant work program to address issues arising, in large measure, from the work surrounding the draft itself and comments we received on it. That effort resulted in publication of three reports that can be viewed as a background to, and support for, this document (copies are available upon request):

Power Options

This report contains a description of the resource database supporting the SRA, including important assumptions about the price and availability of energy on the market.

The Value of Existing Generation

One of the recommendations of the draft SRA was that SCL conduct a critical economic assessment of its existing resource base. This report begins that process by focusing on resources that face near-term decisions: Centralia, Lucky Peak, Boundary, Cedar Falls, and the Skagit.

Existing Resources Portfolio

This report provides a comprehensive, accessible description of each of SCL's owned or contracted generating resources.

In concert with the draft SRA, SCL also published a draft Environmental Impact Statement (EIS), held public hearings, and solicited public comment. A final EIS will be published in May 1997.

There have been significant changes to the regulatory and market conditions SCL faces since the draft SRA was written. Legislation enabling retail customer choice is already in place in California, and similar legislation has been proposed for Washington state.

The Comprehensive Review of the Northwest Energy System published its final report in December 1996, in which it recommended significant changes to the energy marketplace in the Northwest. Among its recommendations are that retail customer choice be available by the end of the decade, and that the transmission system for the entire region be operated as an independent, open access system.

Energy markets continue to expand, and prices are low and are expected to remain low for some time to come. Natural gas prices, a key driver of energy prices, have declined sharply in recent years, and many industry watchers are predicting further declines.

While the draft SRA anticipated the general direction of these changes, it did not adequately capture the extent.

There have also been changes to SCL's own situation since the draft: both the level of conservation acquisition and amount of BPA purchases have been decided, at least for the near term. We report on these changes, but neither topic is analyzed further here.

Since the draft, however, new issues have arisen. Based on input from the citizens' review panel[1] and from the City Council Utility and Environmental Management Committee (UEMC) we have broadened the scope of the final SRA to include:

- our reliance on the market versus contracting for dispatchable energy;
- the potential acquisition of a limited amount of a 'green'[2] resource;
- the cost-effectiveness[3] of our existing resources in the new market environment.

This report is organized into sections: Section II summarizes the conclusions of the report, and the changes that have taken place since the draft SRA. Section III provides greater detail on the changes that have occurred since the draft SRA, and presents new or revised analysis. Finally, Section IV addresses the new issues raised by Council and the citizens' panel.

[1] The membership of the review panel, its charter and its report, are detailed in the draft SRA.
[2] For the purposes of this report, a green resource is a non-hydro renewable such as wind, or geothermal.
[3] Used in this document, cost-effective refers to utility cost.

II. Update to draft SRA Policy Issues

A. Environmental Externalities

Our analysis continues to show that including environmental externality costs in the decision to acquire resources reduces the societal cost of providing electricity to SCL's customers, while resulting in moderate rate impacts. The reduction in societal costs will occur even if the utility does not consider environmental costs in later resource-dispatch decisions, since externalities continue to favor the selection of more efficient gas-fueled resources.

Green resources likewise benefit when environmental externality costs are considered in the decision process. While not currently cost-effective compared to gas-fueled resources, even with externalities considered, green resources provide insulation from fuel price risk and lower levels of air pollution.

Based on these considerations, SCL continues to support the three recommendations made in the draft SRA:

- Include environmental externalities when making resource-acquisition decisions, and use environmental adders to supplement our screening-and-ranking of resources.

- Do not use environmental adders in dispatch decisions unless other utilities can be persuaded to do likewise.

- Where the market does not recognize environmental costs, advocate public policies to promote green resources without placing a competitive burden on an individual utility.

The City Council expressed its support for the first recommendation in Resolution 29427, which endorsed the 1996 Energy Management Services Plan (discussed in Section II.B). In the resolution, the Council specifically endorsed "the use of quantified environmental externality estimates in the cost-effectiveness calculations for energy conservation savings" and directed City Light "to incorporate its best estimates of quantified environmental benefits in the cost-effectiveness calculation for all demand-side resources in planning for new power resources."

Regarding the support of public policies to promote green technology, Seattle City Light has been an active participant in the Regional Review. There the utility has supported measures to promote continued conservation and renewable resource development.

B. Conservation

The final Energy Management Services Plan (EMSP) was endorsed by the City Council on August 23, 1996. The EMSP presents the direction City Light's conservation and energy efficiency programs and services will take over the period 1997-2002. The program was revised in part in response to the recommendations of the draft SRA that the pace of conservation acquisition be slowed from ten average megawatts per year to about five.

C. Bonneville Relationship

An amendment to our BPA contract was approved by City Council in August 1996. This agreement represents a significant departure for both parties in terms of the rates SCL will pay, and the contractual relationship between the parties. SCL is no longer obligated to purchase, and BPA is no longer obligated to supply, the full difference between our load and the generation of our resources. Instead, SCL will purchase a maximum of 195 average megawatts of energy from BPA for five years, obtaining the balance of its requirements from its existing resource portfolio and short-term market purchases. This is expected to result in lower average system rates than would otherwise have been possible as the price of BPA energy is significantly lower under the new contract. However, greater dependence on the market could increase the price and availability risks we face in the near to long term future when compared to other firm contract opportunities.

D. Gas-Fired Dispatchable Resources

Gas-fired dispatchable resources were considered an attractive way to supplement our hydroelectric base in the draft SRA. However, lower forecasts of energy prices and higher forecasts of its availability mean that traditional contracts for the services of gas-fired resources now have difficulty competing with the market.

In response to these market changes, many resource developers are no longer requiring long term take-or-pay contracts. New, so-called 'merchant plants' serving no native load are being proposed and financed by private entrepreneurs to provide multiple energy services to a variety of customers. In some instances, developers are willing to assure the competitive advantage of these services by indexing the variable cost to natural gas prices, energy prices, or both. SCL is currently exploring options for contractual arrangements to secure power outside the real-time market at a competitive, guaranteed rate.

As in the draft, our current analysis argues that we not exclude dispatchable resource contracts from consideration in any future resource decisions.

E. Other Issues

Green resource acquisition

Green resources reduce impacts on the environment (if appropriately sited) and provide insulation from fluctuation in fuel price and availability. SCL's analysis shows that a small amount (about 10 aMW) of renewable resource may be acquired through contract with only moderate rate effects as compared to purchase of energy from the market. The environmental benefits of such a contract relative to reliance on the market are significant, and derive mainly from reductions in carbon dioxide emissions.

However, even given substantial increases in fossil fuel prices and full attribution of environmental costs, renewables remain more expensive than gas-fired resources. Furthermore, since green resources are not dispatchable, they are a poor fit with our hydro-dominated resource base.

Nevertheless, given their environmental benefits and the public policy interest in a sustainable renewable resource industry, our conclusion remains that the utility should advocate public policies to promote green resources without placing a competitive burden on an individual utility.

New energy resource investment proposals

SCL has re-analyzed the economics of two previous resource investment proposals in light of lower prices in the market place. These are the Gorge Companion Tunnel, a project that would allow increased energy production at the Gorge Dam on the Skagit River, and the construction of a Combustion Turbine. Both of these projects have been removed from the Department's Capital Improvement Program and budget as they are no longer economic under projected market conditions[4].

Existing resource evaluation

SCL has submitted two reports on our existing generation resources to Council. *The Value of Existing Generation* assessed many of our resources in light of changing market conditions, and made recommendations on the value of further investment in them. *Existing Resources Portfolio* describes each of SCL's currently owned and contracted resources in detail.

[4] SCL retains the Duwamish site on which the proposed combustion turbine would have been built.

III. Changes Since Publication of the draft SRA

A. Environmental Externalities

Consistent with our conclusions in the draft SRA, our new analysis shows that using environmental adders in selecting resources results in modest increases in utility costs and rates and lowers environmental impacts, as measured by externality costs. When we include adders in resource selection, levelized rates increase approximately 1.1% over then next five years and 1.4% over the next twenty years. This is a little higher than reported in the draft SRA, due to changes in our treatment of externalities. Also consistent with the draft SRA, the resource mix shifts to more efficient gas-fueled resources when environmental adders are included.

Changes in Treatment of Externalities

Since the draft SRA, there has been a significant change in SCL's treatment of externalities. We now attribute the same environmental impact to marginal changes in our out-of-system transactions, whether these arise from changes in our market purchases, market sales, or BPA purchases. We adopted this new approach because we have come to understand that, while we cannot be certain of the immediate source of the electricity we are buying at any one time, we can be reasonably certain that the marginal effect of changes in our out-of-system sales or purchases will be to change total fossil fuel generation in the western U.S. by a comparable amount.

Our earlier approach treated changes in our out-of-system sales and purchases differently depending on the particular market concerned (i.e., BPA purchases, market sales or purchases). This lack of consistency resulted in our analysis incorrectly showing an environmental preference for BPA purchases over the market. It also failed to value the environmental benefits of surplus sales adequately.

To assess the impact, we constructed a 'melded resource' consisting primarily of a blend of existing coal and gas-fired resources. Table 1 summarizes the assumptions used, and the direction of change from the draft to the final SRA, for BPA purchases and market purchases and sales. For a more detailed discussion of the melded resource approach, see the chapter on Energy Market Price Forecast in the SCL report, *Power Options*.

Table 1 Basis of Externality Cost Determination

Resource	Draft SRA	Final SRA	Change in Externality Cost
Market Purchases	Varied by market and water condition	Melded resource	NW markets under dry and very dry water conditions decreased, but overall average increase
BPA Purchases	Combined-cycle combustion turbine	Melded resource	Increase
Surplus Sales (Benefit from Displacement)	Combined-cycle combustion turbine	Melded resource	Increase in benefit (reduction in externality costs)

The externality cost for the melded resource is about $29/MWh, less than that of coal-fired generation and more than that of natural gas-fired generation. Compared to the draft SRA, this represents an increase in the externality cost per megawatt-hour assigned to BPA energy[5], and a reduction in externality costs assigned to surplus sales[6].

Whereas we previously assigned various individual resource types to the different purchase markets represented in our modeling framework, we now assign the melded resource environmental cost to all purchase markets. This change results in slightly lower externality costs per megawatt hour for the NW markets under dry and very dry conditions, and significantly higher costs for the NW markets under medium and wet conditions. As a consequence, the overall impact of the change has been to increase the externality costs of market purchases in our analyses.

Reduction in Externality Costs and Shift in Resource Selection

When externalities are considered in resource selection[7], the total externality costs of constructing and operating the resulting portfolio are always lower than when externalities are not considered. Not surprisingly, this environmental benefit comes with an increase in total costs to the utility. In other words, the effect of including externalities when choosing our portfolios is that the utility acquires more expensive resources which have lower environmental impacts.

As in the draft SRA, the reduction in externality costs is always greater than the corresponding increase in utility costs, resulting in a net reduction in total societal costs.

Table 2 compares utility and externality costs for two cases: a base case in which externalities are not considered at all in resource selection, and a case in which externalities at 100% of recommended values are assessed on all resources, including the market. The types of resources

[5] We previously assumed marginal purchases were provided by a combined-cycle combustion turbine.
[6] In our analyses we account for the environmental benefit of surplus sales. When surplus energy is sold outside SCL's system, it is assumed to displace, or shut off, fossil-fuel generation in the western US.
[7] That is, when we attribute externality costs to all resources when *choosing* the least cost portfolio, but ignore them when we operate the chosen portfolio.

that are selected for each case are also summarized. All of the cases assume the currently planned levels of conservation and the new BPA contract amendment.

Table 2 Changes in Utility and Externality Costs

Scenario	Change in Utility Cost from Base Case	Change in Externality Cost from Base Case	Resources Acquired	
	(NPV through 2020 in millions of 1995 $)		1997-2006	2007-2020
Base Case	-	-	Fuel Cells; Shared CCCT	Advanced Fuel Cells;Shared CCCT
Externalities @ 100%	$65.69	($239.97)	Fuel Cells; Shared Advanced CCCT; Advanced CCCT	Advanced Fuel Cells

Overall, the shift in resources resulting from inclusion of externalities is similar to that seen in the draft SRA as more efficient and technologically advanced gas-fueled resources replace their less efficient counterparts.

In general, our analysis shows that consideration of externalities supports acquisition of new gas-fueled resources to displace existing less efficient and more polluting fossil-fuel generation, especially coal fired.

B. Conservation

The EMSP was a significant revision of the 1992 Plan, both in terms of the rate of conservation acquisition, and the design of our conservation programs. For the final SRA, we incorporated these changes, but did not conduct an analysis of conservation comparable to that in the draft. The key changes incorporated are summarized below.

Improved cost effectiveness

To address cost effectiveness concerns, several programs have been redesigned, either by dropping high cost measures or improving the efficiency of program delivery. For example, in the Warm Home Program, windows have been eliminated due to their high costs. In other programs, procedures and processes have been streamlined or eliminated to reduce program administrative costs. These program changes, along with updated program cost and savings data, have improved the projected economic performance of the new programs. Analysis completed for the final EMSP shows that the redesigned conservation programs should produce positive economic benefits to the service territory, whether or not environmental benefits are explicitly taken into account.

Increased customer contributions

Several programs now have higher customer contributions: in the Warm Home Program, the customer's contribution for insulation and other measures has been increased; in the Multifamily Targeted Acquisition Program, the loan period has been reduced from ten to six years; in the Low-Income Multifamily Program, building owners will now be asked to cover twenty percent of the costs of windows, along with paying for any repair costs which may be incurred; in the Water

Heater Rebate Program, the rebate amount for each water heater was reduced from $60 per water heater to $30; and in the Energy Smart Design Program, incentives to commercial customers for lighting measures have been reduced by fifteen percent.

Increasing the customers' share of costs in programs and reducing the SCL's share will provide at least two potential benefits in the future: SCL dollars go further in leveraging customer energy-efficiency investments, and rate impacts of conservation are reduced.

Protecting our conservation investments

Stranded conservation investments become a critical issue to address as SCL customers begin to enjoy the choice of retail electricity suppliers. One way to protect conservation investments is to include stranded cost recovery provisions in SCL's conservation contracts. This type of provision is included in SCL's recent conservation agreement with the University of Washington (UW). That contract, for the energy-efficient retrofit of many buildings across the UW campus, provides that, in the event the UW leaves our system — whether by fuel switching, contracting with another supplier, or self-generating — during the useful life of the conservation measures we paid for, the UW will reimburse City Light for a pro rated share of the incentives paid for those "stranded measures."

Slowing down the pace of acquisition

The 1992 plan outlined the strategies SCL would use to meet the City of Seattle's ten-year electrical load growth with cost-effective conservation. These strategies translated into a goal of acquiring one hundred average megawatts of cost-effective conservation by the year 2003 at a rate of nine to ten average megawatts per year, with annual conservation budgets of $40 million.

The EMSP retains the one hundred average megawatts long term goal from the 1992 Plan, but will achieve this target at a slower rate. Under the EMSP, energy savings will be acquired at a rate of about five to six average megawatts per year, with annual budgets ranging from $20 to $24 million. At this rate, SCL conservation programs under the EMSP will achieve another 36% of the overall one hundred average megawatts target between 1997 and 2002, leaving 18% of the target to be acquired in the years beyond 2003.

Comprehensive energy management services

Competition in the retail power markets is emerging as customers begin to exercise choice in who will provide them with retail energy services. Retail energy service competition is now evident in SCL's own service territory, as competitors already deliver retail energy management services to a handful of SCL customers. Beyond conservation recommendations made in the draft SRA, the EMSP addressed this increasingly competitive utility environment by putting increased emphasis on delivering value-added energy management services.

Providing comprehensive value-added customer services allows customers to leverage their investments in energy efficiency, and therefore increase the likelihood they will implement conservation measures. Second, in the face of increased competition in the retail energy services market, these expanded energy management services will be a real competitive advantage for SCL.

C. BPA Contractual Terms and Rates

Rate and contract negotiations with the BPA concluded in July of 1996. Those negotiations and internal measures taken by the BPA resulted in significant changes to rates, contract terms and conditions. Table 3 compares the new and old contract terms, while Table 4 compares the new and old rate structures. Since the City Council has already approved the new BPA contract, we did not repeat the analysis presented in the draft SRA.

Table 3 BPA Contract Terms Compared

Current Contract	*Amended Contract*
• Difference between firm resources and load – ranges from 274 to 322 MW	• Maximum 195 MW
• 95% Confidence water	• 82% Confidence water
• Unlimited Displacement	• 80-87% Displaceable 1996-2001
• Entitlement shaped to monthly deficit	• Equal Entitlement in all months
• Expires 6/30/2001	• Expires 9/30/2001

Table 4 BPA Rate Structure Compared

Power	**1994**	**1996**
PF Demand ($/MW month)	$4141	$870
PF Demand Reservation ($/MW month)	-	$670
PF Energy ($/MWh)	$27.38	$24.4
SCL Effective Rate ($/MWh)*	$19.71	$20
PF Availability Charge	29.4%	35.%
Transmission		
NTP: Federal Power ($/MWh)	$0	$2.13
Point to Point: Federal Power $/MWh)	$0	$1.37
Point to Point: Federal and Non-Federal Power ($/MWh)	-	$2.57
Integrated Resources: Non-Federal ($/MWh)	$2.31	$2.95

*1994 includes power and transmission, 1996 is power only

D. Changes in expectations about future supply and cost of energy

The conclusions and recommendations of the draft SRA depended heavily on assumptions made about the price and availability of energy in the West Coast market[8]. Recent changes in the electricity industry driven by FERC orders 888 and 889, lower natural gas prices, and a West Coast surplus of capacity, have combined to lower energy prices in recent years. These changes present new opportunities to SCL. In the past SCL relied on 'firm resources' (resources available with a high degree of certainty) to meet its firm load. In the future, with low cost and abundant

[8] The market in which SCL trades is roughly the region defined by the Western Systems Coordinating Council, from British Columbia and Alberta to the north, to California, Nevada, and Wyoming to the south and east

market energy, SCL could rely on a combination of its own hydro and market energy to serve load.

There are, however, risks associated with this strategy: lack of supply, unanticipated price increases, and congestion or failure of transmission paths. Since such purchases are now being used as the measure against which other resource opportunities are judged, understanding the market and the ways to mitigate risks has become extremely important. Since publication of the draft SRA we have changed our method of forecasting both energy prices, and natural gas prices, a key determinant of energy prices.

Gas prices now reflect spot market prices to the local distribution network, rather than contract prices to the burner-tip as they did in the draft. These prices feed into a completely revised Energy Market Price Model that has been expanded to include temperatures in the Northwest and Southwest. And the dependence on Northwest water conditions, indirect in the draft, is now explicit. (See the chapter on Energy Market Price Forecast in *Power Options* for details).

Figure 1 and Figure 2 show the changes in the forecasts of gas prices since the draft SRA. As Figure 1 indicates, our current Southwest gas forecast is about the same as in the draft in the near-term, but is lower in the long-term, while the Northwest forecast is a little higher near-term, but also lower in the long-term. The monthly shape in Figure 2 shows the impact of increased demand and decreased supply in the winter period.

Figure 1: Natural Gas Price Forecasts

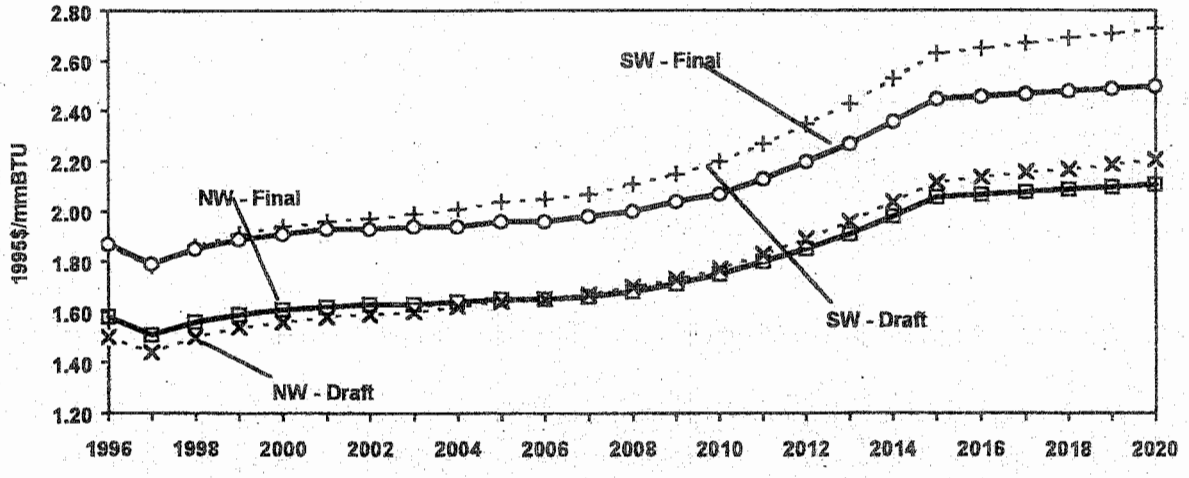


Figure 2: Monthly NW Gas Prices (year 2000)

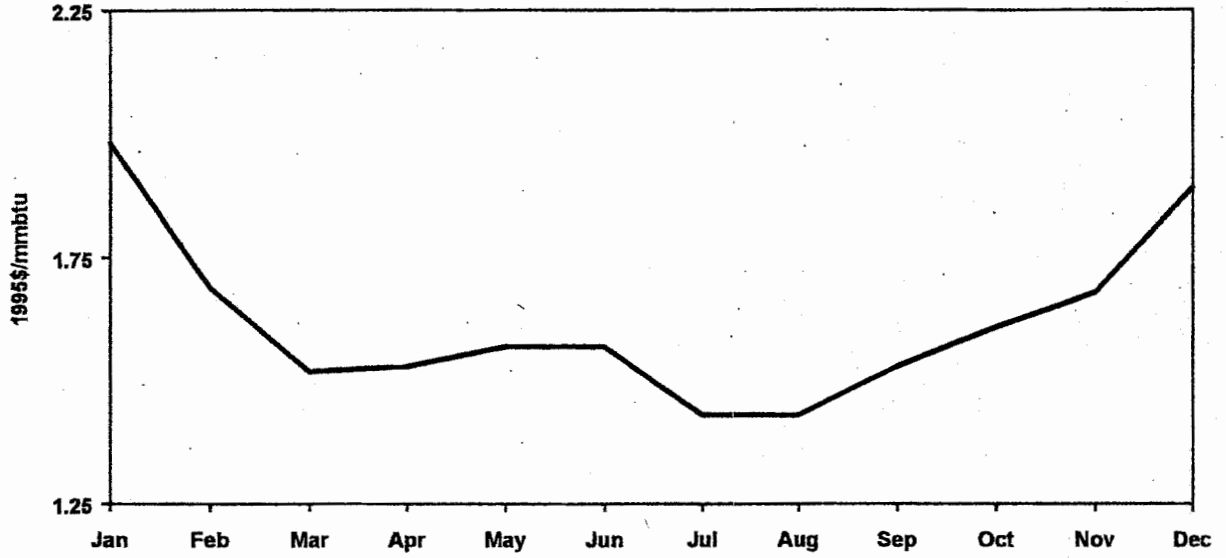
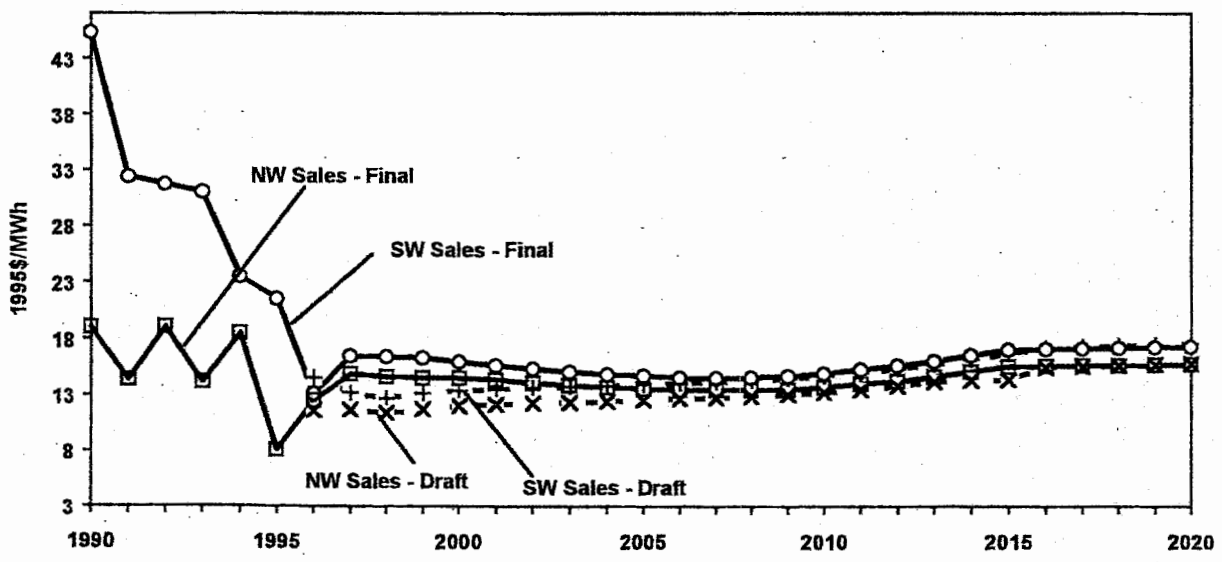


Figure 3 compares the draft and final annual average energy market price forecasts[9] for the Northwest and Southwest markets under normal temperature and water conditions, and using the base case natural gas price forecasts. The change from the draft to the final represents both changes in the definition and forecast of gas prices, and a change in underlying methodology.

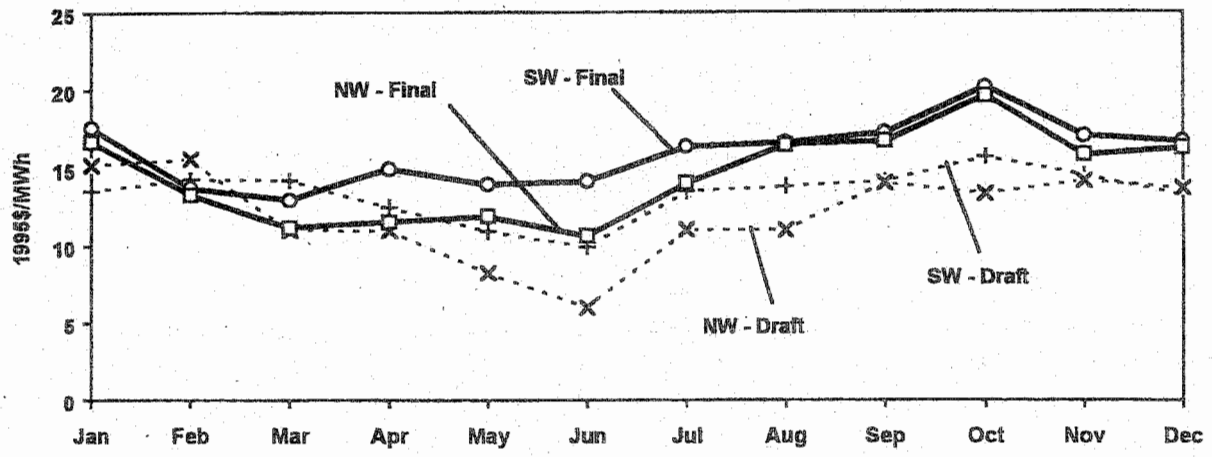
Figure 3 Annual Energy Market Sales Prices



[9] Note: these prices are not truly market prices, rather they reflect prices SCL is likely to experience in its transactions.

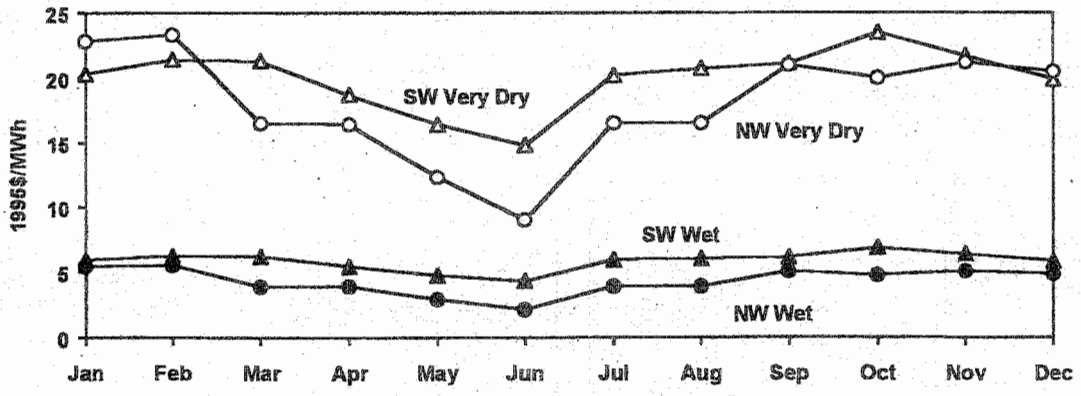
Figure 4 documents the changes from the draft to the final in the energy price forecast for average water and temperature, and base case natural gas . The new forecast is substantially higher in the summer and fall than the draft.

Figure 4: Monthly Energy Sales Prices for Average Water in Year 2000



In Figure 5 we show energy prices for the Northwest and Southwest by water condition under normal temperatures and base case gas prices for the year 2000. The seasonal shape very pronounced under very dry conditions as gas prices play a relatively larger role in the market for energy.

Figure 5: Energy Sales Prices by Water Condition in Year 2000



IV. Issues Identified by City Council

Three issues were raised by Seattle City Council members during the hearing of the Utilities and Environmental Management Committee on the draft SRA:

A. the cost-effectiveness of some of SCL's existing resource portfolio in the new market environment;
B. dispatchable resources as an alternative to reliance on the market to meet load; and
C. the effects of acquiring a limited amount of green resources.

A. Cost-effectiveness of existing resources

This issue was addressed in a separate submittal to the Council entitled *The Value of Existing Resources*, which examined Centralia, Boundary, Lucky Peak, Skagit, and Cedar Falls.

B. Alternatives to reliance upon the market

In this section (parts B and C) we consider the possibility of acquiring resources, or contracts for the services of resources which reduce our reliance on the market. To provide an indication of the risks involved in committing to a specific resource, we assessed the value of each acquisition under the four Business Planning Scenarios.

The Business Plan scenarios (Gaia, Competition, Re-regulation, and Gridlock) were developed by SCL as part of its Business Plan in an effort to capture the range of possible outcomes to industry de-regulation. Each scenario has an underlying theme: in Gaia, environmental concerns become paramount in the future; in Competition, free market access drives the future; Re-regulation starts with a push towards competition, but social and political pressures lead to new regulations rather than freer markets; and finally, in Gridlock, there are so many competing interests that de-regulation becomes bogged down, and nothing fundamental changes for the foreseeable future.

How these scenarios were made operational in our modeling framework, and a comparison to the assumptions made for the draft SRA is presented in Appendix A.

Dispatchable Resources

The 1992 Energy Resources Strategy (and several previous strategic resource plans) recommended acquisition of an eighty megawatt simple cycle combustion turbine to provide a source of reliable, low fixed-cost, dispatchable energy as an alternative to market purchases. Until recently, we had assumed this resource would be on-line by 1999, and our capital program, rates and revenue requirement projections reflected this assumption. However, because of the west-coast energy surplus and low prices, the utility has canceled these projects.

During the May 2, 1996 briefing of the Seattle City Council, the Utilities and Environmental Management Committee (UEMC) chair expressed interest in exploring the relative merits of market reliance versus a firm contract for a dispatchable resource. Since then we have conducted

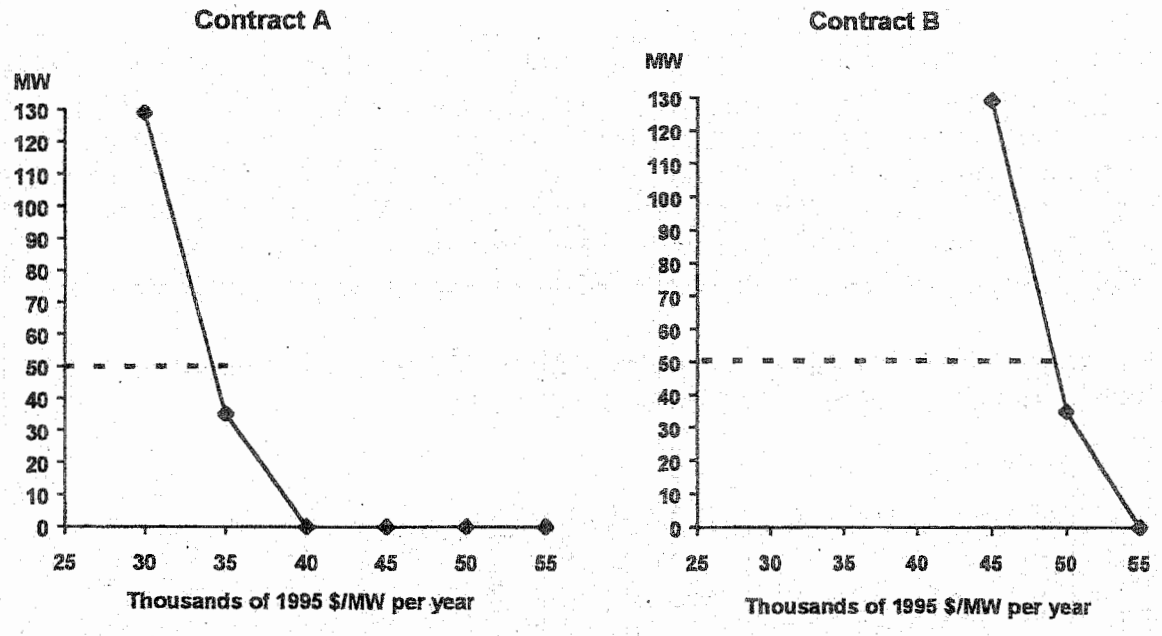
further analyses and engaged in detailed discussions with independent power producers to determine conditions under which such an alternative to the market might be cost-effective.

Based on those discussions, we formulated two contracts for the services of a dispatchable gas-fired resource. Contract A ties the price of gas used by the resource to an index of energy prices in the mid-Columbia market, and contract B ties it to an index of gas prices at Sumas. We assumed the same thermal efficiency for both contracts, only the pricing methodologies are different.

These contracts do not reflect any offers SCL is currently considering, but rather the results of preliminary discussions. The intent here is to define reasonable contract parameters that could form the basis of solicitation of further discussion if such a decision is made.

Using these fuel costs and the thermal efficiency, we estimated the amount of capacity SCL could purchase at varying prices for capacity, and still break even with the market. Figure 6 shows the results. We chose fifty megawatts (as indicated by the dashed lines on the figures) as a reasonable amount, given our existing resources and what we believe may be realistically available in the near-term. The contracts, and how they were modeled, are shown in Table 5.

Figure 6: The Demand for Capacity (1999)



Contract A has the advantage of linking the resource dispatch cost directly to energy prices, thus securing a market advantage relative to the market. Contract B, on the other hand, has a lower dispatch cost relative to the market, so SCL might be willing to pay a higher price for capacity than for Contract A. Interestingly, despite the different ratios of fixed to variable costs for these

two contracts, our analysis shows that, were we to acquire either, we would utilize them at very high capacity factors.

Table 5 Summary of contract details

A.) Indexed to the electricity market:

Time of Year:	August through March*
Amount:	50 MW of fully dispatchable capacity and energy
Fixed Cost:	$35,000/MW per year payment to reserve guaranteed capacity
Dispatch Cost:	Gas price 8% of mid-Columbia energy price
	Dispatch cost = 7,200 BTU/kWh * gas fuel price + variable O&M
Transmission Cost:	Included in Fixed Cost
Duration:	5 and 10 years

B.) Indexed to natural gas spot market:

Time of Year:	August through March*
Amount:	50 MW of fully dispatchable capacity and energy
Fixed Cost:	$45,000/MW per year payment to reserve guaranteed capacity
Dispatch Cost	Gas price indexed 75% of natural spot gas price at Sumas
	Dispatch cost = 7,200 BTU/kWh *gas price + variable O&M
Transmission Cost:	Included in Fixed Cost
Duration:	5 and 10 years

*(Based on analysis in the draft SRA, we limited the contracts to the months August through March. Further analysis of specific contract opportunities would be necessary to determine the optimal time period).

Table 6 and Table 7 show the impacts of these two contracts on rates, revenue requirements, and quantified environmental externalities[10], as measured against *reliance on the market* under each Business Planning Scenario.

Three features of the results stand out. First, in all the Business Plan scenarios both contracts lower environmental costs. The reduction, which is approximately the same for both contracts, arises because we displace market purchases with the energy of a cleaner resource (see the discussion of the environmental cost of the melded resource in Section III.A).

[10] The rates and revenue requirements figures exclude environmental costs.

Table 6 Gas-Fired Contract A

Business Planning Scenario	Annual Change in Revenue Requirements (Levelized $1995 m)	Annual Change in Rates (Levelized % change)	Annual Change in Environmental Cost (Levelized $1995 m)
Gaia			
5 yr contract	($0.65)	-0.21	($2.27)
10 yr contract	($1.37)	-0.45	($3.01)
Competition			
5 yr contract	($0.22)	-0.07	($2.46)
10 yr contract	($1.15)	-0.34	($3.21)
Market Failure			
5 yr contract	($0.16)	-0.05	($2.46)
10 yr contract	($0.61)	-0.19	($3.27)
Gridlock			
5 yr contract	($0.07)	-0.03	($2.47)
10 yr contract	($0.62)	-0.19	($3.26)

Second, both contracts lower our rates and revenue requirements. The lower utility cost arises because a dispatchable resource with the above parameters[11] allows us to avoid costly market purchases at peak load times, and provides the opportunity for us to sell energy when market conditions are favorable.

Table 7 Gas-Fired Contract B

Business Planning Scenario	Annual Change in Revenue Requirements (Levelized $1995 m)	Annual Change in Rates (Levelized % change)	Annual Change in Environmental Cost (Levelized $1995 m)
Gaia			
5 yr contract	($0.84)	-0.27	($2.27)
10 yr contract	($1.52)	-0.50	($3.01)
Competition			
5 yr contract	($0.38)	-0.12	($2.44)
10 yr contract	($1.29)	-0.38	($3.17)
Market Failure			
5 yr contract	($0.32)	-0.10	($2.42)
10 yr contract	($0.70)	-0.22	($3.11)
Gridlock			
5 yr contract	($0.23)	-0.07	($2.44)
10 yr contract	($0.76)	-0.23	($3.23)

Finally, with either contract, total societal cost of serving load is reduced – both SCL's internal and external costs decline.

[11] Since both of these contracts were designed specifically to fit SCL's needs it should not be surprising that they result in reduced in utility costs under a wide variety of conditions.

These results suggest that there *may* be contracts SCL could sign that would allow us to gain some certainty of mid to long-term supply and cost relative to the market, and that preserve our competitive position while at the same time improving environmental quality when compared to reliance on the market.

C. The effects of acquiring a limited amount of green resources

Over the last year, the Pacific Northwest region instituted a regional review process to examine the structure of the electric utility business in the region in light of fundamental changes in the market place and its regulation. In December of 1996, the Comprehensive Review of the Northwest Energy System published its final report, *Towards a Competitive Electric Power Industry for the 21st. Century*, in which it recommended that the region continue to develop renewable resources. The report envisioned utilities either acquiring renewables directly, or in the event it was not cost-effective for them to do so, devoting 0.49 percent of their revenues to fund research into, and development of, renewables.

While SCL has made no direct financial commitment to renewable resources to date, it has actively supported regional funding of such resource development, and has funded EPRI research through its participation in the Hydro and Renewable Business Unit.

To date, Northwest non-hydro renewable development has been primarily through sponsorship of BPA in partnership with utilities. Table 8 summarizes that activity and the status of the projects with which BPA is, or has been, involved.

Table 8 Status of Renewable Projects

Project	Primary Sponsor	Capacity	Status
Columbia Wind Farm	CARES	25 MW	Letter of Agrm't; Budgeted; EIS complete; Permits on appeal; Scheduled on-line 1998
Foote Creek Wind Farm	PacifiCorp	68 MW	Letter of Agrm't; Budgeted; EIS complete; Uncertain due to Kenetech bankruptcy; Scheduled for 1998
Glass Mountain Geothermal	Calpine	33 MW	MOU; No budget; Attempting to market as green power
Newberry Geothermal	California Energy	33 MW	Canceled, Insufficient resource. May be moved to Glass Mountain
Wauna Cogeneration	James River	36 MW	In service March 1996
Short Mountain Landfill Gas	Emerald PUD	3.6 MW	In service 1992 with expansion in 1994

In response to recommendations from the citizens' review panel and City Council, SCL examined the consequences of acquiring small quantities of wind and geothermal.

Our analysis continues to show that under fairly wide variations in fossil fuel prices, renewable resources are more expensive for SCL than other market opportunities within the next ten years. Even so, renewables provide a hedge against rising fossil fuel prices and environmental taxes.

Table 9 and Table 10 show the changes to revenue requirements, rates, and environmental costs, under the four Business Planning Scenarios, that result if a renewables contract is entered into. The changes are relative to complete dependence on the market. We examined two contracts: 35 megawatts of wind, and 10 megawatts of geothermal. The capacities were chosen so that the energy production of the contracts would be approximately the same – about ten average megawatts.

Table 9 35 MW Wind Resource Contract

Business Planning Scenario	Annual Change in Revenue Requirements (Levelized $1995 m)	Annual Change in Rates (Levelized % change)	Annual Change in Environmental Cost (Levelized $1995 m)
Gaia			
5 yr contract	$0.69	0.23	($2.47)
10 yr contract	$0.54	0.18	($2.44)
Competition			
5 yr contract	$1.22	0.38	($2.51)
10 yr contract	$1.11	0.35	($2.56)
Market Failure			
5 yr contract	$1.18	0.38	($2.48)
10 yr contract	$1.15	0.38	($2.48)
Gridlock			
5 yr contract	$1.28	0.41	($2.51)
10 yr contract	$1.29	0.42	($2.54)

As the tables show, acquiring a renewable resource increases rates and revenue requirements to SCL's customers in all four scenarios, but by a modest amount. However, both contracts result in avoided environmental costs, and since the value of the environmental savings is greater that the increased revenue requirements, there is a positive net benefit to the region and society from either of these renewables contracts. The primary environmental benefit is the reduction in carbon dioxide emissions: the wind contract would lower West Coast emissions by about 67,000 tons per year, while the geothermal contract would lower them by about 60,000 tons per year.

Table 10 10 MW Geothermal Resource Contract

Business Planning Scenario	Annual Change in Revenue Requirements (Levelized $1995 m)	Annual Change in Rates (Levelized % change)	Annual Change in Environmental Cost (Levelized $1995 m)
Gaia			
5 yr contract	$1.00	0.34	($1.58)
10 yr contract	$0.92	0.31	($1.77)
Competition			
5 yr contract	$1.44	0.45	($1.64)
10 yr contract	$1.42	0.45	($1.91)
Market Failure			
5 yr contract	$1.40	0.45	($1.60)
10 yr contract	$1.43	0.47	($1.81)
Gridlock			
5 yr contract	$1.49	0.47	($1.62)
10 yr contract	$1.56	0.50	($1.88)

Green Pricing

Given that acquisition of renewable resources will result in a moderate increase in rates, a policy issue exists as to how to allocate the rate impact. One possibility is through 'green pricing'.

Offering a special 'green rate' to customers who wish to purchase energy from renewable resources is one possible mechanism by which SCL could develop renewable resources. It has the benefit of allowing such development without impacting customers who do not wish to bear its higher cost. A variety of studies have been conducted across the nation, several of them in the Pacific Northwest, to ascertain the willingness of customers to pay such a rate. The Renewable Northwest Project compiled a summary of such surveys in March of 1996. Results indicate that from fifty to seventy percent of survey respondents believed that utilities should invest in green resources, and were willing to pay a higher rate to support that effort; however, the willingness to pay variety widely – from one to ten dollars extra a month. Below is a summary of the survey results:

- **Salem Electric Coop**: Seventy-eight percent of people surveyed supported renewable resource development and felt all customers except those on low-incomes should pay. They supported rate increase of from four to eight percent.

- **Eugene Water and Electric Board**: Sixty percent of people surveyed would spend between one and twelve dollars extra per month.

- **Kenetech**: In a survey of 801 people in Washington and Oregon, eighty six percent would replace lost hydro with wind even if utility bills went up nine dollars per month

- **Portland General**: Of 766 surveyed, sixty-one percent of residential and sixty-five percent of business customers wanted renewable resources to be priority.

- **Snohomish County**: A survey of 25 focus groups showed support for up to ten percent extra on utility bill for renewables.

If six percent (about 17,000) of SCL's customers were willing to pay an additional five dollars per month, SCL could acquire about ten average megawatts of a green resource without impacting the rates of its remaining customers.

SCL's draft SRA recommendation to consider a limited acquisition of renewable resource continues to be viable. It is consistent with the Regional Review, past direction from the City Council on resource priorities, and is a hedge against higher fossil fuel prices and environmental taxes.

Appendix A: Business Plan Scenarios

		GAIA	COMPETITION	MARKET FAILURE	GRIDLOCK
Environmental Taxes	**Draft**	Internalize environmental costs	None.	2-Mill transmission charge (excl. Skagit).	None.
	Final	$15/ton tax on CO_2 emission	None.	2 mill subsidy for renewables applied as reductions in fixes costs starting in 2003.	None.
BPA	**Draft**	Full requirements customer Rates = MVE + externalities, 100% availability charge	No BPA.	Max of 200 aMW, rates = high, 100% availability charge.	Up to full entitlement, base rates and availability charge.
	Final	Current contract through 2001, then BPA sold. SCL continues to get 195 aMW share. Variable costs are converted to fixed costs.	BPA sold, many small buyers, add 195 aMW to NW surplus @ market prices.	Current BPA quantity, high rates, take-or-pay starting in 2002.	Current contract.
Conservation Funding	**Draft**	Renew funding at 66%	None.	None.	None.
	Final	Revert to original funding amount; amount of acquisition the same as current plan	None.	Renewed conservation funding in 2003 at 66%	None.
Resource Performance	**Draft**	Reduced hydro (10% less due to climate changes)	Double size of market.	Pessimistic case	Base case.
	Final	Dryer: probability of low flow times 1.5.	Base case.	Base case.	Base case.
Biological Opinion	**Draft**	Yes.	No.	Yes.	Yes.
	Final	Yes.	Yes.	Yes.	Yes.
Natural Gas Prices	**Draft**	High[12] for load, Base for resource.	Low for load, Base for resources	Base for load, Base for resources.	High for load, Base for resources.
	Final	High	Base.	High.	Base.
Load Growth	**Draft**	Low.	High.	Low.	Base.
	Final	Low.	High.	Low.	Base.
Market Prices (Avg. growth over 20 yrs)	**Draft**	High.	Low	Base	High.
	Final	3% escalation.	0.2% escalation.	2.7% escalation.	0.2% escalation.
Municipal bond tax exemption	**Draft**	Yes.	No.	No.	Yes.
	Final	Yes.	No.	No.	Yes.

[12] High, Base, and Low refer to preset growth rates for the forecasts.