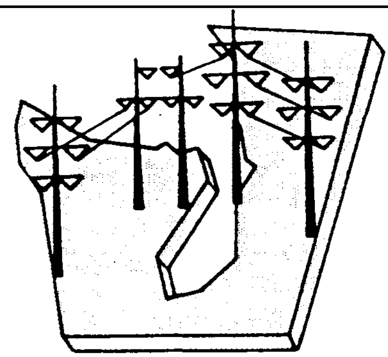
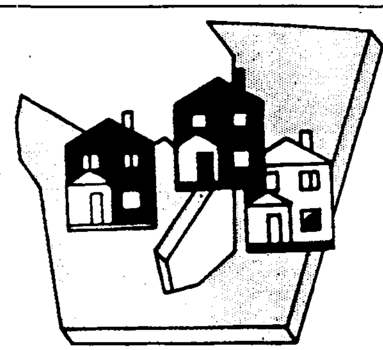
Puget Sound Area Electric Reliability Plan

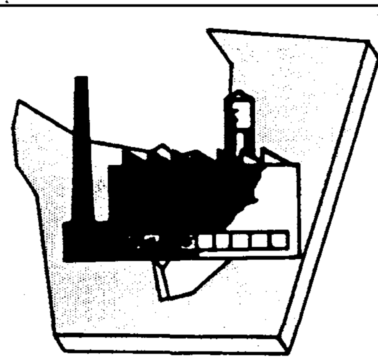
Economic and Technical Evaluation Appendix C



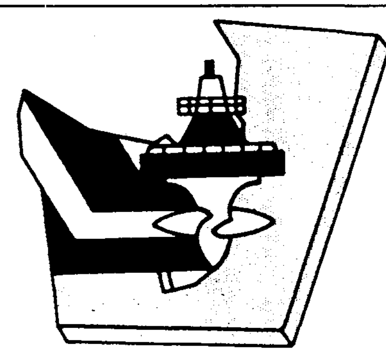
Transmission Reinforcement



Conservation and Load Management



Load Curtailment



Local Generation

1 Introduction

In this appendix, the study framework and evaluation system for economic and technical factors are explained. This material documents the analysis performed for Section 4.8 of the EIS. Coupled with the environmental analysis, the evaluation factors described below will be used to judge the relative merits of our four alternatives.

1.1 Study Framework

The evaluation factors include measures of economic impacts, risk, and social responsibility. For simplicity, this study assumes that the Puget Sound area is served by a single utility. Therefore, no distinction is made between private and public utilities or load served by BPA and load served by utility-owned generation. In addition, where appropriate, costs incurred by consumers are included as well as utility costs.

This study has two relevant time periods. First is the decision period, which extends from 1994 through 2003. It is during these ten years that utilities must take actions to meet peak loads in each year. The analysis continues beyond 2003 through 2010 in order to adequately capture the costs and benefits of actions taken through 2003. This longer study period is needed because not all costs and benefits occur equally in all years.

Where appropriate, a 5% inflation rate and 3% real discount rate are used.

As described in Section 3, local generation developed to meet energy needs is not included in the alternatives.

1.2 Evaluation Factors

Six evaluation factors are used in this study to characterize each alternative that solves the peak load problem in the Puget Sound area.

Net Present Value
Sensitivity to Load Growth
Near Term Revenue Requirements
Long Term Revenue Requirements
Deliverability
Reliability

The first five of these evaluation factors have been applied by utilities in the region for various resource planning exercises and have received public review during those processes. The last factor is new for this project and specifically addresses the issue of power system reliability. Section 2 explains the methods used for each evaluation factor.

1.3 Assembling Alternatives

Because of the nature of the problem in Puget Sound area and the characteristics of the individual measures, it is unlikely that any one measure alone will provide a satisfactory solution. For example, a transmission line might completely solve the problem, but it will take six or more years to site and build. On the other hand, conservation programs can be implemented quickly, deferring the need for a major new facility. Therefore we combine measures to take advantage of their individual strengths. Each alternative presented in the EIS has been assembled to meet the Reliability Criteria under the medium economic load growth. The process is described in Section 3.

2 Evaluation Factors

2.1 Net Present Value

This factor analyzes the quantifiable costs and benefits of the measures in each alternative to calculate the net present value (NPV). Net present value is a type of analysis that expresses costs and benefits occurring over a period of time as a single number or value. For this study costs and benefits are analyzed over the study period, 1994 to 2010. This calculation takes a societal perspective including costs and benefits to BPA, utilities and consumers.

The costs for this calculation include the costs to build, operate and maintain (O&M) th measures in each alternative. The value of any power produced or saved by an alternative is included as a benefit since this power allows utilities to avoid purchasing other resources to meet power system needs. The analysis is done in real terms, without inflation and all numbers are reported in 1990 dollars.

The NPVs were calculated using a LOTUS 123 spreadsheet. The spreadsheet is divided into five sections, Section 1 which is for inputs, Sections 2-4 which perform the calculations and Section 5 which summarizes the output. The spreadsheet for Alternative 1 has the sections labeled for reference.

<u>SECTION 1</u> is where the characteristics of the measures are defined that will be used to calculate the NPV of the alternative. The first input required is the name of the alternative. The rest of input requirements are described below starting with the far left column:

Selection Variable - Allows user to select a measure for the alternative (1=yes 0=no).

Measure - Name of Measure.

Total Fixed Cost - Capital costs and NPV of fixed O&M for the resource life in 1990 $/kw.

Resource Life - Expected life of the resource in years.

Fixed Cost Esc - Percentage above inflation that fixed costs escalate over time.

Variable Cost Esc - Percentage above inflation that variable costs escalate over time.

Energy:Cap Ratio - Average firm energy produced as a percent of peak capacity.

Nov-Feb Power - Percent of energy produced November-February. Used to determine seasonality.

The remaining columns of section one are for the input of the incremental peak megawatts of each measure in the alternative. The on-line year assumes that measures are installed in time to meet that years winter peak. On-line year 1994 means that measures must be installed before November 1, 1994 and are available for the 1994-1995 winter. For the evaluation the MW represent the normal cold weather peak. Since northwest energy planners are more accustomed to planning for average megawatts working in peak megawatts may take some mental adjustment.

The real discount rate is section one's final input. For this analysis a 3 percent rate is used. Sections 2-5 take the inputs of Section 1 and calculate the alternative's NPV.

<u>SECTION 2</u> describes the alternative. It also calculates the levelized fixed costs and the capacity situation after the measures are implemented. The levelized fixed cost is calculated by amortizing the input total capital cost/kw over the resource life using the 3% real discount rate. The variable cost and incremental megawatts are copied from Section 1 but in Section 2 only the measures selected in the alternative are shown.

The final two rows examine the capacity situation in the Puget Sound Area. The deficit line shows the forecast capacity deficit with medium load growth and no action. The last line shows the capacity surplus or deficit as the expected resources described in Section 3 and the measures in the alternative come on-line.

<u>SECTION 3</u> calculates the costs associated with each alternative. This section aggregates the costs and MW from Section 2. The levelized fixed costs of the measures and the variable costs of operation are multiplied by the incremental MW and added together for each measure in each year. Fixed and variable escalation are included if applicable. The levelized fixed and O&M costs from previously added MW as well as incremental MW are included in each calculation. If a measure wears out before the end of the study period it is replaced.

The matrix of costs are then summed to get the totals for each year for the alternative. Using the real discount rate these total are then brought back to 1990 dollars and summed to give the present value of costs.

<u>SECTION 4</u> begins on sheet two of the table, and calculates the power benefits associated with the alternative. Within Section 4 are three subsections: marginal cost, cumulative aMW and benefit calculations.

Some of the measures acquired for Puget Sound reliability also produce or save power. This allows the region to avoid acquiring the power from another source. BPA's 1990 long run incremental cost for medium load growth is used to value this power. This analysis took the marginal cost stream and applied weighting factors which represent the seasonality of the value of power. Power produced or saved in the winter is worth more than summer power.

The cumulative aMW subsection simply multiplies the matrix of incremental megawatts in Section 2 by the energy/capacity ratio, keeping track of cumulative MW. This yields a matrix in units more familiar to energy planners in the northwest, average megawatts.

The benefit calculation multiplies the cumulative matrix by the marginal cost, yielding a yearly total benefit for each measure. The benefits are then summed and present valued to 1990 dollars in the same way as costs.

SECTION 5 summarizes the costs and benefits that are calculated in the rest of the spreadsheet. The first row shows the cumulative present values of the alternative in each year. Positive numbers indicate benefits outweighing costs and negative numbers indicate greater costs. The last three rows summarize the present value of the alternatives.

The following table summarizes the NPV for the alternatives. Alternative 2 has benefits which far exceed their costs. The detailed spreadsheets used to calculate the NPVs are in Tables 2.1-1 through 2.1-4.

NPV of Alternatives
Millions 1990$

Alternative 1	+ 67
Alternative 2	**+105**
Alternative 3	-128
Alternative 4	+ 40

2.2 Sensitivity to Load Growth

The Alternative Strategies are constructed to meet medium load growth. However, if loads take off at a lower or higher rate than anticipated, utilities will need to adjust their actions accordingly. This decision factor looks at the economic consequences of being wrong. Load growth scenarios (low, medium, and high) are depicted in Figure 1-2 of the EIS and are described in more detail in Appendix A, Chapter II.

This analysis assumes that the change in growth begins in 1994 and utilities begin to take actions in 1998. Using 1998 allows time for collection of load growth information so that utilities are convinced that the growth they are experiencing is more than an aberration. The analysis uses the same framework as the NPV analysis except that the deficits and the value of the power to the system change.

For low load growth conservation, load management and fuel switching programs are stopped in 1999. Some pre-1998 load management and conservation is self-limiting due to lower load growth. Within the four alternatives peaking CTs are the only other measures that can be delayed or stopped after 1998 so alternative 4 has less CTs with low growth. Expected resources also decrease, to 300 MW since energy deficits decrease under low load growth.

For high load growth contract curtailment is acquired to cover deficits before other measures can be brought on-line. The alternatives are then adjusted to cover the additional peak deficits from high load growth. Alternative 1 has enough excess capacity to cover the additional load. Alternative 2 adds a transmission line in 2002. Alternative 3 and 4 both add Voltage Support 2 in 2001. In addition Alternative 4 also adds more CTs from 2001-2003. Some conservation savings accelerate due to higher load growth. Expected resources in Puget Sound also increase under high loads to 800 MW as utilities acquire power to meet their energy deficits.

In addition to the resource changes described above, the spreadsheet itself is adjusted to reflect the changes in load growth. As mentioned earlier the forecast deficit is increased. The most substantial change however is in the marginal cost of power. Under low load growth the region is in surplus so the power is worth less than with medium growth. Under higher load growth the region has to acquire more and higher cost sources of power so the value increases. BPA's low load growth marginal cost is used for the low load growth scenario and the high load growth marginal cost are used for the high scenario.

Besides the low, medium and high NPVs a range is reported, indicating the distance between each alternative's most positive and the most negative NPV. The table below summarizes the results, listing the NPVs for the alternatives under the three growth scenarios and the range of those values. While Alternative 3 has the highest costs under all three load growth scenarios, it has the smallest range.

Sensitivity to Load Growth
NPV 1990 $ Millions

	Low	Medium	High	Range
Alternative 1	- 88	+ 67	+109	196
Alternative 2	- 21	+105	+ 97	126
Alternative 3	-212	-128	-131	**84**
Alternative 4	- 35	+ 39	- 63	102

Spreadsheets used to calculate the low NPVs (2.2-1 through 2.2-4) and high NPVs (2.2-5 through 2.2-8) are provided. These tables also show the forecast deficits and the marginal cost streams for low and high growth.

2.3 Near Term Revenue Requirements

This decision factor looks at the amount utilities pay to acquire the measures in each alternative from 1996-1998. The analysis looked at the Puget Sound Region as a single utility. In contrast to the NPV calculations this analysis only looks at utility costs. The amount calculated represents the actual dollars utilities would need to pay for the alternatives but does not include the effects of lost revenues or changes that would occ in system operations. Results reported are average gross impacts on revenue requirements for the years 1996-1998.

Revenue Requirements were calculated using Bonneville's spreadsheet model MICROFIN and results were given a reality check with Puget Power and Light's financial model ECON. Microfin was used to develop yearly costs for single megawatt increments of each of the measures. These expected yearly costs were fed into a post processing spreadsheet (Tables 2.3-1 through 2.3-4). This spreadsheet combined the information for the revenue requirements per MW and the number of megawatts of each measure alternative to calculate the total revenue requirement. As in the NPV analysis measures that wear out before the end of the study period are replaced.

MICROFIN Financial Inputs

Price Level	1990
Federal Tax	34.0%
Insurance	0.18%
Private State Tax	0.0%
Publics Property Tax	0.0%
Private Property Tax	1.14%
Gross Revenue Publics	9.0%
Gross Revenue Private	6.71%
Publics Debt Fraction	100.0%
Private Debt Fraction	60.0%
Publics Nominal Interest Rate	7.4%
Private Nominal Interest Rate	9.0%
Private Equity Return	12.8%
Inflation Rate	5.0%

Project Description

	Sponsorship Public	Sponsorship Private	Years to Construct
Acc Weatherization	65%	35%	1
Acc Industrial	75%	25%	1
Low Flow Shower Heads	65%	35%	1
Commercial Retrofit	65%	35%	1
Transmission Line	100%	0%	6
Voltage Support 1	100%	0%	2
Voltage Support 2	100%	0%	3
Water Heater Controls	65%	35%	1
Time of Use Rates	65%	35%	1
Fuel Switching	*Not Included*		
Peaking CTs	55%	45%	4

The preceeding tables shows the financial assumptions used to calculate the revenue requirements and the public/private sponsorship fractions used to develop the assumed single Puget Sound Area Utility.

The near Term Revenue Requirements are summarized in the table below. Notice that revenue requirements are not included for fuel switching in alternative 3; it is unclear what electric utilities would pay for this measure (See Appendix D on reduce use options for discussion of possible costs). Results are expressed in terms of the average yearly revenue requirement between 1996-1998. Alternatives 2 and 4 have about one-half of the revenue requirements of the remaining two alternatives.

Near Term Revenue Requirements
$ Millions/year

Alternative 1	50
Alternative 2	**25**
Alternative 3 *	50
Alternative 4	**20**

* Doesn't include fuel switching

2.4 Long Term Revenue Requirements

This decision factor is the same as and is calculated the same way as Near-Term Revenue Requirements except it looks at the years 2006-2008. Long-Term impacts are also important to consider. Alternative 2 has significantly lower revenue requirements than the others.

Long-Term Revenue Requirements
$ Millions/year

Alternative 1	75
Alternative 2	**40**
Alternative 3 *	110
Alternative 4	105

* Doesn't include fuel switching

2.5 Deliverability

In every decision process, factors other than economic or financial impacts affect the final decision. These influences are largely political and/or social and can strongly affect whether an alternative strategy is practical and achievable, regardless of its economic attractiveness. Certain technologies or actions may be well known and proven, but public acceptance may keep them from occurring. This evaluation factor attempts to assess the impact of factors such as regulatory influences, institutional complexity, and public acceptability on the ability to implement each alternative strategy.

There likely will be some overlap with the environmental impacts as well as other evaluation factors. However, this factor assesses how the perception of environmental impacts affects the feasibility, or deliverability, of a particular alternative It does not necessarily follow that the alternative with the fewest or most benign environmental impacts will be the most deliverable. Finally, in contrast to the other evaluation factors, this element is largely the result of judgement.

Members of the Sounding Board were asked to rank each measure on a scale ranging from deliverable (1) to undeliverable (4). Rankings of the 19 members present were averaged (Table 2.5-1). Only the measures that differ between the alternatives are presented in the table below. Rankings for a transmission line range from 1.6 if existing right-of-way segments are used to 3.1 for new corridor segments. We assumed that a new line would use existing corridor segments to the maximum extent possible.

Alternative 3, which has three measures not used in the other alternatives, was scored based on the measure with the highest value, or least deliverable. We find that there is little difference between the alternatives. Conservation measures, included in all four alternatives, are ranked as deliverable to somewhat deliverable (1.4 to 1.9). For comparison, a nuclear plant was rated as undeliverable (3.7).

Deliverability

Alternative 1	**1.6**
Transmission Line	1.6
Alternative 2	**1.5**
Voltage Support 2	1.5
Alternative 3	2.0
Water Heater Control	2.0
Time of Use Rates	*not ranked*
Fuel Switching	1.8
Alternative 4	**1.7**
Combustion Turbines	1.7

1= Deliverable 4 = Undeliverable

2.6 Reliability

Reliability is a measure of the capability of the power system to meet consumer demands over a period of time. It is typically measured in terms of unreliability, such as how often outages occur, how long they last, and how much load is affected In contrast, the goal is to maximize reliability to the extent economically justifiable.

Planners use a set of rules, such as the BPA Reliability Criteria, to establish reliability requirements for the power system. All proposed alternatives must meet the tests specified in the Criteria. However, even after meeting the tests, each alternative may provide a different level of reliability. For example, two transmission circuits on the same tower pose a greater risk than two transmission circuits on different towers.

Existing transmission reliability models are not capable of examining the Puget Sound peak load problem because of the complexity of the system and the difficulty of predicting voltage collapse. Therefore, a simplified analysis will be performed for this evaluation factor that qualitatively ranks the alternatives according to their respective reliability.

The following factors were considered for each measure (see Table 2.6-1):

Number of units (100,000's water heaters vs. two transmission circuits)
Failure rate (based on experience, how often it is *not* available)
Common mode outages (loss of one tower with two circuits)

All of the measures were ranked on a scale of highly reliable (1) to not very reliable (4). Of the measures that are different between the alternatives, only fuel switching stands out as highly reliable (1). This is because an appliance, such as an electric water heater, is removed and can not add to the peak load problem. At the other extreme, a nuclear plant, with a lot of eggs in one large basket, was ranked as not very reliable (4). We can not differentiate between the alternatives based on measure reliability.

Reliability

Alternative 1	**2**
Transmission Line	2
Alternative 2	**2**
Voltage Support 2	2
Alternative 3	**2**
Water Heater Control	2
Time of Use Rates	2
Fuel Switching	1
Alternative 4	**2**
Combustion Turbines	2

2.7 Excess Capacity

One factor which is not captured by the evaluation is the potential benefits of excess capacity provided by each alternative. Some measures, such as the transmission line, provide more capacity than needed during the decision period. By 2003, the following margins remain:

	Margin (MW)
Alternative 1	1600
Alternative 2	600
Alternative 3	400
Alternative 4	30

These margins provide for additional reliability throughout the decision period should the deficit increase due to higher load growth or a delay in expected generation or conservation. In addition, the margin can serve load growth beyond the decision perio without requiring further investment.

2.8 Summary

Findings for the six evaluation factors are tabulated below. The alternative which ranks highest, or group of high ranking alternatives, are shown in **bold**.

Economic and Technical Evaluation Summary

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Net Present Value	67	**105**	-128	39
Sensitivity to Load Growth	196	126	**84**	102
Near Term Rev Rqmts	50	25	50	**20**
Long Term Rev Rqmts	75	**40**	110	105
Deliverability	**1.6**	**1.5**	2.0	**1.7**
Reliability	**2**	**2**	**2**	**2**

3.0 Assembling Alternatives

For our preliminary analysis we combined the measures to assemble 11 test cases, each of which solves the peak load problem.

- A Conservation, Load Management, Curtailment
- B Conservation, Load Management, Curtailment, Line
- C Conservation, Load Management, Cogeneration
- D Conservation, Load Management, Cogeneration, Fuel Switching
- E Voltage Support, Combustion Turbines
- F Voltage Support
- G Voltage Support, Line
- H Curtailment, Line
- I Cogeneration, Small Hydro, Coal
- J Combustion Turbines, Cogeneration, WNP3
- K Conservation, Load Management, Fuel Switching, Voltage Support

The test cases were examined using the evaluation factors, and the findings discussed with the Sounding Board. We also made a simplified assessment of the individual measures. Our basic approach was then to determine which measures should be excluded, which measures should be in all alternatives, and finally, how the alternatives should be differentiated.

Generators that produce energy over the year, called base load plants, cost about ten times as much as transmission alternatives when compared based on their contributi to fixing the peak load problem. Given this price difference, generation acquisition decisions will be driven by energy needs rather than for peaks. We have therefore removed most generation from the list of solutions to the problem, while recognizing that resources acquired in the Puget Sound will reduce the peak load problem.

Analysts have conservatively estimated that 400 MW (peak) of new but currently uncommitted resources will be developed in the Puget Sound by 2003 to meet the energy needs of utilities. Plans for new resources are typically outlined in each utility's least-cost plan, and are presented below in summary form. Note that these quantities are in addition to the conservation in the load forecast (EIS Table 1-1) and generation in the Puget Sound (EIS Table 1-2). We assumed that 60 MW will be acquired in each year from 1994 through 1998, with 20 MW additional each year through the evaluation period.

Expected Resources	Peak MW
Conservation	40
Cogeneration	310
Combustion Turbines	35
Hydro	15
Total	400

Cogeneration, small hydro, coal, and WNP3 do not appear in the four final alternatives. Combustion turbines installed to meet system peaks and located in the Puget Sound are included in Alternative 4.

After analyzing the costs and impacts of curtailment, the utilities decided that depending on curtailment for *long-range* planning is inappropriate. However, curtailment is included as a contingency measure in all alternatives.

Accelerated conservation programs in the residential, commercial and industrial sectors and a high-efficiency shower head program were found to be cost-effective, have low environmental impacts, and are somewhat deliverable. Therefore these measures appear in all four alternatives.

Transmission planners divided the voltage support measures into two options. Voltage Support 1, consisting of shunt capacitors at Echo Lake substation, was found to be cost-effective, have low environmental impacts, and is deliverable. This option is included in all four alternatives. Voltage Support 2 adds a new 500-kV substation north of Ellensberg, Washington, and is the prime component of Alternative 2.

The remaining measures, load management, and fuel switching, are the foundation for Alternative 3, while Alternative 1 uses a transmission line.

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SH 1 of 2

Section 1

-UGET SOUND AREA ELECTRIC RELIABILITY PLAN
09-Jun-91

-LTERNATIVE STRATEGY 1: Line, Voltage Support & Conservation

Sel-ct 1=Y 0=N	Total Cap -ost '90 /kw	Yearly Var Cost '90$/yr/kw	Resource Life	Fixed Cost Escalat	Var Cost Escalat	Ene gy: Cap city Rat o	Power Produced % during Nov-Feb	INCREMENTAL MEGAWATTS 1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	200	2005	2006	2007
1 Expectd Generation	0	0	0	0.0%	0.0%	0%	0.0%	0.0	60.0	60.0	60.0	60.0	60.0	20.0	20.0	20.0	-.0	20.0	0.0	0.0	0.0	0.0
1 ACC Weather	0	61.6	50	0.0%	0.0%	23%	70.0%	0.0	9.6	9.6	10.4	10.4	10.5	10.4	10.5	-8.2	-8.2	-8.2	-8.2	-.1	-6.2	-6.0
1 ACC Industrial	0	56	20	0.0%	0.0%	98%	33.3%	0.0	4.2	4.2	3.2	3.-	3.2	3.2	3.1	3.4	3.4	-5.9	-.9	-6.0	-2.7	-2.6
1 Efficient Shr Hds	335	0	7	0.0%	0.0%	44%	33.3%	0.0	0.0	7.2	7.1	7.0	4.1	4.0	4.0	3.9	3.9	0.0	0.0	0.0	0.0	0.0
1 Comm Retrofit	1420	0	30	0.7%	0.7%	64%	33.3%	0.0	3.7	3.8	10.3	10.4	10.3	10.3	10.4	6.8	6.9	6.8	0.0	0.0	0.0	0.0
1 Voltage Support1	10	0.5	35	0.5%	0.8%	0%	0.0%	0	300	300	0	0	0	0	0	0	0	0	0	0	0	0
0 Voltage Support2	40	1	35	0.5%	0.8%	0%	0.0%	0	0	0	0	1000	0	0	0	0	0	0	0	0	0	0
1 Line	130	.1.	40	1.2%	0.7%	1%	60.0%	0	0	0	0	0	2000	0	0	0	0	0	0	0.0	0.0	0.0
0 Water Htr Control	323.6	28.	12	0.0%	0.0%	2%	33.3%	0	40.1	39.2	43.4	43.5	42.4	43.6	43.4	22.8	21.8	22.9	0	0	0	0
0 Time of Use Rates	249	[illegible]	20	0.0%	0.0%	0%	0.0%	0	1-.5	24.3	3.6	23.1	5	4.8	4.8	5.2	5.2	0	0	0	0	0
0 Peaking CTs	505	15.6	30	1.2%	2.3%	5%	60.0%	0	0	0	0	0	0	0	140	70	140	70	0	0	0	0

Discount Rate..... 3.0%

OUTPUT

Section 2

ALTERNATIVE ST-TEGY 1: Line, Voltage Support & Conserv- ion

	Lev Fix Cost 1990$/kw	Vrly Var Cost 1990$/kw	Incremen- l Megawatts Year 1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Expectd Generation	0.00	0.00	0.0	60.0	60.0	60.0	60.0	60.0	20.0	20.0	20.0	20.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ACC Weather	0.00	61.60	0.0	9.6	9.6	10.4	10.4	10.5	10.4	10.5	-8.2	-8.2	-8.2	-8.2	-8.1	-6.2	-6.0	-6.1	-6.1	-6.1
ACC Industrial	0.00	56.00	0.0	4.2	4.2	3.2	3.2	3.2	3.2	3.1	3.4	3.4	-5.9	-5.9	-6.0	-2.7	-2.6	-.7	-2.6	-2.7
Efficient Shr Hds	53.77	0.00	0.0	0.0	7.2	7.1	7.0	4.1	4.0	4.0	3.9	3.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Comm Retrofit	7-.45	0.00	0.0	3.7	3.8	10.3	10.4	10.3	10.3	10.4	6.8	6.9	6.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Voltage Support1	0.47	0.50	0.0	00.0	300.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Line	5.62	1.20	0.0	0.0	0.0	0.0	0.0	2000.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Puget Area Deficit	0	-200	- 00	- 00	-700	-900	-1000	-1200	-1 00	-1500	-1600
Cum Post-Actn L/R Bal	0.0	177.5	2 .3	.3	244.3	2132.4	2080.3	1928.3	1854.2	1680.2	1592.9

Section 3

COSTS INCURRED FROM ALTERNATIVE STRATEGY 1: Line, Voltage Support & Cons (Thousands 1990$)

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	00	2003	2004	200	2006	2007	2008	2009	2010
Expectd Generation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ACC Weather	0	591	1183	1823	2464	3111	3751	4398	3893	3388	2883	2378	1879	1497	1127	752	376	0
ACC Industrial	0	235	470	650	829	1008	1187	1361	1551	1742	1411	1081	745	594	448	297	151	-0
Efficient Shr Hds	0	0	387	769	1145	1366	1581	1796	2006	2215	2215	2215	2215	2215	215	2215	2215	2215
Comm Retrofit	0	276	561	1339	2130	2919	3714	4521	5053	5597	6136	6136	6136	6136	136	6136	6136	6136
Voltage Support1	0	297	598	600	603	605	608	610	613	616	616	621	624	626	29	632	635	637
Line	0	0	0	0	0	14912	14930	14948	14966	14984	15002	15021	15039	15058	15077	15096	15115	15134
Yearly Totals	0	1399	3199	5181	7171	3921	5771	7635	28082	2854	8 66	7452	26638	26126	2 633	25127	24628	123

Cost PV ($1990) $242,121

TABLE 2.1-1
SH 2 of 2

Section 4

P R BENEFITS FROM ALTERNATIVE STRATEGY I: Line, Voltage Support & Cons

MARGINAL COSTS	1993	1994	1995	19	1997	1998	1999	2000	2001	00	003	004	005	2006	2007	2008	2009	2010
Winter MC mill/kwh	31.5	30.1	33.7	31.7	32.7	34.	33.6	33.8	34.2	34.8	36.1	35.0	33.3	37.5	39.5	3 .8	3 .8	3 .8
Summer MC mill/kwh	29.3	28.0	31.4	29.5	30.4	31.8	31.3	31.5	31.8	3 .3	33.6	32.5	30.9	34.9	36.8	3 .3	3 .3	3 .3
CUMULATIVE AMW																		
Expectd Generation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ACC Weather	0.0	2.2	4.3	6.7	9.0	11.4	13.7	16.1	14.2	12.4	10.5	8.7	6.9	5.5	4.1	2.7	1.4	0.0
ACC Industrial	0.0	4.1	8.2	11.4	14.5	17.6	20.8	23.8	27.1	30.5	24.7	18.9	13.0	10.4	7.8	5.2	2.6	-0.0
Efficient Shr Hds	0.0	0.0	3.2	6.3	9.4	11.2	12.9	14.7	16.4	18.1	18.1	18.1	1 .1	18.1	18.1	18.1	18.1	18.1
Comm Retrofit	0.0	2.4	4.8	11.4	18.0	4.6	31.2	37.9	42.2	46.7	51.0	51.0	51.0	51.0	51.0	51.0	51.0	51.0
Voltage Support1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Line	0.0	0.0	0.0	0.0	0.0	4.6	24.6	4.6	24.6	4.6	24.6	24.6	4.6	24.6	.6	.6	.6	.6
BENEFIT CALCULATIONS (Thousands 1990$)																		
Expectd Generation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ACC Weather	0	558	1249	1811	2524	3332	3950	660	4171	3 91	3261	2606	1959	1759	1396	819	409	0
ACC Industrial	0	1035	2320	3011	3960	5037	5836	731	7752	8 46	7449	5523	3619	3255	2589	1508	768	-0
Efficient Shr Hds	0	0	893	1666	2559	3192	3634	4154	468	5261	5468	5293	5034	5680	5987	5261	5261	5261
Comm Retrofit	0	595	1353	3017	4927	7036	8773	10709	1 062	13541	15385	14894	14164	15981	16845	14805	14805	14805
Voltage Support1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Line	0	0	0	0	0	7163	7042	7086	7163	7	7564	7327	6969	7857	8279	7	7	7
Yearly Total	0	188	5814	9505	13969	5761	9235	33339	35835	386 4	39127	35643	31745	34531	35096	29676	28527	7350

Bene P (\$1990)	\$308

Section 5

ALTERNATIVE STRATEGY I: Line, oltage Sup ort & Conservation
COST BENEFIT SUMMARY (million \$1990)

	1993	1994	1995	19	1997	1998	1999	2000	2001	00	003	004	005	2006	2007	2008	2009	2010
Cum PV (Disc 90$)	0	700	9	6578	12105	135	16213	20457	6058	33130	405 5	45940	49218	54456	60181	62853	65077	66864

Cost PV	-242.1
Bene its PV	309.0
Net	66.9

TABLE 2.1-2
SH 1 of 2

PUGET SOUND AREA ELECTRIC RELIABILITY PLAN
09-Jun-91

A TERNATIVE STRATEGY 2: Voltage Support & Conservation

Select 1=Y 0=N	Total Cap Cost '90$/kw	Yearly Var Cost '90$/yr/kw	Resource Life	Fixed Cost Escalat	Var Cost Escalat	Energy: Capacity Ratio	Power Produced % during Nov-Feb	INCREMENTAL MEGAWATTS 1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
1 Expectd Generation	0	0	0	0.0%	0.0%	0%	0.0%	0.0	60.0	60.0	60.0	60.0	60.0	20.0	20.0	20.0	20.0	20.0	0.0	0.0	0.0	0.0
1 ACC Weather	0	61.6	50	0.0%	0.0%	23%	70.0%	0.0	.6	9.6	10.4	10.4	10.5	10.4	10.5	-8.2	-8.2	-8.2	-8.2	-8.1	-6.2	-6.0
1 ACC Industrial	0	56	20	0.0%	0.0%	98%	33.3%	0.0	4.2	4.2	3.2	3.2	3.2	3.2	3.1	3.4	3.4	-5.9	-5.9	-6.0	-2.7	-2.6
1 Efficient Shr Hds	335	0	7	0.0%	0.0%	44%	33.3%	0.0	0.0	7.2	7.1	7.0	4.1	4.0	4.0	3.9	3.9	0.0	0.0	0.0	0.0	0.0
1 Comm Retrofit	1420	0	30	0.7%	0.7%	64%	33.3%	0.0	3.7	3.8	10.3	10.4	10.3	10.3	10.4	6.8	6.9	6.8	0.0	0.0	0.0	0.0
1 Voltage Support1	10	0.5	35	0.5%	0.8%	0%	0.0%	0	300	300	0	0	0	0	0	0	0	0	0	0	0	0
1 Voltage Support2	40	1	35	0.5%	0.8%	0%	0.0%	0	0	0	0	1000	0	0	0	0	0	0	0	0	0	0
0 Line	130	1.2	40	1.2%	0.7%	1%	60.0%	0	0	0	0	0	2000	0	0	0	0	0	0	0.0	0.0	0.0
0 Water Htr Control	323.6	28.9	12	0.0%	0.0%	2%	33.3%	0	40.1	39.2	43.4	43.5	42.4	43.6	43.4	22.8	21.8	22.9	0	0	0	0.
0 Time of Use Rates	249	48	20	0.0%	0.0%	0%	0.0%	0	18.5	24.3	23.6	23.1	5	4.8	4.8	5.2	5.2	0	0	0	0	0
0 Peaking CTs	505	15.65	30	1.2%	2.3%	5%	60.0%	0	0	0	0	0	0	0	140	70	140	70	0	0	0	0

Discount Rate..... 3.0%

OUTPUT

A T RNATIVE STRATEGY 2: Voltage Support & Conservation

	Lev Fix Cost 1990$/kw	Yrly Var Cost 1990$/kw	Incremental Megawatts Year 1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Expectd Generation	0.00	0.00	0.0	60.0	60.0	60.0	60.0	60.0	20.0	20.0	20.0	20.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ACC Weather	0.00	61.60	0.0	9.6	9.6	10.4	10.4	10.5	10.4	10.5	-8.2	-8.2	-8.2	-8.2	-8.1	-6.2	-6.0	-6.1	-6.1	-6.1
ACC Industrial	0.00	56.00	0.0	4.2	4.2	3.2	3.2	3.2	3.2	3.1	3.4	3.4	-5.9	-5.9	-6.0	-2.7	-2.6	-2.7	-2.6	-2.7
Efficient Shr Hds	53.77	0.00	0.0	0.0	7.2	7.1	7.0	4.1	4.0	4.0	3.9	3.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Comm Retrofit	72.45	0.00	0.0	3.7	3.8	10.3	10.4	10.3	10.3	10.4	6.8	6.9	6.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Voltage Support1	0.47	0.50	0.0	300.0	300.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Voltage Support2	1.86	1.00	0.0	0.0	0.0	0.0	1000.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
																		0.0	0.0	0.0

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Puget Area Deficit	0	-200	-500	-600	-700	-900	-1000	-1200	-1300	-1500	-1600
Cum Post-Actn L/R Bal	0.0	177.5	262.3	253.3	1244.3	1132.4	1080.3	928.3	854.2	680.2	592.9

COSTS INCURRED FROM ALTERNATIVE STRATEGY 2: Voltage Support & Conservati (Thousands 1990$)

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Expectd Generation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ACC Weather	0	591	1183	1823	2464	3111	3751	4398	3893	3388	2883	2378	1879	1497	1127	752	376	0
ACC Industrial	0	235	470	650	829	1008	1187	1361	1551	1742	1411	1081	745	594	448	297	151	-0
Efficient Shr Hds	0	0	387	769	1145	1366	1581	1796	2006	2215	2215	2215	2215	2215	2215	2215	2215	2215
Comm Retrofit	0	276	561	1339	2130	2919	3714	4521	5053	5597	6136	6136	6136	6136	6136	6136	6136	6136
Voltage Support1	0	297	598	600	603	605	608	610	613	616	618	621	624	626	629	632	635	637
Voltage Support2	0	0	0	0	2985	2994	3002	3011	3019	3028	3037	3046	3055	3064	3073	3082	3091	3100
Yearly Totals	0	1399	3199	5181	10156	12002	13843	15698	16136	16586	16301	15477	14654	14132	13629	13114	12604	12090

Cost PV ($1990) $141,028

TABLE 2.1-2
SH 2 OF 2

POWE ENEFITS FROM ALTERNATIVE STRATEGY 2: Voltage Support & Conservati

MARGINAL COSTS	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Winter MC mill/kwh	31.5	30.1	33.7	31.7	32.7	34.2	33.6	33.8	34.2	34.8	36.1	35.0	33.3	37.5	39.5	34.8	34.8	34.8
Summer MC mill/kwh	29.3	28.0	31.4	29.5	30.4	31.8	31.3	31.5	31.8	32.3	33.6	32.5	30.9	34.9	36.8	32.3	32.3	32.3
CUMULATIVE AMW																		
Expectd Generation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ACC Weather	0.0	2.2	4.3	6.7	9.0	11.4	13.7	16.1	14.2	12.4	10.5	8.7	6.9	5.5	4.1	2.7	1.4	0.0
ACC Industrial	0.0	4.1	8.2	11.4	14.5	17.6	20.8	23.8	27.1	30.5	24.7	18.9	13.0	10.4	7.8	5.2	2.6	-0.0
Efficient Shr Hds	0.0	0.0	3.2	6.3	9.4	11.2	12.9	14.7	16.4	18.1	18.1	18.1	18.1	18.1	18.1	18.1	18.1	18.1
Comm Retrofit	0.0	2.4	4.8	11.4	18.0	24.6	31.2	37.9	42.2	46.7	51.0	51.0	51.0	51.0	51.0	51.0	51.0	51.0
Voltage Support1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Voltage Support2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ENEFIT CALCULA IONS (Thousands 1990$)																		
Expectd Generation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ACC Weather	0	558	1249	1811	2524	3332	3950	4660	4171	3[illegible]91	3261	2606	1959	1759	1396	819	409	0
ACC Industrial	0	1035	2320	3011	3960	5037	5836	6731	7752	8846	7449	5523	3619	3255	2589	1508	768	-0
Efficient Shr Hds	0	0	893	1666	2559	3192	3634	4154	4687	[illegible]61	5468	5293	5034	5680	5987	5261	5261	5261
Comm Retrofit	0	595	1353	3017	4927	7036	8773	10709	12062	1[illegible]41	1530[illegible]	14894	14164	15981	16845	14805	14805	14805
Voltage Support1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Voltage Support2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yearly Total	0	2188	5814	9505	13969	18598	22193	26253	28672	31340	31563	28316	24776	26674	26816	22392	21243	20066

Bene PV ($1990)	$245,538

ALTERNATIVE STRATEGY 2: Voltage Support & Conservation
COST BENEFIT SUMMARY (million $1990)

Cum PV (Disc 90$)	0	700	2956	6578	9678	14885	21284	29139	38195	48544	58937	67425	73922	81738	89716	95167	100093	104510

Costs PV	-141.0
Benefits PV	245.5
Net PV	104.5

TABL 2.1-3
SH 1of2

PUGET SOUND AREA ELECTRIC REL[illegible]ILITY PLAN
04-Jun-91

ALTERNATIVE STRATEGY 3: Load Mgmt, Fuel Switching, Voltage Support & Conservation

Select 1=Y 0=N	Total Cap Cost '90$/kw	Yearly Var Cost '90$/yr/kw	Resource Life	Fixed Cost Escalat	Var Cost Escalat	Energy: Capacity Ratio	Power Produced % during Nov-Feb	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
1 Expectd Generation	0	0	0	0.0%	0.0%	0%	0.0%	0.0	60.0	60.0	60.0	60.0	60.0	20.0	20.0	20.0	0.0	20.0	0.0	0.0	0.0	0.0
1 ACC Weather	0	61.6	50	0.0%	0.0%	23%	70.0%	0.0	9.7	9.5	10.4	10.1	9.9	9.6	9.4	-8.2	-8.1	-8.0	-7.9	-7.7	-5.9	-5.7
1 ACC Industrial	0	56	20	0.0%	0.0%	98%	33.3%	0.0	4.2	4.2	3.2	3.2	3.2	3.2	3.1	3.4	3.4	-5.9	-5.9	-6.0	-2.7	-2.6
1 Lo Flow Shr Hds	335	0	7	0.0%	0.0%	44%	33.3%	0.0	0.0	7.1	6.9	6.7	3.8	3.6	3.5	3.5	3.4	0.0	0.0	0.0	0.0	0.0
1 Comm Retrofit	1420	0	30	0.7%	0.7%	64%	33.3%	0.0	3.7	3.8	10.3	10.4	10.3	10.3	10.4	6.8	6.9	6.8	0.0	0.0	0.0	0.0
1 Voltage Support1	10	0.5	35	0.5%	0.8%	0%	0.0%	0	300	300	0	0	0	0	0	0	0	0	0	0	0	0
0 Voltage Support2	40	1	35	0.5%	0.8%	0%	0.0%	0	0	0	0	1000	0	0	0	0	0	0	0	0	0	0
0 Line	130	1.2	40	1.2%	0.7%	1%	60.0%	0	0	0	0	0	2000	0	0	0	0	0	0	0.0	0.0	0.0
1 Water Htr Control	323.6	28.9	12	0.0%	0.0%	2%	33.3%	0	30.5	48.8	61.4	51.4	49.3	46.7	44.7	43.4	41.5	34	0	0	0	0
1 Time of Use Rates	249	48	20	0.0%	0.0%	0%	0.0%	0	18.5	24.3	3.6	23.1	5	4.8	4.8	5.2	5.2	0	0	0	0	0
1 Fuel Switching	660.5	31.2	50	0.0%	3.0%	28%	60.0%	0	20	22	35	34	35	36	35	22	24	24	0	0	0	0

* Discount Rate..... 3.0% *

OUTPUT

ALTERNATIVE STR EGY : Load Mgmt, Fuel Switching, Voltage Support & Conservation

	Lev Fix Cost 1990$/kw	Yrly Var Cost 1990$/kw	Incremental Megawatts * Year	1993	1994	1995	1996	1997	1998	1999	2000	001	200	2003	2004	2005	2006	2007	2008	2009	2010
* Expectd Generation	0.00	0.00	*	0.0	60.0	60.0	60.0	60.0	60.0	20.0	20.0	0.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 *
* ACC Weather	0.00	61.60	*	0.0	9.7	9.-	10.4	10.1	9.9	9.6	9.4	-8.2	-8.1	-8.0	-7.9	-7.7	-5.9	-5.7	-5.8	-5.6	-5.7 *
* ACC Industrial	0.00	56.00	*	0.0	4.2	4.2	3.2	3.2	3.2	3.2	3.1	3.4	3.4	-5.9	-5.9	-6.0	-2.7	-2.6	-2.7	-2.6	-2.7 *
* Lo Flow Shr Hds	53.77	0.00	*	0.0	0.0	7.1	6.9	6.7	3.8	3.6	3.5	3.5	3.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 *
* Comm Retrofit	72.45	0.00	*	0.0	3.7	3.8	10.3	10.4	10.3	10.3	10.4	6.8	6.9	6.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0 *
* Voltage Support1	0.47	0.50	*	0.0	300.0	300.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 *
*			*																		*
*			*																		*
* Water Htr Control	32.51	28.90	*	0.0	30.5	48.8	61.4	51.4	9.3	46.7	44.7	43.4	41.5	34.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 *
* Time of Use Rates	16.74	48.00	*	0.0	18.5	4.3	.6	23.1	5.0	4.8	4.8	5.2	5.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 *
* Fuel Switching	25.67	31.20	*	0.0	20.0	.0	5.0	34.0	3-.0	36.0	35.0	22.0	24.0	24.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0 *
		*	Puget Area Deficit	0	-200	-00	-600	-00	-900	-1000	-1200	-1 00	-1500	-1600 *							
		*	Cum Post-Actn L/R Bal	0.0	246.6	4 .3	537.1	6 .0	612.5	46.7	577.6	573.7	470.0	440.9 *							

COSTS INCURRED FROM TERNATIVE STRATEGY 3: Load Mgmt, l Switching, Vo (Thousands 1990$)

* Year	199	1994	1995	1996	1997	1998	1999	000	001	00	00	2004	2005	2006	2007	2008	2009	2010 *
* Expectd Generation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 *
* ACC Weather	0	598	1183	1823	446	3055	3647	4226	3721	3222	2729	2242	1768	1404	1053	696	351	0 *
* ACC Industrial	0	235	470	650	829	1008	1187	1361	1551	1742	1411	1081	745	594	448	297	151	-0 *
* Lo Flow Shr Hds	0	0	382	753	1113	1317	1511	1699	1887	2070	2070	2070	2070	2070	2070	2070	2070	2070 *
* Comm Retrofit	0	276	561	1339	130	2919	3714	4521	5053	5597	6136	6136	6136	6136	6136	6136	6136	6136 *
* Voltage Support1	0	297	598	600	603	605	608	610	613	616	618	621	624	626	629	632	635	637 *
*																		*
*																		*
* Water Htr Control	0	1873	4870	8640	11797	14 24	17692	20437	10	5651	27739	27739	27739	27739	27739	27739	27739	27739 *
* Time of Use Rates	0	1198	2771	4299	5794	6 18	6428	6739	7076	7412	7412	7412	7412	7412	7412	7412	7412	7412 *
* Fuel Switching	0	1216	2597	4845	7109	9 18	12081	14669	16457	18451	20817	20912	21318	21737	22168	22612	23069	23540 *
* Yearly Totals	0	5692	13431	2949	31820	39365	46868	54263	59461	64760	68633	68213	67812	67719	67656	67594	67563	67535 *

* Cost PV ($1990) $591,603 *

TABLE 2.1-3
SH 2 OF 2

POWER BENEFITS FROM ALTERNATIVE STRATEGY 3: Load Mgmt, Fuel Switching, Vo

MARGINAL COSTS	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Winter MC mill/kwh	31.5	30.1	33.7	31.7	32.7	34.2	33.6	33.8	34.2	34.8	36.1	35.0	33.3	37.5	39.5	34.8	34.8	34.8
Summer MC mill/kwh	29.3	28.0	31.4	29.5	30.4	31.8	31.3	31.5	31.8	32.3	33.6	32.5	30.9	34.9	36.8	32.3	32.3	32.3
CUMULATIVE AMW																		
Expectd Generation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ACC Weather	0.0	2.2	4.3	6.7	8.9	11.2	13.3	15.4	13.6	11.8	10.0	8.2	6.5	5.1	3.8	2.5	1.3	0.0
ACC Industrial	0.0	4.1	8.2	11.4	14.5	17.6	20.8	23.8	27.1	30.5	24.7	18.9	13.0	10.4	7.8	5.2	2.6	-0.0
Lo Flow Shr Hds	0.0	0.0	3.1	6.2	9.1	10.8	12.4	13.9	15.4	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9
Comm Retrofit	0.0	2.4	4.8	11.4	18.0	24.6	31.2	37.9	42.2	46.7	51.0	51.0	51.0	51.0	51.0	51.0	51.0	51.0
Voltage Support!	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Water Htr Control	0.0	0.6	1.6	2.8	3.8	4.8	5.8	6.7	7.5	8.4	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
Time of Use Rates	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Switching	0.0	5.6	11.8	21.6	31.1	40.9	51.0	60.8	66.9	73.6	80.4	80.4	80.4	80.4	80.4	80.4	80.4	80.4
BENEFIT CALCULATIONS (Thousands 1990$)																		
Expectd Generation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ACC Weather	0	563	1249	1811	2505	3273	3840	4477	3986	3510	3087	2457	1843	1650	1304	758	383	0
ACC Industrial	0	1035	2320	3011	3960	5037	5836	6731	7752	8846	7449	5523	3619	3255	2589	1508	768	-0
Lo Flow Shr Hds	0	0	880	1631	2487	3078	3473	3930	4410	4917	5110	4946	4704	5307	5594	4917	4917	4917
Comm Retrofit	0	595	1353	3017	4927	7036	8773	10709	12062	13541	15385	14894	14164	15981	16845	14805	14805	14805
Voltage Support!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Water Htr Control	0	153	447	745	1049	1379	1619	1881	2149	2425	2725	2638	2509	2830	2983	2622	2622	2622
Time of Use Rates	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fuel Switching	0	1435	3377	5821	8652	11904	14589	17501	19486	21804	24709	23934	22766	25666	27046	23794	23794	23794
Yearly Total	0	3782	9625	16036	23580	31708	38129	45229	49845	55043	58464	54393	49605	54690	56362	48403	47287	46137

Bene PV ($1990)	$463,524

ALTERNATIVE STRATEGY 3: Load Mgmt, Fuel Switching, Volta... upport & Conservation
COST BENEFIT SUMMARY (million $1990)

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Cum PV (Disc 90$)	0	-1697	-4980	-10769	-17469	-23514	-30211	-36934	-43880	-50695	-57620	-66757	-78444	-86562	-93395	-104668	-116231	-128079

Costs PV	-591.6
Benefits PV	463.5
Net PV	-128.1

TABLE 2.1-4
SH 1 OF 2

PUGET SOUND AREA ELECTRIC RELIABILITY PLAN
09-Jun-91

ALTERNATIVE STRATEGY 4: Peaking CTs, Voltage Support & Conservation

Select 1=Y 0=N	Total Cap Cost '90$/kw	Yearly Var Cost '90$/yr/kw	Resource Life	Fixed Cost Escalat	Var Cost Escalat	Energy: Capacity Ratio	Power Produced % during Nov-Feb	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
								INCREMENTAL MEGAWATTS														
1 Expectd Generation	0	0	0	0.0%	0.0%	0%	0.0%	0.0	60.0	60.0	60.0	60.0	60.0	20.0	20.0	20.0	20.0	20.0	0.0	0.0	0.0	0.0
1 ACC Weather	0	61.6	50	0.0%	0.0%	23%	70.0%	0.0	9.6	9.6	10.4	10.4	10.5	10.4	10.5	-8.2	-8.2	-8.2	-8.2	-8.1	-6.2	-6.0
1 ACC Industrial	0	56	20	0.0%	0.0%	98%	33.3%	0.0	4.2	4.2	3.2	3.2	3.2	3.2	3.1	3.4	3.4	-5.9	-5.9	-6.0	-2.7	-2.6
1 Efficient Shr Hds	335	0	7	0.0%	0.0%	44%	33.3%	0.0	0.0	7.2	7.1	7.0	4.1	4.0	4.0	3.9	3.9	0.0	0.0	0.0	0.0	0.0
1 Comm Retrofit	1420	0	30	0.7%	0.7%	64%	33.3%	0.0	3.7	3.8	10.3	10.4	10.3	10.3	10.4	6.8	6.9	6.8	0.0	0.0	0.0	0.0
1 Voltage Support1	10	0.5	35	0.5%	0.8%	0%	0.0%	0	300	300	0	0	0	0	0	0	0	0	0	0	0	0
0 Voltage Support2	40	1	35	0.5%	0.8%	0%	0.0%	0	0	0	0	1000	0	0	0	0	0	0	0	0	0	0
0 Line	130	1.2	40	1.2%	0.7%	1%	60.0%	0	0	0	0	0	2000	0	0	0	0	0	0	0.0	0.0	0.0
0 Water Htr Control	323.6	28.9	12	0.0%	0.0%	2%	33.3%	0	40.1	39.2	43.4	43.5	42.4	43.6	43.4	22.8	21.8	22.9	0	0	0	0
0 Time of Use Rates	249	48	20	0.0%	0.0%	0%	0.0%	0	18.5	24.3	23.6	23.1	5	4.8	4.8	5.2	5.2	0	0	0	0	0
1 Peaking CTs	505	15.65	30	1.2%	2.3%	5%	60.0%	0	0	0	0	0	0	0	140	70	140	70	0	0	0	0

Discount Rate..... 3.0%

OUTPUT

ALTERNATIVE STRATEGY 4: Peaking CTs, Voltage Support & Conservation

	Lev Fix Cost 1990$/kw	Yrly Var Cost 1990$/kw	Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
			Incremental Megawatts																		
Expectd Generation	0.00	0.00		0.0	60.0	60.0	60.0	60.0	60.0	20.0	20.0	20.0	20.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ACC Weather	0.00	61.60		0.0	9.6	9.6	10.4	10.4	10.5	10.4	10.5	-8.2	-8.2	-8.2	-8.2	-8.1	-6.2	-6.0	-6.1	-6.1	-6.1
ACC Industrial	0.00	56.00		0.0	4.2	4.2	3.2	3.2	3.2	3.2	3.1	3.4	3.4	-5.9	-5.9	-6.0	-2.7	-2.6	-2.7	-2.6	-2.7
Efficient Shr Hds	53.77	0.00		0.0	0.0	7.2	7.1	7.0	4.1	4.0	4.0	3.9	3.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Comm Retrofit	72.45	0.00		0.0	3.7	3.8	10.3	10.4	10.3	10.3	10.4	6.8	6.9	6.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Voltage Support1	0.47	0.50		0.0	300.0	300.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
																			0.0	0.0	0.0
Peaking CTs	25.76	15.65		0.0	0.0	0.0	0.0	0.0	0.0	0.0	140.0	70.0	140.0	70.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			Puget Area Deficit	0	-200	-500	-600	-700	-900	-1000	-1200	-1300	-1500	-1600							
			Cum Post-Actn L/R Bal	0.0	177.5	262.3	253.3	244.3	132.4	80.3	68.3	64.2	30.2	12.9							

COSTS INCURRED FROM ALTERNATIVE STRATEGY 4: Peaking CTs, Voltage Support (Thousands 1990$)

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Expectd Generation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ACC Weather	0	591	1183	1823	2464	3111	3751	4398	3893	3388	2883	2378	1879	1497	1127	752	376	0
ACC Industrial	0	235	470	650	829	1008	1187	1361	1551	1742	1411	1081	745	594	448	297	151	-0
Efficient Shr Hds	0	0	387	769	1145	1366	1581	1796	2006	2215	2215	2215	2215	2215	2215	2215	2215	2215
Comm Retrofit	0	276	561	1339	2130	2919	3714	4521	5053	5597	6136	6136	6136	6136	6136	6136	6136	6136
Voltage Support1	0	297	598	600	603	605	608	610	613	616	618	621	624	626	629	632	635	637
Peaking CTs	0	0	0	0	0	0	0	6814	10341	17479	21222	21426	21633	21846	22064	22286	22514	22747
Yearly Totals	0	1399	3199	5181	7171	9009	10841	19501	23497	31036	34486	33857	33232	32915	32620	32318	32027	31736

Cost PV ($1990) $245,081

TABLE 2.1-4
SH 2 OF 2

POWER BENEFITS FROM ALTERNATIVE STR-TEGY 4: Peaking CTs, Voltage Support

MARGINAL COSTS	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Winter MC mill/kwh	31.5	30.1	33.7	31.7	32.7	34.2	33.6	33.8	34.2	34.8	36.1	35.0	33.3	37.5	39.5	34.8	34.8	34.8
Summer MC mill/kwh	29.3	28.0	31.4	29.5	30.4	31.8	31.3	31.5	31.8	32.3	33.6	32.5	30.9	34.9	36.8	32.3	32.3	32.3
CUMULATIVE AMW																		
Expectd Generation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ACC Weather	0.0	2.2	4.3	6.7	9.0	11.4	13.7	16.1	14.2	12.4	10.5	8.7	6.9	5.5	4.1	2.7	1.4	0.0
ACC Industrial	0.0	4.1	8.2	11.4	14.5	17.6	20.8	23.8	27.1	30.5	24.7	18.9	13.0	10.4	7.8	5.2	2.6	-0.0
Efficient Shr Hds	0.0	0.0	3.2	6.3	9.4	11.2	12.9	14.7	16.4	18.1	18.1	18.1	18.1	18.1	18.1	18.1	18.1	18.1
Comm Retrofit	0.0	2.4	4.8	11.4	18.0	24.6	31.2	37.9	42.2	46.7	51.0	51.0	51.0	51.0	51.0	51.0	51.0	51.0
Voltage Support	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Peaking CTs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.0	10.5	17.5	21.0	21.0	21.0	21.0	21.0	21.0	21.0	21.0
BENEFIT C--UL-TIONS (Thousands 1990$)																		
Expectd Generation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ACC Weather	0	558	1249	1811	2524	3332	3950	4660	4171	3691	3261	2606	1959	1 59	1396	819	409	0
ACC Industrial	0	1035	2320	3011	3960	5037	5836	6731	7752	8846	449	5523	3619	3 55	2589	1508	768	-0
Efficient Shr Hds	0	0	893	1666	2559	3192	3634	4154	4687	5261	5468	5293	5034	5 80	5987	5261	5261	5261
Comm Retrofit	0	595	1353	3017	4927	7036	8773	10709	12062	13541	15385	14894	14164	15981	16845	14805	14805	14805
Voltage Support	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peaking CTs	0	0	0	0	0	0	0	2016	3057	5182	6457	6255	5949	6707	7068	6218	6218	6218
Yearly Total	0	2188	5014	9505	13969	18598	22193	28270	31729	36522	38020	34570	30725	33381	33884	28610	27461	26284

Bene PV ($1990)	$284,329

ALTERNATIVE STRATEGY 4: Peaking CTs, Voltage Support & Conservation
COST BENEFIT SUMMARY (million $1990)

Cum PV (Disc 90$)	0	700	29	6578	12105	19675	28375	34900	40876	44723	47129	47601	45992	46283	47048	44870	42266	39248

Costs PV	-245.1
Benefits PV	284.3
Net PV	39.2

TABLE 2.2-1
SH 1 OF 2

PUGET SOUND AREA ELECTRIC RELIABILITY PLAN   Low Case
08-Jun-91

ALTERNATIVE STRATEGY 1: Line, Voltage Support & Conservation

Select I=Y O=N	Total Cap Cost '90$/kw	Yearly Var Cost '90$/yr/kw	Resource Life	Fixed Cost Escalat	Var Cost Escalat	Energy: Capacity Ratio	Power Produced % during Nov-Feb	INCREMENTAL MEGAWATTS 1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
I Expectd Generation	0	0	0	0.0%	0.0%	0%	0.0%	0.0	60.0	60.0	60.0	60.0	60.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I Acc Weather	0	61.6	50	0.0%	0.0%	23%	0.0%	0.0	9.6	9.6	10.4	10.4	10.5	0.0	0.0	0.0	0.0	-3.7	-8.2	-8.1	-6.2	-6.0
I Acc Industrial	0	56	20	0.0%	0.0%	98%	[illegible]3%	0.0	3.8	4.0	2.6	2.6	2.7	0.0	0.0	0.0	0.0	0.0	0.0	-5.1	-2.1	-2.1
I Efficient Shr Hds	335-	0	7	0.0%	0.0%	44%	[illegible]3%	0.0	0.0	7.2	7.1	7.0	4.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I Comm Retrofit	1420	0	30	0.7%	0.7%	64%	3.3%	0.0	3.7	3.8	10.3	10.4	10.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
I Voltage Support1	10	0.5	35	0.5%	0.8%	0%	0.0%	0	300	300	0	0	0	0	0	0	0	0	0	0	0	0
O Voltage Support2	40	1	35	0.5%	0.8%	0%	0.0%	0	0	0	0	1000	0	0	0	0	0	0	0	0	0	0
I Line	130	1.2	40	1.2%	0.7%	1%	60.0%	0	0	0	0	0	2000	0	0	0	0	0	0	0.0	0.0	0.0
O Water Htr control	323.6	28.9	12	0.0%	0.0%	2%	3.3%	0	40.1	39.2	43.4	43.5	42.4	4.6	43.4	22.8	21.8	22.9	0	0	0	0
O Time of Use Rates	249	48	20	0.0%	0.0%	0%	0.0%	0	18.5	24.3	23.6	23.1	5	4.8	4.8	5.2	5.2	0	0	0	0	0
O Peaking CTs	505	15.65	30	1.2%	2.3%	5%	60.0%	0	0	0	0	0	0	0	140	0	0	0	0	0	0	0

* Discount Rate..... 3.0% *

OUTPUT

ALTERNATIVE STRATEGY 1: Line, Voltage Support & Conservation

	Lev Fix Cost 1990$/kw	Yrly Var Cost 1990$/kw	Incremental Megawatts Year 1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Expectd Generation	0.00	0.00	0.0	60.0	60.0	60.0	60.0	60.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Acc Weather	0.00	61.60	0.0	9.6	9.6	10.4	10.4	10.5	0.0	0.0	0.0	0.0	-3.7	-8.2	-8.1	-6.2	-6.0	-6.1	-6.1	-6.1
Acc Industrial	0.00	56.00	0.0	3.8	4.0	2.6	2.6	2.7	0.0	0.0	0.0	0.0	0.0	0.0	-5.1	-2.1	-2.1	-2.1	-2.2	-2.2
Efficient Shr Hds	53.77	0.00	0.0	0.0	7.2	7.1	7.0	4.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Comm Retrofit	72.45	0.00	0.0	3.7	3.8	10.3	10.4	10.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Voltage Support1	0.47	0.50	0.0	300.0	300.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Line	5.62	1.20	0.0	0.0	0.0	0.0	0.0	2000.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Puget Area Deficit	0	-100	200	-200	-200	-300	-300	-300	-300	-300	-400
Cum Post-Actn L/R Bal	0.0	277.1	561.7	652.1	742.5	2730.1	2730.1	2730.1	2730.1	2730.1	2626.4

COSTS INCURRED FROM ALTERNATIVE STRATEGY 1: Line, Voltage Support & Cons   (Thousands 1990$)

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Expectd Generation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acc Weather	0	591	1183	1823	2464	3111	3111	3111	3111	3111	2883	2378	1879	1497	1127	752	376	0
Acc Industrial	0	213	437	582	728	879	879	879	879	879	879	879	594	476	358	241	118	-6
Efficient Shr Hds	0	0	387	769	1145	1366	1366	1366	1366	1366	1366	1366	1366	1366	1366	1366	1366	1366
Comm Retrofit	0	276	561	1339	2130	2919	2919	2919	2919	2919	2919	2919	2919	2919	2919	2919	2919	2919
Voltage Support1	0	297	598	600	603	605	608	610	613	616	618	621	624	626	629	632	635	637
Line	0	0	0	0	0	14912	14930	14948	14966	14984	15002	15021	15039	[illegible]	1[illegible]077	150[illegible]	15115	15134
Yearly Totals	0	1377	3165	5114	7070	23792	23813	23833	23854	23874	23667	23183	22420	21942	21476	2100[illegible]	20[illegible]	20050

* Cost PV ($1990) $210.376 *

TABLE 2.2-1
SH 2 of 2

POWER BENEFITS FROM ALTERNATIVE STRATEGY 1: Line, Voltage Support & ConsLow Case

MARGINAL COSTS	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	[illegible]0[illegible]	2010
Winter MC mill/kwh	31.5	15.2	17.0	16.8	16.4	17.3	16.2	18.7	17.9	18.1	19.2	19.8	20.4	19.5	21.0	20.7	[illegible]	[illegible]0.7
Summer MC mill/kwh	29.3	14.2	15.8	15.6	15.2	16.1	15.1	17.4	16.7	16.8	17.8	18.4	19.0	18.2	19.5	19.2	1[illegible].2	1[illegible].2

CUMULATIVE AMW	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	[illegible]0[illegible]	2010
Expectd Generation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Acc Weather	0.0	2.2	4.3	6.7	9.0	11.4	11.4	11.4	11.4	11.4	10.5	8.7	6.9	5.5	4.1	2.7	1.4	0.0
Acc Industrial	0.0	3.7	7.6	10.2	12.7	15.4	15.4	15.4	15.4	15.4	15.4	15.4	10.4	8.3	6.3	4.2	2.1	0.[illegible]
Efficient Shr Hds	0.0	0.0	3.2	6.3	9.4	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2
Comm Retrofit	0.0	2.4	4.8	11.4	18.0	24.6	24.6	24.6	24.6	24.6	24.6	24.6	2[illegible].6	24.6	24.6	2[illegible].6	24.6	24.6
Voltage Support	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.[illegible]	0.0	0.0
Line	0.0	0.0	0.0	0.0	0.0	24.6	24.6	24.6	24.6	2[illegible].6	24.6	24.6	24.6	24.6	2[illegible].6	2[illegible].6	2[illegible].6	2[illegible].6

BENEFIT CALCULATIONS (Thousands 1990$)	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	[illegible]0[illegible]	2010
Expectd Generation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acc Weather	0	282	630	959	1265	1686	1580	1822	1746	1763	1732	1474	1201	915	741	487	243	0
Acc Industrial	0	474	1085	1428	1741	2224	2085	2404	2305	2323	2462	2543	1771	1360	1099	727	355	-17
Efficient Shr Hds	0	0	450	882	1281	1615	1514	1746	1674	1687	1788	1847	1906	1824	1958	1929	1929	1[illegible]29
Comm Retrofit	0	301	681	1597	2466	3561	3338	3849	3691	3720	3943	4072	4202	4022	4317	4252	4252	[illegible]52
Voltage Support	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Line	0	0	0	0	0	3625	3396	3918	3754	3788	401[illegible]	4146	4275	4090	4396	[illegible]331	[illegible]331	[illegible]331
Yearly Total	0	1057	2845	4866	6753	12711	11913	13739	13169	13281	13942	14083	13355	12211	12511	11726	11111	1[illegible]5

Bene PV ($1990) $122.[illegible]67

ALTERNATIVE STRATEGY 1: Line, Voltage Support & Conservation
COST BENEFIT SUMMARY (million $1990)

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	[illegible]0[illegible]	2010
Cum PV (Disc 90$)	0	-284	-[illegible]60	-767	-1025	[illegible]	-18893	-26404	[illegible]34123	-[illegible]1553	-481[illegible]5	-54192	-60010	-66074	-[illegible]1498	-[illegible]69[illegible]8	-[illegible]2319	-876[illegible]

Costs PV	-210.4
Benefits PV	122.8
Net PV	-87.6

BLE 2.2-2
SH 1oF 2

PUGET SOUND AREA ELECTRIC RELIABILITY PLAN   Low Case

08-Jun-91

ALTERNATIVE STRATEGY 2: Volta - Support & Conservation

Select 1=Y 0=N	Total Cap Cost '90$/kw	Yearly Var Cost '90$/yr/kw	Resource Life	Fixed Cost vs Escalat	Var Cost Escalat	Energy: Capacity Ratio	Power Produced % during Nov-Feb	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
								INCREMENTAL MEGAWATTS														
1 Expectd Generation	0	0	0	0.0%	0.0%	0%	0.0%	0.0	60.0	60.0	60.0	60.0	60.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1 ACC Weather	0	61.6	50	0.0%	0.0%	23%	70.0%	0.0	9.6	9.6	10.4	10.4	10.5	0.0	0.0	0.0	0.0	-3.7	-8.2	-8.1	-6.2	-6.0
1 ACC Industrial	0	56	20	0.0%	0.0%	98%	33.3%	0.0	3.8	4.0	2.6	2.6	2.7	0.0	0.0	0.0	0.0	0.0	0.0	-5.1	-2.1	-2.1
1 Efficient Shr Hds	335	0	7	0.0%	0.0%	44%	33.3%	0.0	0.0	7.2	7.1	7.0	4.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1 Comm Retrofit	1420	0	30	0.7%	0.7%	64%	33.3%	0.0	3.7	3.8	10.3	10.4	10.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1 Voltage Support1	10	0.5	35	0.5%	0.8%	0%	0.0%	0	300	300	0	0	0	0	0	0	0	0	0	0	0	0
1 Voltage Support2	40	1	35	0.5%	0.8%	0%	0.0%	0	0	0	0	1000	0	0	0	0	0	0	0	0	0	0
0 Line	130	1.2	40	1.2%	0.7%	1%	60.0%	0	0	0	0	0	2000	0	0	0	0	0	0	0.0	0.0	0.0
0 Water Htr Control	323.6	28.9	12	0.0%	0.0%	2%	33.3%	0	40.1	39.2	43.4	43.5	42.4	43.6	43.4	22.8	21.8	22.9	0	0	0	0
0 Time of Use Rates	249	48	20	0.0%	0.0%	0%	0.0%	0	18.5	24.3	23.6	23.1	5	4.8	4.8	5.2	5.2	0	0	0	0	0
0 Peaking CTs	505	15.65	30	1.2%	2.3%	5%	60.0%	0	0	0	0	0	0	0	140	0	0	0	0	0	0	0

* Discount Rate..... 3.0% *

OUTPUT

ALTERNATIVE STRATEGY 2: Voltage Support & Conservation

	Lev Fix Cost 1990$/kw	Yrly Var Cost 1990$/kw	Year: 1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
			Incremental Megawatts																	
Expectd Generation	0.00	0.00	0.0	60.0	60.0	60.0	60.0	60.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ACC Weather	0.00	61.60	0.0	9.6	9.6	10.4	10.4	10.5	0.0	0.0	0.0	0.0	-3.7	-8.2	[illegible]	[illegible]	-6.0	-6.1	-6.1	-6.1
ACC Industrial	0.00	56.00	0.0	3.8	4.0	2.6	2.6	2.7	0.0	0.0	0.0	0.0	0.0	0.0	-5.1	-2.1	-2.1	-2.1	-2.2	-2.2
Efficient Shr Hds	53.77	0.00	0.0	0.0	7.2	7.1	7.0	4.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Comm Retrofit	72.45	0.00	0.0	3.7	3.8	10.3	10.4	10.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Voltage Support1	0.47	0.50	0.0	300.0	300.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Voltage Support2	1.86	1.00	0.0	0.0	0.0	0.0	1000.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
																		0.0	0.0	0.0

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Puget Area Deficit	0	-100	-200	-200	-200	-300	-300	-300	-300	-300	-400
Cum Post-Actn L/R Bal	0.0	277.1	561.7	652.1	1742.5	1730.1	1730.1	1730.1	1730.1	1730.1	1626.4

COSTS INCURRED FROM A TERNATIVE STRATEGY 2: Voltage Support & Conservati (Thousands 1990$)

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Expectd Generation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ACC Weather	0	591	1183	1823	2464	3111	3111	3111	3111	3111	2883	2378	1879	1497	1127	752	376	0
ACC Industrial	0	213	437	582	728	879	879	879	879	879	879	879	594	476	358	241	118	-6
Efficient Shr Hds	0	0	387	769	1145	1366	1366	1366	1366	1366	1366	1366	1366	1366	1366	1366	1366	1366
Comm Retrofit	0	276	561	1339	2130	2919	2919	2919	2919	2919	2919	2919	2919	2919	2919	2919	2919	2919
Voltage Support1	0	297	598	600	603	605	608	610	613	616	618	621	624	626	629	632	635	637
Voltage Support2	0	0	0	0	2985	2994	3002	3011	3019	3028	3037	3046	3055	3064	3073	3082	3091	3100
Yearly Totals	0	1377	3165	5114	10055	11874	11885	11896	11907	11918	11702	11208	10435	9948	9472	8991	85[illegible]	8017

* Cost PV ($1990) $109,283 *

TABLE 2.2-2
SH 2 OF 2

POWER BENEFITS FROM ALTERNATIVE STRATEGY 2: Voltage Support & ConservatiLow Case

MARGINAL COSTS	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Winter MC mill/kwh	31.5	15.2	17.0	16.8	16.4	17.3	16.2	18.7	17.9	18.1	19.2	19.8	20.4	19.5	21.0	20.7	20.7	20.7
Summer MC mill/kwh	29.3	14.2	15.8	15.6	15.2	16.1	15.1	17.4	16.7	16.8	17.8	18.4	19.0	18.2	19.5	19.2	19.2	19.2
CUMULATIVE AMW																		
Expectd Generation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ACC Weather	0.0	2.2	4.3	6.7	9.0	11.4	11.4	11.4	11.4	11.4	10.5	8.7	6.9	5.5	4.1	2.7	1.4	0.0
ACC Industrial	0.0	3.7	7.6	10.2	12.7	15.4	15.4	15.4	15.4	15.4	15.4	15.4	10.4	8.3	6.3	4.2	2.1	0.0
Efficient Shr Hds	0.0	0.0	3.2	6.3	9.4	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2
Comm Retrofit	0.0	2.4	4.8	11.4	18.0	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6	2 .6	24.6	24.6	24.6
Voltage Support1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Voltage Support2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BENEFIT CALCULATIONS (Thousands 1990$)																		
Expectd Generation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ACC Weather	0	282	630	959	1265	1686	1580	1822	1746	1763	1732	1474	1201	915	741	487	243	0
CC Industrial	0	474	1085	1428	1741	2224	2085	2404	2305	2323	2462	2543	1771	1360	1099	727	355	0
fficient Shr Hds	0	0	450	882	1281	1615	1514	1746	1674	1687	1788	1847	1906	1824	1958	1929	1929	1929
Comm Retrofit	0	301	681	1597	2466	3561	3338	3849	3691	3720	3943	4072	4202	4022	4317	4252	4252	4252
Voltage Support1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Voltage Support2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yearly Total	0	1057	2845	4866	6753	9087	8517	9821	9416	9492	9925	9936	9080	8121	8115	7395	6779	6181
Bene PV ($1990)	$88,186																	

ALTERNATIVE STRATEGY 2: Voltage Support & Conservation
COST BENEFIT SUMMARY (million $1990)

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Cum PV (Disc 90$)	0		-560	-767	-3453	-5653	-8234	-9778	-11978	-13279	14489	-15330	-16200	-17339	-181 0	-19097	-20081	-21098

Costs PV	-109.3
Benefits PV	88.2
Net PV	-21.1

TABLE 2.2-3
SH 1 OF 2

PUGET SOUND AREA ELECTRIC RELIABILITY PLAN   Low Case
08-Jun-91
ALTERNATIVE STRATEGY 3: Load management, Fuel Switching, Voltage Support & ConservPower

Select 1=Y 0=N	Total Cap Cost '90$/kw	Yearly Var Cost '90$/yr/kw	Resource Life	Fixed Cost Escalat	Var Cost Escalat	Energy: Capacity Ratio	Produced % during Nov-Feb	INCREMENTAL MEGAWATTS 1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
1 Expectd Generation	0	0	0	0.0%	0.0%	0%	0.0%	0.0	60.0	60.0	60.0	60.0	60.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1 ACC Weather	0	61.6	50	0.0%	0.0%	23%	70.0%	0.0	9.6	9.6	10.4	10.4	10.5	0.0	0.0	0.0	0.0	-3.7	-8.2	-8.1	-6.2	-6.0
1 ACC Industrial	0	56	20	0.0%	0.0%	98%	33.3%	0.0	3.8	4.0	2.6	2.6	2.7	0.0	0.0	0.0	0.0	0.0	0.0	-5.1	-2.1	-2.1
1 Efficient Shr Hds	335	0	7	0.0%	0.0%	44%	33.3%	0.0	0.0	7.2	7.1	7.0	4.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1 Comm Retrofit	1420	0	30	0.7%	0.7%	64%	33.3%	0.0	3.	3.8	10.3	10.4	10.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1 Voltage Support1	10	0.5	35	0.5%	0.8%	0%	0.0%	0	300	300	0	0	0	0	0	0	0	0	0	0	0	0
0 Voltage Support2	40	1	35	0.5%	0.8%	0%	0.0%	0	0	0	0	1000	0	0	0	0	0	0	0	0	0	0
0 Line	130	1.2	40	1.2%	0.7%	1%	60.0%	0	0	0	0	0	2000	0	0	0	0	0	0	0.0	0.0	0.0
1 Water Htr Control	323.6	28.9	12	0.0%	0.0%	2%	33.3%	0	23.9	0.8	52	46.8	44.6	0	0	0	0	0	0	0	0	0
1 Time of Use Rates	249	48	20	0.0%	0.0%	0%	0.0%	0	17.9	23.1	21.7	20.5	3.3	0	0	0	0	0	0	0	0	0
1 Fuel Switching	642.9	31.2	50	0.0%	3.0%	28%	60.0%	0	20.3	21.2	33.5	33.4	35.5	0	0	0	0	0	0	0	0	0

* Discount Rate..... 3.0% *

OUTPUT

ALTERNATIVE STRATEGY 3: Load management, Fuel Switching, Voltage Support & Conservation

	Lev Fix Cost 1990$/kw	Yrly Var Cost 1990$/kw	Incremental Megawatts * Year 1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
* Expectd Generation	0.00	0.00	0.0	60.0	60.0	60.0	60.0	60.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
* ACC Weather	0.00	61.60	0.0	9.6	9.6	10.4	10.4	10.5	0.0	0.0	0.0	0.0	-3.7	-8.2	-8.1	-6.2	-6.0	-6.1	-6.1	-6.1
* ACC Industrial	0.00	56.00	0.0	3.8	4.0	2.6	2.6	2.7	0.0	0.0	0.0	0.0	0.0	0.0	-5.1	-2.1	-2.1	-2.1	-2.2	-2.2
* Efficient Shr Hds	53.77	0.00	0.0	0.0	7.2	7.1	7.0	4.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
* Comm Retrofit	72.45	0.00	0.0	3.7	3.8	10.3	10.4	10.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
* Voltage Support1	0.47	0.50	0.0	300.0	300.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*																				
*																		0.0	0.0	0.0
* Water Htr Control	32.51	28.90	0.0	23.9	0.8	52.0	46.8	4.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
* Time of Use Rates	16.74	48.00	0.0	17.9	23.1	21.7	20.5	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
* Fuel Switching	24.99	31.20	0.0	20.3	21.2	33.5	33.4	3-.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
* Puget Area Deficit			0	-100	-200	-200	-200	-300	-300	-300	-300	-300	-400							
* Cum Post-Actn L/R Bal			0.0	3 9.2	708.9	906.5	1097.6	1168.6	1168.6	1168.6	1168.6	11 8.6	1064.9							

COSTS INCURRED FROM ALTERNATIVE STRATEGY 3: Load management, Fuel Switch   (Thousands 1990$)

* Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
* Expectd Generation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* ACC Weather	0	591	1183	1823	2464	3111	3111	3111	3111	3111	2883	2378	1879	1497	1127	752	376	0
* ACC Industrial	0	213	437	582	728	879	879	879	879	879	879	879	594	476	358	241	118	-6
* Efficient Shr Hds	0	0	387	769	1145	1366	1366	1366	1366	1366	1366	1366	1366	1366	1366	1366	1366	1366
* Comm Retrofit	0	276	561	1339	2130	2919	2919	2919	2919	2919	2919	2919	2919	2919	2919	2919	2919	2919
* Voltage Support1	0	297	598	600	603	605	608	610	613	616	618	621	624	626	629	632	635	637
*																		
*																		
* Water Htr Control	0	1468	3973	7166	10040	12779	12779	12779	12779	12779	12779	12779	12779	12779	12779	12779	12779	12779
* Time of U e Rates	0	1159	2654	4059	5386	5600	5600	5600	5600	5600	5600	5600	5600	5600	5600	5600	5600	560-
* Fuel Swit hing	0	1220	2538	668	6868	9283	9454	9629	9810	9997	10189	10387	10590	10800	11016	11239	11468	1170-
* Yearly Totals	0	5224	12331	21007	29365	365 2	36715	36894	37077	37266	37233	36928	36350	36063	35795	35527	35260	3500-

* Cost PV ($1990) $371,693 *

TABLE 2.2-3
SH 2 OF 2

POWER BENEFITS FROM ALTERNATIVE STRATEGY 3: Load management, Fuel SwitchLow Case

MARGINAL COSTS	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Winter MC mill/kwh	31.5	15.2	17.0	16.8	16.4	17.3	16.2	18.7	17.9	18.1	19.2	19.8	20.4	19.5	21.0	20.7	20.7	20.7
Summer MC mill/kwh	29.3	14.2	15.8	15.6	15.2	16.1	15.1	17.4	16.7	16.8	17.8	18.4	19.0	18.2	19.5	19.2	19.2	19.2
CUMULATIVE AMW																		
Expectd Generation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Acc Weather	0.0	2.2	4.3	6.7	9.0	11.4	11.4	11.4	11.4	11.4	10.5	8.7	6.9	5.5	4.1	2.7	1.4	0.0
Acc Industrial	0.0	3.7	7.6	10.2	12.7	15.4	15.4	15.4	15.4	15.4	15.4	15.4	10.4	8.3	6.3	4.2	2.1	0.0
Efficient Shr Hds	0.0	0.0	3.2	6.3	9.4	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2
Comm Retrofit	0.0	2.4	4.8	11.4	18.0	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6
Voltage Support1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Water Htr Control	0.0	0.5	1.3	2.3	3.3	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
Time of Use Rates	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Switching	0.0	5.7	11.7	21.2	30.6	40.6	40.6	40.6	40.6	40.6	40.6	40.6	40.6	40.6	40.6	40.6	40.6	40.6
BENEFIT CALCULATIONS (Thousands 1990$)																		
Expectd Generation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acc Weather	0	282	630	959	1265	1686	1580	1822	1746	1763	1732	1474	1201	915	741	487	243	0
Acc Industrial	0	474	1085	1428	1741	2224	2085	2404	2305	2323	2462	2543	1771	1360	1099	727	355	0
Efficient Shr Hds	0	0	450	882	1281	1615	1514	1746	1674	1687	1788	1847	1906	1824	1958	1929	1929	1929
Comm Retrofit	0	301	681	1597	2466	3561	3338	3849	3691	3720	3943	4072	4202	4022	4317	4252	4252	4252
Voltage Support1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Water Htr Control	0	61	184	327	447	602	564	650	623	628	666	688	710	679	729	718	718	718
Time of Use Rates	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fuel Switching	0	742	1694	3024	4263	5979	5602	6463	6192	6249	6626	6839	7053	6747	7252	7145	7145	7145
Yearly Total	0	1861	4722	8217	11463	15667	14683	16934	16231	16370	17217	17464	16842	15547	16096	15258	14643	14044

Bene PV ($1990) $159.953

ALTERNATIVE STRATEGY 3: Load management, Fuel Switching, Voltage Support & Conservation
COST BENEFIT SUMMARY (million $1990)

Cum PV (Disc 90$)	0	-2988	-9551	-20263	-34819	-51297	-68183	-83035	-98095	-112751	-126381	-139249	-151770	-164555	-176474	-188379	-200137	-211740

Costs PV	-371.7
Benefits PV	160.0
Net PV	-211.7

TABLE 2.2-4
SH 1 OF 2

PUGET SOUND AREA ELECTRIC RE- I- - ILITY PLAN   Low Case
08-Jun-91

ALTERNATIVE STRATEGY 4: Peaking CT Voltage Support & Conservation

Select 1=Y 0=N	Total Cap Cost '90$/ w	Yearly Var Cost '90$/yr/kw	Resource Life	Fixed Cost Escalat	Var Cost Escalat	Energy: Capacity Ratio	Power Produced % during Nov-Feb	INCREMENTAL MEGAWATTS 1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
1 Expectd Generation	0	0	0	0.0%	0.0%	0%	0.0%	0.0	60.0	60.0	60.0	60.0	60.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1 ACC Weather	0	61.6	50	0.0%	0.0%	23%	70.0%	0.0	9.6	9.6	10.4	10.4	10.5	0.0	0.0	0.0	0.0	-3.7	-8.2	-.1	-6.2	-6.0
1 ACC Industrial	0	56	20	0.0%	0.0%	98%	33.3%	0.0	3.8	4.0	2.6	2.6	2.7	0.0	0.0	0.0	0.0	0.0	0.0	-5.1	-2.1	-2.1
1 Efficient Shr Hds	335	0	7	0.0%	0.0%	44%	33.3%	0.0	0.0	7.2	7.1	7.0	4.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1 Comm Retrofit	1420	0	30	0.7%	0.7%	64%	33.3%	0.0	3.7	3.8	10.3	10.4	10.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1 Voltage Support1	10	0.5	35	0.5%	0.8%	0%	0.0%	0	300	300	0	0	0	0	0	0	0	0	0	0	0	0
0 Voltage Support2	40	1	35	0.5%	0.8%	0%	0.0%	0	0	0	0	1000	0	0	0	0	0	0	0	0	0	0
0 Line	130	1.	40	1.2%	0.7%	1%	60.0%	0	0	0	0	0	2000	0	0	0	0	0	0	0.0	0.0	0.0
0 Water Htr Control	323.6	28.9	12	0.0%	0.0%	2%	33.3%	0	40.1	39.2	43.4	43.5	42.4	3.6	43.4	22.8	21.8	22.9	0	0	0	0
0 Time of Use Rates	249	48	20	0.0%	0.0%	0%	0.0%	0	18.5	24.3	23.6	23.1	5	4.8	4.8	5.2	5.2	0	0	0	0	0
1 Peaking CTs	505	15.65	30	1.2%	2.3%	5%	60.0%	0	0	0	0	0	0	0	140	0	0	0	0	0	0	0

* Discount Rate..... 3.0% *

OUTPUT

ALTERNATIVE STRATEGY 4: Peaking CT Voltage Support & Conservation

	Lev Fix Cost 1990$/kw	Yrly Var Cost 1990$/kw	Incremental megawatts * Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
* Expectd Generation	0.00	0.00	*	0.0	60.0	60.0	60.0	60.0	60.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
* ACC Weather	0.00	61.60	*	0.0	9.6	9.6	10.4	10.4	10.5	0.0	0.0	0.0	0.0	-3.7	-8.2	-8.1	-6.2	-6.0	-6.1	-6.1	-6.1
* ACC Industrial	0.00	56.00	*	0.0	3.8	4.0	2.6	2.6	2.7	0.0	0.0	0.0	0.0	0.0	0.0	-5.1	-2.1	-2.1	-2.1	-2.2	-2.2
* Efficient Shr Hds	53.77	0.00	*	0.0	0.0	7.2	7.1	7.0	4.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
* Comm Retrofit	72.45	0.00	*	0.0	3.7	3.8	10.3	10.4	10.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
* Voltage Support1	0.47	0.50	*	0.0	300.0	300.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
*			*																		
*			*																0.0	0.0	0.0
*			*																		
*			*																		
* Peaking CTs	25.76	15.65	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	140.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
* Puget Area Deficit				0	-100	-200	- 00	-200	-300	-300	-300	-300	-300	- 00 *							
* Cum Post-Actn L/R Bal				0.0	277.1	561.7	6 . .1	742.5	730.1	730.1	870.1	870.1	870.1	7 . .4 *							

COSTS INCURRED FROM ALTERNATIVE STR TEGY 4: Peaking CTs Voltage Support (Thousands 1990$)

* Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	[illegible]	2010
* Expectd Generation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* ACC Weather	0	591	1183	1823	2464	3111	3111	3111	3111	3111	2883	2378	1879	1497	1127	752	376	0
* ACC Industrial	0	213	437	582	728	879	879	879	879	879	879	879	594	476	358	241	118	-6
* Efficient Shr Hds	0	0	387	769	1145	1366	1366	1366	1366	1366	1366	1366	1366	1366	1366	1366	1366	1366
* Comm Retrofit	0	276	561	1339	2130	2919	2919	2919	2919	2919	2919	2919	2919	2919	2919	2919	2919	2919
* Voltage Support1	0	297	598	600	603	605	608	610	613	616	618	621	624	626	629	632	635	637
*																		
*																		
*																		
*																		
* Peaking CTs	0	0	0	0	0	0	0	6814	6878	69 2	7009	7076	7146	7217	7289	7363	7439	7517
* Yearly Totals	0	1377	3165	5114	7070	8880	8883	15700	15766	15833	15674	15239	14526	14101	13689	13272	12852	12433

* Cost PV ($1990) $131,129 *

TABLE 2.2-4
SM 2 of 2

POWER BENEFITS FROM ALTERNATIVE STRATEGY 4: Peaking CTs Voltage Support Low Case

MARGINAL COSTS	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Winter MC mill/kwh	31.5	15.2	17.0	16.8	16.4	17.3	16.2	18.7	17.9	18.1	19.2	19.8	20.4	19.5	21.0	20.7	20.7	20.7
Summer MC mill/kwh	29.3	14.2	15.8	15.6	15.2	16.1	15.1	17.4	16.7	16.8	17.8	18.4	19.0	18.2	19.5	19.2	19.2	19.2
CUMULATIVE AMW																		
Expectd Generation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ACC Weather	0.0	2.2	4.3	6.7	9.0	11.4	11.4	11.4	11.4	11.4	10.5	8.7	6.9	5.5	4.1	2.7	1.4	0.0
ACC Industrial	0.0	3.7	7.6	10.2	12.7	15.4	15.4	15.4	15.4	15.4	15.4	15.4	10.4	8.3	6.3	4.2	2.1	0.0
Efficient Shr Hds	0.0	0.0	3.2	6.3	9.4	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2	11.2
Comm Retrofit	0.0	2.4	4.8	11.4	18.0	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6
Voltage Support!	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Peaking CTs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
BENEFIT CALCULATIONS (Thousands 1990$)																		
Expectd Generation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ACC Weather	0	282	6 0	959	1265	1686	1580	1822	1746	1763	1732	1474	1201	915	741	487	243	0
ACC Industrial	0	474	108-	1428	1741	2224	2085	2404	2305	2323	2462	2543	1771	1360	1099	727	355	0
Efficient Shr Hds	0	0	4-0	882	1281	1615	1514	1746	1674	1687	1788	1847	1906	1824	1958	1929	1929	1929
Comm Retrofit	0	301	681	1597	2466	3561	3338	3849	3691	3720	3943	4072	4202	4022	4317	4252	4252	4252
Voltage Support!	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peaking CTs	0	0	0	0	0	0	0	1115	1068	1078	1143	1180	1217	1164	1251	1233	1233	1233
early Total	0	1057	2845	4866	6753	9087	8517	10936	10484	10570	11068	11116	10297	9285	9366	8627	8012	7413

Bene PV ($1990)	$96.474

ALTERNATIVE STRATEGY 4: Peaking CTs Voltage Support & Conservation
COST BENEFIT SUMMARY (million $1990)

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Cum PV (Disc 90$)	0	-284	-560	-767	-1025	-862	-1143	-4688	-8503	-12194	-15330	-18056	-20771	-23772	-26387	-29116	-31876	-34655

Costs PV	-131.1
Benefits PV	96.5
Net PV	-34.7

TABLE 2.2-5
SH 1 OF 2

PUGET SOUND AREA ELECTRIC RELIABILITY PLAN   High Case
08-Jun-91

ALTERNATIVE STRATEGY 1: Line, Voltage Support & Conservation

Select 1=Y 0=N	Total Cap Cost '90$/kw	Yearly Var Cost '90$/yr/kw	Resource Life	Fixed Cost Escalat	Var Cost Escalat	Energy: Capacity Ratio	Power Produced % during Nov-Feb	INCREMENTAL MEGAWATTS 1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
1 Expectd Generation	0	0	0	0.0%	0.0%	0%	0.0%	0.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	0.0	0.0	0.0	0.0
1 ACC Weather	0	61.6	50	0.0%	0.0%	23%	70.0%	0.0	9.6	9.6	10.4	10.4	10.5	10.4	10.5	-8.2	-8.2	-8.2	-8.2	-8.1	-6.2	-6.0
1 ACC Industrial	0	56	20	0.0%	0.0%	98%	33.3%	0.0	4.4	5.1	3.7	3.9	4.2	4.5	4.8	4.9	5.2	-6.9	-7.4	-7.9	-3.1	-3.4
1 Efficient Shr Hds	335	0	7	0.0%	0.0%	44%	33.3%	0.0	0.0	7.2	7.1	7.0	4.1	4.0	4.0	3.9	3.9	0.0	0.0	0.0	0.0	0.0
1 Comm Retrofit	1420	0	30	0.7%	0.7%	64%	33.3%	0.0	3.7	3.8	10.3	10.4	10.3	10.3	10.4	6.8	6.9	6.8	0.0	0.0	0.0	0.0
1 Voltage Support1	10	0.5	35	0.5%	0.8%	0%	0.0%	0	300	300	0	0	0	0	0	0	0	0	0	0	0	0
0 Voltage Support2	40	1	35	0.5%	0.8%	0%	0.0%	0	0	0	0	1000	0	0	0	0	0	0	0	0	0	0
1 Line	130	1.2	40	1.2%	0.7%	1%	60.0%	0	0	0	0	0	2000	0	0	0	0	0	0	0.0	0.0	0.0
0 Water Htr Control	323.6	28.9	12	0.0%	0.0%	2%	33.3%	0	40.1	39.2	43.4	43.5	42.4	43.6	43.4	22.8	21.8	22.9	0	0	0	0
0 Time of Use Rates	249	48	20	0.0%	0.0%	0%	0.0%	0	18.5	24.3	23.6	23.1	5	4.8	4.8	5.2	5.2	0	0	0	0	0
1 Curtailment1	0	20	1	0.0%	0.0%	0%	0.0%	0	5	0	180	190	-375	0	0	0	0	0	0	0	0	0

= Discount Rate..... 3.0% =

OUTPUT

ALTERNATIVE STRATEGY 1: Line, Voltage Support & Conservation

	Lev Fix Cost 1990$/kw	Yrly Var Cost 1990$/kw	Incremental megawatts = Year 1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Expectd Generation	0.00	0.00	0.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ACC Weather	0.00	61.60	0.0	9.6	9.6	10.4	10.4	10.5	10.4	10.5	-8.2	-8.2	-8.2	-8.2	-8.1	-6.2	-6.0	-6.1	-6.1	-6.1
ACC Industrial	0.00	56.00	0.0	4.4	5.1	3.7	3.9	4.2	4.5	4.8	4.9	5.2	-6.9	-7.4	-7.9	-3.1	-3.4	-3.7	-4.0	-4.3
Efficient Shr Hds	53.77	0.00	0.0	0.0	7.2	7.1	7.0	4.1	4.0	4.0	3.9	3.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Comm Retrofit	72.45	0.00	0.0	3.7	3.8	10.3	10.4	10.3	10.3	10.4	6.8	6.9	6.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Voltage Support1	0.47	0.50	0.0	300.0	300.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Line	5.62	1.20	0.0	0.0	0.0	0.0	0.0	2000.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Curtailment1	0.00	20.00	0.0	5.0	0.0	180.0	190.0	-375.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Puget Area Deficit			0	-400	-800	-1100	-1400	-1800	-2100	-2400	-2700	-3100	-3400							
Cum Post-Actn L/R Bal			0.0	2.7	8.4	0.0	1.6	1335.7	1144.9	954.6	742.0	429.8	201.5							

COSTS INCURRED FROM ALTERNATIVE STRATEGY 1: Line, Voltage Support & Con (Thousands 1990$)

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Expectd Generation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ACC Weather	0	591	1183	1823	2464	3111	3751	4398	3893	3388	2883	2378	1879	1497	1127	752	376	0
ACC Industrial	0	246	532	739	958	1193	1445	1714	1988	2279	1893	1478	1036	862	672	465	241	-0
Efficient Shr Hds	0	0	387	769	1145	1366	1581	1796	2006	2215	2215	2215	2215	2215	2215	2215	2215	2215
Comm Retrofit	0	276	561	1339	2130	2919	3714	4521	5053	5597	6136	6136	6136	6136	6136	6136	6136	6136
Voltage Support1	0	297	598	600	603	605	608	610	613	616	618	621	624	626	629	632	635	637
Line	0	0	0	0	0	14912	14930	14948	14966	14984	15002	15021	15039	15058	15077	15096	15115	15134
Curtailment1	0	100	100	3700	7500	0	0	0	0	0	0	0	0	0	0	0	0	0
Yearly Totals	0	1511	3360	8971	14800	24106	26029	27988	28519	29079	28748	27849	26929	26395	25857	25295	24717	24123

= Cost PV ($1990) $254.264 =

TABLE 2.2-5

SH 2 OF 2

POWER BENEFITS FROM ALTERNATIVE STRATEGY 1: Line, Voltage Support & ConHigh Case

MARGINAL COSTS	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	3004	2005	2006	2007	2008	2009	2010
Winter mC mill/kwh	31.5	35.7	35.3	37.0	37.8	38.5	41.0	41.6	41.9	37.5	38.7	37.7	39.0	38.7	38.3	39.0	39.0	39.0
Summer mC mill/kwh	29.3	33.2	32.8	34.4	35.2	35.8	38.1	38.7	39.0	34.9	36.0	35.1	36.2	36.0	35.6	36.2	36.2	36.2
CUMULATIVE AMW																		
Expectd Generation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ACC Weather	0.0	2.2	4.3	6.7	9.0	11.4	13.7	16.1	14.2	12.4	10.5	8.7	6.9	5.5	4.1	2.7	1.4	0.0
ACC Industrial	0.0	4.3	9.3	12.9	16.8	20.9	25.3	30.0	34.8	39.9	33.1	25.9	18.1	15.1	11.8	8.1	4.2	-0.0
Efficient Shr Hds	0.0	0.0	3.2	6.3	9.4	11.2	12.9	14.7	16.4	18.1	18.1	18.1	18.1	18.1	18.1	18.1	18.1	18.1
Comm Retrofit	0.0	2.4	4.8	11.4	18.0	24.6	31.2	37.9	42.2	46.7	51.0	51.0	51.0	51.0	51.0	51.0	51.0	51.0
Voltage Support	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Line	0.0	0.0	0.0	0.0	0.0	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6
Curtailment	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BENEFIT CALCULATIONS (Thousands 1990$)																		
Expectd Generation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ACC Weather	0	661	1309	2115	2919	3752	4818	5727	5111	3978	3497	2808	2293	1816	1352	917	459	0
ACC Industrial	0	1284	2746	4000	5293	6711	8657	10409	12175	12483	10713	8146	5898	4881	3759	2646	1371	-0
Efficient Shr Hds	0	0	934	1945	2960	3593	4429	5101	44	5674	5863	5708	5897	5863	5794	5897	5897	5897
Comm Retrofit	0	705	1416	3522	5700	7922	10693	13152	14783	14602	16497	16061	16593	16497	16303	16593	16593	16593
Voltage Support	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Line	0	0	0	0	0	8064	8588	8707	8778	7850	8112	7898	8160	8112	8017	8160	8160	8160
Curtailment	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yearly Total	0	2650	6405	11582	16872	30043	37185	43096	46591	44587	44681	40622	38841	37168	35224	34213	32479	306

Bene PV ($1990)	$362,786

ALTERNATIVE STRATEGY 1: Line, Voltage Support & Conservation
COST BENEFIT SUMMARY (million $1990)

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	3004	2005	2006	2007	2008	2009	2010
Cum PV (Disc 90$)	0	1012	3638	5825	7510	12197	20747	31989	45045	55922	66772	75216	82861	89575	95242	100481	104907	108521

Costs PV	-254.3
Benefits PV	362.8
Net PV	108.5

BLE 2.2-6
SH 1 OF 2

PUGET SOUND AREA ELECTRIC RELIABILITY PLAN   High C se
08-Jun-91

ALTERNATIVE STRATEGY 2: Voltage Support & Conserv tion

Select 1=Y 0=N	Total C p Cost '90$/kw	Ve rly V Cost '9 / r/kw	Resour Li	Fixed Cost Escalat	Var Cos Escala	Energ : Capac ity Ratio	Power Produced % during Nov-Feb	INCREMENTAL MEGAWATTS 1993	1994	1995	1996	1997	1998	1999	[illegible]00	[illegible]1	2002	2003	2004	2005	2006	2007
1 Expectd Generation	0	0	0	0.0%	0.0%	0%	0.0%	0.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	[illegible].0	80.0	80.0	0.0	0.0	0.0	0.0
1 ACC Weather	0	61.6	50	0.0%	0.0%	23%	70.0%	0.0	9.6	9.6	10.4	10.4	10.5	10.4	10.5	-[illegible].2	-8.2	-8.2	-8.2	-8.1	-[illegible].2	-6.0
1 ACC Industrial	0	56	20	0.0%	0.0%	98%	33.3%	0.0	4.4	5.1	3.7	3.9	4.2	4.5	4.8	4.9	5.2	-6.9	-7.4	-7.9	-3.1	-3.4
1 Efficient Shr Hds	35-	0	7	0.0%	0.0%	44%	33.3%	0.0	0.0	7.2	7.1	7.0	4.1	4.0	4.0	3.9	3.9	0.0	0.0	0.0	0.0	0.0
1 Comm Retrofit	1 20	0	30	0.7%	0.7%	64%	33.3%	0.0	3.7	3.8	10.3	10.4	10.3	10.3	10.4	6.8	6.9	6.8	0.0	0.0	0.0	0.0
1 Voltage Support1	10	0.5	35	0.5%	0.8%	0%	0.0%	0	300	300	0	0	0	0	0	0	0	0	0	0	0	0
1 Voltage Support2	40	1	35	0.5%	0.8%	0%	0.0%	0	0	0	0	1000	0	0	0	0	0	0	0	0	0	0
1 Line	130	1.2	40	1.2%	0.7%	1%	60.0%	0	0	0	0	0	0	0	0	0	2000	0	0	0.0	0.0	0.0
0 Water Htr Control	32 .6	28.9	12	0.0%	0.0%	2%	33.3%	0	40.1	39.2	43.4	43.5	42.4	43.6	43.4	[illegible].8	21.8	22.9	0	0	0	0
0 Time of Use Rates	-49	48	20	0.0%	0.0%	0%	0.0%	0	18.5	24.3	23.6	23.1	5	4.8	4.8	5.2	5.2	0	0	0	0	0
1 Curtailment1	0	20	1	0.0%	0.0%	0%	0.0%	0	5	0	180	-185	0	0	45	215	-26[illegible]	0	0	0	0	0

* Discount R te..... 3.0% *

OUTPUT

ALTERNATIVE STRATEGY 2: Voltag Support & Conservation

	Lev Ix Cost 1990$/kw	Vrl Var Cost 1990$/kw	Increment l Megawatts * Year	1993	1994	1995	1996	1997	199	1999	2000	2001	[illegible]02	2003	2004	20[illegible]	20[illegible]	20[illegible]	20[illegible]	20[illegible]	2010
* Expectd Generation	0.00	0.00	*	0.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
* ACC Weather	0.00	61.60	*	0.0	9.6	9.6	10.4	10.4	10.5	10.4	10.5	-8.2	-8.2	-8.2	-8.2	-8.1	-6.2	-6.0	-6.1	-6.1	-6.1
* ACC Industrial	0.00	56.00	*	0.0	4.4	5.1	3.[illegible]	3.9	4.2	4.5	4.8	4.9	5.2	-6.9	-7.4	-7.9	-3.1	-3.4	-3.7	-4.0	-4.3
* Efficient Shr Hds	53.[illegible]	0.00	*	0.0	0.0	7.2	7.[illegible]	7.0	4.1	4.0	4.0	3.9	3.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
* Comm Retrofit	72.[illegible]	0.00	*	0.0	3.7	3.8	10.3	10.4	10.3	10.3	10.4	6.8	6.9	6.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
* Voltage Support1	0.[illegible]7	0.50	*	0.0	300.0	300.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
* Voltage Support2	1.[illegible]6	1.00	*	0.0	0.0	0.0	0.0	1000.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
* Line	5.6	1.20	*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2000.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
* Curtailment1	0.[illegible]0	20.0[illegible]	*	0.0	5.0	0.0	180.0	-185.0	0.0	0.0	45.0	215.0	-260.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
* Puget Area Deficit				0	-400	-800	-1100	-1400	-1[illegible]00	-2100	-2400	-2700	-310[illegible]	-3400							
* Cum Post-Actn L/R Bal				0.0	2.7	8.4	0.0	626.6	[illegible].7	144.9	0.0	2.0	1429.8	1201.5							

COSTS INCURRED FROM ALTERNATIVE STR TEGY 2: Voltage Support & Conservat (Thousands 1990$)

* Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	20[illegible]	2008	2009	2010
* Expectd Gene tion	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
* ACC Weather	0	591	1183	1823	2464	3111	3751	4398	3893	3388	2883	2378	1879	1497	1127	752	376	0
* ACC Industrial	0	246	532	739	958	1193	1445	1714	1988	2279	1893	1478	1036	862	672	465	241	-0
* Efficient Shr Hds	0	0	387	769	1145	1366	1581	1796	2006	2215	2215	2215	2215	2215	2215	2215	2215	2215
* Comm Retrofit	0	276	561	1339	2130	2919	3714	4521	5053	5597	6136	6136	6136	6136	6136	6136	6136	6136
* Voltage Support1	0	297	598	600	603	605	608	610	613	616	618	621	624	626	629	632	635	637
* Voltage Support2	0	0	0	0	2985	2994	3002	3011	3019	3028	3037	3046	3055	3064	3073	3082	3091	3100
* Line	0	0	0	0	0	0	0	0	0	15589	15607	15625	15644	15663	15681	15700	15719	15739
* Curtailment1	0	100	100	3700	0	0	0	900	5200	0	0	0	0	0	0	0	0	0
* Ye rly Totals	0	1511	3360	8971	102 5	12187	14101	16950	21772	32712	32390	31500	30589	30064	29534	28982	28413	27828

* Cost PV ($1990) $239.5 2 *

TABLE 2.2-6
SH 2 OF 2

POWER BENEFITS ROM ALTERNATIVE STRATEGY 2: Voltag Support & ConservatHigh Case

MARGINAL COSTS	1993	1994	1995	19	1997	1998	1999	2000	2001	2002	2003	2004	2005	200	2007	2008	2009	2010
Winter MC mill/kwh	31.5	35.7	35.3	37.0	37.8	38.5	41.0	41.	41.9	37.5	38.7	37.7	39.0	38.7	38.3	39.0	39.0	39.0
Summer MC mill/kwh	29.3	33.2	32.8	34.4	35.2	35.8	38.1	38.7	39.0	34.9	36.0	35.1	36.2	36.0	35.6	36.2	36.2	36.2
CUMULATIVE AMW																		
Expectd Generation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ACC Weather	0.0	2.2	4.3	6.7	9.0	11.4	13.7	16.1	14.2	12.4	10.5	8.7	6.9	5.5	4.1	2.7	1.4	0.0
ACC Industrial	0.0	4.3	9.3	12.9	16.8	20.9	25.3	30.0	34.8	39.9	33.1	25.9	18.1	15.1	11.8	8.1	4.2	-0.0
Efficient Shr Hds	0.0	0.0	3.2	6.3	9.4	11.2	12.9	14.7	16.4	18.1	18.1	18.1	18.1	18.1	18.1	18.1	18.1	18.1
Comm Retrofit	0.0	2.4	4.8	11.4	18.0	24.	31.2	37.9	42.2	46.7	51.0	51.0	51.0	51.0	51.0	51.0	51.0	51.0
Voltage Support1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Voltage Support2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Line	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6
Curtailment1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BENEFIT CALCULATIONS (Thousands 1990$)																		
Expectd Generation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ACC Weather	0	6 1	1309	2115	2919	3752	4818	5727	5111	3978	3497	2808	2293	1816	1352	917	459	0
ACC Industrial	0	1284	2746	4000	5293	6711	8657	10409	12175	12483	10713	8146	5898	4881	3759	2646	1371	-0
Efficient Shr Hds	0	0	934	1945	2960	3593	4429	5101	5744	5674	5863	5708	5897	5863	5794	5897	5897	5897
Comm Retrofit	0	705	1416	3522	5700	7922	10693	13152	14783	14602	16497	16061	16593	16497	16303	16593	16593	16593
Voltage Support1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Voltage Support2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Line	0	0	0	0	0	0	0	0	0	7850	8112	7898	8160	8112	8017	8160	8160	8160
urtailment1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Y arly Total	0	50	405	11582	16872	21978	28597	34389	37812	44587	44681	40622	38841	37168	35224	34213	32479	30650

Bene PV ($1990)	$337,017

ALTERNATIVE STRATEGY 2: Volta S port & Conservation
COST BENEFIT SUMMARY (million 90

Cum PV (Disc 90$)	0	1012	3638	5825	11181	18910	30021	42997	54585	2914	71284	77315	82611	87039	90481	93554	7	97435

Costs PV	-239
Benefits PV	337.0
Net PV	97.4

TABLE 2.2-7
SH 1 of 2

PUGET SOUND AREA ELECTRIC RELIABILITY PLAN High Case
08-Jun-91
ALTERNATIVE STRATEGY 3: Fuel Switching, Load Management, Voltage Support & ConserPower

Select I=Y O=N	Total Cap Cost '90$/kw	Yearly Var Cost '90$/yr/kw	Resource Life	Fixed Cost Va Escalat	Cos Escala	Energy: Capacity Ratio	Produced % during Nov-Feb	INCREMENTAL MEGAWATTS 1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	200	20-	2005	2006	2007
I Expectd Generation	0	0	0	0.0%	0.0%	0%	0.0%	0.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	0.0	0.0	0.0	0.0
I ACC Weather	0	61.6	50	0.0%	0.0%	23%	70.0%	0.0	9.7	9.5	10.4	10.1	9.9	9.6	9.4	-8.2	-8.1	-8.0	-7.9	-7.7	-5.9	-5.7
I ACC Industrial	0	56	20	0.0%	0.0%	98%	33.3%	0.0	4.4	5.1	3.7	3.9	4.2	4.5	4.8	4.9	5.2	-6.9	-7.4	-7.9	-3.1	-3.4
I Efficient Shr Hds	335	0	7	0.0%	0.0%	44%	33.3%	0.0	0.0	7.1	6.9	6.7	3.8	3.6	3.5	3.5	3.4	0.0	0.0	0.0	0.0	0.0
I Comm Retrofit	1420	0	30	0.7%	0.7%	64%	33.3%	0.0	3.7	3.8	10.3	10.4	10.3	10.3	10.4	6.8	6.9	6.8	0.0	0.0	0.0	0.0
I Voltage Support1	10	0.5	35	0.5%	0.8%	0%	0.0%	0	300	300	0	0	0	0	0	0	0	0	0	0	0	0
I Voltage Support2	40	1	35	0.5%	0.8%	0%	0.0%	0	0	0	0	0	0	0	0	1000	0	0	0	0	0	0
I Fuel Switching	680	31.2	50	0.0%	3.0%	28%	60.0%	0	20.9	22	35	35	37	36.1	36.1	24.1	26.1	25.2	0	0.0	0.0	0.0
I Water Htr Control	323.6	28.9	12	0.0%	0.0%	2%	33.3%	0	38.1	58.7	72	6.2	54.2	51.7	49.7	48.4	46.8	39.2	0	0	0	0
I Time of Use Rates	249	48	20	0.0%	0.0%	0%	0.0%	0	20.8	27.6	27	26.8	6.4	6.2	6.4	7.2	7.3	0	0	0	0	0
I Curtailment1	0	20	1	0.0%	0.0%	0%	0.0%	0	0	0	0	0	130	100	100	-330	0	0	0	0	0	0

* Discount Rate..... 3.0% *

OUTPUT

ALTERNATIVE STRATEGY 3: Fuel Switching, Load Management, Voltage Support & Conservation

	Lev Fix Cost 1990$/kw	Yrly Var Cost 1990$/kw	Incremental Megawatts * Year 1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
* Expectd Generation	0.00	0.00	0.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
* ACC Weather	0.00	61.60	0.0	9.7	9.5	10.4	10.1	9.9	9.6	9.4	-8.2	-8.1	-8.0	-7.9	-7.7	-5.9	-5.7	-5.8	.6	-5.7
* ACC Industrial	0.00	56.00	0.0	4.4	5.1	3.7	3.9	4.2	4.5	4.8	4.9	5.2	-6.9	-7.4	-7.9	-3.1	-3.4	-3.7	-.0	-4.3
* Efficient Shr Hds	53.77	0.00	0.0	0.0	7.1	6.9	6.7	3.8	3.6	3.5	3.5	3.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
* Comm Retrofit	72.45	0.00	0.0	3.7	3.8	10.3	10.4	10.3	10.3	10.4	6.8	6.9	6.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
* Voltage Support1	0.47	0.50	0.0	300.0	300.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
* Voltage Support2	1.86	1.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1000.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
* Fuel Switching	26.43	31.20	0.0	20.9	22.0	35.0	35.0	37.0	36.1	36.1	24.1	26.1	2 .2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
* Water Htr Control	32.51	28.90	0.0	38.1	58.7	72.0	56.2	54.2	51.7	49.7	48.4	46.8	3 .2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
* Time of Use Rates	16.74	48.00	0.0	20.8	27.6	27.0	26.8	6.4	6.2	6.4	7.2	7.3	0.0	0.0	.0	0.0	0.0	0.0	0.0	0.0
* Curtailment1	0.00	20.00	0.0	0.0	0.0	0.0	0.0	130.0	100.0	100.0	-330.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
* Puget Area Deficit			0	-400	-800	-1100	-1400	-1800	-2100	-2400	-2700	-3100	-3400							
* Cum Post-Actn L/R Bal			0.0	77.6	191.4	136.7	65.8	1.6	3.6	3.9	40.6	308.2	144.5							

COSTS INCURRED FROM ALTERNATIVE STRATEGY 3: Fuel Switching, Load Manage (Thousands 1990$)

* Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	200	2008	[illegible]	2010
- Expectd Generation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- ACC Weather	0	98	1183	1823	2446	3055	3647	4226	3721	3222	2729	2242	1768	1404	1053	696	351	0
- ACC Industrial	0	46	532	739	958	1193	1445	1714	1988	2279	1893	1478	036	862	672	465	241	-0
- Efficient Shr Hds	0	0	382	753	1113	1317	1511	1699	1887	2070	2070	2070	070	2070	2070	2070	2070	2070
- Comm Retrofit	0	76	561	1339	2130	2919	3714	4521	5053	5597	6136	6136	136	6136	6136	6136	6136	6136
- Voltage Support1	0	97	598	600	603	605	608	610	613	616	618	621	624	626	629	632	635	637
- Voltage Support2	0	0	0	0	0	0	0	0	3058	3067	3076	3085	3094	3103	3112	3121	3130	3139
- Fuel Switching	0	4 86	2685	4961	7316	9886	12488	15182	17140	19309	21493	21902	2 324	22757	23204	23664	24139	24627
- Water Htr Control	0	2 40	5944	10366	13817	17146	20320	23372	26345	29219	31626	31626	3 626	31626	31626	31626	31626	31626
- Time of Use Rates	0	1 47	3133	4881	6616	7030	7432	7846	8312	8785	8785	8785	785	8785	8785	8785	8785	8785
- Curtailment1	0	0	0	0	0	2600	4600	6600	0	0	0	0	0	0	0	0	0	0
* Yearly Totals	0	6389	15018	25462	34998	45752	55764	65771	68117	74163	78426	77946	77462	370		195	77112	77021

* Cost PV ($1990) $679,029 *

TABLE 2.2-7
SH 2 OF 2

POWER BENEFITS FROM ALTERNATIVE STRATEGY 3: Fuel Switching, Load ManageHigh Case

MARGINAL COSTS	1993	1994	1995	1996	1997	1998	1999	2000	2001	002	2003	2004	2005	2006	2007	2008	2009	2010
Winter MC mill/kwh	31.5	35.7	35.3	7.0	37.8	38.5	41.0	41.6	41.9	37.5	38.7	7.7	9.0	38.7	38.3	39.0	39.0	39.0
Summer MC mill/kwh	29.3	33.2	.8	4.4	5.	5.8	8.1	38.7	39.0	34.9	36.0	5.1	.2	36.0	35.6	36.2	36.2	36.2
CUMULATIVE AMW																		
Expectd Generation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Acc Weather	-0.0	2.2	4.3	6.7	8.9	11.2	13.3	15.4	13.6	11.8	10.0	8.2	6.5	5.1	3.8	2.5	1.3	0.0
Acc Industrial	0.0	4.3	9.3	12.9	16.8	20.9	25.3	30.0	34.8	39.9	33.1	25.9	18.1	15.1	11.8	8.1	4.2	-0.0
Efficient Shr Hds	0.0	0.0	3.1	6.2	9.1	10.8	12.4	13.9	15.4	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9	16.9
Comm Retrofit	0.0	2.4	4.8	11.4	18.0	24.6	31.2	37.9	42.2	46.7	51.0	51.0	51.0	51.0	51.0	51.0	51.0	51.0
Voltage Support1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Voltage Support2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Switching	0.0	5.9	12.1	22.0	32.0	42.4	52.6	62.9	69.7	77.1	84.2	84.2	84.2	84.2	84.2	84.2	84.2	84.2
Water Htr Control	0.0	0.8	1.9	3.4	4.5	5.6	6.6	7.6	8.6	9.5	10.3	10.3	10.3	10.3	10.3	10.3	10.3	10.3
Time of Use Rates	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Curtailment1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BENEFIT CALCULATIONS (Thousands 1990$)																		
Expectd Generation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acc Weather	0	667	1309	2115	2897	3685	4684	5502	4884	3782	3311	48	2157	1704	1263	849	428	0
Acc Industrial	0	1284	2746	4000	5293	6711	8657	10409	12175	12483	10713	8146	5898	4881	3759	2646	1371	-0
Efficient Shr Hds	0	0	921	1905	2877	3466	4233	4826	5405	5302	5479	334	5511	547	5414	5511	5511	5511
Comm Retrofit	0	705	1416	3522	5700	7922	10693	13152	14783	14602	16497	1 061	16593	1649	16303	16593	16593	16593
Voltage Support1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Voltage Support2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fuel Switching	0	1796	3651	6950	10289	13907	18376	22246	24862	4592	27763	7030	27926	27763	27438	27926	27926	27926
Water Htr Control	0	227	571	1044	1421	1795	2266	2642	3003	2978	3331	243	3351	3331	3292	3351	3351	3351
Time of Use Rates	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Curtailment1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yearly Total	0	4680	10614	19535	28476	37486	48908	58779	65112	63740	67093	62464	61436	59654	57469	56876	55180	53381

Bene PV ($1990)	$548,178

ALTERNATIVE STRATEGY 3: Fuel Switching, Load management, Voltage Support & Conservation
COST BENEFIT SUMMARY (million $1990)

Cum PV (Disc 90$)	0	-1519	-5318	-1028	-15585	-22110	- 7364	567	-347 8	42049	-49766	-60002	70288	-81328	-93319	-105254	-117762	-130851

Costs PV	-679.0
Benefits PV	548.2
Net PV	-130.9

TABLE 2.2-8
SH 1 OF 2

PUGET SOUND ARE ELECTRIC RELIABILITY PLAN High C se
08-Jun-91

ALTERNATIVE STR TEGY 4: Peakin CTs, Voltage Support & Conservation

Select I=Y O=N		Cap Cost '90$/kw	Yearly Var Cost '90$/yr/kw	Resource Life	Fixed Cost Escala	Var Cost Escalat	Energy: Capacity Ratio	Power Produced % during Nov-Feb	INCREMENTAL MEGAWATTS 1993	1994	1995	1996	1997	1998	1999	2000	2001	20[illegible]	2003	2004	2005	2006	2007
1	Expectd Generation	0	0	0	0.0%	0.0%	0%	0.0%	0.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	0.0	0.0	0.0	0.0
1	ACC Weather	0	61.6	50	0.0%	0.0%	23%	70.0%	0.0	9.6	9.6	10.4	10.4	10.5	10.4	10.5	-8.2	-8.2	-8.2	-8.2	-8.[illegible]	-6.2	-6.0
1	ACC Industrial	0	56	20	0.0%	0.0%	98%	33.3%	0.0	4.4	5.1	3.7	3.9	4.2	4.5	4.8	4.9	5.2	-6.9	-7.	[illegible]	-3.1	-3.4
1	Efficient Shr Hds	-335	0	7	0.0%	0.0%	44%	33.3%	0.0	0.0	7.2	7.1	7.0	4.1	4.0	4.0	3.9	3.9	0.0	0.0	0.0	0.0	0.0
1	Comm Retrofit	1420	0	30	0.7%	0.7%	64%	33.3%	0.0	3.7	3.8	10.3	10.4	10.3	10.3	10.4	6.8	6.9	6.8	0.0	0.0	0.0	0.0
1	Voltage Support1	10	0.5	35	0.5%	0.8%	0%	0.0%	0	300	300	0	0	0	0	0	0	0	0	0	0	0	0
1	Voltage Support2	40	1	35	0.5%	0.8%	0%	0.0%	0	0	0	0	0	0	0	0	1000	0	0	0	0	0	0
1	Peaking CTs	505	15.65	30	1.2%	2.3%	5%	60.0%	0	0	0	0	0	0	0	140	140	350	210	0	0.0	0.0	0.0
0	Water Htr Control	323.6	28.9	12	0.0%	0.0%	2%	33.3%	0	40.1	39.2	43.4	43.5	42.4	43.6	43.4	22.8	21.8	22.9	0	0	0	0
0	Time of Use Rates	249	48	20	0.0%	0.0%	0%	0.0%	0	18.5	2[illegible].3	23.6	23.1	5	4[illegible]	4.8	5.2	5.2	0	0	0	0	0
1	Curtailment	0	20	1	0.0%	0.0%	0%	0.0%	0	5	0	180	190	2[illegible]	190	50	-905	0	[illegible]	0	0	0	0

* Discount Rate..... 3.0% *

OUTPUT

ALTERNATIVE STRATEGY 4: Peaking CTs, Voltage Support & Conservation

	Lev Fix Cost 1990$/kw	Yrly Var Cost 1990$/kw	Incremental Megawatts Year 1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	20[illegible]	2004	2005	20[illegible]	2007	2008	2009	2010
Expectd Generation	0.00	0.00	0.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	8[illegible].0	80.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ACC Weather	0.00	61.60	0.0	9.6	9.6	10.4	10.4	10.5	10.4	10.5	-8.2	[illegible].2	-8.2	-8.2	-8.1	-6.2	-6.0	-6.1	-6.1	-6.1
ACC Industrial	0.00	56.00	0.0	4.4	5.1	3.7	3.9	4.2	4.5	4.8	4.9	5.2	-6.9	-7.4	-7.9	-3.1	-3.4	-3.7	-4.0	-4.3
Efficient Shr Hds	53.77	0.00	0.0	0.0	7.2	7.1	7.0	4.1	4.0	4.0	3.9	3.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Comm Retrofit	72.45	0.00	0.0	3.7	3.8	10.3	10.4	10.3	10.3	10.4	6.8	6.9	6.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Voltage Support1	0.47	0.50	0.0	300.0	300.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Voltage Support2	1.66	1.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1000.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Peaking CTs	25.76	15.65	0.0	0.0	0.0	0.0	0.0	0.0	0.0	140.0	140.0	350.0	210.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Curtailment	0.00	20.00	0.0	5.0	0.0	180.0	190.0	290.0	190.0	50.0	-905.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Puget Area Deficit	0	-400	800	-1100	-1400	-1800	2100	2400	-2700	-3100	-3400
Cum Post-Actn L/R = 1	0.0	2.7	8.4	0.0	1.6	0.7	0.0	0.0	22.0	59.8	41.5

COSTS INCURRED FROM ALTERNATIVE STRATEGY 4: Peaking CTs, Voltage Suppor (Thousands 1990$)

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	20[illegible]	2008	[illegible]	2010
Expectd Generation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ACC Weather	0	591	1183	1823	2464	3111	3751	4398	3893	3388	2883	2378	1873	1497	1127	752	376	0
ACC Industrial	0	246	532	739	958	1193	1445	1714	1988	2279	1893	1478	1036	862	672	465	241	-0
Efficient Shr Hds	0	0	387	769	1145	1366	1581	1796	2006	2215	2215	2215	2215	2215	2215	2215	2215	[illegible]15
Comm Retrofit	0	276	561	1339	2130	2919	3714	4521	5053	5597	6136	6136	6136	6136	6136	6136	6136	[illegible]36
Voltage Support1	0	297	598	600	603	605	608	610	613	616	618	621	624	626	629	632	635	[illegible]37
Voltage Support2	0	0	0	0	0	0	0	0	3058	3067	3076	3085	3094	3103	3112	3121	3130	3[illegible]39
Peaking CTs	0	0	0	0	0	0	0	6814	13804	31535	42568	42974	43390	43815	44250	44695	45151	4[illegible]16
Curtailment	0	100	100	3700	7500	13300	17100	18100	0	0	0	0	0	0	0	0	0	0
Yearly Totals	0	1511	3360	8971	14800	22494	28199	37954	30416	48697	59389	58888	583[illegible]4	58255	58142	58016	57884	[illegible]45

* Cost PV ($1990) $434,906 *

TABLE 2.2-8
SH 2 OF 2

POWER BENEFITS FROM ALTERNATIVE STRATEGY 4: Peaking CTs, Voltage SupporHigh Case

MARGINAL COSTS	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Winter MC mill/kwh	31.5	35.7	35.3	37.0	37.8	38.5	41.0	41.6	41.9	37.5	38.7	37.7	39.0	38.7	38.3	39.0	39.0	39.0
Summer MC mill/kwh	29.3	33.2	32.8	34.4	35.2	35.8	38.1	38.7	39.0	34.9	36.0	35.1	36.2	36.0	35.6	36.2	36.2	36.2
CUMULATIVE AMW																		
Expectd Generation	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ACC weather	0.0	2.2	4.3	6.7	9.0	11.4	13.7	16.1	14.2	12.4	10.5	8.7	6.9	5.5	4.1	2.7	1.4	0.0
ACC Industrial	0.0	4.3	9.3	12.9	16.8	20.9	25.3	30.0	34.8	39.9	33.1	25.9	18.1	15.1	11.8	8.1	4.2	-0.0
Efficient Shr Hds	0.0	0.0	3.2	6.3	9.4	11.2	12.9	14.7	16.4	18.1	18.1	18.1	18.1	18.1	18.1	18.1	18.1	18.1
Comm Retrofit	0.0	2.4	4.8	11.4	18.0	24.6	31.2	37.9	42.2	46.7	51.0	51.0	51.0	51.0	51.0	51.0	51.0	51.0
Voltage Support1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Voltage Support2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Peaking CTs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.0	14.0	31.5	42.0	42.0	42.0	42.0	42.0	42.0	42.0	42.0
Curtailment1	0 0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BENEFIT CALCULATIONS (Thousands 1990$)																		
Expectd Generation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ACC Weather	0	661	1309	2115	2919	3752	4818	5727	5111	3978	3497	2808	2293	1816	1352	917	459	0
ACC Industrial	0	1284	2746	4000	5293	6711	8657	10409	12175	12483	10713	8146	5898	4881	3759	2646	1371	-0
Efficient Shr Hds	0	0	934	1945	2960	3593	4429	5101	5744	5674	5863	5708	5897	5863	5794	5897	5897	5897
Comm Retrofit	0	705	1416	3522	5700	7922	10693	13152	14783	14602	16497	16061	16593	16497	16303	16593	16593	16593
Voltage Support1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Voltage Support2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peaking CTs	0	0	0	0	0	0	0	2478	4996	10052	13850	13484	13931	13850	13687	13931	13931	13931
Curtailment1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yearly Total	0	2650	6405	11582	16872	21978	28597	36867	42808	46789	50419	46208	44612	42906	40895	39985	38251	36422

Bene PV ($1990)	$372.203

ALTERNATIVE STRATEGY 4: Peaking CTs, Voltage Support & Conservation
COST BENEFIT SUMMARY (million $1990)

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Cum PV (DISC 90$)	0	1012	3638	5825	7510	7103	7409	6600	15552	14214	8106	-276	-9109	-18674	-29109	-39701	-50897	-67703

Costs PV	-434.9
Benefits PV	372.2
Net PV	-62.7

TABLE 2.3-1

PUGET SOUND ELECTRIC RELIABILITY PLAN
Revenue Requirements Spreadsheet
ALTERNATIVE STRATEGY 1: [an mission Line, Reactive & Conservation
04-Jun-91

PACKAGE & MW DESIGNATOR

Select	Measure	1993	1994	1995	1996	1997	199	1999	2000	2001	2002	2003	200	2005	2006	2007	20
NO	Fuel Switching	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NO	Peaking CTs	0	0	0	0	0	0	0	140	70	140	70	0	0	0	0	0
Yes	Reactive1	0	300	300	0	0	0	0	0	0	0	0	0	0	0	0	0
Yes	Line	0	0	0	0	0	2000	0	0	0	0	0	0	0	0	0	0
NO	Reactive2	0	0	0	0	1000	0	0	0	0	0	0	0	0	0	0	0
Yes	ACC Weather	0	9.6	9.6	10.4	10.4	10.5	10.4	10.5	-.2	-8.2	-.2	-8.2	-.1	-6.2	-6	-.1
Yes	ACC Industrial	0	4.2	4.2	3.2	3.2	3.2	3.2	3.1	3.4	3.4	-.9	-5.9	-	-2.7	-2.6	-.7
Yes	Lo Flo Shr Hds	0	5.4	5.4	5.3	5.2	4.1	4.1	3.9	9.4	9.2	5.3	5.2	4.1	4.1	3.9	9.4
NO		0	30.5	48.8	61.4	51.4	49.3	46.7	44.7	43.4	41.5	34	0	0	30.5	8.8	61.4
Yes	Comm Retrofit	0	3.7	3.8	10.3	10.4	10.3	10.3	10.4	6.8	6.9	.8	0	0	0	0	0
NO	OU Rates	0	18.5	24.3	23.6	23.1	5	4.8	4.8	5.2	5.2	0	0	0	0	0	0

REVENUE REQUIREMENT CALCULATION
($1000s nominal)

	1996	1997	1998	ST TOTAL	ST AVE	2006	2007	200	LT TOTAL	LT AVE
					0					0
					0					0
					0					0
					0					0
					0					0
					0					0
					0					0
Re-ctive1	11.7	1215	1245	3648	1216	1558	1608	1661	4828	1609
Line	25712	39132	39405	104249	34750	42219	42666	43138	128023	42674
					0					0
ACC Weather	2661	3775	5005	11441	3814	3558	2813	1969	8341	2780
ACC Industrial	984	1319	1684	39 8	1329	1465	1161	808	3434	114
Lo Flo Shr Hds	1944	2434	2874	7252	2417	495	6814	6215	19524	650
					0					0
Comm Retrofit	5434	8125	10902	24461	8154	20093	19750	19441	59 84	19761
					0	0	0	0	0	0

Average Yearly Revenue Re irements

1996-9	$51,680
2006-0	$74,478

TABLE 2,3-2

PUGET SOUND ELECTRIC RELIABILITY PLAN
Revenue Requirements Spreadsheet
ALTERNATIVE STRATEGY 2: Reactive & Conservation
04-Jun-91

PACKAGE & MW DESIGNATOR

Select	Measure	1993	1994	1995	19	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
NO	Fuel Switching	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NO	Peaking CTs	0	0	0	0	0	0	0	140	70	140	70	0	0	0	0	0
Yes	Reactive1	0	300	300	0	0	0	0	0	0	0	0	0	0	0	0	0
NO		0	0	0	0	0	2000	0	0	0	0	0	0	0	0	0	0
Yes	Reactive2	0	0	0	0	1000	0	0	0	0	0	0	0	0	0	0	0
Yes	ACC Weather	0	9.6	9.6	10.4	10.4	10.5	10.4	10.5	-8.2	-8.2	-8.2	-8.2	-8.1	-.2	-6	-.1
Yes	ACC Industrial	0	4.2	4.2	3.2	2	3.2	3.2	3.1	3.4	3.4	-5.9	-5.9	-	-2.7	-2.6	-.7
Yes	Lo Flo Shr Hds	0	5.4	5.4	5.3	2	4.1	4.1	3.9	9.4	9.2	5.3	5.2	4.1	4.1	3.9	9.4
NO		0	30.5	48.8	61.4	51.4	49.3	46.7	44.7	43.4	41.5	34	0	0	0.5	48.8	61.4
Yes	Comm Retrofit	0	3.7	3.8	10.3	10.4	10.3	10.3	10.4	6.8	6.9	6.8	0	0	0	0	0
NO	TOU Rates	0	18.5	24.3	23.6	23.1	5	4.8	4.8	5.2	5.2	0	0	0	0	0	0

REVENUE REQUIREMENT CALCULATION

($1000s nominal)	1996	1997	1998	ST TOTAL	ST AVE	200	2007	2008	LT TOTAL	LT AVE
					0					0
					0					0
					0					0
					0					0
					0					0
					0					0
					0					0
Reactive1	1187	1215	1245	3648	1216	1558	1608	1661	4828	1609
					0					0
Reactive2	4001	7051	7154	18206	069	8226	8397	8578	25201	8400
ACC Weather	2661	3775	5005	11441	814	3558	2813	1969	8341	780
ACC Industrial	984	1319	1684	3988	1329	1465	1161	808	3434	1145
Lo Flo Shr Hds	1944	2434	2874	7252	417	6495	6814	6215	19524	6508
					0					0
Comm Retrofit	5434	8125	10902	24461	8154	20093	19750	19441	59284	19761
					0	0	0	0	0	0

Average Yearly Revenue Requirements

1996-98	$22,999
2 08	$40,204

TABLE 2.3-3

PUGET SOUND ELECTRIC RELIABILITY PLAN
Revenue Requirements Spreadsheet
ALTERNATIVE STRATEGY 3: Load mgmt, Fuel Switching, Reactive & Conservation
04-Jun-91 (Revenue Requirements without Fuel Switching)

PACKAGE & MW DESIGNATOR

Select	Measure	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Yes	Fuel Switching	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NO	Peaking CTs	0	0	0	0	0	0	0	140	70	140	70	0	0	0	0	0
Yes	Reactive1	0	300	300	0	0	0	0	0	0	0	0	0	0	0	0	0
NO		0	0	0	0	0	2000	0	0	0	0	0	0	0	0	0	0
NO	Reactive2	0	0	0	0	1000	0	0	0	0	0	0	0	0	0	0	0
Yes	ACC Weather	0	9.7	9.5	10.4	10.1	9.9	9.6	9.4	-8.2	-8.1	-8	-7.9	-7.7	-5.9	-5.7	-5.8
Yes	ACC Industrial	0	4.2	4.2	3.2	3.2	3.2	3.2	3.1	3.4	3.4	-5.9	-5.9	-6	-2.7	-2.6	-2.7
Yes	Lo Flo Shr Hds	0	0	7.1	6.9	6.7	3.8	3.6	3.5	3.5	10.5	6.9	6.7	3.8	3.6	3.5	3.5
Yes	Wtr Htr Cntrl	0	30.5	48.8	61.4	51.4	49.3	46.7	44.7	43.4	41.5	34	0	0	30.5	48.8	61.4
Yes	Comm Retrofit	0	3.7	3.8	10.3	10.4	10.3	10.3	10.4	6.8	6.9	6.8	0	0	0	0	0
Yes	TOU Rates	0	18.5	24.3	23.6	23.1	5	4.8	4.8	5.2	5.2	0	0	0	0	0	0

REVENUE REQUIREMENT CALCULATION
($1000s nominal)

	1996	1997	1998	ST TOTAL	ST AVE	2006	2007	2008	LT TOTAL	LT AVE
					0					0
					0					0
					0					0
					0					0
					0					0
Fuel Switching	!	!	!	!	0	!	!	!	!	!
					0					0
Reactive1	1187	1215	1245	3648	1216	1558	1608	1661	4828	1609
					0					0
					0					0
ACC Weather	2661	3747	4915	11323	3774	3338	2629	1824	7791	2597
ACC Industrial	984	1319	1684	3988	1329	1465	1161	808	3434	1145
Lo Flo Shr Hds	1879	2435	2825	7139	2380	6422	6553	5481	18457	6152
Wtr Htr Cntrl	16634	23297	30033	69964	23321	87570	82020	74448	244039	81346
Comm Retrofit	5434	8125	10902	24461	8154	20093	19750	19441	59284	19761
TOU Rates	7473	10448	11342	29263	9754	0	0	0	0	0

Average Yearly Revenue Requirements

1996-98	$49.928
2006-08	$112.611

TABLE 2.3-4

PUGET SOUND ELECTRIC RELIABILITY PLAN
Revenue Requirements Spreadsheet
ALTERNATIVE STRATEGY 4: Peaking CTs, Reactive & Conservation
04-Jun-91

PACKAGE & MW DESIGNATOR

Select	Measure	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
NO	Fuel Switching	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yes	Peaking CTs	0	0	0	0	0	0	0	140	70	140	70	0	0	0	0	0
Yes	Reactive1	0	300	300	0	0	0	0	0	0	0	0	0	0	0	0	0
NO		0	0	0	0	0	2000	0	0	0	0	0	0	0	0	0	0
NO	Reactive2	0	0	0	0	1000	0	0	0	0	0	0	0	0	0	0	0
Yes	ACC Weather	0	9.6	9.6	10.4	10.4	10.5	10.4	10.5	-8.2	-8.2	-8.2	-8.2	- .1	-6.2	-6	-6.1
Yes	ACC Industrial	0	4.2	4.2	3.2	3.2	3.2	3.2	3.1	3.4	3.4	-5.9	-5.9	-	-2.7	- .6	-2.7
Yes	Lo Flo Shr Hds	0	5.4	5.4	5.3	5.2	4.1	4.1	3.9	9.4	9.2	5.3	5.2	4.1	4.1	3.9	9.4
NO		0	30.5	48.8	61.4	51.4	49.3	46.7	44.7	43.4	41.5	34	0	0	30.5	48.8	61.4
Yes	Comm Retrofit	0	3.7	3.8	10.3	10.4	10.3	10.3	10.4	6.8	6.9	6.8	0	0	0	0	0
NO	TOU Rates	0	18.5	24.3	23.6	23.1	5	4.8	4.8	5.2	5.2	0	0	0	0	0	0

REVENUE REQUIREMENT CALCULATION

($1000s nominal)	1996	1997	1998	ST TOTAL	ST AVE	2006	2007	2008	LT TOTAL	LT AVE
					0					0
					0					0
					0					0
					0					0
					0					0
					0					0
Peaking CTs	0	1695	4997	6691	2230	74550	74905	75493	224948	74983
Reactive1	1187	1215	1245	3648	1216	1558	1608	1661	4828	1609
					0					0
					0					0
ACC Weather	2661	3775	5005	11441	3814	3558	2813	1969	8341	2780
ACC Industrial	984	1319	1684	3988	1329	1465	1161	808	3434	1145
Lo Flo Shr Hds	1944	2434	2874	7252	2417	6495	6814	6215	19524	6508
					0					0
Comm Retrofit	5434	8125	10902	24461	8154	20093	19750	19441	59284	19761
					0	0	0	0	0	0

Average Yearly Revenue Requirements

1996-98	$19,160
2006-08	$106,787

TABLE 2.5-1

Deliverability Of Measures

Measures	Deliverable 1	Somewhat Deliverable 2	Somewhat Undeliverable 3	Undeliverable 4	Average
Reduce Demand					
Conservation					
Residential	11	8	0	0	1.4
Commercial	8	9	2	0	1.7
Industrial	6	8	5	0	1.9
Load Management	5	9	5	0	2.0
Fuel Switching	7	9	3	0	1.8
Transmission					
500-kV Line					
New Corridor	0	4	9	6	3.1
Expanded ROW	2	11	5	1	2.3
Existing ROW	10	7	2	0	1.6
Voltage Support					
Series Capacitiors	9	9	0	0	1.5
Static Var Comp	10	7	0	0	1.4
Curtailment					
Industrial Contracts	2	11	5	0	2.2
Co-op Contracts	1	12	5	0	2.2
Local Generation					
Hydroelectric					
Large Impound	0	1	5	13	3.6
Small Impound	0	11	8	0	2.4
Run of River	1	11	4	2	2.4
Combust Turbines					
Hydro Firming	4	13	1	0	1.8
Peaking	8	9	2	0	1.7
Cogeneration					
Fuel - Gas	10	9	0	0	1.5
Fuel - Oil	4	8	5	1	2.2
Fuel - Biomass	4	5	8	0	2.2
Fuel - Coal	0	5	10	4	2.9
WNP-3	0	0	6	13	3.7
No Action	3	4	4	7	2.8

* Numbers reflect votes by 19 Sounding Board members

TABLE 2.6-1

Measure Reliability

		Unit Size	Number of Units	Fail Rate	Comm Mode	Rank
1	Acc Industrial	1 kW	100,000's	0.0%	N	1
2	Comm Retrofit	2 kW	1,000's	0.0%	N	1
3	Low Flo Shr Hds	0.06 kW	100,000's	0.0%	N	1
4	Fuel Switching	6 kW	100,000's	0.0%	N	1
5	Acc Weather	1 kW	100,000's	0.0%	N	1
6	Firming SCCT	70	5	11.0%	N	2
7	Small hydro	1-10	50	3.0%	N	2
8	Voltage Support 1	200	2	0.5%	Y	2
9	Transmission	1000	2	0.1%	Y	2
10	Voltage Support 2	200	5	0.5%	Y	2
11	Curtailment	0.1-100	500	?	Y	2
12	Cogen 1	0.1-500	20	10.0%	N	2
13	Peaking SCCT	70	11	11.0%	N	2
14	Water Htr Control	1 kW	100,000's	?	Y	2
15	Time of Use Rates	1 kW	100,000's	?	?	2
16	Cogen 2	0.1-500	20	10.0%	N	2
17	Coal	250	250	8.0%	N	3
18	WNP3	1240	1	24.0%	N	4