Getting to Code:

Economic Costs and Benefits of
Developing and Implementing
Washington State's Residential
Energy Code, 1983-2003

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Part One: Narrative Summary

Introduction

The nature of residential construction makes it possible to standardize changes in construction practices relatively quickly if they are proven to be easy to implement and are cost-effective. Small increments of energy efficiency in each newly constructed housing unit yield huge systemwide energy savings because large numbers of units are built and they last a long time. For example, about 22,000 electrically heated single and multifamily units were built in Washington in 1992. Although annual expenditures for conservation measures may appear large in their absolute numbers, they are relatively small when viewed against the large, persistent energy savings they produce.

An analysis conducted by the Washington State Energy Office (WSEO) that covers the energy conservation efforts for new residential construction in Washington State supports this perspective.

Background

The first residential energy code in Washington State was created in 1978 and revised in 1980. The 1980 code became the baseline for later analysis of potential electrical energy savings from more stringent code measures. Also in 1980, Congress passed the Northwest Power Planning and Conservation Act which created the Northwest Power Planning Council (Power Council). The Act gave the Power Council authority to adopt Model Conservation Standards (MCS) for electrical energy use in newly constructed buildings.

In 1983, the Power Council adopted its first regional Power Plan, which included an appendix setting forth the first Model Conservation Standards for electrically heated residential buildings. Starting with the adoption of these 1983 standards, the Power Council, through the Bonneville Power Administration (BPA), began to develop a strategy to get MCS implemented through building codes in each of the four Northwest states: Washington, Oregon, Idaho, and Montana. (See also Schwartz, H. 1990, which brings the story through 1990).

The Power Council's strategy ultimately consisted of four parts:

1. Testing and demonstrating conservation measures (e.g., insulation levels, window specifications, air infiltration reductions) in houses built to the MCS standards. The Residential Standards Demonstration Project (RSDP) and the Residential Construction Demonstration Project (RCDP) were the two most significant demonstration projects.
2. Offering incentive programs (e.g., the Super Good Cents program) via BPA's customer utilities to pay builders and buyers of new homes for part of the incremental cost of energy-efficient construction.
3. Offering incentive programs (e.g., Early Adopter and Northwest Energy Code programs) that encourage local governments to voluntarily adopt the MCS as their local energy code.
4. Providing technical and financial assistance to and through the states in order to facilitate adoption of statewide MCS-level residential energy codes.

In 1986, the Washington State Legislature passed a law that required the Washington State Energy Code (WSEC) be brought about halfway from the 1980 code

toward the MCS and specified that further studies be conducted to determine the cost effectiveness of the full MCS. In 1990, based on those studies, the Legislature passed a law requiring the WSEC be raised to MCS levels. Other provisions of the same legislation in effect required the Bonneville Power Administration and utilities to partially offset the incremental costs of the new code by providing payments to "owners at time of construction" of new buildings and by funding enforcement assistance for local governments. The code went into effect on July 1, 1991.

Conclusion

Developing and implementing the 1991 WSEC/MCS has been a long and expensive process. Over a 20-year period (1983-2003), the Bonneville Power Administration and Washington State utilities will have spent about \$112 million to develop, demonstrate, write, enforce, and support the Code. Figure 1 shows the percentage of MCS-related expenditures spent in each program category. Figure 2, on the next page shows expenditures by type of activity. All dollar figures are stated in constant 1990 dollars, unless otherwise specified.

These efforts will capture between 150.5 and 163.9 aMW for all the electric utilities in Washington state through 2003. The total cost to all parties for this resource will be approximately \$779 million or between 18.6 and 20.3 mills/kWh. Of that total cost, BPA will have paid \$112 million or between 2.7 and 2.9 mills/kWh. Modeling of the northwest electricity system by Northwest Power Planning Council staff indicates that the electricity saved is worth between \$1.2 billion and \$1.3 billion or roughly 31.2 mills/kWh. In other words, BPA and the utility system would need to spend 31.2 mills/kWh to obtain through a mix of conservation and generation what they receive for 3 mills/kWh through conservation alone. See Figure 3, Cost of MCS vs. Value of Energy Saved.

A utility cost of 3 mills leverages an acquisition program which has costs to society as a whole of 20 mills, but which yields significantly greater benefits—a resource worth 31 mills. WSEO's analysis indicates that the costs of implementing the 1991 WSEC/MCS are a wise investment for the utility system, costing the system less than three mills/kWh and that, as predicted, societal benefits do exceed societal costs.

Figure 1

Figure 2

Figure 3

Part Two: Method of Investigation

The analysis conducted by the Washington State Energy Office required three investigative steps: compiling data about BPA expenditures, estimating energy savings, and analyzing the cost per kWh.

BPA Expenditures

To determine BPA expenditures, we had to identify relevant programs and related expenditure data where available, estimate expenditures where data were not available, and project future expenditures. (Attachment A contains a breakdown of expenditures.) We chose all of BPA/WSEO programs that were designed either to move Washington toward adoption of the code or to implement it successfully. Table 1 summarizes the programs' years of operation and expenditures.

Table 1
Residential MCS-Related Program Expenditures

Period	Program	\$1990
1983-1987	Early Adopter	\$12,658,228
1983-1991	Residential Standards Demonstration Project	\$4,275,523
1983-1991	Residential Construction Demonstration Project	\$5,541,253
1986-1991	Super Good Cents	\$21,547,331
1987-1991	Northwest Energy Code	\$14,754,238
1991-1995	WSEC Program	\$12,079,471
1991-1995	WSEC Compliance Payments	\$28,184,098
1983-1992	Bonneville Overhead	\$10,000,000
1996-2003	Post WSEC Support	\$3,200,000
	Total	\$112,240,142

■ Residential Standards Demonstration Project (RSDP) and Residential Construction Demonstration Project (RCDP)

Expenditure period: 1983-1991 (RSDP); 1983-1991 (RCDP)

Cost: \$9,820,000

These research and demonstration projects demonstrated and tested the effectiveness and cost-effectiveness of MCS measures. The work was done by the four states in the region under contract to BPA.

Expenditures reported in Attachment A include all expenditures by WSEO and all other project expenditures in Washington State. Administrative costs of other states have been excluded.

■ Super Good Cents (SGC) Program

Expenditure period: 1986-1991

Cost: \$21,550,000

In this incentive program, utilities, through agreements with BPA, paid incentives to builders of MCS-level homes. Additionally, significant expenditures on

marketing and advertising increased the acceptance of and demand for energy-efficient houses.

■ Early Adopter Program

Expenditure period: 1983-1987
Estimated cost: \$12,660,000

Prior to the introduction of the Northwest Energy Code program, BPA ran a pilot program to encourage adoption of MCS-level codes by local governments. A few Washington governments participated, among them the City of Tacoma was the largest.

■ Northwest Energy Code (NWECC) Program

Expenditure period: 1987-1991
Cost: \$14,750,000

Provided financial support to local governments that voluntarily adopted the NWECC prior to March 1, 1990, and provided incentive payments to builders of code homes.

We obtained the latest data for which reliable total costs were available from BPA. WSEO staff extrapolated the remaining data, based on patterns in the totals provided, to identify a total expenditure amount.

■ State-Local Technical Assistance

Expenditure period: 1985-1991

Through a cooperative agreement with the State of Washington, BPA provided WSEO with funding for MCS development and technical assistance.

Expenditures were derived from records and estimates from WSEO program managers and are included under the NWECC program for the purposes of charts and tables.

■ WSEC Program

Expenditure period: 1991-1995
Estimated cost: \$12,080,000

Provides training, technical assistance, and financial assistance to local governments for WSEC enforcement.

Projected expenditures for the WSEC program are based on the budget agreed to by WSEO, BPA, and Washington utilities and assume expenditure of the entire program budget.

■ WSEC Compliance Payments

Expenditure Period: 1991-1996

Estimated Cost: \$28,180,000

The Revised Code of Washington 19.27A.035 mandates utilities to make payments to the owners at the time of construction of certain newly constructed residential buildings with electric resistance space heat. BPA is in effect required by the same law to reimburse its customer utilities for those payments.

Estimates for compliance payments were arrived at by estimating electric housing starts for the four-year period required by law (July 1, 1991—June 30, 1995) and assuming that payments will be made for every eligible unit.

■ BPA Administrative Overhead

Expenditure Period: 1983-1992

Estimated Cost: \$10,000,000

We have estimated BPA's administrative costs, both at the central office in Portland and at area offices in Seattle, Spokane, and Walla Walla, to be 10 percent of BPA's programmatic expenses, or roughly another \$10,000,000.

■ Post-WSEC Support

Expenditure Period: 1996-2003

Estimated Cost: \$3,200,000

We estimated expenditures of \$400,000 per year for years beyond 1995 because we assumed BPA and the utility system will have to continue some minimum level of expenditure on energy code activities.

The sum of all of these expenditures comes to approximately \$112 million. Given that expenditures on WSEC compliance payments are probably significantly overestimated because of an unexpected decline in housing starts during the early '90s, it is unlikely that any other expenditures that were inadvertently excluded would make actual totals any higher than \$112 million.

Estimating Energy Savings

Key variables in estimating energy savings are the baseline from which savings are determined, the number of housing units built that are more energy efficient than the base case, and the energy savings per unit.

Two methods have been developed to calculate energy savings that result from the move toward an MCS-level code in Washington State. These two methods yield somewhat different results, providing a range of probable savings. It is necessary to explain both methods. Most likely, the savings fall somewhere between the two values; hence, the likely cost per kWh of the WSEC also falls between the two different values.

The first method we called the WSEO/NWPPC method since it has been used by WSEO and the NWPPC in developing estimates of the savings from implementing MCS (Byers, 1989). The second we call the BPA/Oak Ridge method since it was used by Oak Ridge National Labs in its study done under contract to BPA (Brown, et. al., 1991).

■ WSEO/NWPPC Method

In developing the WSEO/NWPPC method, we used the 1980 WSEC as the baseline because development of MCS by the NWPPC and the subsequent region-wide implementation of MCS began in 1981 as an attempt to move the region beyond building practices current at that time. The first expenditures in Washington State began as early as 1983 with the RSDP program. The 1986 WSEC was passed as a interim point toward full implementation of MCS. Therefore, we needed to measure the savings in homes built to the 1986 code, the 1991 code, and the incentive program standards (SGC, NWECC) in terms of the their incremental savings over the 1980 code.

Our principal source for data about units built and estimated to be built was the NWPPC. (See the "New Electrically Heated Residential Units" column of either Table 2 or 3.) For simplicity we ignored incremental savings of NWECC and SGC units (about 15,000) beyond the 1986 code and use only units built to the 1986 code and to the 1991 code. As a result, the estimate savings are slightly lower than they would be if NWECC and SGC units had been included—about two years' worth of 1991 code-level savings for these units. Similarly, the NWPPC probably underestimates the number of multi-family units to be built from 1991-2003, thereby leading to a further underestimate of energy savings.

Annual energy savings are accumulated through the year 2003 by using forecasts of housing starts and data on actual housing starts. These data indicate that 204,541 multifamily and 223,334 single family electrically heated units will have been built in the period 1986-2003. (See Table 2 on the next page for the year-by-year breakdown). The year 2003 is somewhat arbitrary. We chose it because it corresponds to the accelerated acquisition path of the Conservation Implementation Plan, a part of BPA's 1992 Resource Program, and because it is close enough to the present that we can have some confidence in housing estimates.

We calculated energy savings by first finding savings per unit per year. Using data from the 1989 WSEO study, *Cost-effectiveness of Residential Building Energy Codes*, we estimated that the 1986 energy code saved 1.7 kWh/square foot/year in Western Washington (climate zone 1) and 2.39 kWh/single family (sf) in Eastern Washington (climate zone 2). The same study estimates additional savings from the 1991 code at 1.17 and 1.84 kWh/sf/year for climate zones 1 and 2 respectively. Based on average unit size of 840 square feet for multifamily and 1650 square feet for single family, we were able to calculate cumulative savings through 2003 of all electrically heated units built in each year. Total savings estimated in this manner are 163.9 aMW.

Table 2
Annual MegaWatt Savings Attributable to MCS in Washington Using WSEO Assumptions

Year	New Electrically Heated Residential Units		Electricity		aMW		Annual Measure Costs		Cumulative
	Single Family	Multi Family	Savings (GWH)		per yr	cumulative	(1990\$)	PV (1990\$)	(million \$)
			New	per yr					
1981	8,969	8,555							
1982	6,844	5,561							
1983	11,118	7,873							
1984	10,672	12,232							
1985	10,224	16,590							
1986	11,555	15,453	55.9	55.9	6.4	6.4	30,820,425	34,688,660	35
1987	11,977	16,541	58.4	114.3	6.7	13.0	32,340,474	35,339,309	70
1988	12,890	21,214	67.5	181.8	7.7	20.7	37,536,831	39,822,824	110
1989	15,726	19,257	73.3	255.0	8.4	29.1	40,492,708	41,707,489	152
1990	14,281	14,178	61.7	316.7	7.0	36.2	34,101,837	34,101,837	186
1991	12,835	9,100	85.1	401.8	9.7	45.9	49,855,648	48,403,542	234
1992	12,835	9,100	85.1	486.9	9.7	55.6	49,855,648	46,993,730	281
1993	12,835	9,100	85.1	571.9	9.7	65.3	49,855,648	45,624,980	327
1994	12,835	9,100	85.1	657.0	9.7	75.0	49,855,648	44,296,097	371
1995	12,835	9,100	85.1	742.1	9.7	84.7	49,855,648	43,005,920	414
1996	13,230	9,331	87.6	829.6	10.0	94.7	51,318,349	42,978,310	457
1997	13,230	9,331	87.6	917.2	10.0	104.7	51,318,349	41,726,514	499
1998	13,230	9,331	87.6	1004.8	10.0	114.7	51,318,349	40,511,179	539
1999	13,230	9,331	87.6	1092.3	10.0	124.7	51,318,349	39,331,242	579
2000	13,230	9,331	87.6	1179.9	10.0	134.7	51,318,349	38,185,671	617
2001	12,885	9,129	85.4	1265.3	9.7	144.4	50,040,185	36,150,095	653
2002	12,885	9,129	85.4	1350.7	9.7	154.2	50,040,185	35,097,179	688
2003	12,885	9,129	85.4	1436.1	9.7	163.9	50,040,185	34,074,931	722
TOTAL	283,235	256,996							

Table 3
Annual MegaWatt Savings Attributable to MCS in Washington Using Oak Ridge Assumptions

Year	New Electrically Heated Residential Units		Electricity		aMW		Annual Measure Costs		Cumulative
	Single Family	Multi Family	Savings (GWH)		per yr	cumulative	(1990\$)	PV (1990\$)	(million \$)
			New	per yr					
1981	8,969	8,555							
1982	6,844	5,561							
1983	11,118	7,873							
1984	10,672	12,232							
1985	10,224	16,590							
1986	11,555	15,453	55.9	55.9	6.4	6.4	30,820,425	34,688,660	35
1987	11,977	16,541	58.4	114.3	6.7	13.0	32,340,474	35,339,309	70
1988	12,890	21,214	67.5	181.8	7.7	20.7	37,536,831	39,822,824	110
1989	15,726	19,257	73.3	255.0	8.4	29.1	40,492,708	41,707,489	152
1990	14,281	14,178	61.7	316.7	7.0	36.2	34,101,837	34,101,837	186
1991	12,835	9,100	76.1	392.9	8.7	44.8	49,855,648	48,403,542	234
1992	12,835	9,100	76.1	469.0	8.7	53.5	49,855,648	46,993,730	281
1993	12,835	9,100	76.1	545.1	8.7	62.2	49,855,648	45,624,980	327
1994	12,835	9,100	76.1	621.3	8.7	70.9	49,855,648	44,296,097	371
1995	12,835	9,100	76.1	697.4	8.7	79.6	49,855,648	43,005,920	414
1996	13,230	9,331	78.4	775.7	8.9	88.6	51,318,349	42,978,310	457
1997	13,230	9,331	78.4	854.1	8.9	97.5	51,318,349	41,726,514	499
1998	13,230	9,331	78.4	932.5	8.9	106.4	51,318,349	40,511,179	539
1999	13,230	9,331	78.4	1010.8	8.9	115.4	51,318,349	39,331,242	579
2000	13,230	9,331	78.4	1089.2	8.9	124.3	51,318,349	38,185,671	617
2001	12,885	9,129	76.4	1165.6	8.7	133.1	50,040,185	36,150,095	653
2002	12,885	9,129	76.4	1242.0	8.7	141.8	50,040,185	35,097,179	688
2003	12,885	9,129	76.4	1318.4	8.7	150.5	50,040,185	34,074,931	722
TOTAL	283,235	256,996							

■ BPA/Oak Ridge Method

Instead of comparing prototypical houses built to the 1986 WSEC and MCS/1991 WSEC levels to a single baseline of the 1980 WSEC, Oak Ridge and BPA compared actual energy consumption in a sample of houses built to MCS under the Super Good Cents and Early Adopter programs to energy consumption in a sample of non-MCS houses built at the same time (1987) in the region. Thus, the base comparison in the BPA/Oak Ridge method is MCS versus current practice not MCS versus 1980 WSEC and 1986 WSEC as in the WSEO/NWPPC method. Since practice at that time included houses built to the 1986 WSEC and increasingly stringent Oregon codes and reflects the effects of market forces that may be independent of the drive toward more efficient energy codes, energy savings in the BPA/ Oak Ridge method are less than in the WSEO/NWPPC method.¹ Simply stated, the WSEO method employs a fixed base case (existing building code) and the Oak Ridge study uses a variable base case (current practice). There are arguments for both methods since a case can be made that the practice at that time would have become more energy efficient even without the push throughout the region for MCS. On the other hand, it is also likely that the coordinated movement of utilities and Washington State local governments toward MCS and more stringent codes pushed building practices and codes much further than would have been the case without all of the regionwide efforts.

The Oak Ridge study concludes that MCS homes consume .9 kWh/square foot less of electricity than non-MCS homes. This is .6 kWh/square (or 40 percent) less than the savings over the 1986 WSEC base found by WSEO and the NWPPC for typical Washington home when the savings in Western and Eastern Washington homes are averaged (pp. 6.6-7, 7.5). When just Western Washington homes are considered, the difference from the two methods is much less: .27 kWh/square foot or 23 percent. Since 90 percent of new electrically heated homes in Washington are built in Western Washington, much of the statewide difference in energy savings between the BPA/Oak Ridge and WSEO/NWPPC methods disappears. And when we consider that the methodological differences only involve going from 1987 practice to MCS code levels, the differences narrow even further. When we recomputed calculations performed for finding total energy savings using the WSEO/NWPPC method by substituting .9 kWh/square foot for houses built after 1991 to the WSEC, the analysis yielded a total savings of 150.5 aMW or an 8 percent reduction. The results are displayed in Table 3.

Using either method, the savings projected here reflect actual and estimated housing starts from 1986 through 2003. Not included are savings these houses will provide beyond 2003, or savings attributable to houses built after 2003. The energy saved by adopting and implementing an MCS-level code in Washington cannot be determined precisely. Most likely, the savings lie within a range from 150.5 to 163.9 aMW.

¹ Oak Ridge staff included many Oregon homes in its base case; newly constructed Oregon houses were more energy efficient in 1987 than those built in Washington during the same time period.

Estimating Cost Per kWh

■ Cost to BPA

Once we knew the cumulative electrical energy savings through 2003 and the total cost to BPA of acquiring that savings, we were in a position to calculate the utility cost per kWh. This calculation is necessary because kWh/hour costs are used to determine and rank the cost-effectiveness of acquisition programs and measures. BPA's current avoided cost for acquisition of new resources is 56 mills. Converting 163.9 aMW to kWh/hours yields 1436 million kWh/year while converting 150.5 aMW yields 1318 million kWh/year. Using a 3 percent social discount rate yields a capital recovery factor of .03434 for a 70-year period (the average lifetime of each building). The cost to BPA using the high and low estimates of energy savings can then be calculated as follows:

$$.03434 \times \$112 \text{ million} + 1436 \text{ million kWh or } 2.7 \text{ mills/kWh}$$

$$.03434 \times \$112 \text{ million} + 1318 \text{ million kWh or } 2.9 \text{ mills/kWh}$$

■ Total Societal Cost

BPA expenditures are not the total societal cost of acquiring the 150.5 to 163.9 aMW resource. Leaving aside unknown amounts such as unreimbursed expenditures by local governments for code enforcement—and ignoring intangible benefits such as greater comfort and less environmental impact—we looked at increased costs to builders for materials and labor needed to build to more stringent code levels. Once again using data from WSEO's 1989 cost-effectiveness study, we determined that total code measure costs are \$.96 and \$.74 per square foot for the 1986 and 1991 energy codes respectively in Western Washington. Comparable costs for Eastern Washington are \$1.01 and \$1.22.

Using the same methodology used for calculating energy savings and using the same data for single and multi-family units built and their average size (see above), we were able to calculate the amount of money spent on direct code measures (including builder mark-up). Again, assuming a social discount rate of 3 percent and including an inflation factor of 5 percent, we calculated the present value of money spent on code measures as 722 million 1990\$.

To arrive at the total cost to society we added the portion of the \$112 million that BPA did not expend to offset construction costs (builder payments—of \$49 million) to the costs of code measures to arrive at a total societal cost of \$779 million.²

Again, if we assume a social perspective discount rate of 3 percent real we get a capital recovery factor of .03434 to amortize this investment over the 70 year expected life of the energy savings. Total kWh savings as previously calculated are between 1318 and 1436 million kWh/year. The total resource cost to obtain the high and low energy savings estimates is then:

$$.03434 \times \$779 \text{ million} + 1436 \times 10^6 \text{ kWh, or } 18.6 \text{ mills/kWh.}$$

2 Note that expenditures by investor-owned utilities in Washington State are not included in this total, except for owner/builder compliance payments. The totals are not enough to cause meaningful changes.

$.03434 \times \$779 \text{ million} + 1318 \times 10^6 \text{ kWh}$, or 20.3 mills/kWh.

■ Value of Conserved Energy

An Integrated System for Analysis of Acquisitions (ISSAC) run was done by NWPPC staff to estimate the value of the 163.9 aMW (in 1990\$) to the region's electricity grid. It asks the question, "How much more would the electricity system cost to operate (debt and running costs) if 150.5 to 163.9 aMW had to be replaced. The savings making up this total are modeled as replaced in each year. The ISAAC run represents the average of 100 simulations representing a random sampling of all load paths. The average change in system costs to replace 163.9 aMW is \$1.299 billion (present value 1990\$ again assuming a 3 percent real discount rate). Standard deviation is \$400 million and estimates range from \$593 million (under low growth) to \$2.42 billion (under high growth). Accepting the average change in system costs as the best estimate of the replacement value of the conserved energy, we can calculate the cost in mills to replace energy saved by the WSEC:

$.03434 \times \$1299 \text{ million} + 1436 \times 10^6 \text{ kWh}$, or 31.2 mills/kWh.

Assuming a proportionate change in system costs if 150.5 aMW were to be replaced, the average would be \$1.193 billion dollars, again yielding 31.2 mills:

$.03434 \times \$1193 \text{ million} + 1318 \times 10^6 \text{ kWh}$, or 31.2 mills/kWh.

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YEAR	PROGRAM	ACTIVITY	TYPE	EXPENDED	\$1990
1990	WSEC PGM	COOPERATIVE AGREEMENT	A	1,000,000	1,000,000
1990	WSEC PGM	IMPLEMENTATION AGREEMENT	L	440,000	440,000
1990	WSEC PGM	COOPERATIVE AGREEMENT	T	300,000	300,000
1990	WSEC PGM	IMPLEMENTATION AGREEMENT	T	273,000	273,000
1990	WSEC PGM	IMPLEMENTATION AGREEMENT	A	155,000	155,000
1990	WSEC PGM	IMPLEMENTATION AGREEMENT	O	155,000	155,000
1991	WSEC PGM	IMPLEMENTATION AGREEMENT	L	1,937,000	1,844,762
1991	WSEC PGM	IMPLEMENTATION AGREEMENT	T	370,000	352,381
1991	WSEC PGM	IMPLEMENTATION AGREEMENT	O	255,000	242,857
1991	WSEC PGM	IMPLEMENTATION AGREEMENT	A	215,000	204,762
1992	WSEC COMPLIANCE PMTS		B	8,291,580	7,520,707
1992	WSEC PGM	IMPLEMENTATION AGREEMENT	L	2,457,000	2,228,571
1992	WSEC PGM	IMPLEMENTATION AGREEMENT	T	245,000	222,222
1992	WSEC PGM	IMPLEMENTATION AGREEMENT	O	200,000	181,406
1992	WSEC PGM	IMPLEMENTATION AGREEMENT	A	160,000	145,125
1993	WSEC COMPLIANCE PMTS		B	8,754,150	7,562,327
1993	WSEC PGM	IMPLEMENTATION AGREEMENT	L	2,128,000	1,838,286
1993	WSEC PGM	IMPLEMENTATION AGREEMENT	O	200,000	172,771
1993	WSEC PGM	IMPLEMENTATION AGREEMENT	A	160,000	138,217
1993	WSEC PGM	IMPLEMENTATION AGREEMENT	T	120,000	103,663
1994	WSEC COMPLIANCE PMTS		B	8,397,690	6,908,836
1994	WSEC PGM	IMPLEMENTATION AGREEMENT	L	2,050,000	1,686,549
1994	WSEC PGM	IMPLEMENTATION AGREEMENT	O	200,000	164,541
1994	WSEC PGM	IMPLEMENTATION AGREEMENT	A	160,000	131,633
1994	WSEC PGM	IMPLEMENTATION AGREEMENT	T	120,000	98,725
1995	WSEC COMPLIANCE PMTS		B	7,903,140	6,192,228
1986	SGC	FINANCIAL INCENTIVES	B	594,700	687,514
1986	SGC	SALES SUPPORT	T	326,650	377,630
1986	SGC	ADS & PROMOTION	P	254,304	293,993
1986	SGC	OTHER	O	44,525	51,474
1986	SGC	SUB-METERING	R	7,770	8,983
1987	SGC	FINANCIAL INCENTIVES	B	1,652,472	1,850,473
1987	SGC	SALES SUPPORT	T	829,172	928,524
1987	SGC	ADS & PROMOTION	P	444,315	497,553
1987	SGC	SUB-METERING	R	45,352	50,786
1987	SGC	OTHER	O	36,185	40,521
1987	SGC	DATA COLLECTION	R	420	470
1988	SGC	FINANCIAL INCENTIVES	B	1,871,330	2,029,642
1988	SGC	SALES SUPPORT	T	979,148	1,061,983
1988	SGC	ADS & PROMOTION	P	649,880	704,860
1988	SGC	SUB-METERING	R	59,193	64,201
1988	SGC	OTHER	O	56,917	61,732
1988	SGC	DATA COLLECTION	R	5,282	5,729
1989	SGC	FINANCIAL INCENTIVES	B	2,585,482	2,693,210
1989	SGC	SALES SUPPORT	T	668,377	696,226
1989	SGC	ADS & PROMOTION	P	526,262	548,189
1989	SGC	OTHER	O	114,066	118,818
1989	SGC	SUB-METERING	R	66,600	69,375
1989	SGC	DATA COLLECTION	R	3,958	4,122
1990	SGC	FINANCIAL INCENTIVES	B	3,358,882	3,358,882
1990	SGC	SALES SUPPORT	T	687,333	687,333
1990	SGC	ADS & PROMOTION	P	428,385	428,385
1990	SGC	OTHER	O	63,738	63,738
1990	SGC	SUB-METERING	R	38,450	38,450
1990	SGC	DATA COLLECTION	R	550	550
1991	SGC	EST Total	B	4,330,186	4,123,987
1983	RSDP	ALL	R	3,377,663	4,275,523
1985	RCDP	CYCLE 1: 10/85 - 10/87	R	1,948,060	2,310,866
1987	RCDP	CYCLE 2: 10/87 - 6/91	R	2,305,065	2,581,260

TYPE: B=Bldr Pmts, L=Local Gov't Support, O=Overhead&Other, R=Research, T=Training, P=Promotion, A=Tech Assistance

YEAR	PROGRAM	ACTIVITY	TYPE	EXPENDED	\$1990
1989	RCDP	CYCLE 3: 6/89 - 6/92	R	623,162	649,127
1986	NWEC	COOPERATIVE AGREEMENT	T	100,000	115,607
1987	NWEC	COOPERATIVE AGREEMENT	T	150,000	167,973
1988	NWEC	BLDR PAYMENTS	B	1,996,645	2,165,559
1988	NWEC	COOPERATIVE AGREEMENT	T	200,000	216,920
1988	NWEC	INCENTIVE ADMINISTRATION	B	27,450	29,772
1988	NWEC	ADOPTION/STARTUP	L	6,845	7,425
1988	NWEC	RES ENFORCEMENT	L	3,625	3,932
1988	NWEC	COM ENFORCEMENT	L	800	868
1989	NWEC	BLDR PAYMENTS	B	3,021,589	3,147,489
1989	NWEC	COOPERATIVE AGREEMENT	A	500,000	520,833
1989	NWEC	COOPERATIVE AGREEMENT	T	250,000	260,417
1989	NWEC	RES ENFORCEMENT	L	53,015	55,224
1989	NWEC	INCENTIVE ADMINISTRATION	B	42,800	44,583
1989	NWEC	COM ENFORCEMENT	L	39,040	40,667
1989	NWEC	ADOPTION/STARTUP	L	18,639	19,415
1989	NWEC	TRAINING	T	7,161	7,459
1990	NWEC	BLDR PAYMENTS	B	2,473,301	2,473,301
1990	NWEC	ADOPTION/STARTUP	L	371,100	371,100
1990	NWEC	OTHER	O	248,386	248,386
1990	NWEC	TRAINING	T	237,943	237,943
1990	NWEC	RES ENFORCEMENT	L	82,095	82,095
1990	NWEC	COM ENFORCEMENT	L	48,255	48,255
1990	NWEC	INCENTIVE ADMINISTRATION	B	41,900	41,900
1991	NWEC	Est Total	B	4,669,472	4,447,116
1996		EST. CODE SUPPORT 1996	O	536,040	400,000
1997		EST. CODE SUPPORT 1997	O	562,840	400,000
1998		EST. CODE SUPPORT 1998	O	591,000	400,000
1999		EST. CODE SUPPORT 1999	O	620,560	400,000
2000		EST. CODE SUPPORT 2000	O	651,600	400,000
2001		EST. CODE SUPPORT 2001	O	684,200	400,000
2002		EST. CODE SUPPORT 2002	O	718,400	400,000
2003		EST. CODE SUPPORT 2003	O	754,320	400,000
1983	EARLY ADOPTER		L	10,000,000	12,658,228
1983		BPA OVERHEAD 1983	O	790,000	1,000,000
1984		BPA OVERHEAD 1984	O	819,000	1,000,000
1985		BPA OVERHEAD 1985	O	843,000	1,000,000
1986		BPA OVERHEAD 1986	O	865,000	1,000,000
1987		BPA OVERHEAD 1987	O	893,000	1,000,000
1988		BPA OVERHEAD 1988	O	922,000	1,000,000
1989		BPA OVERHEAD 1989	O	960,000	1,000,000
1990		BPA OVERHEAD 1990	O	1,000,000	1,000,000
1991		BPA OVERHEAD 1991	O	1,050,000	1,000,000
1992		BPA OVERHEAD 1992	O	1,102,500	1,000,000
TOTALS rounded to nearest 10,000				\$114,580,000	\$112,240,000

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