LARGE FILING SEPARATOR SHEET

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Direct Testimony
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Behalf of OCC

Table 57. Program Staffing Assumptions

Staffing	FTE	Fully Loaded Salary	Cost
Analyst and Support Staff	3.0	$80,000	$240,000
Managerial Staff	1.0	$120,000	$120,000
Total Staffing	**4.0**		**$360,000**

The program budget presented above includes all fixed and variable expenses paid by the program administrator. The last two columns of Table 56 shows total DSM spending per Vectren customer and as a percent of 2004 revenue, respectively. Spending ramps up gradually throughout the five-year implementation period, reaching a maximum of over nine dollars a customer and 0.7 percent of total revenue in year five. About two-thirds of the spending and 73 percent of the savings is expected to be associated with the Small Building program, primarily residential and small commercial space and water heat measures.

It is important to understand that actual expenditures will vary from planned expenditures in their timing and distribution between specific DSM programs. For this reason it is important for the program administrator to have flexibility in the administration of DSM program funding without having to obtain approval from the Public Utility Commission. We recommend that flexibility include the following, with each action subject to review and approval by the Advisory Board:

1. Roll over unspent funds within program budgets at end of year to categories within the same program in the next year
2. Reallocate program funds across line items within a program
3. Shift up to 25 percent of total budget among approved programs at any time within a program year

Having some flexibility in the administration of program funding will assist in the management of programs and enable staff to fine tune efforts for maximum resource effectiveness.

Expected Program Savings

Therm savings expected from the program are based on the designs and assumptions presented earlier in this report. Key assumptions affecting the annual savings and program cost effectiveness are shown in the table below.

Table 58. Summary of Program Assumptions

	Small Building	G/S EE	Customized	Hospitality	MF Buildings	EE Home Builders
Per Participant:						
Savings (therms)	198	1,998	10,900	1,542	1,367	387
Installed cost	$799	$10,050	$41,000	$6,225	$5,735	$1,920
Incentive	$150	$2,000	$20,000	$3,000	$2,500	$1,920
Program costs	$86	$152	$1,420	$212	$177	$129
Savings Life (years)	16.4	15.3	14.5	13.5	12.1	30.0
Net to Gross Ratio	0.90	0.90	0.70	0.70	0.70	0.90

Most of the items listed in Table 58 were addressed in the Program Plans section. The savings life is calculated from the life of individual measures weighted by program savings and represents the duration of energy savings flowing from a participant in the program. The net-to-gross ratio captures the effect of free riders, participants in the program who would have installed the energy efficient measures without the program. Higher ratios imply a lower rate of free riders in the program.

Annual therm savings across all programs are shown in the table below. Cumulative program activity is expected to result in nearly 11 million therms of annual savings. This represents approximately 1.4 percent of total therms delivered.

Table 59. Total Program Savings

	Small Building	G/S EE	Customized	Hospitality	MF Buildings	EE Home Builders	All Programs
	(thousands of therms)						
Year 1	521	110	44	48	44	25	791
Year 2	1,562	330	98	120	96	63	2,269
Year 3	3,125	659	174	216	154	113	4,442
Year 4	5,208	1,099	273	336	213	164	7,293
Year 5	7,812	1,538	371	456	272	214	10,664

Avoided Gas Costs

The avoided or marginal cost associated with a reduction in gas loads is of primary importance when evaluating the cost effectiveness of demand side management programs. These costs represent the value of an avoided therm of gas. Vectren's avoided costs are the reduction in the cost of supplying gas compared to what they would have been without the reduction in loads and include all incremental commodity, transmission, storage and distribution costs. Ideally, avoided costs are determined using a mathematical optimization approach that considers alternative supply side resources over time. The amount and timing of new investments in pipeline capacity and storage, for example, are identified in an avoided cost study.

Although Vectren North does not have are avoided cost study, they do make quarterly Gas Cost Adjustment (GCA) filings. These filings detail the anticipated demand and commodity costs expected in the quarter ahead. Demand costs are the fixed investments in infrastructure capacity, including transportation, storage and distribution facilities, required to meet anticipated demand. The table below shows capacity and commodity expenses per therm from a recent GCA filing (Cause No. 37394-GCA88).

Predominant Load Shape	Demand	Commodity	Total
Space Heat (RS 210/220/229)	0.1190	1.1568	1.2758
Non-Space Heat (RS 240)	0.0476	1.1568	1.2044

Demand costs per therm are dependent on the nature of the load served. System coincident peeking loads, such as space heating, have greater demand costs per therm served than non-seasonal loads, such as water heating. This relationship is reflected in Vectren's GCA filings, as shown in the table above. The demand costs per therm of space heat dominated loads are nearly twice as high as less seasonal loads. Although demand costs in the GCA filings are prepared by rate schedule, we will apply the demand costs according to predominant load shape affected by the energy efficiency program being assessed. A high efficiency residential water heater program, for example, would be evaluated using the demand costs associated non-space heat loads (RS 240).

Because cost effectiveness analysis considers the impacts of programs over a planning horizon that can be as long as 30 or 40 years, depending on the program, a forecast of demand and commodity cost must be developed. Based on their GCA filings and conversations with staff, Vectren does not appear to be capacity constrained. Demand costs are a relatively small percentage of the total cost of delivering a therm of gas to its customers. Given the small percentage of total costs, lack of known capacity constraints, and no detailed avoided cost study, we assume that demand costs increase over time at the same rate as general price inflation.

The long run outlook for commodity costs is one of the most important assumptions determining the cost effectiveness of DSM programs. A number of factors, including supply disruption from Gulf hurricanes, have caused natural gas prices to spike recently to record highs. Prices are likely to fall in the short-term as supply rebounds and demand moderates in the face of record high utility bills. Our analysis is concerned with both the short and long run, however, and fundamental supply and demand analysis suggest rising real prices for natural gas in the years ahead.

Our commodity forecast is based on Vectren's current portfolio of gas supply as reflected in GCA 88 and a melding of short and long-term price projections. We believe that Vectren's current portfolio of purchased gas is the best measure of their current commodity costs. In the long run, we adjust the current commodity costs using the percent change in natural gas prices forecast by the EIA in their 2005 outlook. The 2005 EIA forecast was published in February 2005, prior to the hurricane induced supply disruptions in the summer of 2005. Hence, we need a short-term price forecast in order to make the transition from current prices to our long term forecast. We used the NYMEX futures contract for natural gas for the near-term percent change in price forecast.

A detailed table showing the calculations of avoided energy costs by year is shown in Table 67 in Appendix D. A summary of these calculations is shown in Table 60 below.

Table 60. Real Levelized Avoided Cost per Therm

Savings Life	Space Heat Loads	Non-Space Heat Loads
5	0.9962	0.9248
10	0.9040	0.8326
15	0.8850	0.8136
20	0.8839	0.8125
25	0.8854	0.8140
30	0.8863	0.8149

Avoided costs are expressed in real levelized terms for the purposes of calculating the cost effectiveness of DSM programs. Real levelized costs reflect the annualized value of a therm of gas over a specific period. Due to the influence of very high commodity prices in the first few years of the forecast, real levelized costs are highest for programs with a five-year life of anticipated savings. With time, commodity prices bottom out and then rise again in real terms. This relationship is also born out in the table above.

Cost Effectiveness Results

In this section we present the findings of the cost effectiveness analysis which provides a systematic comparison of the program benefits and costs discussed in previous sections. Results are shown from the four perspectives mentioned at the beginning of this section. Net present value (NPV) and benefit-costs ratios are shown for all perspectives. The third measure used to assess cost effectiveness differs by perspectives.

The TRC perspective is the broadest of the tests represented in Table 61. As the name implies, TRC shows the total cost of the resource relative to supply side resources. The Participant Test shows the economics of program participation from the participant's perspective and reflects benefits from lower bills and incentive payments. Elements of program design, such as incentive payments, can greatly impact participant economics. Since we assumed that future marginal cost of gas and gas rates were identical, all programs fail the RIM Test. In other words, avoided energy costs are equally offset by lost revenue resulting in negative NPV when program costs are positive. However, the life-cycle rate impact is small, only three-tenths of a cent per therm increase in rates.[32] The Administrator's Cost Test reveals that when only costs paid by the program administrator are considered, the cost of the acquired resource is quite small ranging from less than 20 cents a therm for the Small Buildings and General Services Energy Efficiency Programs to under 50 cents for the Energy Efficient Builder Program.

[32] It should also be pointed out that overall rates and marginal cost may be lowered as a result of a downward shift in demand curve due to DSM programs. For this shift to be apparent in commodity costs, DSM implementation would need to be significant and perhaps regional in scope.

Table 61. Cost Effectiveness Results by Program

Perspective and CE Measure	Small Building	G/S EE	Customized	Hospitality	MF Buildings	EE Home Builders
Total Resource Cost						
Net Present Value (thousands of $)	$30,788	$3,326	$701	$667	$417	$1,171
Benefit-Cost Ratio	1.9	1.5	1.6	1.4	1.4	1.9
Real Levelized Cost ($/therm)[a]	$0.433	$0.560	$0.519	$0.577	$0.630	$0.456
Participant						
Net Present Value (thousands of $)	21,988	$2,877	$1,119	$1,265	$789	$1,268
Benefit-Cost Ratio	2.0	1.5	2.1	1.9	1.9	2.5
Simple Payback (years)	6	7	5	5	5	1
Ratepayer Impact						
Net Present Value (thousands of $)	$(13,182)	$(3,266)	$(968)	$(1,241)	$(724)	$(1,336)
Benefit-Cost Ratio	0.8	0.8	0.7	0.6	0.7	0.6
Lifecycle Revenue Impact ($/therm)	$0.002	$0.001	$0.000	$0.000	$0.000	$0.000
Administrator's Cost						
Net Present Value (thousands of $)	$47,156	$7,422	$963	$1,023	$688	$1,076
Benefit-Cost Ratio	4.6	3.3	2.0	1.8	1.9	1.8
Real Levelized Cost	$0.193	$0.249	$0.409	$0.448	$0.458	$0.491

[a] Refer to real levelized cost figures in Table 60. If real levelized program costs in Table 61 are lower than the real levelized avoided costs in Table 60, the program is cost effective.

An important finding is that all programs are cost effective from the TRC perspective and that rate impacts from the programs are negligible. Overall, the programs generate over $37 million in NPV benefits. These results are obtained using a base case avoided cost of gas forecast which, while based on published sources from recognized industry experts, we believe is conservatively low.

Global Assumptions

Certain global assumptions are required to calculate program cost effectiveness beyond those assumptions already discussed. These assumptions are shown in Table 62.

All tests except the Participant Test use a nominal discount rate of 8.34 percent, Vectren's weighted cost of capital. This translates to a real discount rate of 5.18 percent, assuming an inflation rate of 3 percent. The participant discount rate is set higher reflecting the cost of consumer capital. Externalities are set to zero percent meaning that no preferential treatment is given DSM resources over supply side options due to avoidance of environmental impact of gas supply. The Societal Test, a variant of the TRC Test, is not used in this report. The revenue requirements adder relates to the effects of rate basing utility expenditures. Revenue requirements of 20 percent mean that for every dollar of utility program expense, $1.20 needs to be collected through rates. System sales are used in life cycle rate impact calculations for the RIM Test.

Table 62. Global Assumptions Used in Cost Effectiveness Calculations

	Nominal	Real
Discount Rate		
Participant Test	16.00%	12.62%
Total Resource Cost Test	8.34%	5.18%
Ratepayer Impact Measure	8.34%	5.18%
Administrator's Cost Test	8.34%	5.18%
Societal Test	8.34%	5.18%
Escalation Rates		
Retail Electric Prices	3.00%	
Retail Gas Prices	3.00%	
General Price Inflation	3.00%	
Electric Marginal Costs	3.00%	
Gas Marginal Costs	3.00%	
Externality Adder	0%	
Revenue Requirements Adder (%)		
Electric	20.0%	
Gas	20.0%	
System Sales		
Millions of kWh	n/a	
Therms (millions)	754.0	

All forecasts contain risks, alternative scenarios that could lead to higher or lower numbers than projected. In the case of projected gas prices, we believe the risk to this forecast is clearly and significantly on the high side. If gas commodity costs move higher than projected, the benefits and cost effectiveness of the DSM programs presented in this report will be even greater than expected. The next section explores this risk to the forecast in greater detail.

VIII. ALTERNATIVE FORECAST AND POLICY PARAMETERS

Low-Income Area Policy Concerns

Members of our team have been doing low-income weatherization and payment assistance program evaluations since 1988. At first, we did not look much at policy consequences in the low-income area, nor was that requested as a part of the early evaluations. In the middle 1990's we did several low-income evaluations for gas and electric utilities and could not help but learn how hard utility and Community Based Organization staffs were working to make these projects succeed for the customers, yet customers were still having payment troubles.

This experience and hundreds of interviews with low-income and payment-troubled customers of utilities in different states and cities caused us to look systematically at the economic environment in which the programs are operating. Over a number of years we learned that the programs are "swimming against the tide," no matter how well the programs were implemented and maintained, a tide of economic adversity was gaining. As we write in the fall of 2005, there is no question about a rampant increase in the need for substantially increased assistance for low-income customers.

For example, as reported in Table 63, federal assistance, though very helpful, is not reliable and has deteriorated to about 51 percent nationally (in real terms) of the funding provided in 1982, even though utility bills are considerably higher than they were in 1982 (in real terms). Although the gap compared to 1982 funding has narrowed in recent years, federal funds are insufficient at a time when we need them most.

Table 63. LIHEAP, Valuable but Failing

Pattern of LIHEAP Funding (1982-2004)
(Prepared by Ryan N. Miller using Federal LIHEAP Data and a standard Deflator)

Fiscal Year	Appropriated	Contingency Funds	Total Available	2004 (Constant) Dollars	% of 2004	% of 1982
1982	$1,875,000		$1,875,000	$3,703,692	196%	100.00%
1983	$1,975,000		$1,975,000	$3,673,467	194%	99.18%
1984	$2,075,000		$2,075,000	$3,739,792	198%	100.97%
1985	$2,100,000		$2,100,000	$3,628,811	192%	97.98%
1986	$2,009,700		$2,009,700	$3,352,097	177%	90.51%
1987	$1,825,000		$1,825,000	$2,987,267	158%	80.66%
1988	$1,531,840		$1,531,840	$2,420,275	128%	65.35%
1989	$1,383,200		$1,383,200	$2,099,354	111%	56.68%
1990	$1,443,000		$1,443,000	$2,089,805	111%	56.42%
1991	$1,415,037	$195,177	$1,610,214	$2,212,495	117%	59.74%
1992	$1,500,000	$0	$1,500,000	$1,977,982	105%	53.41%
1993	$1,346,030	$0	$1,346,030	$1,723,251	91%	46.53%
1994	$1,662,392	$300,000	$1,737,392	$2,159,506	114%	58.31%
1995	$1,319,202	$100,000	$1,419,202	$1,719,307	91%	46.42%
1996	$900,000	$180,000	$1,080,000	$1,276,466	68%	34.46%
1997	$1,000,000	$215,000	$1,215,000	$1,394,198	74%	37.64%
1998	$1,000,000	$160,000	$1,160,000	$1,308,836	69%	35.34%
1999	$1,100,000	$175,299	$1,275,299	$1,416,268	75%	38.24%
2000	$1,100,000	$744,350	$1,844,350	$1,994,373	106%	53.85%
2001	$1,400,000	$455,650	$1,855,650	$1,959,562	104%	52.91%
2002	$1,700,000	$100,000	$1,800,000	$1,870,862	99%	50.51%
2003	$1,788,300	$200,000	$1,988,300	$2,034,031	108%	54.92%
2004	$1,789,380	$99,410	$1,888,790	$1,888,790	100%	51.00%

Note: Deflator at http://www.westegg.com/Inflation/

A new study from the Center on Budget and Policy Priorities indicates that, (using data from the US Department of Energy) nationally home heating costs for LIHEAP beneficiaries will increase 47.5 percent between last winter and the winter of 2006-2007.[33] This will be the largest single year increase since 1974. Figure 30 shows the effects of this increase on current funding. An increase of 50 percent on a family with a $300 energy bill would lead to a bill of $450. If that family received a $100 LIHEA benefit, their share would increase from $200 to $350, an increase of 75 percent. Simply providing a 50 percent increase in their LIHEA benefit (to $150) would still increase their share of the bill to $300 or 50 percent. In fact, it shows that to completely absorb the 50 percent increase in the household's energy bill, the LIHEA benefit amount would have to be increased 150 percent. This example illustrates the difficulties low-income families are experiencing in paying to heat their homes and the problems ahead.

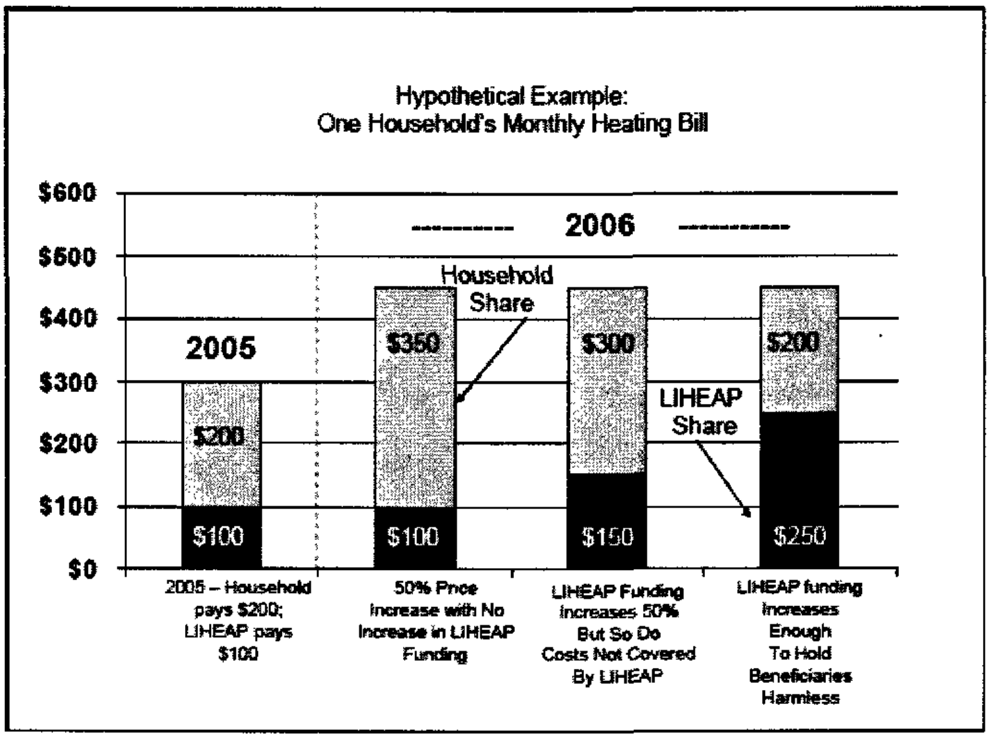

Figure 30. The Winter of 2005-2006 (from CBPP Study)

If we then look at what has happened to real income of low-income families in Indiana since around 1979, for lower-income (bottom quintile) families with children, there has been about a 22 percent drop (Figure 31). (This is conservative, since the last figure is for 1994-1995 prior to the end of the dot-com bubble, 9-11, and other major economic changes.)

[33] "Out in the Cold: How Much LIHEAP Funding Will Be Needed to Protect Beneficiaries from Rising Energy Prices?" Available from the Center for Budget and Policy Priorities website: http://www.cbpp.org/10-6-05bud.htm.

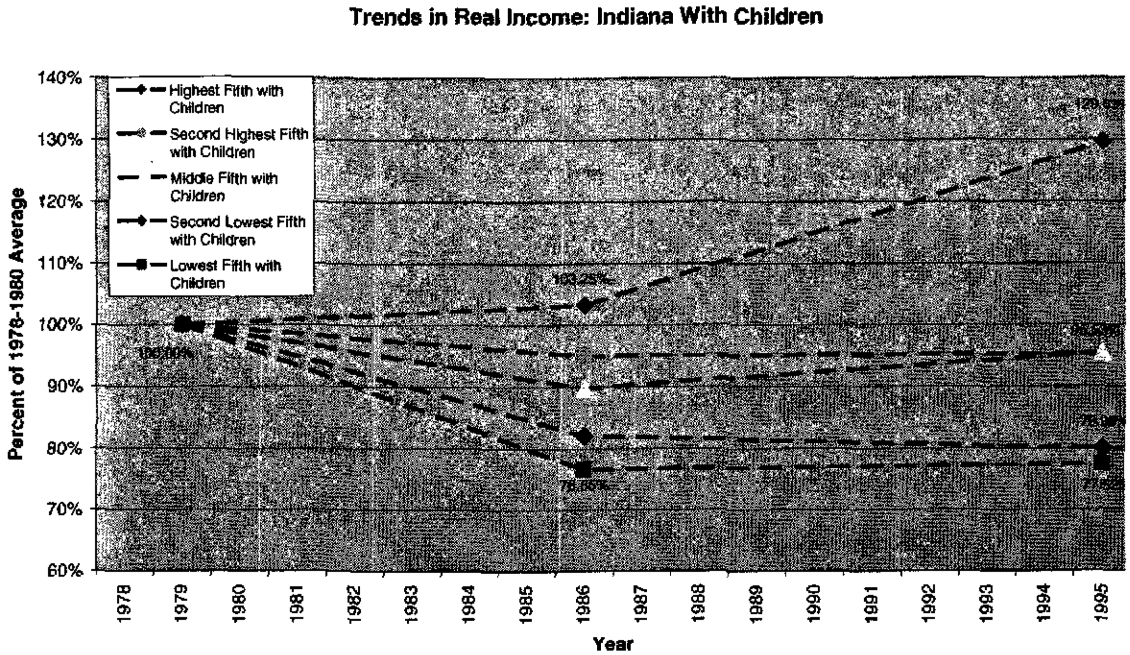

Figure 31. Trends in Real Income, Indiana Families with Children

If we put the first two bits of information together, we see a shortfall of 49 percent in LIHEAP that would require funding at 204 percent of the 2004 level plus an energy shock of 47.5 percent in the coming winter which raises the combined funding requirement to 422 percent of the 2004 level for the winter of 2005-2006 to bring resources even in real terms to those provided by LIHEAP in 1982.

Then, if we plan low-income assistance to be able to serve Indiana low-income families with children, the funding requirement to stay even with services in 1982 jumps to 541 percent of the 2004 LIHEAP allocation. That federal failure has to be made up by the state and utilities.

The remaining adjustment required to fully understand the real situation we face would be the real change in utility rates (1982 vs. 2004). We do not have those numbers to compare. Still, the need for additional funding or a new payment assistance program format (such as, Nevada or New Jersey) is overwhelming. In addition, the price effects of this year's hurricane damage to the US energy infrastructure are supposed to show up next year (the winter of 2006-2007).

Overall Policy Concerns – An Alternative Forecast

There are more problems. Gas production has peaked in the US with only small increases expected in the years ahead. Canadian gas imports, currently responsible for 10 to 15 percent of total US supply, are declining. EIA projections assume a 13 percent annual growth rate in LNG imports. Due mainly to the rapid and sustained increase in LNG imports, supply keeps pace with the 1.5 percent annual growth in demand projected by the EIA through 2025. As a result, the base case forecast shows price declines through 2011 and only modest increases after that. We feel that given the uncertainties embedded in the supply forecast, a realistic alternative with substantially tighter supplies and higher prices should be considered for planning purposes.

With much electricity generated with gas, there is an interaction effect on electricity prices. Also, when natural gas goes up dramatically, low-income and some moderate income customers have to shift to electric heat, one way or another, and this shift can radically deplete utility payment assistance budgets, first of the gas utilities, and then wipe out assistance budgets on the electric side. Compounding this problem is that US houses are built for central heat; they can be modified to provide for area heating (such as, wood heat, coal grates or corn stoves) but it will take intense effort and decades to make the necessary changes throughout the housing stock.

In addition, the consensus among scientists that global warming is real is very strong and that we are so far down this path that, were the government to begin an emergency response now, it would take at least a hundred or perhaps hundreds of years to restore normalcy.[34] Global warming may also be associated with intensity of hurricanes and the loss of coastal regions (in which much of US energy infrastructure is located) to the sea. This has the potential to further threaten the supply outlook.

Further, federal policy changes to fast track siting of LNG facilities at the expense of long-standing democratic decisions to protect natural areas have all of the characteristics of an emergency response to a serious energy supply situation. Supply constraints, including what may be an overly ambitious EIA LNG forecast, do not seem consistent with the declining price forecast embedded in the base-case scenario.

All of these factors point towards the series of benefits specified for the recommended DSM programs being far too low. We put forward a main forecast implicitly accepting industry consensus because that is the standard and proper practice for a DSM potential study and for development of program. We provide this alternative forecast to promote critical thinking about fundamental assumptions and to make us all alert to continuing changes in our energy environment. We need to focus continuing critical intelligences on these issues to ensure optimal response and workable mid-course corrections.

Policy Recommendations

1. There is a pressing need for a substantial multiple of last year's payment assistance funds. Vectren should continue to work through the American Gas Association (AGA) for additional federal funding.
2. Vectren should study the Nevada and New Jersey models for state assistance to complement LIHEAP, to develop recommendations to the Commission and/or the legislature for moving in those directions.
3. The solar option in the measures list (opting for legislative action to require solar site orientation and solar access for new construction) is a very promising least-cost and high effectiveness pathway. This is a quiet program that requires much effort and agreement of many parties, but it is a very powerful solar program and available and least cost. In contrast to the other programs, this is really a policy program and Vectren should adopt it as a policy position and see what progress can be made in this area.
4. If there is concern that gas supply shortages may lead to triage (as is currently happening in the Southeast as industrial customers are curtailed on interruptible rates that were probably never expected to be

[34] Welch, Craig, "Global Warming Hitting Northwest Hard, Researchers Warn," *Seattle Times*, Saturday, February 14, 2004. Also see, Luers, Amy Lind, "A Tale of Two Futures, California Feels the Heat," *Catalyst*, pp. 8-9, Fall 2004.

interrupted), then a rationale outside the standard cost tests exists to develop "stand alone" energy systems for specific household end-uses.

This is a different strategy than current "mainline" DSM programs and would involve removing some end-uses from grid and pipe dependence. For example, solar water heaters can be equipped with small photo-voltaic and operate entirely off the grid. When the grid connection is down, the household system works independently and the house has hot water because the system is not grid or gas supply connected.

Similarly, if there is a concern for grid failures or gas supply problems, corn stoves and similar solutions can remove households from heating dependency and provide ability to maintain "one warm room." This may be important if triage becomes necessary to keep the economy and essential infrastructure running or if there is sabotage, weather damage, or an accident with the grid or pipes.

There are several ways to develop this approach. The important difference is that the approach leads in another direction than current efforts to develop ever-more complex means to extract greater efficiencies. Examples are the direct current computers, refrigerators, and the like used in forest homes off the grid. Though these are electric measures, they are examples of moving to "stand alone" end-uses. Another example is gas furnaces that are combined with gas generation of electricity for the furnace so as to end dependence on the electrical grid.

There is a whole set of established technologies and technical possibilities in this direction. The direction would be towards simpler, easy to repair and sustain "Plain Technologies," such as have been developed by the Amish.[35]

[35] Ed Tenner, "Plain Technology, The Amish have something to teach us," pp. 75, *MIT Technology Review*, July 2005.

IX. PROGRAM EVALUATION

The general philosophy of program evaluation recommended is based on five principles:

- Use generally accepted methods, rather than innovate new evaluation approaches.
- Use an independent (from Vectren and from the program implementer) third party evaluator, where possible. At the same time, some innovation and assessment tasks usually performed by an evaluator can be built in to program implementation reporting in order to conserve dollars. If carefully structured, early program reporting by implementation staff can do double duty of providing Vectren with monitoring information and provide initial (and in some cases baseline data) information for the evaluator.
- Use simple evaluation methods where possible, and especially where there is a choice between a more sophisticated, but complex, method and an adequate simple alternative that is easy for everyone to follow and understand. In particular, evaluators may not use any "black box" methods – the evaluations are required to be "transparent" as to method and calculation of results, providing enough information to allow a reader to independently see how results were arrived at, and to raise relevant questions from the source or intermediate information provided in evaluation reports.
- In general, any statistical results of evaluations (not all will have statistical results) should use samples capable of yielding at least 90 percent confidence and 10 percent precision.
- Evaluation costs should be kept to a moderate level, although a first-cycle evaluation may cost more than subsequent evaluations of ongoing programs, and especially should drop in cost as programs become accepted and mature.

A "high-level" evaluation plan is provided for each of the nine programs. This "high-level" evaluation is not the actual evaluation plan for each program. Instead, it is a planning document that specifies what is to be included in each evaluation, requirements for method and sample size, timing, and approximate budget to be allocated for the first-cycle evaluation. The following step would be for the Vectren evaluation group, or evaluation partner to draft specific requirements for an RFQ or RFP. The final step is for the evaluator to rewrite the plan, assist in final discussions at the evaluation kick-off meeting for each program, and revise based on input and direction from Vectren and the Advisory Board for final acceptance by Vectren. The evaluator then implements the plan in cooperation with Vectren.

In arranging for program evaluation, Vectren and the Advisory Board should consider that there are three basic approaches. The first approach, which we mention but do not suggest, is to create an internal DSM program evaluation shop and staff it. This approach was done in the early days of DSM when utilities were first experimenting with DSM programs as a way to meet customer expectations in the context of the post "oil shock" energy crisis. The expectation for independent outside evaluations had not yet become established. So long as early DSM was primarily an internal program, internal evaluation with occasional support from an outside independent evaluator made sense. Today, this model is not used in the world of DSM and low-income programs but is found in sectors, such as large foundations and many government bureaus (eg, large city health departments), that have internal evaluation departments.

The second approach is to use independent evaluators. Since the early 1990's utilities, stockholders, and commissions have all specified the use of independent evaluators. There may still be an evaluation coordinator in the utility, and occasionally some evaluation staff, but virtually every evaluation is carried out using an independent evaluator. Once DSM expanded beyond the early programs, it became an area for coordination of input and interests among many parties, which all have to be satisfied with the evaluation methods and results. In a primarily cooperative but sometimes adversarial context, with a number of relevant parties, evaluation has come to play a special technical role in working out expectations for programs by providing a way to agree on evaluation methods and to measure results. This leads to open (transparent and independent) evaluations that can find ways to improve programs to make them more efficient from a cost perspective and more effective in delivery of energy savings results. Well designed evaluations, carried out by independent evaluators, can show what works and can provide technical information that Vectren and the Advisory Board can use to make programs better.

The third approach is a concept of the evaluator as a business partner. A number of utilities gearing up for the new DSM cycle have adopted this concept which was largely developed during the "competitive" era in which there was quite a bit of outsourcing of utility functions. In this approach, the evaluation team remains independent, but the utility selects one evaluation partner for at least a five-year period. The evaluation partner then works closely with the utility, almost, but not quite, as if they were outsourced staff. This means really getting to know the utility counterparts, helping with program questions that come up, getting to know the service territory and the expectations of parties, and still carrying out the independent evaluations (usually an impact evaluation and a process evaluation for each program). This is not a majority pattern - most utilities continue to treat programs separately and to select different independent evaluators on a program-by-program basis. However, where commissions have not set a different pattern, the advantages of the evaluation partner model for the utility are:

1. lower administrative effort;
2. a closer relationship which can get more value from the evaluation team in helping prevent problems that might otherwise arrive by insuring they are involved with staff, programs, the service territory, and expectations of parties; and
3. the ability to negotiate a lower overall evaluation cost because the program evaluations do not have to stand alone, travel is reduced since there is only one evaluation team, and evaluation overheads are lower.

The second approach is the primary pattern for DSM and low-income program evaluations in the US and Canada. The third approach has been selected by some utilities, is underway, and will likely prove out as a way of lowering overall evaluation costs.

First Steps

As a first step, Vectren's evaluation group or the Vectren staff assigned to guide and monitor all evaluation activities should order the following articles and key books on evaluation:

- Campbell, Donald T. "Evolutionary Epistemology." In *Methodology and Epistemology for the Social Sciences: Selected Papers*. Edited by E. Samuel Overman. Chicago: University of Chicago Press, 1988.
- Campbell, Donald T., and David A. Kenny. *A Primer on Regression Artifacts.* New York and London: The Guilford Press, 1999.
- Campbell, Donald T., and J. Stanley. *Experimental and Quasi-Experimental Design for Research.* Chicago: Rand McNally Publishing Company, 1966.
- Chen, Huey-Tsyh, and Peter H. Rossi. *Theory-Driven Evaluations.* Newbury Park, London and New Delhi: Sage Publications, 1994.
- Cook, T. D., and Donald T. Campbell. *Quasi-Experimentation: Design and Analysis Issues for Field Settings.* Boston: Houghton-Mifflin, 1979.
- Finsterbusch, Kurt. "Demonstrating the Value of Mini-Surveys in Social Research." *Sociological Methods and Research* 5(1): 117-136, 1976.
- Hill, Lawrence J., and Marilyn A. Brown. "Estimating the Cost effectiveness of Coordinated DSM Programs." *Evaluation Review*, 19(2):181-196, 1995.
- Kaplan, Robert S., and Robin Cooper. Cost and Effect, Using Integrated Cost Systems to Drive Profitability and Performance. Boston: Harvard Business School Press, 1998.
- Mattessich, Paul W., Manager's Guide to Program Evaluation: Planning, Contracting, and Managing for Useful Results. St. Paul, Minnesota: Wilder Publishing, 2003.
- Posavac, Emil J., and Raymond G. Carey. *Program Evaluation Methods and Case Studies*, Sixth Edition. Upper Saddle River, NJ: Prentice-Hall, 2003.
- Salant, Priscilla, and Don A. Dillman. *How to Conduct Your Own Survey.* New York: John Wiley and Sons, 1994.
- Shadish, William R., Thomas D. Cook, and Donald T. Campbell. *Experimental and Quasi-Experimental Designs for Generalized Causal Inference.* Boston and New York: Houghton Mifflin Company, 2002.

Second, the Vectren staff member heading the evaluation should become a member of the American Evaluation Association and provision should be made for that staff to attend the following conferences:

- the AEA evaluation conference held annually,
- the International Energy Program Evaluation Conference held every other year, and
- the American Council for an Energy Efficient Economy Summer Study held every other year.

The two evaluation conferences offer practical short seminars in current evaluation topics. This level of activity, plus occasional assignment to short courses or seminars is part of the necessary overhead to keep the evaluation function effective and alert.

Third, Vectren should decide internally whether they will use an Evaluation Partner or proceed with using staff resources.

Fourth, the plan for assigning specific program evaluations to one or more independent evaluators, and the procedure for selection of evaluators should be determined and implemented on a timely basis.

Evaluation for Program 1. Small Buildings Energy Efficiency Program

The description of the Small Buildings Energy Efficiency Program is repeated below from Table 36. This program is suitable for a standard evaluation approach, using a "non-equivalent control group design" and supplemented by regression analysis (sometimes called "statistically adjusted engineering analysis" or "conditional demand analysis, depending on how the equations are set). These two evaluation approaches are recommended as a pair for this program area because the regression analysis results are subject to distortions unless they are "trued-up" to the simple "difference of means test" that is used to implement the calculations that are integral to the non-equivalent control group design.

Program Type	Target Market	End-Uses	DSM Technologies
1. Small Buildings Energy Efficiency Program	Existing residential (single family up to 4 units) and small commercial buildings (defined by square footage, employees or ccf usage)	Heating, water heating, cooking, laundry, fireplaces	Energy efficient furnaces, duct sealing, weatherization measures, blower door, EE water heaters, flow restriction measures, tank and pipe wraps, gas ranges, clothes washers (for home with gas water heating), dryers, setback thermostats and natural gas fireplaces

Impact Evaluation			
Research Question(s)	**Analysis Approach**	**Required Data Type(s)**	**Description**
How does the pilot impact energy use?	**Non-Experimental Control Group design with difference of means test.** Compares (two-year) pre-year data to post-year energy use for program buildings and households. A comparison group without the program will also be used to develop net savings.	(a) Electronic database of monthly usage, billing cycle, meter read dates, type of read for each program building. (b) Similar database for equal size sample for comparison group. (c) Other data to systemically characterize buildings and measures. (d) Ex Ante estimate of savings for each measure included in the program.	Once program size is determined, either a 90% confidence and 10% precision statistical sample will be specified, or a near-census sampling approach will be specified.
	Regression Analysis. Develops measure results.		
Deliverable: Energy Savings Analysis			

Randomized Evaluation Design Not Appropriate

Recently, there has been a return among evaluators (supported by foundations and federal agencies) to the use of randomized assignment of "treatment programs" to "cases." This approach (true randomization) yields the best and least open to challenge scientific knowledge about program effects. However, true randomization would require forming a list of customers in similar situations who have requested to participate in a program, and subsequent provision of the program to only those customers selected by a random process (usually a computer generates pseudo-random numbers, sometimes the random number tables in the back of statistics books are used).

Those who fail to win participation would be left without a program, given a placebo program, or scheduled for a future program year. There are situations in which randomized controlled experiments could be appropriate, if carefully designed and justified. But, because true randomized controlled experiments have this requirement, they are almost never used for DSM program evaluation even though they represent the best scientific method and produce the surest knowledge of results.

The Format of the Non-Equivalent Control Group Design

A set of quasi-experimental designs was first developed and systematized in the 1960s by Campbell and Stanley.[36] Since then, the line of progress in this evaluation approach has been developed through a number of core evaluation methods texts.[37] In the quasi-experimental design approach, each of the standard experimental research designs has been copied, but without provision for random assignment of cases to treatment and control (no treatment) groups.

Instead, the customers who apply and qualify for a program are accepted. For the evaluation, this group becomes the Participant group.[38] Then a very similar group of customers is selected to be the Comparison group. Strictly speaking, a true experiment incorporates a "control group"; a quasi-experimental design incorporates a "comparison group." The quasi-experimental designs are weaker designs than true experimental designs because they are open to certain kinds of interference or bias of results that a control group is strong enough to prevent in drawing statistical conclusions, but a comparison group is not. Still, on balance they are more appropriate for DSM where the programs are not truly experimental–although the program is under test, there is a fundamental expectation that the program designs will work well. The evaluations serve both a fiduciary purpose – to ensure proper production of benefits and assessments of costs, and also to support the gradual and ongoing optimization of program cost effectiveness.

[36] Campbell, Donald T. and J. Stanley (1966), *Experimental and Quasi-Experimental Design for Research.* Chicago, Rand McNally Publishing Company. This is still the best introduction to quasi-experimental design and remains in print as a core methods text.

[37] The most recent core reference is: Shadish, William R., Thomas D. Cook and Donald T. Campbell (2002), *Experimental and Quasi-Experimental Designs for Generalized Causal Inference.* Boston and New York: Houghton Mifflin Company, 2002.

[38] This can introduce a self-selection bias in which those who are first to enter a program, and especially in contrast to those who never enter, may be more alert, or already searching to find was to conserve energy. This is an example of the kind of bias randomized control experiments protect against, but quasi-experimental designs do not. For DSM, however, the effect of this bias is very small and in many cases it can be disregarded or found to be not relevant due to the program logic.

Overall Savings in the Non-Equivalent Control Group Design

The non-equivalent control group design is one of the most employed designs in DSM evaluation. Like all "non-equivalent" designs there is a Participant group and a Comparison group (here called a "non-equivalent control" group in the name of the design).

The non-equivalent control group design is used with simple "difference of means tests." Results are developed using the t-test or z-test, and based on simple counting and subtractions of group means. As shown in Table 64, there is a "before" and "after" measurement taken on both the Participant Group and the Comparison Group.

Table 64. Layout for Non-Equivalent Control Group Evaluation Design

Group	Baseline	DSM Program	Post-Program
Participant Group	Measurement	X	Measurement
Comparison Group	Measurement	–	Measurement

Once the program has been run for a cycle and the actual building types and characterizations are known, this analysis may be subset and run separately for different building characterizations; or a single analysis group may be used. This will be determined once the actual program data is reviewed.

Analysis Method for the Non-Equivalent Control Group Design: How the Difference of Means Calculation Works

Steps:

- ➔ Collect Baseline and Post-DSM measurements for equal period for both the Participants and the Comparison Group.
- ➔ Subtract the "before" measurement from the "after" measurement for each group.
- ➔ This yields the gross energy savings for each group.
- ➔ Subtract the gross energy savings of the Comparison group from the gross energy savings of the Participant group.
- ➔ This yields the net energy savings due to the program.

Calculation of Measure Savings

The regression method of the California Measurement and Evaluation Protocols is also a standard approach, falling within the general classification of Conditional Demand Analysis (CDA) or Statistical Adjusted Engineering Analysis (SAE) depending on how the equations are set up.[39] The regression approach has two primary virtues:

- It produces savings estimates for individual measures and/or groups of measures.
- It provides a facility to include all kinds of conditioning variables in the analysis.

[39] California Public Utilities Commission, *Protocols and Procedures for the Verification of Costs, Benefits, and Shareholder Earnings from Demand-Side Management Programs*, Appendix J, Quality Assurance Guidelines for Statistical, Engineering, and Self-Report Methods for Estimating DSM Program Impacts, PP. 6-14, "Quality Assurance Guidelines for Conditional Demand Analysis (CDA) Models." See also Violette, D., M. Ozog, M. Keneipp & F. Stern, Impact Evaluation of Demand-Side Management Programs, Volume 1: A Guide to Current Practice. Electric Power Research Institute, Palo Alto, California: 1991, Sections 5.3 – 5.5, Pp. 5-10 to 5-32.

It also has three primary weaknesses:

- It is more complicated. The regression approach cannot be understood without completing at least an introductory college course in regression, and its problems in DSM analysis (such as multicollinearity) cannot become familiar without completion of two or three courses in regression and a substantial amount of practice with energy use data.
- Multicollinearity is inherent in installing a package of measures. Within the "building box," and taken as a set, the measures interact with each other to produce higher or lower effects than they would produce separately or in other combinations. The high overlap of measure effects can make it very difficult for the least squares algorithm to allocate the appropriate "weight" or coefficient to each independent variable. This means that different analysts can get different results from correct application of the method. This is not a problem with the underlying theory of energy conservation or with the mechanics of the least-squares algorithm, as such. It is a problem of adequacy of method in relation to degree of "resolution" that is possible given relations among the independent variables within the data.[40] The regression assigns the values and signs of the coefficients so that estimation of change in energy use is as close as possible to the actual case values. The mathematics of this will work in any case. However, if some of the measures overlap then some of the measures that overlap may have the wrong sign.[41] They may also have the wrong size in relation to physical knowledge of how buildings and measures work, depending on specification of the regression equation.[42]
- The method assumes a standardization of building conditions that may or may not actually exist.[43] In actual practice, the method is easy to "trick" into showing higher overall savings than have actually been generated by the measures installed. It automatically allocates the real savings plus the pseudo savings across the measures.

How the Regression Approach Works

Beginning with *ex ante* estimates for each measure, the regression derived coefficients are realization rates. For each measure, when the *ex ante* amount for the measure is multiplied by its realization rate the result is the gross savings. The gross savings, multiplied by the measure's net-to-gross ratio yields the net savings due to the program.

Steps:

- ➔ Receive Ex Ante values (planning estimates of per measure savings for each measure included in the program).
- ➔ Apply regression analysis using billing data, program installation data, and Ex Ante estimates.
- ➔ Output "realization rates."
- ➔ Multiply Ex Antes by associated realization rates.
- ➔ Output is estimates of gross measure savings.
- ➔ Apply net-to-gross ratios.
- ➔ Output is Ex Post energy savings estimates for each measure.

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[40] Kahane, Leo H. *Regression Basics.* Thousand Oaks, California, London, and New Delhi: Sage Publications, 2001, pp. 114.

[41] Among several coefficients, some may be given a sign that does not accord with theory, or appears physically impossible. Montgomery, Douglas C., Elizabeth A. Peck and G. Geoffrey Vining. *Introduction to Linear Regression Analysis, Third Edition.* New York: Wiley, 2001, pp. 120-130.

[42] Neter, John, Michel H. Kutner, Christopher J. Nachtscheim and William Wasserman. *Applied Linear Regression Models, Third Edition.* Chicago: Irwin, 1996, pp. 290-291.

[43] Essentially, the regression assumptions include a "fixed model," that is, the results developed from the regression are specific to the specification of the regression equation from which the estimates were developed. Problems arise when measure coefficients are unstable in different regression runs with different specifications, and also in abstracting measure values from the context of a specific regression to use as constants to project savings from a wider population.

Combination of the Two Methods

The vulnerability of the regression approach when used alone to overestimate overall program energy savings and to distribute both real savings and pseudo-savings over the measures can be fixed by using the net savings developed in the simple difference of means test to "true-up" the overall savings from the regression analysis. Then the measure savings from the regression analysis can be ratioed back to eliminate any overall pseudo-savings. The problem of the allocation of (corrected) overall savings among the measures remains and has to be treated either as a matter of professional judgment or additional protocol steps to specify the regressions.

Process Evaluation

The purpose of process evaluation is to describe the program as planned and as delivered. It documents perceived successes and failures in program definition, administration and actual service delivery. It also documents changes introduced to resolve problems and improve service. Process evaluation begins with the assumption that it is possible to improve every program. It collects and organizes technical knowledge developed through the course of program implementation as a key source for improvements by program staff. We learn by doing the work, so it is likely that management and staff will change several program factors as the program matures.

Using the questions below as guides, the process evaluation will describe how the program works and document the history of the program. It will detail the roles and responsibilities of staff, contractors and other parties, while tracking promotional and marketing efforts. And, it will relate the story of administration and program process.

The basic method for the (qualitative) process evaluation is to compare plans for the program with what actually occurs. Process evaluation includes discussion of barriers to effective implementation. It also includes discussion of factors that make the program effective, and for developing recommendations for improvement for future program cycles.

Program Description Questions:

- What are the program goals?
- How is the program trying to meet these goals?
- How is the program organized? What is the program structure, management, and how does the organizational process work?
- What are the program energy conservation measures?
- What are the educational aspects of the program, and how is the education dimension of the program intended to work?
- What are the linkages of the program to other programs/resources? How are these linkages intended to work?
- What is the flow of activity; from a customer perspective, the stages of steps that participants pass through to accomplish the program?

Institutional Questions:

- How have program goals changed? Are there implicit or explicit changes in goals?
- What factors support achievement of program goals? What factors impede planned program achievements?
- How does the program work, both formally and informally? What are the actual organizational processes (contract procedure, operating procedure, contractor perception, staff perception, management perception)? This includes recruitment, handling applications and inquiries, relationships with program partners, and provision of services and quality control.
- Assess the adequacy and workability of the program monitoring and tracking systems.
- What factors might explain any detected difference between expected and actual energy usage?
- Could the program design be improved to improve the capability, efficiency, or effectiveness in achieving program goals? How can management and staff change program implementation to better achieve program goals?

Customer, Customer Relations and Marketing Questions:

- Is the program meeting the target market or only sub-segments of the target market? What elements of the program have wide customer appeal? Which program elements do customers perceive as drawbacks?
- How did participation change over time? How did participation track with customer communication efforts? What factors might explain the participation or lack of participation achieved by the program?
- How is the program perceived by participants?
- Is there any detectible difference between participants and non-participants?
- How can management and staff improve marketing efforts? In particular, are there any real or perceived barriers that exist for program participation?

Information for the process evaluation should be gathered from program records and data, participant surveys, and brief interviews with program providers.

Schedule

Before the program begins, Vectren should set up a procedure for the evaluator to request baseline energy consumption records to handle that request when it becomes necessary for the evaluation. The evaluation team should be designated within three months after the program begins, and the process evaluation (and evaluation Kick-Off meeting with Vectren and the Advisory Board) should take place six months after the program begins.

An interim process evaluation is scheduled to be delivered to the Advisory Board the first month of the second program year (month 13). The purpose of this evaluation is similar to the full process evaluation but with emphasis on providing early program feedback to implementers and the Advisory Board. The program implementer may do an initial satisfaction survey as it completes installations. This can be used for on-going project reporting to Vectren, and also by the process evaluator, later.

This evaluation will require two full years of baseline data. These should be common to all buildings (rather than different for individual buildings), include both Participant and Comparison group buildings, and most likely should be calendar years of data. A full year of post-DSM energy consumption for each Participant and

Comparison building will also be required, along with survey information from both Participant and Comparison group buildings to support the regression analysis.

Schedule Overview
➔ Program Implementation begins. ➔ Initial Satisfaction Surveys begin and are carried out by implementation contractor throughout the program cycle. ➔ [Month 3] Evaluation Team designated. ➔ [Month 6] Kick-Off Meeting for Evaluation ➔ [Month 6] Process Evaluation begins. ➔ [Month 13] Interim process evaluation delivered to Advisory Board. ➔ A full year of post-DSM consumption data is required for each building. ➔ This means the first evaluation results can be developed one-year following the end of the first program year (to allow a full year of implementation for the program and one year after). ➔ The first draft evaluation impact evaluation report will be due two years and five months following program implementation.

Evaluation for Program 2. General Services Energy Efficiency Program

This program will serve existing large commercial and industrial facilities with prescriptive equipment rebates for upgrading heating, water heating and gas cooling systems; boiler replacement, water heating equipment, tune ups (building commissioning) and control systems.[44]

Program Type	Target Market	End-Uses	DSM Technologies
2. General Services Energy Efficiency Program	Existing and new medium to large commercial and industrial facilities	Heating, water heating	Boiler replacement, water heating equipment

Engineering Desk Review

Since this program uses prescriptive equipment rebates, the recommended impact evaluation method is an engineering desk review, with no direct measurement in plants or facilities, and no analysis of billing data. This approach is possible for this program for two reasons:

- The list of units approved for this program is discrete and the physical capabilities of the prescribed units are known. Retrofit of this kind is highly predictable based on physical calculations, with virtually no behavioral effects except a firm leaving business.
- Another support for this approach is that the facility is paying most of the cost of each measure and Vectren is adding a smaller amount that can be treated as a "buy-down." Facility managers are very careful to manage retrofits in a way that maximizes the return to their company of each dollar invested in an upgrade.

The essential data needed for this evaluation is a characterization for each piece of equipment that is replaced, and access to the internal management justification for the replacement (or at least the internal summary

[44] Larger and customized retrofits will be covered under the Custom program (Program 3).

calculation carried out by the customer firm). If the characterization of the existing (to be replaced) equipment is recorded, a seasoned engineer can verify the approximate energy savings associated with the retrofit.

The evaluation engineer for this program evaluation should have industrial or large commercial experience, so as to be well accepted by the customer firms.

Process Evaluation

The process evaluation will be focused as low-key, with a short list of research questions, and if surveys are used they are to be short mini-surveys. Generally, the process evaluation will focus on perceptions of key individuals at the customer firms, and perceived strengths and weakness of the program from a customer perspective. Any barriers to participation should be detailed, along with a short list of recommendations to make the program more efficient and effective or to better tailor the program to serve customer needs. In addition to the customer-firm interview, the process evaluator will interview program implementation staff and the Vectren program manager.

Schedule

Before the program begins, Vectren should create a file of program documentation to provide to the evaluator. This should include the full list of approved prescriptive measures, including date of approval if measures added after the program begins. Vectren also needs to ensure that the implementation contactor is tasked with gathering the documentation that justifies each change-out and that these are kept systematically for when the evaluation begins. The evaluation team should be designated within three months after the program begins and the process evaluation (and evaluation Kick-Off meeting with Vectren and the Advisory Board) should take place six months after the program begins.

An interim process evaluation is scheduled to be delivered to the Advisory Board the first month of the second program year (month 13). The purpose of this evaluation is similar to the full process evaluation but with emphasis on providing early program feedback to implementers and the Advisory Board. The program implementer may do an initial satisfaction survey as it completes installations. This can be used for on-going project reporting to Vectren, and also by the process evaluator later.

This evaluation will not require baseline data, but it will require access to economic justifications for each change-out and a name on record for the evaluator to call at each customer firm to discuss the change-outs. This evaluation can stay close to the program implementation activities and a draft final report should be submitted at the end of the first quarter following the first implementation year.

Schedule Overview
➔ Program Implementation begins ➔ Initial Satisfaction Surveys begin and are carried out by implementation contractor throughout the program cycle ➔ [Month 3] Evaluation Team designated ➔ [Month 6] Kick-Off Meeting for Evaluation ➔ [Month 6] Process Evaluation begins ➔ [Month 13] Interim process evaluation delivered to Advisory Board. ➔ The first draft evaluation impact and process evaluation report will be due three months following the end of the first year of program implementation

Evaluation for Program 3. Customized Energy Efficiency Program

This program serves existing large commercial and industrial facilities with customized information for making improvements to their gas end-use operations. It consists of a Technical Assessment conducted by a qualified engineering firm, under contract to Vectren, with the customer's portion of the costs reimbursed by Vectren if they proceed with the recommendations.[45]

Program Type	Target Market	End-Uses	DSM Technologies
3. Customized Energy Efficiency Assessment Program	Existing and new large commercial and industrial facilities	Heating, water heating, process uses	All identified gas end-uses

Engineering Desk Review

This program provides a Technical Assessment by a qualified engineer or engineering firm. Since all of the analytic work is completed by the implementation engineer, a simple desk review by a seasoned engineer is all that is required for the impact evaluation, plus verification for those projects for which reimbursement is claimed. The verification can be built in to the implementation effort and should only require document review by the engineering evaluator. This program may also include prescriptive equipment rebates, for which the recommended impact evaluation method is also an engineering desk review, with no direct measurement in plants, facilities or billing data analysis.

Process Evaluation

As for the prescriptive program evaluation, the process evaluation for the Custom Program will be low-key, with a short list of research questions, and if surveys are used they are to be short mini-surveys. Generally, the process evaluation will focus on perceptions of key individuals at selected customer firms and perceived strengths and weakness of the program from a customer perspective. Any barriers to participation should be detailed, along with a short list of recommendations to make the program more efficient and effective or to better tailor the program to serve customer needs. In addition to the customer-firm interview, the process evaluator will interview program implementation staff and the Vectren program manager.

[45] Participants may also take advantage of the prescriptive equipment rebates offered under Program 2 for upgrading heating, water heating and gas cooling systems, boiler replacement, water heating equipment, tune ups and control systems.

Schedule

Before the program begins, Vectren should create a file of program documentation to provide to the evaluator. As the implementation contractor proceeds, the implementation contractor should be tasked to provide and maintain a file of site-by-site information to be reviewed by the engineering evaluator. This should include both the result of information assessments, custom recommendations and the full list of prescriptive measures included in a package.

The evaluation team should be designated within three months after the program begins and the process evaluation (and evaluation Kick-Off meeting with Vectren and the Advisory Board) should take place six months after the program begins.

An interim process evaluation is scheduled to be delivered to the Advisory Board the first month of the second program year (month 13). The purpose of this evaluation is similar to the full process evaluation but with emphasis on providing early program feedback to implementers and the Advisory Board. The program implementer may do an initial satisfaction survey as it completes installations. This can be used for on-going project reporting to Vectren, and also by the process evaluator later.

This evaluation will not require baseline data, but it will require access to economic justifications for each change-out for cases in which reimbursement is provided and a name on record for the evaluator to call at each customer firm to discuss the change-outs. This evaluation can stay close to the program implementation activities and a draft final report should be submitted at the end of the first quarter following the first implementation year.

Schedule Overview
➔ Program Implementation begins ➔ Initial Satisfaction Surveys begin and are carried out by implementation contractor throughout the program cycle ➔ [Month 3] Evaluation Team designated ➔ [Month 6] Kick-Off Meeting for Evaluation ➔ [Month 6] Process Evaluation begins ➔ [Month 13] Interim process evaluation delivered to Advisory Board. ➔ The first draft evaluation impact and process evaluation report will be due three months following the end of the first year of program implementation

Evaluation for Program 4. Hospitality Industry Energy Efficiency Program

This program is targeted to restaurants, bakeries, institutional housing (nursing homes, colleges, and schools), hotels, hospitality facilities and other cooking facilities that employ natural gas for cooking and food preparation. The program provides incentives and promotes the installation of energy efficient booster water heaters, dishwashers, fryers, griddles, and gas ranges to replace aging equipment in existing facilities and/or as the efficient option for new facilities.

Program Type	Target Market	End-Uses	DSM Technologies
4. Hospitality Industry Energy Efficiency Program	Restaurants, bakeries, institutional housing, hotels, hospitality facilities and other cooking facilities	Cooking and food preparation	Energy efficient gas ranges, ovens, broilers, warmers and related processes

Desk Review

This program provides different opportunities depending on how it is implemented each year. If it is largely implemented through customer communications and rebates, then a small number of spot checks by telephone or in person by the evaluator, along with the implementation record of equipment receipts and records will be sufficient. At the same time, this program has an alternative implementation by a charismatic program leader familiar with the industry. If such a program leader sets up meetings from town to town, the rebate portion of the program will be the same as in a more remote administration, but there may be significant additional opportunities to improve work practices to save energy. That part of the puzzle will require a Vectren staff leader or a highly skilled and experienced implementation contractor to develop turn-out for meetings and then to actually observe and make recommendations for practices in individual food preparation shops.

In the first type of implementation, the evaluator and the evaluation effort can be low-key and primarily focused on review of written records. In the second type, the evaluator will need to accompany the implementer to a small number of meetings for presentations and to accompany the implementer in "walk-through" audits of facilities. In the second type of implementation, the evaluator or the implementer will need ability to informally spot meter some equipment to estimate effects. In the first type, this will not be necessary. This study will proceed as with the prescriptive equipment rebates (Program 2), except that some spot metering is expected. There will be no billing data analysis.

Process Evaluation

The process evaluation will be limited to telephone or in-person contact with a small number of facilities. Generally, the process evaluation will focus on perceptions of key individuals at selected customer firms and perceived strengths and weakness of the program from a customer perspective. Any barriers to participation should be detailed, along with a short list of recommendations to make the program more efficient and effective or to better tailor the program to serve customer needs. In addition to the customer-firm interview, the process evaluator will interview program implementation staff and the Vectren program manager.

Schedule

Before the program begins, Vectren should create a file of program documentation to provide to the evaluator. As the implementation contractor proceeds, the implementation contractor should be tasked to provide and maintain a file of site-by-site information to be reviewed by the evaluator. If the implementer makes use of town meetings and/or on-site "walk through" audits, the process evaluator should participate in at least three town meetings and at least seven walk-throughs.

The evaluation team should be designated within three months after the program begins and the process evaluation (and evaluation Kick-Off meeting with Vectren and the Advisory Board) should take place six months after the program begins.

An interim process evaluation is scheduled to be delivered to the Advisory Board the first month of the second program year (month 13). The purpose of this evaluation is similar to the full process evaluation but with emphasis on providing early program feedback to implementers and the Advisory Board. This evaluation will not require baseline data, but it will require access to implementation records and a name on record for the evaluator to call at each customer firm to discuss the change-outs (although only a sample of firms will be contacted by the evaluators). This evaluation can stay close to the program implementation activities and a draft final report should be submitted at the end of the first quarter following the first implementation year.

Schedule Overview
➔ Program Implementation begins ➔ [Month 3] Evaluation Team designated ➔ [Month 6] Kick-Off Meeting for Evaluation ➔ [Month 6] Process Evaluation begins ➔ [Month 13] Interim process evaluation delivered to Advisory Board. ➔ The first draft evaluation impact and process evaluation report will be due three months following the end of the first year of program implementation

Evaluation for Program 5. Multi-Family Building Energy Efficiency Program

This program will serve multi-family buildings with prescriptive equipment rebates for upgrading heating, water heating and gas cooling systems; boiler replacement, water heating equipment, tune ups and control systems. Building occupants and tenants will also be given a package of free low-cost weatherization measures for self-installation.

Program Type	Target Market	End-Uses	DSM Technologies
5. Multi-Family Building Energy Efficiency Program	Multi-family buildings with 5 or more units, dormitories, hotels, other large residential facilities	Common area boilers, water heating and laundry; individual unit water heating, weatherization	Energy efficient furnaces, duct sealing, weatherization measures, blower-door, EE water heaters, flow restriction measures, tank wraps

Evaluation Options

If the focus of this program is on whole building applications (exclusive of the low-cost/no-cost packages for the tenants), then it will be useful to approach the evaluation with a billing analysis of common areas, that is, of the portion of the building's energy use that is the building owner's responsibility (hot water, furnace, common area lighting). If this is done, it will be necessary to ensure the correct metered accounts are identified. This identification can be tasked to the program implementer.

However, if the program develops in a way that disburses the program budget in a pattern of one or two measures per apartment building across a very large number of buildings, an analysis of metered energy use will be less valuable. It is likely, in advance of program implementation that the program will take both directions, with some buildings engaged in fairly holistic retrofit and others participating for one or two measures. In that case, the buildings will be partitioned into two groups and two different evaluation approaches will be used.

Energy Use Analysis

Analysis for buildings with a holistic approach to common area measures will use a standard Non-Equivalent Control Group design with a double pre-test.[46] The double pre-test gives two prior year (calendar year) measures and adds to the stability of the design. The analysis method will be the simple different of means test, as developed for Program 1, above.

For buildings with only one or two measures, the evaluator will have to consider whether to include them in the core analysis with the holistic measure package buildings or whether to estimate them separately without direct measurement but with review of claimed savings referenced to the building's baseline energy use using a simulation package, such as E-Z Sim.

Table 65. Layout for Non-Equivalent Control Group Evaluation Design with Double Pre-Test

Group	Baseline	DSM Program	Post-Program
Participant Group	Measurement 1 Measurement 2	X	Measurement
Comparison Group	Measurement 1 Measurement 2	–	Measurement

There is not a high return in analyzing low-cost/no-cost measure impacts because they are typically so small for apartments. For a single-family home, diligent application of a kit of low-cost/no-cost measures, typically, is claimed to provide minor savings of perhaps $100 to $150 in the first year as measured across water, gas and electricity savings. However, much of this is often due to a water heater wrap, which will not apply to an apartment with central hot water. Also, measured savings for the kit-type programs are more likely to be $50 to $100, spread over a year. Still, the kits are typically cost effective and customers often like these programs; and they do provide some physical improvement to the home. It makes sense to do the kits when the apartment building is also receiving more major measures to improve the building as a whole. However, for evaluation purposes it is realistic to stipulate a value for the expected savings per apartment and confine the evaluation to an inspection as to whether and to what extent measures have actually been installed. (When kits are distributed to apartments, but the items are left to the tenant to install, many of the kits are never installed.) Direct measurement in this case would have a poor signal-to-noise ratio due to the small amount of the savings produced by kits and the fact that three streams of data would have to be analyzed (gallons of water, therms, and kWh). It is possible to do the direct measurement and to detect small effects if the sample sizes are large enough.

[46] Shadish, Cook and Campbell, *op. cit.*, Page 145.

Process Evaluation

Because the major measures are not in the apartments, the process evaluation will be similar to the process evaluation of the General Services Program (Program 2). The process evaluation will be focused as low-key, with a short list of research questions, and if surveys are used they are to be short mini-surveys. Generally, the process evaluation will focus on perceptions of key individuals (building owners and/or landlords, or the building engineer if there is one). The process evaluation will focus on perceived strengths and weakness of the program from a customer perspective. Any barriers to participation will be detailed, along with a short list of recommendations to make the program more efficient and effective or to better tailor the program to serve customer needs. In addition to the customer-firm interview, the process evaluator will interview program implementation staff and the Vectren program manager, provide a description of the program and how it works, and provide the story of any problems encountered by program staff during implementation and how they were overcome.

Schedule

Before the program begins, Vectren should create a file of program documentation to provide to the evaluator. This should include the full list of approved prescriptive measures included in the multi-family program, including date of approval if measures are added after the program begins. Vectren also needs to ensure that the implementation contactor is tasked with gathering the documentation that justifies each change-out and that these records are kept systematically for when the evaluation begins, and thereafter. The evaluation team should be designated within three months after the program begins. and the process evaluation (and evaluation Kick-Off meeting with Vectren and the Advisory Board) should take place six months after the program begins.

An interim process evaluation is scheduled to be delivered to the Advisory Board the first month of the second program year (month 13). The purpose of this evaluation is similar to the full process evaluation but with emphasis on providing early program feedback to implementers and the Advisory Board. The program implementer should be tasked to do an initial satisfaction survey as it completes installations. This can be used for on-going project reporting to Vectren, and also by the process evaluator later.

This evaluation will require two years of baseline data for each building included in the program, careful identification of appropriate meters (by the implementation contractor) for analysis, and one year of post-retrofit data. The simplest design is to use two common baseline years (calendar years), implement the program for a year, then use a common post year for all buildings completed in the first program year; then repeat for each subsequent program year. The draft impact evaluation will be due three months after the end of the first program year, and can be updated on a yearly basis thereafter throughout the program cycle.

Schedule Overview
➔ Program Implementation begins ➔ Initial Satisfaction Surveys begin and are carried out by implementation contractor throughout the program cycle ➔ [Month 3] Evaluation Team designated ➔ [Month 6] Kick-Off Meeting for Evaluation ➔ [Month 6] Process Evaluation begins ➔ [Month 13] Interim process evaluation delivered to Advisory Board. ➔ The first draft evaluation impact and process evaluation report will be due one-year and three months following the end of the first year of program implementation

Evaluation for Program 6. Innovative EE Technologies Research and Demonstration Program

This is an innovative program that will provide funding to the Indiana Clean Manufacturing Technology and Safe Materials Institute (CMTI) for conducting research into emerging gas technologies that contribute to increased energy efficiency in both residential and non-residential applications. There are no direct incentives to customers under this program, rather it provides a funding stream to support research into technologies that may be added to the portfolio of programs offered by Vectren in the future. In addition, case studies would be supported at some customer sites on a case-by-case basis, such that field demonstrations could be performed and studied for potential future market application.

Program Type	Target Market	End-Uses	DSM Technologies
6. Innovative Energy Efficiency Technologies Research and Demonstration Program	All markets	All gas end-uses	Emerging high efficiency natural gas technologies, use of renewable technologies to off-set or enhance gas technologies

Evaluation Approach (Technology Evaluation)

The evaluation approach for this project is "technology evaluation." This is special area of evaluation with a well developed set of standard methods which are aimed at assessment of technology potentials. The evaluation will be based on review of funding and project documents, including monitoring reports as well as interviews with the CMTI and any designated profession and scientific staff. There will be a single evaluation covering both impact and process elements. The orientation of the evaluation will be forward-looking, with discussion of potential impacts of technology work that is funded. The evaluation is expected to be low-key and to involve some research and reporting of related technology implications so as to develop a context within which technology work can be interpreted. It is not to become as focused as in development of technology road maps.[47]

[47] The models for technology evaluation are provided by standard evaluations of this type carried out by the federal national laboratories, and in foundation internal program evaluations.

Schedule

Before the program begins, Vectren should create a file of program documentation to provide to the evaluator. The evaluation team should be designated within six months after the program begins and the evaluation Kick-Off meeting with Vectren and the Advisory Board should take place nine months after the program begins.

The evaluation will begin with a review of program documents and an informal meeting with Vectren, the Advisory Board (or interested members) and CMTI. From that point forward, the evaluator will meet with CMTI by phone or in person every quarter. Two meetings, both in-person and on-site, will be required each year. Since the evaluation is a technology evaluation, the approach will be different from all of the other evaluations, similar to foundation program evaluations which typically involve considerable consultation and reporting and integration of perceptions and potentials. Since the evaluation will track with the program development, the draft impact evaluation will be due three months following the end of the first program year, then on a yearly schedule with dates to be determined throughout the program cycle.

Schedule Overview
➔ Program Implementation begins ➔ [Month 6] Evaluation Team designated ➔ [Month 9] Kick-Off Meeting for Evaluation ➔ [Month 9] First meeting with CMTI ➔ The first draft evaluation will be due one-year and three months following the initiation of program implementation

Evaluation for Program 7. Energy Efficient Builder Program

This program will promote the incorporation of high efficiency design features in new homes, plus installation of high efficiency equipment above standard appliances, furnaces and windows. It will be targeted to builders of subdivision and tract homes.

Program Type	Target Market	End-Uses	DSM Technologies
7. Energy Efficient Builder Program	Residential and non-residential new construction	Any gas end-uses being considered	Design incentives to upgrade planned gas equipment to energy efficient options, reduced hook-up fees and/or line extension costs

Evaluation Approach (Engineering Desk Review)

Since this program will be keyed to the national Energy Star program and also incorporate the prescriptive measures list for Program 2 above, an engineering desk review is the recommended impact evaluation method (as in Program 2). Unless there is some reason to investigate a particular measure, we will rely on measure values as established by Energy Star and for the prescriptive measures list for Program 2. In addition to a secondary engineering review, the evaluation will rely on installation and/or verification records developed by the program implementation contractor. Vectren will need to task the program implementation contractor with development of reliable installation and/or verification records.

Process Evaluation

The process evaluation will be focused as low-key, with a short list of research questions, and if surveys are used they are to be short mini-surveys. Generally, the process evaluation will focus on perceptions of key individuals at the builders and perceived strengths and weakness of the program from a builder perspective. Any barriers to participation should be detailed, along with a short list of recommendations to make the program more efficient and effective or to better tailor the program to serve customer needs.

In addition to builder interviews, the process evaluator will interview program implementation staff and the Vectren program manager. Also, the process evaluator with be tasked with describing the builder community, the extent to which local builders can enter into programs, and the extent to which subdivision standards are dependent on national programs of multi-state builders. The process evaluation should fully relate the nature and direction of new building markets in relation to the program.

Schedule

Before the program begins, Vectren should create a file of program documentation to provide to the evaluator and identify Vectren staff with key responsibilities for builder relationships. The evaluator should proceed in careful coordination with Vectren staff to ensure that relationship expectations are fully observed in the work. The evaluation team should be designated within three months after the program begins and the process evaluation (and evaluation Kick-Off meeting with Vectren and the Advisory Board) should take place six months after the program begins.

An interim process evaluation is scheduled to be delivered to the Advisory Board the first month of the second program year (month 13). The purpose of this evaluation is similar to the full process evaluation but with emphasis on providing early program feedback to implementers and the Advisory Board. This evaluation can stay close to the program implementation activities and a draft final report should be submitted at the end of the first quarter following the first implementation year.

Schedule Overview
➔ Program Implementation begins ➔ [Month 3] Evaluation Team designated ➔ [Month 6] Kick-Off Meeting for Evaluation ➔ [Month 6] Evaluation begins ➔ [Month 13] Interim process evaluation delivered to Advisory Board. ➔ The first draft evaluation impact and process evaluation report will be due three months following the end of the first year of program implementation

Evaluation for Program 8. New Program Development and Regulatory Affairs

This program is a support program; it does not deliver direct energy savings. Instead, this program serves as a budget line item to allow for new project developments and coordinated interaction with regulatory and legislative bodies for development of policies supportive of DSM activities (e.g., improved energy efficiency building codes and standards).

Program Type	Target Market	End-Uses	DSM Technologies
8. New Program Development and Regulatory Affairs	All sectors	All end-uses	Emerging technology research and demonstration and regulatory liaison activities

Two additional program areas are the corn stove promotion and the "real" programmable thermostat demonstration. Both of these initial program areas are practical, but neither is particularly "high-tech." Corn stoves, of course, are special in that they have an EPA waiver because they are so clean. A "senior-friendly" programmable thermostat is a simple device using ordinary technology that is needed.

With regard to regulatory affairs, there is a continuing need for Vectren to be pro-active in gaining state regulatory and legislative policies that provide inexpensive energy conservation (such as, slow improvement of energy efficiency housing codes, slow improvement of code enforcement, solar orientation of new construction, and recognition of passive solar savings as DSM).

Evaluation Approach (Policy Evaluation)

The evaluation for this program will be a single evaluation, emphasizing policy and process evaluation. There are standard methods, for policy evaluation, which will be adapted for this policy and program development area. As specific DSM test or support research is initiated, each program area will require its own specific evaluation approach.

Schedule

Before the program begins, Vectren should create a file of program documentation to provide to the evaluator, and discuss any new program or policy areas underway with the evaluator when the evaluator begins work. The evaluation team should be designated within three months after the program begins and the evaluation (and evaluation Kick-Off meeting with Vectren and the Advisory Board) should begin six months after the program begins. This evaluation can stay close to the program implementation activities and a draft final report should be submitted at the end of the first quarter following the first implementation year.

Schedule Overview
➔ Program Implementation begins ➔ [Month 3] Evaluation Team designated ➔ [Month 6] Kick-Off Meeting for Evaluation ➔ [Month 6] Evaluation begins ➔ [Month 13] Interim process evaluation delivered to Advisory Board ➔ The first draft policy and new program development evaluation will be due three months following the end of the first year of program implementation

Evaluation for Program 9. Public Education and Outreach Program

This program will provide funding for cross-program public education activities to raise awareness of the benefits and methods of improving energy efficiency in homes and businesses.

Program Type	Target Market	End-Uses	DSM Technologies
9. Public Education and Outreach Program	All sectors	All end-uses	All technologies

This program is not subject to cost effectiveness screening, which is deemed inappropriate according to the California Standard Practice Manual:

> "For generalized information programs (e.g., when customers are provided generic information on means of reducing utility bills without the benefit of on-site evaluations or customer billing data), cost effectiveness tests are not expected because of the extreme difficulty in establishing meaningful estimates of load impacts."

Types of activities that would be included in this program are:

- General mass media campaign for the public on pending gas price increases and ways to help control utility bills through energy efficiency measures and actions
- Development of (update of the) Vectren North website to include the latest energy efficiency information for commercial, residential and school use
- Targeted educational campaign for businesses
- Targeted training and educational program for trade allies
- Distribution of federal ENERGY STAR and other national organization materials in the service territory
- A schools curriculum program to educate teachers and direct students to available educational materials on the Web about energy efficiency opportunities

The schools program component will require developing an energy education outreach program targeting Vectren North service territory schools K-12; providing energy curricula to schools that teach students the fundamentals of energy and how to change behavior to conserve; and securing consultant services to provide teacher training and classroom materials.

Evaluation Approach (Process Evaluation)

The process evaluation will tell the story of the educational and promotional effort, and will take its specific content from the directions taken in the program effort. Some of the areas covered in the process evaluation:

- Review of promotional and marketing materials.
- Evaluation of promotional and market plans, and implementation efforts.
- Reporting on showing/airings of materials, communications events, and awareness efforts.
- For any demonstrations or seminar events, the evaluation will rely upon mini-survey questions on beginning and completing the specific activity.

- Activities will be grouped into types and evaluated using a "case study" approach.[48] At certain points, methods of "reason analysis" may also be used.[49]
- When a schools program component begins, evaluation will be based on interviews with selected teachers and students plus: number of schools participating, number of teachers trained in the curricula, and number of students receiving energy awareness education through the program. If the schools program includes any before versus after assessments, they will be incorporated into the process evaluation.

The evaluation report for this program will be a process evaluation, focused on promotion, marketing and communication. It will be primarily descriptive, telling the story of the effort.

Schedule

Before the program begins, Vectren should create a file of program documentation, to provide to the evaluator, that tracks promotional, marketing, communication and education effort initiated under this program. Vectren staff and/or implementation contractor for this area (if any) should be tasked to meet with the evaluator to discuss activities and plans for the year as the evaluation begins. The evaluation team should be designated within three months after the program begins and the evaluation (and evaluation Kick-Off meeting with Vectren and the Advisory Board) should begin six months after the program begins. This evaluation can stay close to the program implementation activities and a draft final report should be submitted at the end of the first quarter following the first implementation year.

Schedule Overview
➔ Program Implementation begins ➔ [Month 3] Evaluation Team designated ➔ [Month 6] Kick-Off Meeting for Evaluation ➔ [Month 6] Evaluation begins ➔ [Month 13] Interim process evaluation delivered to Advisory Board ➔ The first draft (process) evaluation will be due three months following the end of the first year of program implementation

[48] Yin, Robert K. and Donald T. Campbell. Case Study Research: Design & Methods, Vol. 5, Third Edition. Newbury Park, California, London and New Delhi: Sage Publications, December 2002.
[49] Zeisel, Hans. *Say It With Figures*, Fifth Edition, Revised. New York: Harper and Row, 1968.

APPENDIX A. DATA SOURCES AND REFERENCES

Primary (Vectren)

- Revenue Ledger Reports
- Gas Cost Adjustment Filings
- Customer Information and Billing Data Extracts from Banner System
- Residential Customer Survey

Secondary

- Census
    - Population
    - Housing Attributes
    - Housing Permitted for Construction
- Woods and Poole
    - Employment

References

Amann, Jennifer Thorne, and Eric Mendelsohn. *Comprehensive Commercial Retrofit Programs: Review of Activity and Opportunities*. Report No. A052. Washington, DC: American Council for an Energy-Efficient Economy, April 2005.

Buying and Maintaining an Energy-Efficient Home: A Resource Guide for Housing Educators and Counselors. Publication H1593. Washington, DC: Fannie Mae, 2004.

Marks, Michael, Joseph Lopes, and Luisa Freeman. *Comprehensive Resources Assessment Plan for New Jersey Natural Gas Utilities.* Hauppauge, NY: Applied Energy Group, April 2000.

Natural Gas Utility Conservation Rebates (Gas Rebate Facts). St. Paul: Minnesota Department of Commerce, February 2003.

Nadel, Steve, et al. *Emerging Energy Saving Technologies and Practices for the Buildings Sector.* Report No. A985. Washington, DC: American Council for an Energy-Efficient Economy, December 1998.

Elliott, Neal, R., and Anna Monis Shipley. *Impacts of Energy Efficiency and Renewable Energy on Natural Gas Markets: Updated and Expanded Analysis*. Report No. E052. Washington, DC: American Council for an Energy-Efficient Economy, April 2005.

Energy Conservation Improvement Program. St. Paul, Office of the Legislative Auditor, State of Minnesota, 2005.

APPENDIX B. METHODOLOGY

Choice of Methodology–The simplest approach to DSM analysis, often used in larger multi-utility DSM planning, uses synthesizes estimates from demographics applied to engineering prototypes. This approach is easy to apply to individual measures and to small groups of measures where the result of all the measures is small relative to the total energy sales. But the simple synthesis approach becomes unstable where a large or comprehensive technical potential is contemplated because the sum of the savings can sometimes exceed the total energy sales. In this case, where a technical potential will be derived from a maximum application of a wide variety of measures, it is particularly important to be able to establish a reasonable upper bound to the space heat technical potential and to the base load technical potential.

A second problem with the simple synthesis approach is the interaction of measures. Whenever there is a load reduction measure, the net realized energy savings will also be dependent on an assumed thermal conversion efficiency. Where a conversion efficiency is changed at the same time as a load reduction, the result is interactive, and it is important to consider the effect of both measures simultaneously. In this case, where a wide range of efficiency and load reduction measures will be applied, it is also particularly important to be able to deal with measure interactions in an orderly way.

Following the need for a reasonable bound for technical potential, and following the need to deal accurately with measure interactions, we have chosen to use a calibrated engineering model. This approach is calibrated to existing use which provides a realistic starting point for calculating savings or technical potential. The model is structured to include variables for conversion efficiency and load reduction measures so that these types of measures may be modeled simultaneously. However it is important to note that a calibrated model can only be used if there is a coherent body of information to calibrate to. In this case, the DSM planning is for a single compact utility with a coherent body of available billing information which can support a calibrated modeling approach.

Use of General Ledger Records–It is fortunate that Vectren has readily available monthly ledger record summaries that have the total quantity of gas sales for each rate class. While these records are timely and available, they were created for accounting purposes, not engineering ones. Therefore, a few adjustments need to be made to the ledger data in order to use it for these purposes.

The principal adjustment lies in associating the correct average temperature to the gas sales noted in the ledger. It is assumed that the ledger sales are accumulated as each of the 21 meter read cycles is completed. Under these circumstances, the temperatures during the actual time that the energy is used will be for the prior month as well as the current month. In this analysis the temperature associated with ledger gas sales for a particular month will be the average of the particular month and the month preceding it. These temperatures are referred to in this analysis as the "lagged monthly temperatures."

A second potential adjustment lies in the fact that the ledger records are month by month with a different number of business or meter read days in each month. It is assumed that each month 21 meter read cycles are completed regardless of the number of days in the month, and that the ledger usage and customer numbers for the month actually do reflect a single month of usage.

Usage Normalization - For planning purposes, usage data is normalized to the average 30-year temperatures for the region, in this case Indianapolis. Figure 32 shows the actual temperatures in the test year and the long-term average temperatures.

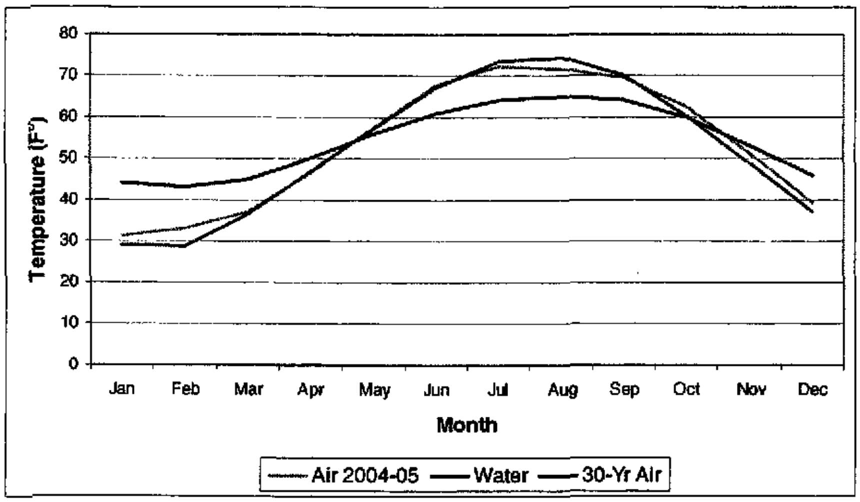

Figure 32. Air and Water Temperatures

In Figure 32, it is evident that the test year, green, is close to the 30-year average, red. The water temperature in Figure 32 refers to the ground water temperature which is used in the end-use models for hot water heating energy. In this case, the 30-year estimate of the groundwater temperature is assumed the same for the test year.

APPENDIX C. TECHNOLOGY CHARACTERISTICS AND ASSUMPTIONS

The ECM and program assumptions used in this report derive from a variety of sources, including our own expert opinion and experience. Secondary sources include government and utility studies in the public domain or available from our direct involvement with research.

The natural gas utilities that were consulted (through published filings with state regulatory agencies) are:

- Atlanta Gas Light (ATL)
- Elizabethtown Natural Gas (ELIZ)
- Long Island Lighting Company (LILCO, now KeySpan)
- Minnegasco
- New Jersey Natural Gas (NJN)
- South Jersey Natural Gas (SJG)
- UtiliCorp

Additional information used in this study came from an overview of the Conservation Improvement Programs offered by the Minnesota natural gas utilities as described in the 2005 report of the State Department of Commerce. The utilities represented in that study include:

- CenterPointEnergy Minnegasco
- Great Plains Natural Gas
- Interstate Power and Light
- Northern Minnesota Utilities
- Peoples Natural Gas
- Xcel Energy

A few web sites also offer valuable information at the technology level, including:

- The California Database for Energy Efficient Resources (DEER), http://eega.cpuc.ca.gov/deer/.
- Work files of the Fifth Northwest Electric Power and Conservation Plan, http://www.nwcouncil.org/energy/powerplan/plan/Default.htm. Although the plan does not include gas DSM technologies, many of the technologies can be expected to have similar measure lives and cost.

The research team also consulted the "2001 DEER (Database for Energy Efficiency Resources) Update Study Final Report," prepared for California Energy Commission.

APPENDIX D. COST EFFECTIVENESS METHODOLOGY

Cost effectiveness analysis refers to the systematic comparison of program benefits and costs using standardized measures of economic performance. In this report, cost effectiveness is discussed at both the technology level and the program level. The assumptions and approach used to calculate technology and program cost effectiveness are presented in this appendix. Much of the material in this section is taken from the *California Standard Practice Manual: Economic Analysis of Demand Side Management Programs and Projects, October 2001* (SPM 2001),[50] which has broad industry acceptance.

Technology Cost Effectiveness

It is desirable to consider some measure of a technology's cost effectiveness in the preliminary stages of program design. This allows program planners to subjectively tradeoff cost and other attributes of energy conservation measures (ECM) when considering possible packages and program designs. Cost effectiveness analysis is less precise at the technology screening stage because estimates of energy savings and costs at the measure level are subject to a great deal of variance due to interaction with other measures and actual program implementation. Still, measure cost effectiveness provides a useful metric for consideration along with the many other factors outlined in the Program Design section of this report.

What is needed at the technology or measure level is a simple measure of cost effectiveness that does not require assumptions of avoided resource cost, rebates, program delivery cost and other program level details. Levelized Cost (LC) provides just such a measure by expressing the cost of a measure in annual terms per unit of energy saved. This allows an easy way to compare and rank order the cost effectiveness of measures. The formula used for the LC calculations in this report is presented below:

LC=DCosts / DSavings

$$DCost = \sum_{t=1}^{N} \frac{IC_t}{(1+d)^{t-1}} \qquad DSavings = \sum_{t=1}^{n} [(\Delta EN_t) \div (1+d)^{t-1}]$$

where:

LC	=	Levelized cost per unit of the total cost of the resource (cents per therm)
IC	=	Incremental cost of the measure or technology
DCost	=	Total discounted costs
DSavings	=	Total discounted load impacts
ΔENit	=	Reduction in net energy use in year t

[50] Prepared by the California Public Utilities Commission (CPUC) and the California Energy Commission (CEC). All formulas and discussion are based on the SPM 2001. Formulas have been modified to remove peak savings, multiple costing periods, and otherwise adapted to be relevant for use with this project.

Although not suited for fuel substitution and load building programs, LC provides an easily calculated way of comparing measures. Measure cost, savings, useful life, and discount rate are the only assumptions required for calculating LC.

Program Cost Effectiveness

Many additional assumptions over and above those required for calculating ECM cost effectiveness must be made when calculating program cost effectiveness. Cost effectiveness of energy efficiency programs involves describing the economic impact of the program from the perspective of various groups. This analysis required detailed program budgets and design elements such as rebate levels and other program features. Perspectives, also called tests, presented in this report are listed in the table below along with the primary benefits and costs used to compute cost effectiveness.

Table 66. Benefits and Costs by Cost Effectiveness Test

Cost Effectiveness Test	Benefits	Costs
Participant	Reduced gas bill Incentive payments Tax credits Decreased O&M costs	ECM installation Increased O&M costs
Ratepayer Impact	Avoided gas costs (net)	Lost gas revenue (net) Program expenses
Total Resource Cost	Avoided gas costs (net) Tax credits Decreased O&M costs	ECM installation Program expenses Increased O&M costs
Program Administrator Cost (formerly named Utility Cost)	Avoided gas costs (net)	Program expenses paid by program administrator

Reference to "net" indicates that the load used to measure the benefit or cost is net of free riders. ECM installation includes all incremental costs to acquire and install an ECM. Program expenses include all costs related to delivery of the program and include staffing and overhead, advertising, incentive payments, administration fees, and monitoring and evaluation expenses.

Various measures of the economic impact are available for each perspective. The two primary measures we will use in this report are listed below:

- Net Present Value (NPV)
- Benefit-Cost Ratio (BCR)

In addition to the economic criteria listed above, other criteria may be unique to a given perspective. For example, simple payback of investment is often cited as an important criterion from the participant perspective. Each of the perspectives is discussed in detail below including the assumptions and formulas required to calculate the measures of economic impact. Each of the cost effectiveness tests are discussed below.

Participant Test

This test compares the reduction in energy bills resulting from the program with any costs that might have been incurred by participants. Other benefits included in this test include incentive payments and tax credits. When calculating benefits, gross energy savings are used rather than reducing savings for free-riders.

The main value of the Participant Test is that it provides insight into how the program might be received by energy consumers. The incentive level required to achieve some minimum level of cost effectiveness, for example, can be useful in program design efforts. It should be noted, however, that consumer decision making is far more complex than reflected by the Participant Test. For this reason, the test should be used as one consideration of likely program acceptance and not an absolute indicator.

Ratepayer Impact Measure Test

The Ratepayer Impact Measure (RIM) Test measures the impacts to customer bills and rates due to changes in utility revenues and operating costs caused by the program. Rates will go down if the change in revenues from the program is greater than the change in utility costs. Conversely, rates will go up if revenues collected after program implementation is less than the total costs incurred by the utility for implementing the program. This test indicates the direction and relative magnitude of the expected change in customer rate levels.

The benefits calculated in the RIM Test are the savings from avoided supply costs. These avoided costs include the reduction in commodity and distribution costs over the life of the program.

The costs for this test are the lost revenues from gas sales and all program costs incurred by the utility, including incentives paid to the participant. The program costs include initial and annual costs, such as the cost of equipment (either total cost for a new installation or net cost if done as a replacement), operation and maintenance, installation, program administration, and customer dropout and removal of equipment (less salvage value). The decreases in supply costs and lost revenues should be calculated using net savings.

Total Resource Cost Test

The Total Resource Cost Test measures the net costs of a demand-side management program as a resource option based on the total costs of the program, including both the participants' and the utility's costs. Of all the tests, the TRC is the broadest measure of program cost effectiveness. This makes the TRC Test useful for comparing supply and demand side resources.

The primary benefit in the TRC Test is the avoided cost of gas. Loads used in the avoided cost calculation are net of free riders. Tax credits and reductions in annual O&M costs, if applicable, are also treated as a program benefit (or a reduction in costs). Costs used in the TRC calculations include all ECM installation costs, program related costs and any increased O&M costs no matter who pays them. Incentive payments are viewed as transfers between participants and ratepayers and are excluded from the TRC Test,

Program Administrator Cost Test

The Program Administrator Cost Test measures the cost of acquired energy savings considering only the costs paid by the program administrator. Benefits are similar to the TRC Test but costs are more narrowly defined. Its primary purpose is for assessing resource acquisition from the perspective of the program administrator. In this sense, it is similar to the Participant Test in that the test provides a measure of cost effectiveness from a single perspective that does not include all costs.

Benefits included in the calculation are the avoided cost of gas. Net loads are used for the purpose of calculating avoided cost of gas benefits. The costs include all administrator program expenses including incentive payments for ECM installation.

Avoided Cost of Gas Details

All tests, except the Participant Test, rely on an estimate of the avoided cost of gas. The details behind these calculations are presented in the table below. See the Avoided Gas Costs discussion in the Program Cost Effectiveness section for a description of how these results are used to estimate avoided gas costs.

Table 67. Avoided Cost of Gas Details

			Commodity Costs						Demand Costs		Total - Space Heat			Total Non-Space Heat		
Description	Amount	Year	Short Term Outlook a)	Pct Change	EIA 2005 Outlook b)	Pct Change	Forecast Pct Chg	Vectren Forecast	Space Heat	Non-Space Heat	$/Therm	NPV	Level'd	$/Therm	NPV	Level'd
Weighted average cost of capital	8.34%	1	13.88		9.30			$ 1.16	0.119	0.0476	$ 1.2758		$ 1.2758	$ 1.2044		$ 1.2044
Inflation	3.00%	2	11.242	-19.0%	8.54	-8.2%	-19.0%	$ 0.94	0.119	0.0476	$ 1.0560	$ 2.17	$ 1.1687	$ 0.9846	$ 2.03	$ 1.0973
Inflation adjusted discount rate	5.18%	3	9.747	-13.3%	7.96	-6.8%	-13.3%	$ 0.81	0.119	0.0476	$ 0.9314	$ 2.97	$ 1.0936	$ 0.8600	$ 2.77	$ 1.0221
		4	8.847	-9.2%	7.45	-6.5%	-9.2%	$ 0.74	0.119	0.0476	$ 0.8564	$ 3.67	$ 1.0387	$ 0.7850	$ 3.42	$ 0.9673
		5	8.212	-7.2%	7.20	-3.3%	-7.2%	$ 0.68	0.119	0.0476	$ 0.8034	$ 4.29	$ 0.9962	$ 0.7320	$ 3.98	$ 0.9248
		6			6.96	-3.3%	-3.3%	$ 0.66	0.119	0.0476	$ 0.7807	$ 4.87	$ 0.9647	$ 0.7093	$ 4.51	$ 0.8933
		7			6.87	-1.3%	-1.3%	$ 0.65	0.119	0.0476	$ 0.7719	$ 5.41	$ 0.9411	$ 0.7005	$ 5.00	$ 0.8697
		8			6.95	1.1%	1.1%	$ 0.66	0.119	0.0476	$ 0.7793	$ 5.93	$ 0.9243	$ 0.7079	$ 5.47	$ 0.8529
		9			7.07	1.7%	1.7%	$ 0.67	0.119	0.0476	$ 0.7906	$ 6.43	$ 0.9123	$ 0.7192	$ 5.93	$ 0.8409
		10			7.25	2.5%	2.5%	$ 0.69	0.119	0.0476	$ 0.8075	$ 6.92	$ 0.9040	$ 0.7361	$ 6.37	$ 0.8326
		11			7.39	1.9%	1.9%	$ 0.70	0.119	0.0476	$ 0.8206	$ 7.39	$ 0.8982	$ 0.7492	$ 6.80	$ 0.8268
		12			7.37	-0.2%	-0.2%	$ 0.70	0.119	0.0476	$ 0.8192	$ 7.84	$ 0.8933	$ 0.7478	$ 7.21	$ 0.8219
		13			7.40	0.4%	0.4%	$ 0.70	0.119	0.0476	$ 0.8223	$ 8.26	$ 0.8893	$ 0.7509	$ 7.60	$ 0.8179
		14			7.53	1.8%	1.8%	$ 0.72	0.119	0.0476	$ 0.8347	$ 8.67	$ 0.8866	$ 0.7633	$ 7.97	$ 0.8152
		15			7.71	2.4%	2.4%	$ 0.73	0.119	0.0476	$ 0.8517	$ 9.07	$ 0.8850	$ 0.7803	$ 8.34	$ 0.8136
		16			7.85	1.8%	1.8%	$ 0.75	0.119	0.0476	$ 0.8647	$ 9.46	$ 0.8841	$ 0.7933	$ 8.69	$ 0.8127
		17			7.97	1.6%	1.6%	$ 0.76	0.119	0.0476	$ 0.8765	$ 9.83	$ 0.8839	$ 0.8051	$ 9.03	$ 0.8125
		18			8.03	0.7%	0.7%	$ 0.76	0.119	0.0476	$ 0.8818	$ 10.18	$ 0.8838	$ 0.8104	$ 9.36	$ 0.8124
		19			8.04	0.2%	0.2%	$ 0.76	0.119	0.0476	$ 0.8833	$ 10.52	$ 0.8838	$ 0.8119	$ 9.67	$ 0.8124
		20			8.11	0.8%	0.8%	$ 0.77	0.119	0.0476	$ 0.8895	$ 10.85	$ 0.8839	$ 0.8181	$ 9.97	$ 0.8125
		21			8.18	0.9%	0.9%	$ 0.78	0.119	0.0476	$ 0.8967	$ 11.16	$ 0.8843	$ 0.8253	$ 10.25	$ 0.8129
		22				0.0%	0.0%	$ 0.78	0.119	0.0476	$ 0.8967	$ 11.45	$ 0.8846	$ 0.8253	$ 10.53	$ 0.8132
		23				0.0%	0.0%	$ 0.78	0.119	0.0476	$ 0.8967	$ 11.73	$ 0.8849	$ 0.8253	$ 10.78	$ 0.8135
		24				0.0%	0.0%	$ 0.78	0.119	0.0476	$ 0.8967	$ 12.00	$ 0.8851	$ 0.8253	$ 11.03	$ 0.8137
		25				0.0%	0.0%	$ 0.78	0.119	0.0476	$ 0.8967	$ 12.25	$ 0.8854	$ 0.8253	$ 11.26	$ 0.8140
		26				0.0%	0.0%	$ 0.78	0.119	0.0476	$ 0.8967	$ 12.49	$ 0.8856	$ 0.8253	$ 11.48	$ 0.8142
		27				0.0%	0.0%	$ 0.78	0.119	0.0476	$ 0.8967	$ 12.72	$ 0.8858	$ 0.8253	$ 11.70	$ 0.8144
		28				0.0%	0.0%	$ 0.78	0.119	0.0476	$ 0.8967	$ 12.94	$ 0.8860	$ 0.8253	$ 11.90	$ 0.8146
		29				0.0%	0.0%	$ 0.78	0.119	0.0476	$ 0.8967	$ 13.15	$ 0.8861	$ 0.8253	$ 12.09	$ 0.8147
		30				0.0%	0.0%	$ 0.78	0.119	0.0476	$ 0.8967	$ 13.34	$ 0.8863	$ 0.8253	$ 12.27	$ 0.8149

Notes:
a) NYMEX futures, February contract (10/13/05)
a) 2003 dollars per million BTU, East North Central Region

APPENDIX E. SUMMARY OF NATURAL GAS PROGRAM REBATES, MINNESOTA

Natural Gas Utility Conservation Rebates

The following is an excerpt from Gas Rebate Facts, Minnesota Department of Commerce, February 2003, pages 1-5.

INTRODUCTION

The following provides general information about the variety and type of rebates being offered to customers of Minnesota's investor owned natural gas utilities. The information has been compiled from programs submitted to the Commissioner in the Conservation Improvement Program filings. The intent is not to provide an exhaustive listing of every rebate being offered, but rather to summarize and describe a range of program offerings. The amount of rebate offered varies depending upon the unique circumstances of the utility; the rebate amount shown is simply what is being offered and is not a recommendation. We hope this information will help persons involved in developing programs become more familiar with rebate possibilities. For more information, please contact Christina Brusven (651-282-5008).

RESIDENTIAL PROJECTS

The energy saving focus of residential projects is space heating, which is the largest use of natural gas in the residential sector. Rebates are offered for furnaces, boilers and setback thermostats. Some utilities also provide rebates for domestic water heaters and integrated space and water heating appliances. Rebates are listed for each utility as they were provided to the department; unless otherwise stated, the listed efficiency criterion is the minimum requirement.

Aquila (Northern Minnesota Utilities and People's Natural Gas)

- Forced air furnaces (92% AFUE)–$200.
- Forced air furnaces (94% AFUE)–$250.
- Integrated systems (90% Combined Annual Efficiency)–$250.
- ENERGY STAR setback thermostats–$40.
- Water Heaters (.62 Energy Factor)–$45.

CenterPoint Energy Minnegasco

- Forced air furnaces (92% AFUE)–$100 participant; $15 dealer.
- Boilers (85% AFUE)–$100 participant; $15 dealer.
- Integrated systems (88% Combined Annual Efficiency)–$150 participant; $15 dealer.

Great Plains

- Forced air furnaces (92% AFUE)–$150.
- Integrated systems (88% Combined Annual Efficiency)–$150.
- Setback thermostats–$20.
- Water heaters (.62 Energy Factor)–$50.

Interstate Power and Light

- Forced air furnaces (92% AFUE)–$200; 15 percent dealer incentive.
- Boilers (85% AFUE)–$200.
  - Eligible boiler and furnaces must be listed in the GAMA directory and cannot exceed 300,000 BTU/hr input.
- Setback thermostats–$25.
- Water heaters (.62 energy factor)–$50.
- Horizontal axis ENERGY STAR clothes washers–$100.
- Windows (U value of .35 or less)–$20 per window.

Xcel Energy

- Forced air furnaces (90% AFUE)–$75.
- Forced air furnaces (94% AFUE)–$100.
- Boilers (85% AFUE)–$100.
- Water heaters (.62 Energy Factor)–$50.

COMMERCIAL AND INDUSTRIAL PROJECTS

Projects for this customer class fall into two general categories: prescriptive and custom. Prescriptive projects are similar to residential rebate projects in that they offer a set rebate amount for a specific technology. Custom projects are tailored to the specific customer; rebates are determined by evaluating the project with a benefit/cost model.

Prescriptive Projects

Aquila (Northern Minnesota Utilities and People's Natural Gas)

- Water heaters 50 gallons or more (.62 Energy Factor)–$150 per unit.
- Forced air furnaces less than 225,000 BTU/hr (92% AFUE)–$200.
- Forced air furnaces less than 225,000 BTU/hr (94% AFUE)–$250.
- Also provides incentives for heating system retrofit measures.

CenterPoint Energy Minnegasco

Foodservice Equipment

- Targeted to customers with large cooking loads such as restaurants, hospitals, schools, etc.

Foodservice Equipment	Incentive Amount
Convection ovens (thermostatically controlled)	$200 per unit
Conveyor ovens (thermostatically controlled)	$250 per unit
Combi-ovens (thermostatically controlled)	$1,000 per unit
High efficiency or Infrared Fryers	$250 per unit
Pasta cookers	$200 per unit
Infrared upright Broiler	$600 per unit
Infrared charbroilers	$200 per unit

Boiler System Tune-up

- Targets customers using up to 75,000 therms annually.
- Rebate of up to 25% of the tune-up cost with a cap of $200 per boiler and $1,000 per facility.

Heating Systems

Equipment Type and Size	Efficiency Requirements	Rebate Amount
High efficiency forced-air furnace <225,000 BTU/hr	92% AFUE	$100/Furnace
Unit Heaters/Duct Furnaces (all sizes)	83% AFUE	10% of equipment cost; $1,000/unit cap
High efficiency boiler system <10 MMBTUs per system	85% combustion efficiency or greater	$1,000/MMBTU; $10,000/system cap
Continuous air/fuel modulating Boiler Burners <10 MMBTUs per system	Minimum 6-step modulation system	$600/MMBTU; $6,000/system cap
High efficiency boiler system > or equal to 10 MMBTUs per system	Requirements determined on a case-by-case basis. Rebates must pass the BENCOST financial modeling criteria.	Rebate will use the Custom Rebate criteria and will vary case-by-case; $50,000/system cap

Heating System Retrofits

Equipment Type or Service	Efficiency Requirements	Rebate Amount
Steam trap replacement	Steam trap survey (infrared or ultrasonic evaluation of existing steam trap operation) is required.	35% of equipment cost; $10,000/building cap
Continuous Air/Fuel Modulating Boiler Burners <10 MMBTUs per system	Minimum 6-step modulation system	$600/MMBTU; $6,000/system cap
Single pipe steam balancing		25% of equipment cost; $1,000 cap
Vent dampers		25% of equipment cost; $250/boiler cap
Boiler reset control		Up to $150/control system; not to exceed equipment cost
Boiler cut-out control		Up to $150/control system; not to exceed equipment cost
Customized heating system rebate	Requirements determined on a case by-case basis. Rebates must pass BENCOST financial modeling criteria.	Rebate will use the Custom Rebate criteria and will vary case-by-case; $50,000/system cap

Xcel Energy

Boiler System Rebates

- Follows ASHRAE 90.1 and Federal Energy Management Program Standards.

Capacity (MMBTUH)	Hot Water Boilers	Low Pressure Steam Boiler	High Pressure Steam Boiler	Rebate Cap per Boiler System
<300	83% AFUE	83% AFUE	81.5% AFUE	$750
300 – 1,000	83%	83%	81.5%	$2,500
1,001 – 10,000	83%	83%	81.5%	$5,000
>10,001	83%	83%	81.5%	$7,500
Rebate	$400/MMBTUH +$150/MMBTUH x (EFF - 83)	$500/MMBTUH +$250/MMBTUH x (EFF - 83)	$300/MMBTUH +$150/MMBTUH x (EFF - 81.5)	

Boiler Retrofits, Controls, and Improvements

- Tune-ups 25% up to $250.
- Modular burner controls (5 to 1 turndown ratio min.) 25% up to $2,500.
- Modular burner controls (10 to 1 Turndown ratio or greater) 25% up to $5,000.
- Turbulators – 25% up to $400.
- Blowdown heat recovery, stack economizers and O2 trim controls – 25% up to $5,000.
- Outdoor air reset controls – 25% up to $500.
- Stack dampers – 25% up to $250.

Natural Gas Fired Engine Driven Cooling Systems

- COP must be greater or equal to 1.95.
- Rebates calculated on a custom basis with each installation passing a cost/benefit test. Rebate level is $6/ton plus $8 MMBTU saved.

Other Rebates

- Xcel also provides prescriptive rebates for infrared heaters, setback thermostats and hot water heaters.
- Rebates are 25% of equipment costs or $1,500, whichever is the least amount.

Custom Projects

Aquila (Northern Minnesota Utilities and People's Natural Gas)

- All projects must pass societal benefit/cost test (result must be greater than 1.0).
- Buydown to a two-year payback.
- Rebate amount is 50% of incremental cost.

CenterPoint Energy Minnegasco

Custom Process Rebates

- Provides custom rebates on a case by case basis to industrial dual fuel customers.
- Examples of technologies include: process boilers, heat recovery systems, tower melters, and heat treat systems.
- Customer receives the lesser of: $.70 per therm saved; buy down to a 2-year payback;
- 50% of incremental equipment cost; 25% of equipment cost.

Engineering Assistance

- Reimburses C/I customers for a portion of the engineering fees for the design and installation of qualifying energy efficient process technologies.
- Provides up to $2,500 (not to exceed 50%). If a qualifying process is installed, an additional maximum $2,500 can be rebated.

Industrial Audits

- Largest industrial customers may qualify for $5,000 up front.
- May also qualify for an additional $5,000 with the installation of qualifying efficient natural gas process technologies.

Great Plains

- All projects are pre-screened and must pass societal benefit/cost test.
- Maximum rebate is $2,000 or 50% of the cost, whichever is less.

Interstate Light and Power

- All C and I customers are served through the custom program.
- Includes a detailed energy analysis to identify energy management and efficiency recommendations.
- Projects must pass societal benefit/cost screening test.

Xcel Energy

Custom Efficiency Projects

- Provides incentives of up to $2 per MCF saved.
- Also includes food service equipment.

Energy Design Assistance

- Focuses on gas savings for new and major building renovations.
- Incentive is $2 per MMBTU saved.

APPENDIX F. ENERGY CONSERVATION MEASURE ASSUMPTIONS

The table below contains the ECM assumptions used in developing the program budgets and cost effectiveness analysis. Readers can use this information to see the ECM details that make up each of the proposed programs. Install Rate refers to the percentage of program participants who actually install each of the ECMs. Cost is the incremental cost of the ECM over a standard efficiency option. The Therms Saved represent annual savings per installation and the expected life is the number of years the ECM is expected to deliver savings. Our approach in developing these assumptions was to consider a broad range of relevant research (see Appendix C) as well as our experience. Since each assumption is derived from many sources, including our own experience and expert opinion, it is not possible to map each of the assumptions listed below to any one source.

Table 68. Energy Conservation Measure Assumptions Used in Program Planning and Design

Energy Conservation Measure	Install Rate	Cost	Therms Saved	Expected Life
Small Buildings Energy Efficiency Program				
Showerheads	60%	$25	27	10
Furnace Repair[a]	10%	$200	140	10
Wall Insulation	10%	$1,500	200	25
Ceiling Insulation	10%	$1,000	70	25
Education	30%	$25	60	4
New Furnace	15%	$1,100	300	25
Duct Seal	60%	$200	41	13
House Seal	50%	$300	47	13
Thermostat	30%	$120	35	13
HE Gas Water Heater	20%	$180	50	15
HE Gas Range	20%	$100	5	18
HE Gas Dryer	20%	$100	13	18
ES Clothes Washer[b]	20%	$500	30	15
[a] Repair burner and/or heat exchanger [b] Horizontal axis				
General Services Energy Efficiency Program				
Showerheads	20%	$1,000	600	10
New Boiler	10%	$20,000	2560	20
Commissioning Audit	50%	$1,300	640	5
Controls[c]	40%	$8,000	2400	15
Roof Insul	10%	$15,000	1600	25
Low-E Glass	5%	$30,000	1600	25
Low-E New	5%	$4,500	800	25
Solar Water	2%	$30,000	1600	25
HE Water Heater	5%	$3,500	600	15
[c] Bundle includes boiler tune up and HE FAF				
Customized Energy Efficiency Program				
Commissioning	20%	$15,000	10000	10
New Boiler	10%	$60,000	9000	20
Custom ECMs	20%	$100,000	20000	15
Controls	20%	$60,000	20000	15

continued on next page

Table 68. Energy Conservation Measure Assumptions Used in Program Planning and Design, Continued

Energy Conservation Measure	Install Rate	Cost	Therms Saved	Expected Life
Hospitality Industry Energy Efficiency Program				
Showerheads	20%	$1,000	600	10
New Boiler	10%	$20,000	2560	20
Commissioning Audit	50%	$1,300	640	5
Controls	20%	$8,000	2400	15
ES Stove[d]	10%	$4,000	1280	15
ES Oven	10%	$5,000	1280	15
ES Dryer and Washers	10%	$4,000	640	15
Solar Water	1%	$30,000	1600	25
HE Water Heater	5%	$3,500	600	15
[d] Bundle includes ES fryer, griddle, and infrared products				
Multi-Family Building Energy Efficiency Program				
Showerheads	60%	$25	27	10
Furnace Tune	60%	$75	30	3
Furnace Repair[e]	5%	$200	80	10
Wall Insulation	5%	$1,000	140	20
Ceiling Insulation	10%	$500	50	20
Education	30%	$25	40	4
New Furnace[f]	10%	$1,100	200	20
Duct Seal	50%	$200	41	13
House Seal	50%	$300	47	13
Thermostat	30%	$120	35	13
[e] Repair burner and/or heat exchanger [f] Bundle includes WH, boilers, and boiler tune up.				
Energy Efficient Builder Program				
Solar Siting	60%	$200	120	50
ES Construct[g]	90%	$2,000	350	50
[g] Includes HE windows				

Note: HE = High Efficiency; WH = Water Heat; ES = Energy Star

Responding to the Natural Gas Crisis: America's Best Natural Gas Energy Efficiency Programs

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GLOSSARY OF TERMS AND ABBREVIATIONS

Natural Gas and Energy Units and Abbreviations

cubic foot (cf)—basic unit of natural gas delivery = ~1,030 Btu
Mcf = thousand cubic feet
ccf = hundred cubic feet
MMBtu = million British thermal units
therm = 100,000 Btu
Decatherm = 10 therms = 1 MMBtu
billion cubic feet (Bcf) = ~ trillion Btu
trillion cubic feet (Tcf) = ~Quad
MBH = million Btu/hour

EXECUTIVE SUMMARY

The year 2003 marked a dramatic turn-around in the situation regarding the U.S. natural gas market. After many years of very low prices, there has been roughly a doubling of gas prices in the wholesale market. According to industry experts, the United States faces a prolonged period of dramatically elevated prices and potential supply problems. The circumstances are severe enough that even Federal Reserve Chairman Alan Greenspan has testified before Congress on the very real threat this situation poses to the health of the U.S. economy.

In the face of these developments, there has been considerable re-awakened interest in the subject of natural gas energy efficiency programs. At the federal level, even the Secretary of Energy has noted that there must be an emphasis on conservation and energy efficiency. At the state level, many regulatory commissions and utilities are re-examining opportunities for natural gas efficiency programs after having let such efforts fade during the lengthy period of low gas prices during the 1990s.

In response to these developments, ACEEE launched an expedited project to identify and profile exemplary existing natural gas energy efficiency programs. The objective was to provide policymakers, regulators, and utilities that were interested in initiating or expanding natural gas efficiency efforts with practical models of proven successful gas efficiency programs.

After an extensive nationwide search, ACEEE selected a total of 29 programs to profile as representative of outstanding natural gas efficiency programs. We also selected 5 "special case studies" as noteworthy examples of comprehensive program portfolios and/or multi-utility collaboratives. Programs exist for all types of customers and for all principal natural gas end-use technologies, providing a variety of products and services to help customers increase their energy efficiency.

While we found many good models of natural gas efficiency programs worthy of emulation by others, we also found that such programs tend to be concentrated in a relatively few number of states. This means that there is a lot of room for expansion of such efforts.

We recommend offering natural gas energy efficiency programs to customers in areas not presently served or underserved by such programs. Improved efficiency is a concrete step customers can take to offset price increases, but decades of experience suggest that they won't necessarily take such a step without the presence of energy efficiency programs.

We urge policymakers and regulators to take the initiative to facilitate natural gas energy efficiency programs. Utilities can also take action themselves to provide energy efficiency programs, but they typically need support from their regulators to make such programs feasible and effective. Therefore, in addition to profiling specific programs, this report also provides information about policy and regulatory mechanisms that leading states use to encourage and require utility natural gas energy efficiency programs.

BACKGROUND

Context for this Project

Over the past two years, natural gas prices in the United States have increased dramatically, and industry experts warn that the problem may persist for quite some time. A recent report to Energy Secretary Spencer Abraham prepared by the National Petroleum Council (NPC 2003) observes that "there has been a fundamental shift in the natural gas supply-demand balance that has resulted in higher prices and volatility in recent years" (p. 16), and concludes that natural gas prices could average between $5 and $7 per 1,000 cubic feet for years to come without significant advances in energy efficiency. (That would be about double the cost of natural gas from only a couple years ago.)

In the face of these dramatic developments, interest in natural gas energy efficiency has been growing rapidly. Utilities and states that had allowed energy efficiency efforts to languish during the extended period of low natural gas prices during the 1990s are showing renewed interest in energy efficiency. In response to these developments, ACEEE launched this expedited project to identify and profile exemplary natural gas energy efficiency programs. The goal is to provide practical and successful program models to emulate, for those states/utilities that wish to initiate or expand their natural gas energy efficiency efforts.

The Importance of Demand

The situation with respect to natural gas today is a textbook case of fundamental economics. Demand for natural gas has risen steadily, driven by large increases in its use for electric power generation and residential heating. Over 60 million American households now use natural gas to heat their homes, up from 48 million in 1987. In the electric power sector, 90% of all new power plants constructed in recent years use natural gas, largely because of its clean-burning characteristics and the perceived generally ample domestic supplies historically—a situation now apparently changing.

While demand has increased steadily, supply has not kept up an equivalent growth rate. According to the National Petroleum Council report, production from traditional U.S. and Canadian sources has reached a plateau. Production volume from North American gas fields is declining at an annual rate of more than 25%. This means that companies need to increase their drilling activity just to try to find sufficient new supplies to maintain steady volumes of production.

Despite increased exploration activity, North American supplies of natural gas have not kept pace with increased demand. The result is a tightening market—constrained supplies and higher prices. One concrete sign of this market imbalance occurred in the spring of 2003 when the amount of natural gas in storage dropped to its lowest level since the federal government began tracking these data in 1976. New technologies and infrastructure—such as to accommodate liquefied natural gas—offer some promise to ease supply problems, but this type of development is years away from practice. Even development of a natural gas pipeline from Alaska to the lower 48 states would only offer modest relief from the constrained supply outlook—and again, such a development would be years away even if the decision is made to proceed with this project as a result of pending federal energy policy legislation in Congress.

Prices already have responded to supply constraints. In September 2003, the spot price for natural gas was over $4.50 per 1,000 cubic feet—which was about 50% higher than a year earlier. Consumer prices for natural gas rose sharply during the winter of 2002–03—in some cases almost doubling. Many residential consumers have not become aware of the increases in natural gas prices that began in the fall of 2002 because they are on fixed-cost annual contracts. Residential retail prices for 2003–04 are projected to be $2 per thousand cubic feet (Mcf) higher than for 2002–03, with the higher prices projected to persist for at least the next four years. These residential consumers will begin to experience the price increases this fall with a national average 36% increase in natural gas bills.

The National Petroleum Council's report echoes this price outlook, concluding that natural gas prices could be $5–7 per 1000 cubic feet for years to come without significant policy actions. The report also predicts that U.S. demand is likely to reach over 30 trillion cubic feet per year by 2025, a significant increase from today's demand of about 23 trillion cubic feet per year. (It is noteworthy that these scenarios presume no significant advances in energy efficiency.)

Clearly, the outlook for consumers and the overall economy is not bright. There are few options to switch to less expensive fuels in most applications where natural gas is used as a fuel. Homeowners can't readily switch their furnaces to use other fuels. And electric power generators based on natural gas also aren't readily and economically switched to other fuels, even if such a switch would be possible.

In a response to the National Petroleum Council's report, Energy Secretary Spencer Abraham observed, "What this report makes unmistakably clear is that major challenges face us with respect to natural gas. Increasing demand for natural gas, coupled with decreasing domestic supply, will mean price volatility and a potentially serious drag on the nation's economy" (Reuters 2003). Federal Reserve Board Chairman Alan Greenspan echoed these concerns in testimony to Congress in the summer of 2003.

What can be done to brighten this outlook for consumers? The answer lies with this textbook case of market economics—reduce demand through energy efficiency and conservation. As the National Petroleum Council concludes in its report, in the very near term, reducing demand is the primary means to keep the market in balance because of the lead times required to bring new supply to market (NPC 2003).

Energy Secretary Spencer Abraham concurs. In a letter to Senate Minority Leader Tom Daschle (Abraham 2003), the Secretary stated, "Over the next 12 to 18 months, there are only limited opportunities to increase supply… therefore, the emphasis must be on conservation, energy efficiency and fuel switching."

Recent research by ACEEE and the Environmental and Energy Analysis, Inc. (Elliott et al. 2003) clearly shows the benefits of an increased emphasis on energy efficiency and conservation to reduce demand, along with parallel efforts to increase use of renewable energy. Results of this analysis are that modestly reducing both natural gas and electricity consumption along with accelerating installation of renewable energy generation can dramatically affect natural gas prices and availability. Such actions could stabilize natural gas prices and save gas and electricity consumers billions of dollars. The researchers analyzed the potential impacts of aggressive but readily achievable energy efficiency programs and renewable energy resources in the lower 48 states.

That research by ACEEE and EEA suggests that nationwide efforts in just 12 months could reduce natural gas consumption by 1.9% from the base case and could reduce electricity consumption by 2.2%. Such reductions could in turn lead to a 20% reduction in wholesale natural gas prices. In the longer term, the researchers project that America can reduce electricity consumption by 3.2% and natural gas consumption by 4.1%, and increase renewable generation from 2.3 to 6.3% of national generation by 2008, which would lower wholesale natural gas prices by 22%. National retail savings to residential, commercial, and industrial consumers would exceed $75 billion for the five-year period of 2004–2008. The researchers also examined state and regional impacts. They found that reducing energy consumption and increasing renewable energy generation in just one state or region can result in dramatic wholesale price reductions on the order of 5 to 7% in the region (Elliott et al. 2003).

Using Energy Efficiency and Conservation To Combat the Crisis

Energy efficiency is clearly a concrete step that can be taken immediately to combat the problems looming with the price and supplies of natural gas for the winter of 2003-04. Energy efficiency can also play a key role in a broader overall strategy to address our nation's future natural gas needs. Other elements in such a strategy will include greater use of renewable energy generation and more efficient power generation.

The ACEEE and EEA research also notes that no single policy strategy will achieve the results outlined in their analysis. Rather, they conclude that a portfolio of strategies is most likely to achieve quick and sustained saving from energy efficiency and renewable energy resources. These strategies include:

- Creating energy efficiency performance targets for utilities and/or expanding public benefits funds
- Expanding federal funding for energy efficiency and renewable energy programs at DOE and EPA
- Expanding, updating, and making more stringent appliance efficiency standards
- Expanding and making more stringent energy efficiency provisions in building codes
- Increasing support for clean and efficient distributed generation
- Adopting renewable energy portfolio standards
- Raising public awareness through a state and national campaigns

An important component of the above portfolio of strategies is an increased level of activity for individual utility and related state programs that promote natural gas end-use efficiency. If energy efficiency is to be part of the solution to the looming natural gas crisis, regulators, policy makers, utility managers, and related energy professionals need to be able to build on past success with such programs. Identifying and profiling examples of highly successful programs as a means to document this past success and encourage greater level of program activity is the genesis and overall objective of this report.

RESEARCH OBJECTIVES AND METHODOLOGY

ACEEE conducted a nationwide search and review of utility sector natural gas energy efficiency programs and associated regulatory and policy mechanisms. This research project had two primary objectives:

1. Provide a catalog and detailed description of the best programs available for saving natural gas through energy efficiency improvements.
2. Provide a review and summary of specific policy and regulatory mechanisms currently being used by state policymakers and regulators to encourage and support efforts by natural gas utilities to provide energy efficiency services to their customers.

This report presents the findings of this project to identify and document "best practices" for the design and implementation of natural gas efficiency programs. The intent of this report is to provide regulators, policy makers, and program administrators with a guidebook of practical, state-of-the-art information about energy efficiency programs that can be used effectively to yield critical natural gas savings in an expedited time frame. Applying the lessons learned from over two decades of experience with natural gas efficiency programs can play a key role in developing and implementing new and revised programs to address the looming crisis with natural gas prices and supplies.

We used the following data collection methods:

- A screening survey of all 50 states
- Interviews with national experts
- A public solicitation of program nominations
- Review of appropriate policy and program documentation
- Interviews with representatives of programs selected for the "best practices" catalog and from states with noteworthy policy/regulatory mechanisms for supporting natural gas efficiency programs

We summarize the objectives and tasks performed for each of these data collection methods below.

1. *Screening survey of all 50 states:* We conducted an initial state screening survey to determine which states have utility-related (including public benefit fund supported) natural gas energy efficiency programs, and to identify appropriate contact persons for obtaining additional information. We pursued follow-up contacts as necessary to get initial descriptive information about programs and regulatory or policy mechanisms in place to support these programs.
2. *Interviews with national experts:* We contacted various national experts and industry observers who are familiar with utility-related energy efficiency activities around the country, and interviewed them regarding their suggestions for exemplary natural gas energy efficiency programs and noteworthy policy/regulatory mechanisms for facilitating such programs.
3. *Public solicitation of program nominations:* ACEEE broadly solicited nominations for exemplary natural gas programs, including placing a notice on our Web site and e-

mailing a notice to our large e-mail list of government and industry contacts in the utility sector.

4. *Review of appropriate policy and program documentation:* We obtained and reviewed appropriate documents and materials describing promising natural gas energy efficiency programs and noteworthy policy/regulatory mechanisms, including evaluation reports. This material helped inform the selection of programs and policy mechanisms to be featured in the final report.
5. *Interviews with representatives of selected programs and state policy/regulatory institutions:* For the programs and policies that we selected for inclusion in the report, we conducted interviews and other data collection to acquire the more detailed information necessary for the profiles that we present in this report (individual program profiles are given in Appendix B).

RESEARCH RESULTS

50-State Screening Survey

At the outset of this research project, ACEEE conducted a natural gas energy efficiency screening survey with each of the 50 states and the District of Columbia. The screening survey was designed to both determine which states currently operate utility-funded natural gas energy efficiency programs and, for the states that do have programs, obtain contacts in each state familiar with those programs.

Approach

A list of initial survey contacts was identified based on state regulatory commission staff that ACEEE had worked with previously on other research projects. In cases where such individuals were not available, additional contact names were obtained from the National Association of Regulatory Utility Commissioners (NARUC) membership directory. When neither of these efforts resulted in a successful contact, we called the main commission telephone number and asked to be referred to someone familiar with utility natural gas energy efficiency programs in the state. Eventually, all 50 states and the District of Columbia were successfully surveyed through this combined methodology.

Respondents were asked if the natural gas utilities in their states were currently funding energy efficiency programs. If the respondent answered affirmatively, he/she was asked how the programs are funded and who administers them, and also for the name of a contact in the state that is familiar with program details. If the respondent stated that the natural gas utilities in his/her state were not currently offering energy efficiency programs, he/she was asked if there has been any discussion at the commission about starting programs in response to recent increases in natural gas costs.

Screening Survey Results

A summary of the responses is presented in Table 1. The survey found that less than half of the states have utility ratepayer-funded energy efficiency programs for natural gas. Out of the 51

Table 1: Natural Gas Screening Survey

State	Does State Have NG EE Programs?	Who Administers	Is Commission Discussing Starting Programs?
Alabama	No		No
Alaska	No		
Arizona	Yes	Utilities/Energy Office	
Arkansas	No		No
California	Yes	Utilities/3rd parties	
Colorado	No		No
Connecticut	No		No
Delaware	No		No
District of Columbia	No	7	No
Florida	Yes	Utilities	
Georgia	No		No
Hawaii[1]	N/A		
Idaho	Yes	Utilities	
Illinois	Yes	State	
Indiana[2]	No		
Iowa	Yes	Utilities	
Kansas	No		No
Kentucky	No		No
Louisiana	No		
Maine	No		Yes
Maryland	Yes	Utilities	
Massachusetts	Yes	Utilities, contractors	
Michigan	No		No
Minnesota	Yes	Utilities	
Mississippi	No		No
Missouri	No		Yes
Montana	Yes	Utilities	
Nebraska	No		No
Nevada	Yes	Utilities	
New Hampshire	Yes	Utilities	
New Jersey	Yes	Utilities	
New Mexico	No		No
New York[3]	Yes	State (NYSERDA)	
North Carolina	Yes		
North Dakota	No		No
Ohio	No		No
Oklahoma	No		No
Oregon	Yes	Utilities and also the Energy Trust of Oregon	
Pennsylvania	Yes	Utilities/nonprofits	
Rhode Island	No		No
South Carolina	Yes	Utilities	
South Dakota	No		No
Tennessee	No		No

State	Does State Have NG EE Programs?	Who Administers	Is Commission Discussing Starting Programs?
Texas	No		No
Utah	No		Yes
Vermont	Yes	Utilities	
Virginia	No		Yes
Washington	Yes	Utilities	
West Virginia	Yes	Utilities	
Wisconsin	Yes	State	
Wyoming	No		No
N/A	1		
No	28		21
Yes	22		4
Total	51		25

[1] Hawaii does not use natural gas.
[2] Small utility settlement pending.
[3] NYSERDA has some fuel-neutral programs that save natural gas.

respondents to the survey, 22 confirmed that they currently have utility-funded natural gas efficiency programs in their states.[1] In 19 of those 22 states, the utility companies have the primary role in administering the natural gas efficiency programs. In the remaining three states (Illinois, New York,[2] and Wisconsin), the programs are funded through utility rates but are administered by a state agency.

Twenty-eight, or 55%, of the respondents stated that they do not currently have utility-funded natural gas programs in their states. Twenty-four of those states responded to the question regarding whether their state was discussing starting utility-funded natural gas energy efficiency programs in response to increasing natural gas costs. Four of those 24 (17%) respondents answered that this issue is currently under discussion in their states.

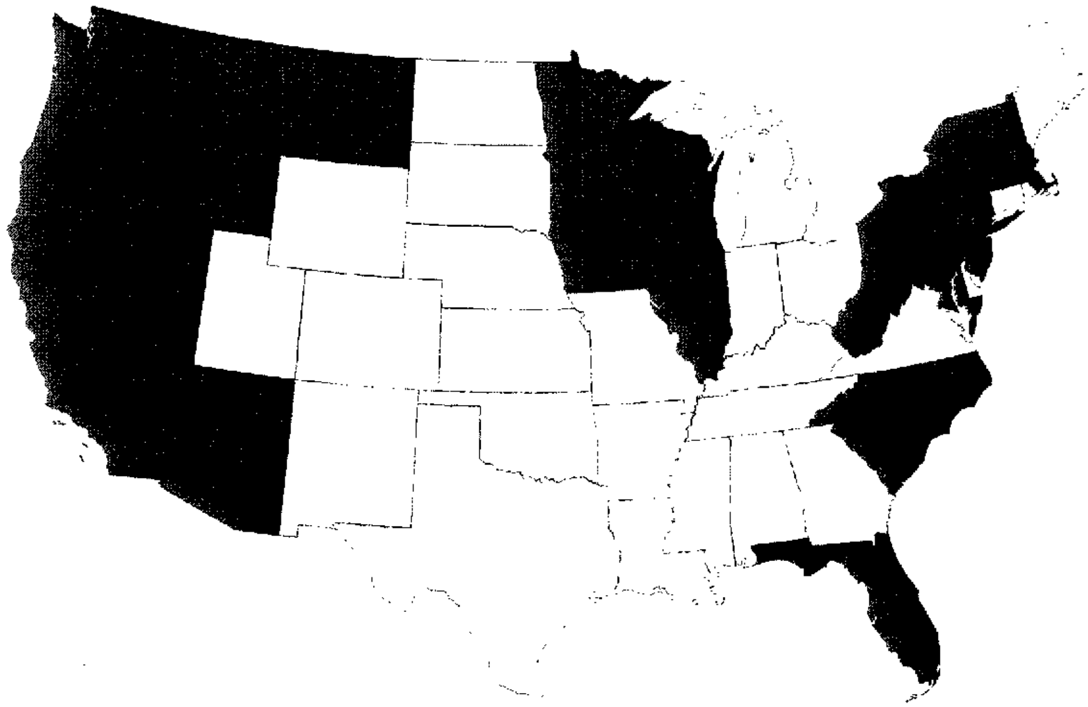
In addition to providing a brief overview of utility natural gas energy efficiency activity around the nation, this survey helped the project to identify states and individuals to contact in order to seek to locate exemplary natural gas energy efficiency programs to profile in this report.

To provide a more visual illustration of the geographic distribution of states involved in natural gas efficiency, Figure 1 presents a map where those states with active utility-related natural gas energy efficiency programs are shaded.

[1] Admittedly, a number of those states have fairly modest natural gas energy efficiency efforts. States with some of the most significant programs include California, Massachusetts, Minnesota, New Jersey, Oregon, Vermont, Washington, and Wisconsin.

[2] Technically, NYSERDA in New York operates electric energy efficiency programs. However, its energy efficiency programs are operated in a fuel-neutral manner, and as a result, some programs have significant natural gas savings as well.

Figure 1: States with Natural Gas Utility-Funded Energy Efficiency Programs



Legislative and Regulatory Mechanisms

Past research has abundantly demonstrated that some type of legislative and/or regulatory requirement and funding mechanism is an essential ingredient for any significant utility energy efficiency program effort to occur (e.g., see Cowart 2001; Kushler & Suozzo 1999; and Kushler & Witte 2001). In order to help facilitate further natural gas energy efficiency program efforts in the United States, this project sought to identify and describe the legislative/regulatory foundations underlying exemplary energy efficiency programs that are being successfully delivered in the field today.

Approach

There were two primary sources used to identify the examples of legislative/regulatory frameworks for natural gas energy efficiency that we present in this report. First, in our interviews with national experts, we asked for their suggestions regarding noteworthy state legislative/regulatory policies we should examine. Second, in doing the research to identify the exemplary energy efficiency programs that we profile in this report, it was possible to identify a group of what might be considered "leading states" in the area of utility-sector natural gas energy efficiency programs. (These states include California, Massachusetts, Minnesota, New Jersey, Oregon, Vermont, Washington, and Wisconsin.) We decided to present summary information about the legislative/regulatory foundation for natural gas energy efficiency in each of those states.

We then used interviews and written surveys with appropriate contacts (e.g., state regulatory staff, utility personnel, etc.) to obtain the descriptive information regarding the legislative/regulatory framework behind their natural gas energy efficiency programs.

Results

Table 2 presents summary data for eight states and one Canadian province regarding their legislative and regulatory framework for utility natural gas programs. These nine jurisdictions were chosen because they were the leading areas identified in this study in terms of utility natural gas energy efficiency efforts.

Information is provided in the table regarding four categories of legislative/regulatory structure:

1. whether there is a legal requirement in the state to provide natural gas energy efficiency programs;
2. whether there is an approved program cost-recovery mechanism in place;
3. whether there is a mechanism for the utility to earn shareholder incentives for good performance with its natural gas energy efficiency program; and
4. whether there is a mechanism in place for utilities to recover "lost revenues" resulting from their natural gas energy efficiency programs.

The results presented in Table 2 reveal some significant patterns among these leading jurisdictions for natural gas energy efficiency. First, seven of the nine jurisdictions have some type of legal requirement for utility funding of natural gas energy efficiency programs, and the other two have strong regulatory encouragement for such programs. All nine jurisdictions have some type of explicit mechanism in place to assure cost-recovery for natural gas energy efficiency program expenditures.

These two key features (i.e., a legislative/regulatory requirement for funding and a mechanism for cost-recovery) have been characterized elsewhere (e.g., Kushler & Witte 2001) as crucial threshold conditions for significant utility energy efficiency efforts to occur, and the results of this study would seem to bear that out.

Beyond those minimum conditions, the observations regarding other regulatory mechanisms are somewhat mixed. Three of the nine jurisdictions have some type of utility shareholder incentive mechanism and two of those also have a lost revenue recovery mechanism (plus one other jurisdiction has a decoupling mechanism). While we received some good anecdotal feedback about the usefulness and desirability of those mechanisms, their presence in only a minority of these leading jurisdictions suggests that they are enhancements rather than minimum threshold conditions for achieving successful natural gas energy efficiency programs. (Nonetheless, we do support the use of some incentive mechanism beyond simple cost-recovery as a way to help encourage maximum effectiveness on the part of the program administrator.)

In addition to this "at a glance" summary, further details about the legislative/regulatory framework for natural gas energy efficiency programs in each of these nine jurisdictions are provided in Appendix A.

Table 2: Summary of Legislative and Regulatory Mechanisms

State	Legal Requirement	Cost-Recovery	Shareholder Incentives	Lost-Revenue Recovery	Other Mechanisms
CA	Yes (required by statute)	Yes (gas public purpose surcharge)	No	No	Also a system benefit charge for low-income energy efficiency programs
MA	No (encouraged by regulators)	Yes ("conservation charges" approved in company-specific regulatory cases)	Yes (some gas utilities do have incentive mechanisms)	Yes (most utilities have some recovery mechanism)	Statute requires statewide energy audit program. Funded by small customer charge, administered by state.
MN	Yes (required by statute)	Yes (gas utilities required to spend 0.5% of revenues)	Yes (Commission approved mechanism)	No (used to, was replaced by incentive mechanism)	No
NJ	Yes (required by statute)	Yes ("societal benefits charge" on customer bills)	No (used to; no current mechanism)	No (no current authorization, issue is under review)	No
Ontario, Canada	Yes (Ontario Energy Board order)	Yes (included in rates, also has a "DSM Variance Account" to reconcile over- and under-spending on EE by utility)	Yes (one major utility has a shared savings mechanism (SSM) with + and – incentives)	Yes (a lost revenue adjustment mechanism)	No
OR	Yes (for residential gas space heat customers; for others, EE efforts are encouraged by PUC)	Yes (thru balancing accounts, but largest gas utility has a surcharge for EE with funds transferred to a state agency)	No	Yes (although now N/A for the largest gas utility, which has decoupling)	Utilities required by Statute to provide free energy audits and loans/rebates for residential gas space heat customers.
WA	No (encouraged by regulators)	Yes (covered in utility-specific regulatory orders)	No	No	Commission requires "least cost planning," comparing energy efficiency to gas purchasing options.

State	Legal Requirement	Cost-Recovery	Shareholder Incentives	Lost-Revenue Recovery	Other Mechanisms
VT	Yes (required by statue and regulatory orders)	Yes (included in rates and reviewed in rate cases)	No	Yes (net lost revenues are eligible for recovery in rates cases)	The electricity energy "efficiency utility" in VT operates programs that also produce gas savings.
WI	Yes (required by statute)	Yes (certain funding amounts must by transferred by utilities to the state public benefits EE program)	N/A (programs are administered by a state agency)	No	Statute allows utility to spend more on EE, beyond the minimum it must send to the state, if it wishes.

Exemplary Natural Gas Efficiency Programs

One of the main objectives of this project was to identify and profile examples of outstanding natural gas efficiency programs—those in place that are highly successful in improving the energy efficiency of customer end-uses. Such examples demonstrate the real benefits of energy efficiency for customers and natural gas companies, as well as related manufacturers, suppliers, and contractors of energy-efficient products and services. These examples also offer models of the best practices in place today for programs serving natural gas customers. For areas not served by such programs, these models are worthy of emulation and could facilitate rapid and successful development of similar programs in such areas. In this way, successful program designs and results can be replicated, assuring that greater numbers of natural gas customers have access to programs and services that can help them reduce their natural gas costs through improved energy efficiency.

In this section we discuss our efforts to identify and profile exemplary natural gas programs. We also discuss our observations and analysis of the set of programs that we selected.

<u>Approach</u>

In the late summer and early fall of 2003, ACEEE issued a widespread "call for nominations" for exemplary natural gas efficiency programs via a number of channels, including:

- program contacts from our prior best practices project (completed early in 2003, this project included some programs that provided both electricity and natural gas efficiency, although most programs were electricity-only—see York & Kushler 2003);
- contacts with other organizations involved with energy efficiency programs and issues, for example, the Consortium for Energy Efficiency's Natural Gas Committee;
- contacts from participants in ACEEE events, such as the National Conference on Energy Efficiency As a Resource that was held in June 2003;
- contacts with energy efficiency program experts; and

- contacts made with regulatory staff as part of our survey work to identify states where natural gas efficiency programs are offered.

Compared to ACEEE's prior best practices study, this process was more focused on a specific pragmatic objective—identifying a set of programs that would serve as excellent models for other states and utilities to emulate if they were interested in initiating or expanding their natural gas efficiency efforts. Our mission was therefore somewhat narrower than in the previous project. In addition, the starting set of program possibilities is much smaller for natural gas programs as compared to programs that target electric end-use efficiency; there simply are fewer programs that address natural gas efficiency.

We sought programs specifically that address the primary consumer end-uses of natural gas: (1) space and water heating for buildings (residential and commercial); and (2) process heating for industry. We also sought programs illustrative of different types of organizations that fund, administer, and implement such programs (e.g., investor-owned utilities, municipal utilities, and state agencies involved in administering public benefits energy efficiency programs). We looked both for long-established and relatively new programs. We also looked for variety in the approaches and services offered to yield improved efficiency of natural gas end-uses.

After we had identified a set of candidate programs, which came via both external nominations and internal recommendations, we acquired basic information on each program. We asked for the following information to be included with program nominations:

- program name
- organization (administrator and/or implementor)
- contact person (program manager) name, phone number, and email address
- program synopsis/summary: customers served, services provided, history
- program results (participants, market share, energy impacts, etc.)
- reasons why program is exemplary

We supplemented this self-reported information with other independent sources, such as evaluation reports or surveys with recognized experts familiar with best practices.

ACEEE staff made the final selections of programs to feature in this report. We considered a number of criteria for our selections, namely:

- *Positive energy savings impact:* Demonstrated ability of the program to deliver substantial immediate or near-term therm savings from energy efficiency. Programs could be noteworthy due to overall total magnitude of impact (i.e., very large programs) or in terms of amount of impact per dollar spent (i.e., very cost-effective programs).
- *Replicability:* Programs that are well documented and have characteristics amenable to easily replicating the program design in other settings.
- *Evaluation results:* Programs that have used good quality *ex post facto* evaluation/verification methodologies to document savings impact and/or market effects achieved by the program received more favorable consideration than those for which good quality evaluation results were not available.

- *Qualitative assessment:* Achievements of the program in terms of noteworthy program implementation performance, customer participation, participant satisfaction, stakeholder support, etc. also were factors considered.

Results: Programs Selected

We selected a total of 29 programs to profile as representative of outstanding natural gas efficiency programs. We also selected 5 "special case studies" as noteworthy examples of comprehensive program portfolios and multi-party collaboratives. Together these 34 profiles paint a comprehensive picture of the types of programs available to provide to natural gas customers, from low-income single-family households to large industrial facilities. Table 3 provides a categorized list of the full set of programs selected in this project. Appendix B contains summary profiles of each program selected, including basic descriptions, backgrounds, results, lessons learned, and contact information.

Program Characteristics and Common Traits

Targeted End-Uses and Technologies

Residential. For residential customers, programs target the two primary natural gas end-uses: space and water heating. Technologies and measures for improving space heating efficiency include weatherization (reducing heat losses through the building envelope by reducing air infiltration and increasing insulation levels), installation of energy-efficient windows, duct sealing/insulating, high-efficiency furnaces and boilers, and improved controls, such as with set-back thermostats.

Measures to reduce natural gas use for water heating can either address hot water supply or domestic uses of hot water. Measures that can improve the efficiency of hot water supply include installation of energy-efficient water heaters, adding insulation to existing water heaters that are under-insulated, adding insulation to hot water supply pipes, and reducing set-points of water heaters. Measures to reduce demand for domestic hot water include resource-efficient clothes washers, energy-efficient dishwashers, faucet aerators, and low-flow showerheads.

Commercial/industrial. C/I efficiency measures offered by programs also target space heating and water heating, but also address process energy use, which can be the dominant end-use of energy for many C/I customers. For space heating, the primary technologies targeted are more efficient boilers and HVAC equipment, including control systems. In new construction, programs may target more efficient building envelopes and related means to reduce space heating demand.

Improving energy efficiency for process energy use also may involve improved efficiency of boilers and control equipment. Measures might also be promoted to reduce energy losses associated with end-uses, such as for gas-saving commercial kitchen exhaust hoods.

Table 3: Exemplary Natural Gas Energy Efficiency Programs

Program Name	Organization(s)	State or Province	End-Use Technologies	Services
Residential Retrofit				
HomeBase Retrofit Program	Vermont Gas Systems, Inc.	VT	Furnaces, boilers, water heaters	Technical services, financial incentives
Residential Weatherization Program	KeySpan Energy Delivery	MA, NH	Space heating	Weatherization
Home Performance with ENERGY STAR®	New York State Energy Research and Development Authority	NY	Whole house weatherization	Technical services, incentives and financing
Residential Audit				
Residential Home Performance Audit Program	CenterPoint Energy Minnegasco	MN	Space heating	Advanced energy audit, including infrared scan, combustion safety test and blower door testing
Residential Space Heating Equipment				
Joint Gas & Electric High Efficiency Furnace Rebate Program	GasNetworks®	MA	Space heating	Coordinated marketing and financial incentives for new product purchases
High Efficiency Furnace Program	NW Natural	OR	Space heating	Marketing, financial incentives
High Efficiency Furnace Programs	Gaz Métro	Quebec	Space heating	Marketing and incentives for replacement sales
HomeBase Equipment Replacement Program	Vermont Gas Systems, Inc	VT	Furnaces, boilers, water heaters	Financial incentives
Residential Windows				
ENERGY STAR® Residential Windows Program	Northwest Energy Efficiency Alliance	OR, WA, ID, MT	Space heating	Market transformation: marketing and working with manufacturers
Residential New Construction				
ENERGY STAR® Homes	Joint Management Committee (Massachusetts)	MA	Space and water heating	Marketing assistance, financial incentives, technical services
New Jersey ENERGY STAR® Homes	New Jersey Clean Energy Program	NJ	Space and water heating	Marketing assistance, financial incentives, technical services
Vermont ENERGY STAR® Homes	Efficiency Vermont and Vermont Gas Systems, Inc.	VT	Space and water heating	Marketing assistance, financial incentives, technical services

Program Name	Organization(s)	State or Province	End-Use Technologies	Services
Residential Low-Income Single Family				
Low-Income Gas Program	NSTAR Gas Company	MA	Space and water heating	Weatherization, heating system check, safety inspection
Non-Profit Affordable Housing Project	CenterPoint Energy Minnegasco, Habitat for Humanity, Project for Pride in Living, and the Greater Metropolitan Housing Corporation	MN	Space and water heating	Financial incentives for efficient mechanical equipment; training and education
Low-Income Usage Reduction Program (LIURP)	National Fuel	PA	Space and water heating	Heating system safety check, energy audit, education, weatherization, post-inspection
New Jersey Comfort Partners Program	New Jersey Clean Energy Program	NJ	Space and water heating	Weatherization, education, direct installation, safety test
Residential Multifamily				
Multifamily Low-Income Program	Efficiency Vermont, Vermont Gas Systems, Inc. and the Burlington Electric Department	VT	Fuel-blind, space and water heating	Technical assistance, financial incentives
Apartment and Condo Efficiency Services	Focus on Energy	WI	Space and water heating	Technical assistance, financial incentives
Residential Appliances				
ENERGY STAR® Products	Wisconsin Energy Conservation Corporation	WI	Residential appliances (water heating)	Marketing and incentives for new sales
Commercial/Industrial Technical Assistance and Demonstration				
New York Energy $mart℠ FlexTech Program	New York State Energy Research and Development Authority	NY	All NG and electricity end-uses	Technical assistance

Program Name	Organization(s)	State or Province	End-Use Technologies	Services
Multifamily and C&I Building Practices and Technology Demonstration Program	KeySpan Energy Delivery	MA	All NG end-uses	Financial incentives; technical assistance for technology demonstration
Commercial/Industrial Building and Equipment Retrofit				
WorkPlace Equipment Replacement Program and WorkPlace Retrofit Program	Vermont Gas Systems, Inc	VT	Space, water, process heating, HVAC	Technical assistance, financial incentives
Flexible Gas-Efficiency Portfolio Standard	Avista Utilities	WA	All NG end-uses	Financial incentives
Boiler Efficiency	Xcel Energy	MN	Boilers and boiler systems	Financial incentives
Custom Process Rebate	CenterPoint Energy Minnegasco	MN	Process equipment	Financial incentives
Commercial/Industrial New Construction				
New Jersey SmartStart Buildings®	New Jersey Clean Energy Program	NJ	All NG and electric end-uses	Financial incentives
Energy Design Assistance	Xcel Energy, the Weidt Group, Herzog/Wheeler & Associates	MN	All NG and electric end-uses	Technical assistance
WorkPlace New Construction Program	Vermont Gas Systems, Inc	VT	All NG end-uses	Technical assistance and financial incentives
Commercial/Industrial Small Business				
2002 Express Efficiency	Pacific Gas and Electric Company	CA	All NG and electric end-uses	Financial incentives
Special Case Studies: Comprehensive Portfolios and Collaboratives				
Large Utility Effort through Multiple Local Distribution Companies: *Comprehensive Program Portfolio*	KeySpan Energy Delivery New England	MA, NH	All NG end-uses	Technical assistance, financial incentives
Single Investor-Owned Utility: *Comprehensive Program Portfolio*	Vermont Gas Systems, Inc	VT	All NG end-uses	Technical assistance, financial incentives

Program Name	Organization(s)	State or Province	End-Use Technologies	Services
Municipal Utilities Collaborative Program: *Conserve & Save*	The Triad: Austin Utilities, Owatonna Public Utilities and Rochester Public Utilities	MN	All NG end-uses	Financial incentives for new product purchases
Multi-party collaborative: *Massachusetts Low Income Energy Affordability Network*	Massachusetts Department of Housing and Community Development in collaboration with KeySpan Energy Delivery New England	MA	Residential space and water heating	Full package of low-income services--including Wx
Regional Multi-Utility Collaborative: *Comprehensive Program Portfolio*	GasNetworks®	MA, NH	All NG end-uses	Technical assistance, financial incentives

Program Types

Residential. To address space heating, programs generally take one of three approaches: (1) services to reduce heat losses through the building envelope; (2) marketing and incentives to promote the purchase and installation of more efficient heating supply, delivery. and control systems; and (3) marketing, incentives, and training to increase the number of new homes constructed that are more energy efficient than "standard" construction. Home weatherization programs clearly fall into the first category, and such programs exist both for low-income households and as fee-based services within the markets for home heating products and services. Our profiles include examples of each of these types of programs.

Marketing and incentive programs for energy-efficient heating technologies are also common program approaches. We found numerous programs that provide direct financial incentives (rebates) to encourage customers to purchase energy-efficient furnaces and boilers. While clearly these incentives are important to program success, effective marketing is also key to program success to increase demand for these products and services. We also found training programs for both sales and technical staff often associated with these programs. Sales staff need to understand the benefits of the energy-efficient technologies and technical staff (such as equipment contractors) need training to be able to install and set-up the equipment properly so that the intended performance is achieved.

Residential new construction programs are the third broad category of programs offered to consumers. Such programs address "whole house" energy efficiency—building envelope, space heating systems, water heating, appliances, and lighting. Use of "ENERGY STAR®" for branding homes that meet the program's standards is a common feature of new homes programs.

Commercial/industrial. C/I programs parallel those for residential programs to a large degree. There are programs to (1) improve/upgrade efficiency of space and water heating systems and (2) improve whole building efficiency for new construction. Additionally, there are C/I programs that address process heating efficiency.

C/I programs typically blend technical assistance with financial incentives. They also often include training, which may be for building owners and operators, as well as equipment suppliers and contractors.

Company/Organization Types

As documented in other research, the landscape of organizations offering energy efficiency programs has undergone extensive change in many states and regions. This transformation continues. The organizations involved with the set of programs that we selected offer a snapshot of the growing diversity of organizations involved with natural gas efficiency programs. These include "traditional" investor-owned utilities, municipal utilities, large integrated energy companies with multiple local distribution companies, government agencies, nonprofit organizations, multi-party collaboratives, energy efficiency "utilities," and private contractors.

Approaches and Services Provided

We found that integrated packages of services are common among leading natural gas efficiency programs. This is true across program types, from those serving low-income residential households to those serving large industrial customers. The integrated package of services may include marketing and consumer education, technical assistance (audits, economic/technical analysis of efficiency options, design recommendations, etc.), financial incentives (principally rebates or financing), and follow-up quality assurance and verification of results. The best programs tend to have a single point of contact with customers, who in turn may access other program services and expertise as needed. But the customer may only work with a single person or small, well-coordinated team to access the full range of products and services available, rather than having to contact one person for one service and another for a different service.

Integration of services within a single program is common, but we also noted that this is a trait of entire portfolios of programs offered by single organization. Again, the emphasis is on having a single point of contact for program services from the customer's perspective.

Most residential programs tend towards a prescriptive approach to services, including financial incentive amounts, but programs that offer some degree of technical assistance may provide some flexibility for adapting to unique circumstances. For marketing and incentive programs, such as promotion of energy-efficient furnaces, generally the programs are entirely prescriptive; to get financial incentives, customers must purchase one of a set of qualified units.

C/I programs typically are more flexible and customized, particularly as a function of the size of the customer's demand. Small C/I programs tend to be more prescriptive, like residential programs, while programs targeting larger C/I customers tend to offer more custom options (such as incentives paid on the basis of an established $/therm savings). Flexible, customized approaches are especially important for larger customers, who tend to have more unique needs than smaller customers.

Financial incentives are a common feature to affect customer purchase decisions for both residential and commercial/industrial customers. High-efficiency technologies for natural gas applications—furnaces, boilers, process equipment, controls, etc.—generally still carry a price premium over other technologies. While customers may recognize the long-term value of investing in the more efficient technologies, program experience is that financial incentives—principally rebates, although some below-market financing is also used—are still necessary to get customers to purchase these technologies. This seems to be true across customer types, from the homeowner replacing a furnace to the industrial facility manager replacing a boiler. As the markets for such technologies develop and mature, incentive levels may be reduced or even eliminated entirely. The efficiency of qualifying technologies and units also may be periodically ratcheted upward as "standard" equipment itself becomes more efficient, which may occur through adoption of standards or market forces.

Another common feature among leading programs is the prevalence of strategic partnerships and collaborations, which can improve program effectiveness and leverage resources. The most successful programs effectively work with key market actors—such as distributors, local suppliers/retailers, contractors, manufacturers, and allied organizations, such as government agencies, nonprofit service organizations, and trade groups.

Related to strategic partnerships and collaborations are training and education as part of the program services. Many of the programs selected in this study offer training and education for suppliers, retailers, and contractors—even for programs primarily offering financial incentives as their key service.

Evaluation

Evaluation is a critical element of successful programs. The programs selected and profiled in this study often represent several years of program evolution. The programs have used evaluations to assess performance and make improvements based on the feedback and analysis provided by such evaluations. Exemplary programs use evaluation strategically to support program goals and explicitly include evaluation plans within broader program plans. Early in a program's life, the emphasis may be on process evaluation—assessing the quality of services and customer response to them, while later in the program's life, the focus may shift to impact evaluation—measuring total energy savings and other indicators of program performance, such as market share.

Lessons Learned

Our review and analysis of programs selected and profiled in this study revealed a number of general lessons learned, including:

- Some newly created programs, as well as existing programs that were significantly "made-over," have achieved rapid success in the market.

- Some organizations have achieved success with a single program, while other organizations have achieved success with a comprehensive portfolio of programs and services. In the latter case, there likely are significant cross-over benefits from individual programs within the portfolio as customers have a greater number of options to meet their specific needs.
- A factor in the success of long-standing programs is that they have had time to develop, mature, and earn consumer confidence.
- Incentive levels need to be periodically evaluated—both from the perspective of changing avoided costs, but also relative to market conditions (including penetration rates and measure costs).
- The best programs work as a catalyst within the target markets by working with existing market participants to make them successful according to their own specific objectives.
- Regulatory support is a crucial factor in the success of natural gas energy efficiency programs, but is not the only motivation for regulated companies to offer programs. In many of the programs we profile, the companies also see value in helping their customers better manage costs and receive other benefits from energy-efficient technologies. In some cases, the companies themselves sought regulatory support of their programs in order to make them viable. To the extent that policy/regulatory interests and utility self-interest can be aligned, energy efficiency programs have a better chance of flourishing.

CONCLUSIONS

Our research for this study shows that there clearly are a number of excellent programs being provided to natural gas customers to reduce their use of natural gas through efficiency improvements. Programs exist for all types of customers and for all principal natural gas end-use technologies. Some organizations offer comprehensive portfolios of services, while others may offer a single-focused program.

While we found many good models of natural gas efficiency programs worthy of emulation by others, we also found that such programs tend to be concentrated in a relatively few number of states. Natural gas customers in most states, unfortunately, do not have access to such programs, thereby limiting their ability to reduce their energy costs through improved efficiency. This lack of energy efficiency programs also seriously hinders the ability of states and utilities to respond to the problem of higher natural gas market prices. As just presented in a new ACEEE study (Elliott et al. 2003), aggressive but readily achievable reductions in natural gas use can produce significant reductions in the market cost of natural gas (on the order of 10 to 20%), thereby benefiting all customers and the economy as a whole.

The fact that natural gas efficiency programs tend to be concentrated in a relatively few states and regions means that there is a lot of room for expansion of such efforts, especially in light of impending natural gas price increases and possible supply constraints. Customers not currently served by programs will be looking for ways to reduce their energy costs as prices rise. The types of programs we profile in this study clearly offer tremendous opportunities for assisting customers in lowering their energy costs through efficiency improvements. Such programs demonstrate the real benefits of energy efficiency for individual customers, their utilities, and society as a whole.

RECOMMENDATIONS

Natural gas customers are facing rapidly rising costs. This has significant adverse effects on individual customers as well as the broader economy. We recommend creating and offering energy efficiency programs to customers in areas not presently served by such programs, and expanding such efforts in areas where only limited programs currently exist. Improved energy efficiency is a concrete step that customers can take to offset price increases, but decades of experience with natural gas customers suggests that they won't necessarily take such a step without facilitation via energy efficiency programs. Moreover, the natural gas price problem creates serious societal costs as well, which strengthens the rationale for affirmative government policies to help address this problem through energy efficiency.

Energy companies can take the initiative themselves to offer their customers programs, but they also need support from their regulators to make such programs a reality. Regulatory support may come from a variety of mechanisms, which include program cost-recovery through rates, financial incentives for meeting established performance targets, and perhaps some type of "lost revenue" recovery or decoupling of profits from sales volume.

Government agencies at the state or local level also can support, create, and implement programs to serve natural gas customers independently from utilities and other energy providers. We encourage states to consider enactment of public benefits programs to serve all energy customers, or to expand existing programs to include natural gas customers if they are not already included.

There is little time to spare to create and expand programs to serve customers presently not served by efficiency programs. Generally, financial incentive programs can be created and implemented rather quickly, while programs offering technical assistance and related services take more time to develop and implement. Energy companies and regulators should examine existing programs to look for opportunities to expand services and increase the reach and impacts of such programs.

The challenging natural gas market situation—higher prices and constrained supplies—is not likely to go away for years, if ever. Utility companies, governments, and related organizations should view natural gas efficiency programs as both a near-term and long-term element in an overall strategy of helping natural gas customers manage their energy costs, as well as helping our economy deal with higher market energy prices. Some actions can be taken now to address very near-term conditions, while other actions can be taken over the next few years to begin laying the foundation for long-term beneficial effects. This report presents many examples of successful energy efficiency programs that could be applied to each of those time frames.

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APPENDIX A: SUMMARIES OF STATE POLICY AND REGULATORY MECHANISMS

SURVEY OF STATE NATURAL GAS ENERGY EFFICIENCY POLICIES

State: California

Overall policy and regulatory requirements

1. Is there a requirement for utility natural gas energy efficiency programs?

Yes—natural gas utility energy efficiency programs are required by statute in California. California Assembly Bill 1002 passed in 2000 established a gas public purpose surcharge to be administered by the CPUC.

Regulatory mechanisms for natural gas program costs and performance

2. Is there a mechanism in place for providing cost-recovery of program costs?

Yes—California Assembly Bill 1002 passed in 2000 established a gas public purpose surcharge to be administered by the California Public Utilities Commission in conjunction with existing energy efficiency programs. As of 2002, there is a separate line item per-therm surcharge on customer bills.

The public purpose gas surcharge is collected by the investor-owned utilities from each customer class under the direction of the California Public Utilities Commission. These revenues provide a secure stream of funding for natural gas energy efficiency programs.

Revenue collection is set on a forecast basis including forecast energy efficiency. Any actual collections over or under forecast are adjusted in the Biennial Cost Allocation Proceeding (BCAP).

Total funding for natural gas energy efficiency programs is approximately $45 million per year.

3. Is there a mechanism in place for utility shareholder incentives for natural gas efficiency program performance?

No.

4. Is there a mechanism in place for recovery of "lost revenues" from natural gas energy efficiency programs?

No.

5. If there are other regulatory mechanisms in place that help encourage utilities to provide natural gas efficiency programs, please briefly describe such mechanisms below.

There is also a separate public benefits funding mechanism in California that provides revenues for low-income energy efficiency programs.

Experience to date

6. Please provide a brief summary of how the overall cost-recovery/incentive system has worked so far. Include a description of any modifications that have been made to the approach, and why.

Cost-recovery to date has been satisfactory. No modifications have been made since implementation of AB 1002 by the California Public Utilities Commission.

SURVEY OF STATE NATURAL GAS ENERGY EFFICIENCY POLICIES

State: Massachusetts

Overall policy and regulatory requirements

1. Is there a requirement for utility natural gas energy efficiency programs?

There is no statutory requirement, but the Massachusetts Department of Telecommunications and Energy (DTE) has required that gas companies implement energy efficiency programs in a series of company-specific decisions.

Unlike on the electric side, there is no statutorily set annual energy efficiency budget. Typically, efficiency plans and budgets are enacted through a company-specific, pre-approval process, usually resulting in a consensus settlement with regulators and other interested non-utility parties, including low-income customer representatives.

(See also response to #5 below regarding the Commonwealth RCS program.)

For key Massachusetts regulators see http://www.state.ma.us/dte (DTE) and http://www.state.ma.us/doer (Division of Energy Resources—DOER).

Another excellent resource is the GasNetworks website: www.gasnetworks.com. GasNetworks is an association of LDCs and interested participants, including regulators, that helps coordinate energy efficiency efforts and promotes energy-efficient technologies and best practices on a regional basis.

A number of the policies and philosophies underlying the DTE's support for energy efficiency are found in the generic D.P.U. 86-36 docket. Other important early orders include, The Berkshire Gas Company, D.P.U. 91-154 (October 6, 1992), Fall River Gas Company, D.P.U. 91-212 (1995), Boston Gas Company, D.P.U. 90-320, pp. 102–104 (1992), Commonwealth Gas Company, D.P.U. 91-60 (Phase II), pp. 68–71 (1992); Colonial Gas Company, D.P.U. 91-150, p. 67 (1992) and Boston Gas Company, D.T.E. 95-50, pages 174–192 (Phase I) (November 29, 1996).

Regulatory mechanisms for natural gas program costs and performance

2. Is there a mechanism in place for providing cost-recovery of program costs?

Yes—program costs are typically recovered through a "conservation charge" (CC) mechanism and are based on a per-therm basis. Each company generally negotiates cost-recovery in its own settlement agreement, but all or nearly all Massachusetts LDCs use the CC mechanism. CC provisions are typically included as a component of an LDC's cost of gas adjustment rate schedule.

3. Is there a mechanism in place for utility shareholder incentives for natural gas efficiency program performance?

Yes—some companies have incentive mechanisms included in their individual settlement agreements. Incentives are generally determined in accordance with the provisions of the DTE Incentive Guidelines established in docket D.T.E. 98-100.

4. Is there a mechanism in place for recovery of "lost revenues" from natural gas energy efficiency programs?

Yes—most companies have mechanisms in place for recovery of "lost revenues" from natural gas energy efficiency programs included in their individual settlement agreements. Recovery of lost margins is generally capped in accordance with the "Rolling Period Method" adopted in Colonial Gas Company, D.T.E. 97-112 (1999), which limits recovery of lost revenues to a period based on the average length of time between each of a company's last four rate cases.

5. If there are other regulatory mechanisms in place that help encourage utilities to provide natural gas efficiency programs, please briefly describe such mechanisms below.

The state has a mandated Residential Conservation Service (RCS) audit program, originally enacted after the energy crisis of the late 1970s. This program is described in MG.L. c. 164, App. 2-1 et seq., 220 CMR 7.00 et seq., and 225 CMR 4.00 et seq. LDCs generally seek to coordinate their pre-approved energy efficiency programs that provide for the installation of major measures with the RCS program, which is separately funded through a (typically small) monthly surcharge on customer bills. The DOER actively manages the RCS program.

Experience to date

6. Please provide a brief summary of how the overall cost-recovery/incentive system has worked so far. Include a description of any modifications that have been made to the approach, and why.

The overall cost-recovery/incentive system has generally worked well thus far. Individual companies typically negotiate cost-recovery mechanisms based on the individual company's circumstance. Recovery of lost revenues is a critical element for most LDCs, enabling such companies to address, at least partially, the sales reducing elements of environmentally beneficial energy efficiency programs.

SURVEY OF STATE NATURAL GAS ENERGY EFFICIENCY POLICIES

State: Minnesota

Overall policy and regulatory requirements

1. Is there a requirement for utility natural gas energy efficiency programs?

Yes—Minnesota Statute 216B.241 requires investor-owned natural gas utilities to spend 0.5% of its gross operating revenues from service provided in the state on energy conservation improvements.

http://www.revisor.leg.state.mn.us/stats/216B/241.html

Minnesota's "Conservation Improvement Program (CIP) was enacted by the legislature in 1982, and has been providing for significant electric and natural gas conservation programs for over two decades.

Regulatory mechanisms for natural gas program costs and performance

2. Is there a mechanism in place for providing cost-recovery of program costs?

Yes—Minnesota Statute 216B.241, Subdivision 2b allows a utility to recover expenses resulting from a conservation improvement program required by the Department of Commerce. These expenses are typically recovered through a tracker mechanism where the Minnesota Public Utilities Commission approves the tracker balance on an annual basis. The tracker mechanism is trued up in a general rate case.

http://www.revisor.leg.state.mn.us/stats/216B/241.html

3. Is there a mechanism in place for utility shareholder incentives for natural gas efficiency program performance?

Yes—in December 1999, the Minnesota Public Utilities Commission approved a Joint Proposal for a Shared-Savings DSM Financial Incentive Plan that allows a utility to qualify for a financial incentive if the program significantly exceeds the statutory spending requirements and energy savings goals in a cost-effective manner.

Minnesota Public Utilities Commission Docket No. E,G999/CI-98-1759

http://search.state.mn.us/puc/query.html

Minnesota Statute 216B.16, subdivision 6(c) provides statutory criteria for determining if an incentive plan constitutes good public policy.

http://www.revisor.leg.state.mn.us/stats/216B/16.html

4. Is there a mechanism in place for recovery of "lost revenues" from natural gas energy efficiency programs?

No—from 1992 through 1998, Minnesota allowed the full recovery of lost margins associated with energy savings resulting from the implementation of a conservation improvement program. In 1999, the Shared-Savings DSM Financial Incentive Plan replaced that mechanism.

5. If there are other regulatory mechanisms in place that help encourage utilities to provide natural gas efficiency programs, please briefly describe such mechanisms below.

None.

Experience to date

6. Please provide a brief summary of how the overall cost-recovery/incentive system has worked so far. Include a description of any modifications that have been made to the approach, and why.

The major gas utilities in Minnesota report that cost-recovery and recovery of requested lost margins and financial incentives has generally worked very well. CenterPoint Energy Minnegasco, the largest natural gas utility in the state, reports that all requested lost margins and financial incentives have been approved by the Minnesota Public Utilities Commission, and Xcel Energy reports that any cost-recovery denials have been minimal.

SURVEY OF STATE NATURAL GAS ENERGY EFFICIENCY POLICIES

State: New Jersey

Overall policy and regulatory requirements

1. Is there a requirement for utility natural gas energy efficiency programs?

Yes—the 1999 Electric Discount and Energy Competition Act, N.J.S.A. 48:3-49 et seq. provided for a non-bypassable Societal Benefits Charge, a fee assessed by the energy utilities at the point of use for both natural gas and electricity. The Act established this funding for a minimum of eight years. Every four years though a proceeding and public hearing, the Board of Public Utilities is to establish the four-year funding levels for the program.

The first proceeding was initiated in February 1999 and resulted in an order in March 2001. The BPU set the funding for the first three years, determined the programs to be funded and the funding allocation among utilities, and set the initial program administration. The Order is dated March 9, 2001 and the docket is EX99050347. The BPU's website is www.bpu.state.nj.us. The information is provided under the Office of Clean Energy portion of the site.

Regulatory mechanisms for natural gas program costs and performance

2. Is there a mechanism in place for providing cost-recovery of program costs?

Yes—recovery is through the aforementioned SBC.

3. Is there a mechanism in place for utility shareholder incentives for natural gas efficiency program performance?

Not currently—there used to be, however, the mechanism is for standard offer programs that no longer are accepting new projects. Under EDECA and the March 9, 2001 Order there is no such mechanism.

4. Is there a mechanism in place for recovery of "lost revenues" from natural gas energy efficiency programs?

Not currently—there is technically a mechanism available, but collection of lost revenue is dependent upon the BPU's acceptance of energy savings protocols that were filed in July of 2001. Approval of those protocols is still pending.

5. If there are other regulatory mechanisms in place that help encourage utilities to provide natural gas efficiency programs, please briefly describe such mechanisms below.

None.

Experience to date

6. Please provide a brief summary of how the overall cost-recovery/incentive system has worked so far. Include a description of any modifications that have been made to the approach, and why.

The utilities have petitioned the BPU to include performance incentives as a legitimate cost of the Clean Energy Programs. However, thus far there has not been any support for this concept. Further, because the energy savings protocols have not been finalized and approved by the Board, there has been no lost revenue booked. The issue of lost revenues will be reviewed again in the next Comprehensive Resource Analysis proceeding that will look at the next four years of the Clean Energy Program. This will be conducted in 2004. With administration of the energy efficiency programs moving to the BPU, the concept of performance incentives appears to be a dead issue.

SURVEY OF STATE NATURAL GAS ENERGY EFFICIENCY POLICIES

State: Canadian Province of Ontario

Overall policy and regulatory requirements

1. Is there a requirement for utility natural gas energy efficiency programs?

Yes—extensive rules governing gas DSM in Ontario were laid out in an Ontario Energy Board order (EBO-169) in 1993.

Regulatory mechanisms for natural gas program costs and performance

2. Is there a mechanism in place for providing cost-recovery of program costs?

Yes—both Ontario utilities receive cost-recovery for DSM expenditures through annual rate cases. There has been a reliable mechanism for cost-recovery since the gas DSM programs were initiated in 1994.

In addition, one of the two major gas utilities in Ontario (Enbridge Gas Distribution, or EGD) has a DSM Variance Account. This allows the company to spend above its budget by up to 20%. It also ensures that any spending under budget that was rolled into rates can be recaptured for ratepayers.

3. Is there a mechanism in place for utility shareholder incentives for natural gas efficiency program performance?

Only EGD has a shareholder incentive mechanism. The sole metric of performance is the present value of net economic benefits to ratepayers calculated using the total resource cost test. EGD's actual performance each year is compared to a target set for that year. After an audit of its savings claims, EGD's shareholders are awarded incentives equal to a percentage of all net benefits above the target.

4. Is there a mechanism in place for recovery of "lost revenues" from natural gas energy efficiency programs?

Both Ontario utilities receive compensation for lost revenues through a Lost Revenue Adjustment Mechanism (LRAM).

5. If there are other regulatory mechanisms in place that help encourage utilities to provide natural gas efficiency programs, please briefly describe such mechanisms below.

None.

Experience to date

6. Please provide a brief summary of how the overall cost-recovery/incentive system has worked so far. Include a description of any modifications that have been made to the approach, and why.

The EGD incentive mechanism has been in place since 1999. Initially, the shareholder incentive limit was equal to 35% of all net benefits above the target. There was also a symmetrical penalty of 35% of all net benefits below the target.

Subsequently, the maximum value was reduced to 20%. It is believed that this was a result of two things: (1) ECG had earned substantial incentives for bringing in savings substantially above the target and some consumer groups (including industrial customers) were complaining; and (2) avoided costs went up, meaning that net benefits were higher even for the same level of incremental savings above the target.

Also, earlier this year there was a contentious case in which EGD was filing a claim for about $8 million (it was initially much higher, but brought down in settlement negotiations with several parties) in shareholder incentives for performance in 2000 and 2001. At the heart of the dispute was whether actual savings should be computed based on best available information and evaluation after the fact and still compared to a target that was built up using older assumptions. In particular, should custom commercial and industrial project savings be calculated using (1) a newly found 49% free rider rate for actuals and compared to a forecast based on a 10% free rider rate, or (2) the newly found 49% free rider rate for actuals with the target retroactively adjusted downward using the same 49% rate, or (3) both actuals and target calculated using the old 10% free rider rate?

One big problem contributing to this dispute was that key elements of the "rules" had not been clearly defined and spelled out, with all parties at least having a common understanding of what they were. Of course another factor was that some parties were concerned about the size of the incentive payments being claimed. In the end, the settlement agreement that EGD negotiated with the Green Energy Coalition and other parties was upheld by the OEB.

There is a fairly widespread consensus that the shareholder incentive mechanism has definitely motivated EGD to increase its energy efficiency efforts over the years it has been in effect.

SURVEY OF STATE NATURAL GAS ENERGY EFFICIENCY POLICIES

State: Oregon

Overall policy and regulatory requirements

1. Is there a requirement for utility natural gas energy efficiency programs?

Yes—there is a state requirement for gas utilities to provide residential weatherization services to customers with natural gas space heat (ORS 469.631-645). The law requires utilities to provide free energy audits and options of 6.5% financing or 25% rebates on the installation of cost-effective weatherization measures.

Oregon regulators do have certain expectations for gas utility DSM programs, including energy efficiency and energy audits. The Oregon PUC conducts annual reviews of utility DSM programs each spring. Effective October 1, 2003, the state's largest natural gas utility (NW Natural) transferred its responsibility for energy efficiency and energy audits to the Energy Trust of Oregon (ETO), and will collect a specific tariff from customers to support those activities and transfer those revenues to the ETO. (Historically [1995-2003], energy efficiency activities were driven by Integrated Resource Planning and funded though a balancing account mechanism approved by the Oregon Public Utility Commission.)

Regulatory mechanisms for natural gas program costs and performance

2. Is there a mechanism in place for providing cost-recovery of program costs?

Yes—the Oregon Public Utility Commission approved a balancing account mechanism to recover DSM program expense in 1993. Later, the commission approved a similar accounting mechanism to recover excessive costs of its weatherization program (beyond those funded in rates) when external factors like high commodity costs drove program participation above normal levels. For NW Natural, energy efficiency and low-income weatherization expenses will now be covered through a specific tariff (set at 1.25% of residential and commercial customers' monthly bill for energy efficiency programs and 0.25% for weatherization), with the revenues transferred to the Energy Trust of Oregon for implementation of non-low-income programs.

Oregon PUC Order No. 02-634, Sept. 12, 2002

The two smaller gas utilities in the state, Avista and Cascade Natural, continue to recover their energy efficiency program costs through deferred balancing accounts.

3. Is there a mechanism in place for utility shareholder incentives for natural gas efficiency program performance?

No.

4. Is there a mechanism in place for recovery of "lost revenues" from natural gas energy efficiency programs?

There has been a mechanism in place as a part of the cost-recovery process that allows the recovery of lost revenues for the gas utilities. The mechanism no longer applies to NW Natural since it adopted a form of revenue decoupling ("Distribution Margin Normalization") as a part of the approved settlement agreement that transferred its energy efficiency responsibilities to the Energy Trust of Oregon. [order cited above]

5. If there are other regulatory mechanisms in place that help encourage utilities to provide natural gas efficiency programs, please briefly describe such mechanisms below.

The utilities are allowed to recover their energy efficiency expenditures over a shorter period than the lives of the measures, which had been the earlier approach to cost-recovery.

Experience to date

6. Please provide a brief summary of how the overall cost-recovery/incentive system has worked so far. Include a description of any modifications that have been made to the approach, and why.

Oregon's historical cost-recovery mechanism has worked well for all three natural gas utilities.

SURVEY OF STATE NATURAL GAS ENERGY EFFICIENCY POLICIES

State: Vermont

Overall policy and regulatory requirements

1. Is there a requirement for utility natural gas energy efficiency programs?

Yes—Vermont has comprehensive legislation requiring utility least cost planning and energy efficiency programs [30 V.S.A. § 202a, 209, 218 etc.]. The specific requirements for Vermont Gas Systems (the only natural gas utility in Vermont) were established through Public Service Board order 5270-VGS-2, 10/23/92, which essentially approved the program design submitted by VGS (which had been developed through a collaborative process). 5270-VGS-2 also refers to exhibits and other orders in hearings for both Vermont Gas and Vermont's electric utilities that, together with 5270, form the basis for all of the mechanisms discussed below.

Regulatory mechanisms for natural gas program costs and performance

2. Is there a mechanism in place for providing cost-recovery of program costs?

Yes—DSM expenses are deferred between rate proceedings and then the deferred amounts are reviewed and, assuming they were appropriately incurred, approved for recovery in the context of the utility's rate cases.

3. Is there a mechanism in place for utility shareholder incentives for natural gas efficiency program performance?

No.

4. Is there a mechanism in place for recovery of "lost revenues" from natural gas energy efficiency programs?

Yes—lost revenues are calculated for the period of time between rate cases. Essentially, lost revenue equals the retail rate less the avoided gas cost for gas that would have been sold absent efficiency programs. Lost revenues are reviewed and approved in the course of rate proceedings, amortized over three years, and collected in rates.

5. If there are other regulatory mechanisms in place that help encourage utilities to provide natural gas efficiency programs, please briefly describe such mechanisms below.

Vermont also has a special support mechanism for low-income weatherization known as the Vermont Weatherization Trust Fund. It is funded through a ½% gross receipts tax on energy (electricity, gas, oil, propane, etc.) and is used to supplement the federal Weatherization Program funding. Most of the money goes to the Weatherization network, but utilities can file for recovery of low-income program expenses. The natural gas utility in Vermont (VGS) has used this mechanism to help cover some of its costs related to low-income energy efficiency programs.

Experience to date

6. Please provide a brief summary of how the overall cost-recovery/incentive system has worked so far. Include a description of any modifications that have been made to the approach, and why.

Lost revenue calculations have been modified to exclude certain measures, but otherwise the process has remained essentially unchanged. In general, the process is regarded as being fair and balanced, although the review requires a significant amount of time and effort for both regulators and the utility during the rate proceeding.

SURVEY OF STATE NATURAL GAS ENERGY EFFICIENCY POLICIES

State: Washington

Overall policy and regulatory requirements

1. Is there a requirement for utility natural gas energy efficiency programs?

There is no formal legislative requirement. However, state regulators (the Washington Utilities and Transportation Commission) do have rules requiring least-cost planning for both electric and gas utilities, and they do encourage all utilities to provide energy efficiency programs.

Regulatory mechanisms for natural gas program costs and performance

2. Is there a mechanism in place for providing cost-recovery of program costs?

Yes—cost-recovery mechanisms have been designed on a utility-by-utility basis in WUTC regulatory proceedings. Two natural gas utilities (Cascade Natural Gas and Northwest Natural Gas) recover prior-year actual costs through annual purchase gas adjustment (PGA) filings. The other two natural gas utilities (Avista and Puget Sound Energy) recover expenditures through separate surcharges to rates (e.g., conservation riders).

3. Is there a mechanism in place for utility shareholder incentives for natural gas efficiency program performance?

No.

4. Is there a mechanism in place for recovery of "lost revenues" from natural gas energy efficiency programs?

No.

5. If there are other regulatory mechanisms in place that help encourage utilities to provide natural gas efficiency programs, please briefly describe such mechanisms below.

Commission regulations require "least-cost planning" for all utilities. These plans are required to incorporate an assessment of technically feasible improvements in the efficient use of gas and compare them to gas-purchasing options in order to develop a least-cost plan for meeting future demand. WAC 480-90-238

http://search.leg.wa.gov/wslwac/WAC%20480%20%20TITLE/WAC%20480%20-%2090%20%20CHAPTER/WAC%20480%20-%2090%20-238.htm

Experience to date

6. Please provide a brief summary of how the overall cost-recovery/incentive system has worked so far. Include a description of any modifications that have been made to the approach, and why.

The cost-recovery mechanisms have been very effective. The companies are able to recover their expenditures in a timely manner, which has allowed them flexibility to respond to changing market conditions with less regulatory risk than waiting for a rate case. The WUTC reports that the companies have successfully recovered all of their incurred program costs in recent years.

SURVEY OF STATE NATURAL GAS ENERGY EFFICIENCY POLICIES

State: Wisconsin

Overall policy and regulatory requirements

1. Is there a requirement for utility natural gas energy efficiency programs?

Yes—Wisconsin natural gas utilities have operated energy efficiency programs for many years. Legislation passed in 1999 (1999 Wisconsin Act 9) transferred responsibility for energy efficiency programs from the utilities (gas and electric) to the Wisconsin Department of Administration (DOA). After a three-year phase-in period, utilities (gas and electric) now transfer over all of the "Public Benefits" revenues they collect for energy efficiency to the DOA (see comments on customer service programs retained by utilities). The Public Service Commission of Wisconsin (PSCW), as prescribed in Act 9, determined the revenue amount to transfer based on 1998 utility program expenses. In addition, utilities collect a public benefits charge from all electric customers and also transfer these revenues to the DOA. Although those additional funds are collected only from electric customers, they also may be spent on gas energy efficiency programs for eligible customers. The DOA now administers energy efficiency programs statewide under its "Focus on Energy" program. The DOA offers a wide variety of programs, and does have both electricity and natural gas savings targets.

There is a component of the statutes—S.196.374(3)—that would allow utilities to spend additional funds on energy efficiency beyond what they are required to transfer over to the DOA, if their request for additional funding is approved by the PSCW. A few utilities offer some small "customer service" programs that include efficiency features. Also, one utility (Alliant Energy) has been allowed to maintain a large customer "shared savings" DSM program that includes natural gas measures.

Regulatory mechanisms for natural gas program costs and performance

2. Is there a mechanism in place for providing cost-recovery of program costs?

Yes—the statewide public benefits energy efficiency funding mechanism described above provides for an assured stream of revenues to support energy efficiency programs. In addition, utilities have the option of seeking approval to spend additional funds themselves on energy efficiency programs. Utilities recover their costs through the traditional ratemaking process, and are allowed to escrow these expenses, just as they did in the past. Use of a forward-looking test year allows utilities to forecast public benefits expenses and incorporate those costs into rates.

3. Is there a mechanism in place for utility shareholder incentives for natural gas efficiency program performance?

No—under the current framework, this would be inappropriate, since the energy efficiency programs are administered by the state. Previously, the PSCW had experimented with shareholder incentives (increased allowable return on equity), but there was no consensus that such a mechanism was necessary.

4. Is there a mechanism in place for recovery of "lost revenues" from natural gas energy efficiency programs?

No—as described above, the combination of escrow accounting and forward-looking test years has tended to mitigate concerns utilities and the PSCW had about lost revenues. Wisconsin utilities were allowed to amortize DSM expenses in the past, but all costs are now expensed and trued up during each rate case.

5. If there are other regulatory mechanisms in place that help encourage utilities to provide natural gas efficiency programs, please briefly describe such mechanisms below.

The previously cited legislation (1999 Wisconsin Act 9) also established public benefit funding support for low-income programs, including weatherization services. Utilities also transfer funds for that program to the state DOA.

Experience to date

6. Please provide a brief summary of how the overall cost-recovery/incentive system has worked so far. Include a description of any modifications that have been made to the approach, and why.

The revenue collection method passed in 1999 Wisconsin Act 9 is a mechanism that should provide a solid foundation for support of energy efficiency programs in Wisconsin, but in practice has been subject to a number of practical challenges. Some utilities have balked at transferring all of the revenues they collect for energy efficiency over to the state. More importantly, in the last legislative session the legislature and governor took a significant portion of the forthcoming energy efficiency revenues (ranging from about a third to a half of the total funding) to help balance the state budget. At this point, there is some uncertainty about how best to protect the long-term funding of energy efficiency programs in Wisconsin and institutionalize those programs as a valuable planning resource.

ACE3

Appendix B: Exemplary Natural Gas Energy Efficiency Programs

Program Name	Organization(s)
Residential Retrofit	
HomeBase Retrofit Program	Vermont Gas Systems, Inc.
Residential Weatherization Program	KeySpan Energy Delivery
Home Performance with ENERGY STAR®	New York State Energy Research and Development Authority
Residential Audit	
Residential Home Performance Audit Program	CenterPoint Energy Minnegasco
Residential Space Heating Equipment	
Joint Gas & Electric High Efficiency Furnace Rebate Program	GasNetworks®
High Efficiency Furnace Program	NW Natural
High Efficiency Furnace Programs	Gaz Métro
HomeBase Equipment Replacement Program	Vermont Gas Systems, Inc
Residential Windows	
ENERGY STAR® Residential Windows Program	Northwest Energy Efficiency Alliance
Residential New Construction	
ENERGY STAR® Homes	Joint Management Committee (Massachusetts)
New Jersey ENERGY STAR® Homes	New Jersey Clean Energy Program
Vermont ENERGY STAR® Homes	Efficiency Vermont and Vermont Gas Systems, Inc.
Residential Low-Income Single Family	
Low-Income Gas Program	NSTAR Gas Company
Non-Profit Affordable Housing Project	CenterPoint Energy Minnegasco, Habitat for Humanity, Project for Pride in Living, and the Greater Metropolitan Housing Corporation
Low-Income Usage Reduction Program (LIURP)	National Fuel
New Jersey Comfort Partners Program	New Jersey Clean Energy Program
Residential Multifamily	
Multifamily Low-Income Program	Efficiency Vermont, Vermont Gas Systems, Inc. and the Burlington Electric Department
Apartment and Condo Efficiency Services	Focus on Energy
Residential Appliances	
ENERGY STAR® Products	Wisconsin Energy Conservation Corporation

ACE³

Exemplary Natural Gas Energy Efficiency Programs

Program Name	Organization(s)
Commercial/Industrial Technical Assistance and Demonstration	
New York Energy $mart^{SM} FlexTech Program	New York State Energy Research and Development Authority
Multifamily and C&I Building Practices and Technology Demonstration Program	KeySpan Energy Delivery
Commercial/Industrial Building and Equipment Retrofit	
WorkPlace Equipment Replacement Program and WorkPlace Retrofit Program	Vermont Gas Systems, Inc
Flexible Gas-Efficiency Portfolio Standard	Avista Utilities
Boiler Efficiency	Xcel Energy
Custom Process Rebate	CenterPoint Energy Minnegasco
Commercial/Industrial New Construction	
New Jersey SmartStart Buildings®	New Jersey Clean Energy Program
Energy Design Assistance	Xcel Energy, the Weidt Group, Herzog/Wheeler & Associates
WorkPlace New Construction Program	Vermont Gas Systems, Inc
Commercial/Industrial Small Business	
2002 Express Efficiency	Pacific Gas and Electric Company
Special Case Studies: Comprehensive Portfolios and Collaboratives	
Large Utility Effort through Multiple Local Distribution Companies: *Comprehensive Program Portfolio*	KeySpan Energy Delivery New England
Single Investor-Owned Utility: *Comprehensive Program Portfolio*	Vermont Gas Systems, Inc
Municipal Utilities Collaborative Program: *Conserve & Save*	The Triad: Austin Utilities, Owatonna Public Utilities and Rochester Public Utilities
Multi-party collaborative: *Massachusetts Low Income Energy Affordability Network*	Massachusetts Department of Housing and Community Development in collaboration with KeySpan Energy Delivery New England
Regional Multi-Utility Collaborative: *Comprehensive Program Portfolio*	GasNetworks®

BEFORE

THE PUBLIC UTILITIES COMMISSION OF OHIO

In the Matter of the Application of Vectren Energy Delivery of Ohio, Inc. for Approval, Pursuant to Revised Code Section 4929.11, of Tariffs to Recover Conservation Expenses and Decoupling Revenues Pursuant to Automatic Adjustment Mechanisms and for Such Accounting Authority as May be Required to Defer Such Expenses and Revenues for Future Recovery through Such Adjustment Mechanisms.	)	Case No. 05-1444-GA-UNC

RESPONSE TO INTERROGATORIES, REQUEST FOR PRODUCTION OF DOCUMENTS, AND REQUESTS FOR ADMISSION PROPOUNDED TO VECTREN ENERGY DELIVERY OF OHIO, INC. BY THE OFFICE OF THE OHIO CONSUMERS' COUNSEL FIRST SET

(February 6, 2007)

Pursuant to Ohio Admin. Code §§ 4901:1-19, 4901:1-20 and 4901:1-22, Vectren Energy Delivery of Ohio (VEDO or the Company) submits its responses to the Ohio Consumers' Counsel's Interrogatories, Requests for Production of Documents, and Requests for Admissions, First Set.

<u>GENERAL OBJECTIONS</u>

GENERAL OBJECTIONS COMMON TO ALL INTERROGATORIES AND REQUESTS FOR PRODUCTION OF DOCUMENTS:

For each of these separate admissions, please admit or deny that each of the following statements were made by an agent of Vectren Corporation, concerning a matter within the scope of his employment, and were made during the existence of the employment relationship:

32. "Last year we recognized the need for a fundamental shift in utility rate design and filed conservation programs in Ohio and Indiana designed to encourage energy savings" Niel Ellerbook, Vectren Corporation Reports Year to Date and Third Quarter Results" November 2, 2006.

RESPONSE:

Admit.

33. "These programs [Ohio and Indiana conservation programs] moved away from volumetric ratemaking and provided the foundation to aggressively help our customers use less energy and reduce their energy bills." Niel Ellerbook, Vectren Corporation Reports Year to Date and Third Quarter Results" November 2, 2006.

RESPONSE:

Admit.

34. "The Ohio commission has taken an important step by recently approving a rate design change that allows the Company to become a conservation advocate and authorizing an expanded low-income conservation program that will better align the Company's and customers' interest to conserve natural gas." Niel Ellerbook, Vectren Corporation Reports Year to Date and Third Quarter Results" November 2, 2006.

RESPONSE:

Admit.

35. "Our utility businesses will benefit from new rate design and conservation program orders recently implemented for our Ohio and Indiana North gas utility territories that enable us to help our customer lower their gas bills by promoting reduced consumption." Niel Ellerbrook, News Release "Vectren Issues Initial 2007 Earnings Guidance," December 13, 2006.

RESPONSE:

Admit.

36. "The new rate design is in effect for approximately 90% or our gas customers and provides for recovery of substantially all of the costs found to be appropriate in prior rate cases while at the same time authorizing comprehensive programs designed to help customers lower their bills by using less gas commodity." Niel Ellerbrook, News Release "Vectren Issues Initial 2007 Earnings Guidance," December 13, 2006.

RESPONSE:

Admit.

37. "We are pleased with today's commission action and are excited to be among the first companies in the country to establish a rate mechanism that will allow us to encourage our Ohio customers to conserve energy." Niel Ellerbrook, News Release "PUCO approves conservation program for Vectren Energy Delivery of Ohio," September 13, 2006.

RESPONSE:

Admit.

38. "The approved rate design change marks a departure from tradition and is an approach advocated by energy efficiency experts, consumer advocates and the natural gas industry." Niel Ellerbrook, News Release "PUCO approves

conservation program for Vectren Energy Delivery of Ohio," September 13, 2006.

RESPONSE:

Deny.

39. "This fundamental change to the ratemaking paradigm will allow us to aggressively support customer conservation efforts, thus helping customers lower the total cost of their natural gas bills without penalizing the company for achieving reductions in customer usage." Niel Ellerbrook, News Release "Vectren Receives Approval of Comprehensive Conservation Proposal to Help Indiana Customers Conserve, Save Money on Natural Gas bills" December 1, 2006.

RESPONSE:

Admit.

VECTREN ENERGY DELIVERY OHIO OPERATIONS
Gas Margin, Volumes, and Margin per Unit Summary
Budget 2007

Month	January	February	March	April	May	June	July	August	September	October	November	December	Total
Margin by Category:													
Order Granted	$9,189	$7,538	$6,354	$4,554	$2,351	$1,767	$1,633	$1,539	$1,808	$2,973	$5,123	$7,578	$52,407
Service Charge	2,473	2,473	2,467	2,454	2,436	2,427	2,420	2,415	2,422	2,447	2,474	2,487	29,393
Gross Receipts	2,857	2,371	1,931	1,307	676	488	463	458	537	946	1,619	2,439	16,090
SB287 Tax	1,020	832	673	451	214	149	140	134	162	305	551	847	5,480
PIPP	814	660	530	345	151	101	98	99	118	231	428	673	4,249
Bad Debt	973	788	634	412	181	121	118	118	141	276	512	804	5,076
SRC	776	1,108	1,087	853	672	279	11	7	187	603	853	1,214	7,630
Misc. Revenue	430	269	343	434	297	314	174	218	188	217	197	244	3,325
Total	$18,532	$16,038	$13,998	$10,810	$6,978	$5,645	$5,057	$4,987	$5,564	$7,998	$11,758	$16,284	$123,650
Throughput Margin Roll-up:													
Tariff 310 - Residential	$7,911	$6,724	$5,479	$3,641	$1,813	$1,043	$813	$811	$1,115	$2,599	$4,650	$7,029	$43,629
Tariff 315 - Residential	1,816	$1,560	$1,275	$853	$429	$245	$182	$181	$254	$597	$1,062	$1,619	10,073
Tariff 320 - General Service	3,255	2,746	2,201	1,461	774	523	478	477	590	1,079	1,847	2,862	18,292
Tariff 325 - General Service	465	395	317	209	113	75	68	68	85	155	265	413	2,627
Tariff 330 - Large	246	220	218	160	99	111	156	169	168	131	163	225	2,066
Tariff 341 - Large	1	1	1	1	0	0	0	0	0	0	0	1	6
Tariff 345 - Large	1,180	1,048	1,054	1,017	725	657	577	496	560	586	777	917	9,595
Specialty Customers - Large	309	259	281	276	190	179	164	135	158	155	199	235	2,538
School Customers - Large	446	344	363	304	103	73	25	16	23	33	123	253	2,107
Total Throughput Margin	$15,630	$13,297	$11,188	$7,923	$4,245	$2,905	$2,463	$2,354	$2,954	$5,334	$9,086	$13,553	$90,932
Misc. Revenue	430	269	343	434	297	314	174	218	188	217	197	244	3,325
Service Charge	2,473	2,473	2,467	2,454	2,436	2,427	2,420	2,415	2,422	2,447	2,474	2,487	29,393
Total Other	$2,902	$2,741	$2,810	$2,887	$2,733	$2,740	$2,594	$2,633	$2,610	$2,663	$2,672	$2,730	$32,718
Total Margin	$18,532	$16,038	$13,998	$10,810	$6,978	$5,645	$5,057	$4,987	$5,564	$7,998	$11,758	$16,284	$123,650
Units (Dth):													
Tariff 310 - Residential	3,554	2,867	2,249	1,388	583	350	331	331	420	968	1,864	2,962	17,866
Tariff 315 - Residential	1,002	809	634	392	164	99	93	93	118	273	526	835	5,039
Tariff 320 - General Service	1,519	1,244	996	686	332	239	232	232	268	489	844	1,276	8,356
Tariff 325 - General Service	268	219	176	121	59	42	41	41	47	88	149	225	1,475
Tariff 330 - Large	162	141	142	104	61	69	105	118	112	85	101	142	1,342
Tariff 341 - Large	1	1	1	1	0	0	0	0	0	0	0	1	5
Tariff 345 - Large	1,142	1,006	1,012	976	679	612	535	453	518	544	733	871	9,081
Specialty Customers - Large	747	628	676	664	464	418	385	321	372	363	458	569	6,063
School Customers - Large	251	194	204	171	58	41	14	9	13	18	69	142	1,185
Total:	8,647	7,107	6,089	4,504	2,399	1,869	1,737	1,597	1,868	2,825	4,745	7,023	50,411
Margin Per Unit													
Order Granted	$1.063	$1.061	$1.043	$1.011	$0.980	$0.946	$0.940	$0.964	$0.968	$1.052	$1.080	$1.079	$1.040
Riders	$0.296	$0.360	$0.366	$0.358	$0.418	$0.268	$0.131	$0.140	$0.239	$0.393	$0.378	$0.383	$0.336
Gas Cost:													
Residential	$30,033	$24,226	$19,006	$11,734	$4,929	$2,954	$2,801	$2,794	$3,548	$8,177	$15,757	$25,030	$150,988
General Service	12,840	10,510	8,420	5,800	2,804	2,016	1,959	1,958	2,263	4,129	7,135	10,786	70,619
Large	1,378	1,200	1,204	889	515	580	888	995	951	716	860	1,206	11,381
Total:	$44,251	$35,937	$28,630	$18,422	$8,248	$5,550	$5,647	$5,747	$6,762	$13,021	$23,751	$37,022	$232,988
Revenue:													
Residential	$41,834	$34,585	$27,830	$18,286	$9,212	$6,273	$5,820	$5,807	$6,944	$13,422	$23,545	$35,765	$229,322
General Service	16,927	14,018	11,303	7,834	4,054	2,977	2,868	2,866	3,301	5,729	9,614	14,429	$95,919
Large	3,593	3,103	3,152	2,679	1,664	1,632	1,842	1,843	1,893	1,651	2,153	2,868	$28,073
Misc. Revenue	430	269	343	434	297	314	174	218	188	217	197	244	$3,325
Total:	$62,783	$51,975	$42,628	$29,232	$15,226	$11,196	$10,704	$10,734	$12,326	$21,019	$35,509	$53,306	$356,638
Customers													
Residential	296,311	296,339	295,702	293,999	291,600	290,210	289,268	288,596	289,455	292,715	296,515	298,260	293,247
General Service	24,734	24,719	24,660	24,563	24,493	24,508	24,523	24,512	24,537	24,675	24,765	24,764	24,621
Large	662	662	662	662	662	662	662	662	662	662	662	662	662
Total:	321,706	321,720	321,024	319,224	316,755	315,380	314,453	313,770	314,654	318,052	321,942	323,686	318,530
Residential AUPC (Dth)	15.4	12.4	9.8	6.1	2.6	1.5	1.5	1.5	1.9	4.2	8.1	12.7	78.1

2006 Prjected Margin as of August 2006	$ 115,268	
2007 Per Annual Budget (as of Sep 2006)	$ 123,650	
	$ 8,382	
Weather	$ 2,515	
Taxes	$ (867)	
SRC	$ 5,647	1/
Large	$ 580	
All Other	$ 3	
Customer Count	$ 218	1/
Misc Rev.	$ (27)	
Service Charge	$ 140	
PIPP	$ 54	
Rate Block Split - Small	$ (20)	
AUPC	$ (1,907)	1/
Bad Debt	$ 2,046	
	$ 5,867	

Summation of 1/ is 3,958 and constitutes the net increase in margin for lost margin recovery

Vectren Energy Delivery of Ohio
Actual SRR Variance
October 2006 through December 2006
First Set OCC Production of Documents No. 5, Case No. 05-144-GA-UNC

		October 2006			November 2006			December 2006		
		Residential Rate 310/315	General Service Rate 320/325	Total	Residential Rate 310/315	General Service Rate 320/325	Total	Residential Rate 310/315	General Service Rate 320/325	Total
1	Actual Revenue	$ 14,041,779	$ 7,037,210	$ 21,078,989	$ 23,108,014	$ 9,121,781	$ 32,229,794	$ 30,564,711	$ 13,180,309	$ 43,745,020
	Less Riders:									
2	PIPP	$ (210,070)	$ (96,154)	$ (306,225)	$ (328,035)	$ (123,657)	$ (451,692)	$ (417,247)	$ (168,743)	$ (585,989)
3	Uncollectible Expense	$ (251,044)	$ (115,271)	$ (366,315)	$ (392,012)	$ (147,907)	$ (539,919)	$ (498,391)	$ (201,489)	$ (699,881)
4	SB287	$ (271,833)	$ (103,356)	$ (375,189)	$ (424,915)	$ (128,411)	$ (553,326)	$ (540,588)	$ (178,222)	$ (718,810)
5	Gross Receipts Excise Tax	$ (739,242)	$ (334,883)	$ (1,074,125)	$ (1,176,606)	$ (430,649)	$ (1,607,255)	$ (1,548,777)	$ (631,468)	$ (2,180,245)
6	GCR Revenue and variances	$ (10,393,038)	$ (5,476,294)	$ (15,869,331)	$ (17,554,860)	$ (7,124,188)	$ (24,679,048)	$ (23,513,769)	$ (10,424,921)	$ (33,938,690)
7	Transportation Program Rider	$ 12	$ 11	$ 23	$ 38	$ (0)	$ 38	$ 4	$ 5	$ 9
8	SRR	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
9	Actual Base Revenue	$ 2,176,565	$ 911,263	$ 3,087,828	$ 3,231,624	$ 1,166,968	$ 4,398,593	$ 4,045,945	$ 1,575,470	$ 5,621,415
10	Service Charge Revenue	$ 2,001,684	$ 360,673	$ 2,362,357	$ 2,035,670	$ 367,107	$ 2,402,777	$ 2,049,793	$ 368,726	$ 2,418,518
11	Weather Normalization	$ (296,225)	$ (123,547)	$ (419,772)	$ 199,055	$ 67,283	$ 266,338	$ 802,137	$ 304,007	$ 1,106,143
12	Normalized Base Revenue	$ 3,882,023	$ 1,148,390	$ 5,030,413	$ 5,466,349	$ 1,601,359	$ 7,067,708	$ 6,897,874	$ 2,248,203	$ 9,146,077
13	Order Granted Base Revenue	$ 4,006,000	$ 1,175,000	$ 5,181,000	$ 5,525,000	$ 1,699,000	$ 7,224,000	$ 7,663,000	$ 2,438,000	$ 10,101,000
14	Add: Customer Growth Revenue	$ 38,504	$ (27,807)	$ 10,696	$ 34,138	$ (30,908)	$ 3,230	$ 12,175	$ (18,179)	$ (6,003)
15	Adjusted Order Granted Revenue	$ 4,044,504	$ 1,147,193	$ 5,191,696	$ 5,559,138	$ 1,668,092	$ 7,227,230	$ 7,675,175	$ 2,419,821	$ 10,094,997
16	SRR Amount (line 15 - 12)	$ 162,480	$ (1,197)	$ 161,284	$ 92,789	$ 66,733	$ 159,522	$ 777,301	$ 171,619	$ 948,920
17	Add: Gross Receipts Excise Tax (4.8767%)	$ 7,924	$ (58)	$ 7,865	$ 4,525	$ 3,254	$ 7,779	$ 37,907	$ 8,369	$ 46,276
18	SRR Amount- Gross (line 16-17)	$ 170,404	$ (1,255)	$ 169,149	$ 97,314	$ 69,988	$ 167,302	$ 815,208	$ 179,988	$ 995,196

		October 2006 Residential	October 2006 General Service	November 2006 Residential	November 2006 General Service	December 2006 Residential	December 2006 General Service
	Banner Customer Count (ACRT)						
17	Actual Customer Count	286,976	24,382	290,674	24,610	292,502	24,759
18	Financial vs Service Charge Customer Count	-	-	-	-	-	-
19	Actual Customer Count	286,976	24,382	290,674	24,610	292,502	24,759
20	Order Granted Customer Count	284,244	24,973	288,889	25,066	292,038	24,945
21	Customer Growth	2,732	(591)	1,785	(456)	464	(186)
22	Order Granted Base/Customer	$ 14.09	$ 47.05	$ 19.12	$ 67.78	$ 26.24	$ 97.74
23	Customer Growth Base Revenue	$ 38,504	$ (27,807)	$ 34,138	$ (30,908)	$ 12,175	$ (18,179)

State of Ohio
Office of the Governor
Executive Order 2007 – 02S

Coordinating Ohio Energy Policy and State Energy Utilization

1. **Creating the Governor's Energy Advisor.** Ohio is one of the most energy abundant states in the country, rich with a diverse array of energy resources ranging from fossil fuels to renewable resources. Ohio's economy also ranks among the most energy-intensive in the nation, home to energy-dependent industries ranging from agriculture to manufacturing. The State of Ohio's responsibilities for development and implementation of policy and regulation of energy issues are presently fragmented among myriad state organizations. Accordingly:

    a. I hereby create the role of Governor's Energy Advisor, to serve as my principal advisor on all energy-related issues.

    b. I authorize the Governor's Energy Advisor to coordinate energy policy for the State of Ohio across state agencies, boards and commissions.

    c. The Energy Advisor will secure the necessary resources to offer advice and coordination on energy policy.

    d. The current Executive Director of the Ohio Air Quality Development Authority is designated to serve as my Energy Advisor, in addition to continuing to carry out his current responsibilities.

2. **Coordinating Energy Policy.** Dozens of state agencies, commissions, and boards play roles in energy policy and regulation. As a result, energy issues appear within everyone's scope, but rarely reach the top of anyone's agenda. At the same time, energy is an essential ingredient in powering Ohio's economy, protecting our environment, and employing Ohio workers. Accordingly:

    a. Each executive agency is directed to cooperate with my Energy Advisor on energy-related issues, naming an individual at the Deputy Director level or higher to work directly with my Energy Advisor.

    b. Non-executive state agencies and organizations are strongly encouraged to cooperate with my Energy Advisor on energy-related issues.

    c. The Governor's Energy Advisor shall sit on the Third Frontier Commission as the Governor's Science and Technology Advisor.

3. **Reducing and Improving Energy Consumption by the State.** It is the responsibility of state government to lead by example in reducing energy consumption in this era of steep energy prices, mounting environmental concerns, and persistent energy security risks. By improving energy efficiency and adopting advanced energy utilization technologies, we can make the most of our existing energy resources and also stimulate activity and investment in the energy efficiency services sector. Accordingly, I order the following actions:

   a. Buildings

      i. Instead of waiting until April 13 to implement various energy savings policies enacted into law last year, the affected agencies shall begin to implement those procedures immediately. This includes, but is not limited to, developing rules to establish energy efficiency and conservation standards; designing a common method to analyze the life-cycle cost of facilities and how energy efficiency can reduce that cost; and, designing and implementing a plan to improve the state's ability to identify and purchase the most appropriate energy efficient products.

      ii. The Department of Administrative Services, in consultation with the Energy Advisor, is directed to develop a tool for measuring energy consumption which can be used by all state agencies, boards, and commissions to track and measure their energy use in a common and consistent manner. Using such a tool will allow meaningful energy consumption comparisons between the various facilities maintained by state agencies. This tool shall be developed by March 16, 2007.

      iii. The tool for measuring energy consumption will include means of calculating each organization's "carbon footprint" which demonstrates the impact our activities have on climate change by calculating the green house gas emissions produced by daily activities and reporting those emissions in units of carbon dioxide.

      iv. Each state agency, board, and commission is directed to conduct a statewide energy audit of its respective facilities, both owned and leased. This audit will use the tool developed by the Department of Administrative Services to facilitate comparisons between similar facilities and should be completed by June 2007.

      v. Upon completion of this energy audit, each state agency, board, and commission is directed to achieve an overall reduction of 5% in building energy use for its facilities within the first year of the next biennium and 15% by the end of four fiscal years.

   b. Transportation

i. Each state agency is directed to take action immediately to reduce our dependence on foreign oil by requiring motor vehicle fleets operated by state government to acquire alternative fuel vehicles, including hybrid electric vehicles. Each state agency will develop a set of numerical goals, with a timeline, for acquiring these vehicles. The goals will be developed by April 15 and should use current state and federal requirements as the starting minimum point and be implemented beginning July 1.

ii. The Department of Administrative Services is directed to consult with the Energy Advisor to include transportation fuels in the energy consumption measurement tool and to develop and implement a goal-driven plan to reduce petroleum consumption by State vehicle fleets through revision of policies, adoption of technologies, and utilization of alternative fuels.

iii. In order to ensure the State fleet has access to alternative fuels, the Department of Administrative Services is directed to prepare plans to establish pumps for fuel that is 85% ethanol and 15% gasoline (known as E85 fuel) or diesel fuel made from vegetable oil or animal fats (known as biodiesel fuel) where such pumps are not otherwise available.

iv. The Department of Administrative Services, in consultation with the Energy Advisor, is directed to develop and implement a plan to raise biodiesel fuel consumption to at least 25% of State diesel purchases by January 1, 2008 if not before. Each agency, board and commission owning or leasing diesel fuel vehicles will cooperate with this plan.

4. **Launching the Governor's Higher Education Energy Challenge.** State-supported colleges and universities represent centers of both energy consumption and energy innovation. It will be the policy of my administration to recognize and value energy leadership. Accordingly:

   a. I hereby establish the Governor's Higher Education Energy Challenge as an award and recognition program to encourage energy efficiency innovation at Ohio's colleges and universities.

   b. The Energy Advisor is directed to encourage state-supported colleges and universities to establish teams of students, faculty, administrators, and staff to develop energy savings initiatives on their campuses.

   c. The Energy Advisor is directed to establish procedures for identifying the most innovative of these energy-saving initiatives for recognition in the Governor's Higher Education Energy Challenge competition.

5. I signed this Executive Order on January 17, 2007 in Columbus, Ohio and it will expire on my last day as Governor of Ohio unless rescinded before then.

Ted Strickland, Governor

ATTEST:

Jennifer Brunner, Secretary of State

CERTIFICATE OF SERVICE

I hereby certify that a copy of the Direct Testimony of Martin G. Kushler, Ph. D. on behalf of the Office of the Ohio Consumers' Counsel was provided, as specifically agreed to by the persons listed below, electronically this 21st day of February 2007.

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