1.0 Introduction

1.1 Stipulation and Commission Order

On December 30, 2002, the Utah Public Service Commission ("Commission") issued its Report and Order, In the Matter of the Application of Questar Gas Company ("QGC") for a General Increase in Rates and Charges, Docket No. 02-057-02, approving a Demand-Side Management Stipulation and Settlement ("Stipulation No. 3") submitted by QGC, the Division of Public Utilities ("DPU"), Committee of Consumer Services ("Committee") and Utah Energy Office ("UEO"). Stipulation No. 3 established a work group consisting of utility regulators, other state agencies, energy consumer groups, energy efficiency specialists, environmental groups, and other organizations interested in the development of gas DSM in QGC's Utah service territory. This work group, the Natural Gas DSM Advisory Group, ("Advisory Group"), was charged with evaluating the additional information needed by QGC to adequately address DSM funding in future Integrated Resource Plan ("IRP") proceedings. Additionally, it called for QGC and UEO to jointly fund a study of achievable, cost-effective gas DSM measures in Utah:

> "*QGC and UEO will jointly fund a study of achievable, cost-effective gas DSM measures in Utah . . . The study will include information QGC will need to adequately evaluate DSM in its Sendout model for future IRP proceedings. The study will also specifically evaluate opportunities for gas-fired generation and combined heat and power; and will estimate the potential revenue impacts to QGC of implementing cost-effective DSM measures identified*"

The results of the collaborative efforts and DSM study were to be utilized by QCG to examine DSM alternatives in IRP cycles beginning in May 2003. Rate design changes to facilitate DSM were referred to the task force established in the Allocation and Rate Design Stipulation and Settlement, which was also approved by the Commission in Docket No. 02-057-02. Any recommendations for tariff changes or DSM programs resulting from the examination of DSM alternatives in QGC's IRP are to be addressed as appropriate in future regulatory proceedings.

In addition the Commission directed the Advisory Group to study the optimal state funding for the low-income weatherization program previously approved in Docket No. 99-057-20. QGC was authorized to continue to include the present level of funding, $250,000, in its annual Utah revenue requirement.

1.2 Overview of the Work of the Advisory Group

The DSM Advisory Group has held meetings on the following dates:

- December 19, 2002
- January 10, 2003
- February 13, 2003
- March 11, 2003
- April 30, 2003

- October 20, 2003
- February 19, 2004
- March 24, 2004
- April 7, 2004
- May 26, 2004
- August 26, 2004
- December 1, 2004

Many topics have been discussed during these meetings including the following:

- DSM Stipulation and Settlement
- December 30, 2002 UPSC Order
- Sendout Model DSM input screens and output reports
- Weatherization Program
- Avoided Costs
- Standard California Tests
- Scope of the DSM Study
- Roles of the participants
- Timing issues
- Utility incentives
- PacifiCorp involvement
- Distributed gas-fired power generation and combined heat and power
- Industry Surveys
- IRP Guidelines
- Promotional Advertising
- Revenue Impact of DSM on QGC
- RFP for the DSM Study

Five meetings of the Natural Gas DSM Advisory Group (Advisory Group) were held from December 2002 through April 2003 where numerous issues were discussed. A primary undertaking of the Advisory Group during the first six months of its existence was to begin crafting a document defining the scope of work for the Utah natural gas DSM study.

At the March 11, 2003, DSM Advisory Group Meeting, a subcommittee was established with representatives from the Utah Energy Office, the Utah Division of Public Utilities, the Utah Committee of Consumer Services, and Questar Gas Company to prepare a request-for-proposal document to be sent out to entities interested in bidding on the DSM study. The subcommittee also established the bid criteria, consistent with Utah State guidelines, to be used in evaluating the RFP responses.

By late July 2003, eight responses to the Utah natural gas DSM RFP had been received. After reviewing the proposal documents and conducting numerous interviews, an engineering and consulting firm from Marietta, Georgia, GDS Associates, Inc., was notified that it was the

successful bidder for the Utah natural gas DSM study. That notification was made on September 28, 2003.

On October 20, 2003, a Kick-Off Meeting was held with GDS and the Advisory Group to launch the Utah natural gas DSM study.

On February 19, 2004, a DSM Advisory Group meeting was held at the Heber M. Wells Building. Also attending the meeting were representatives of GDS, Inc. Preliminary findings of the DSM Study were presented, along with the outlook for natural gas demand in Utah, and an overview of utility sponsored natural gas DSM programs in the U.S.

Given the breadth of the work undertaken, the DPU, on behalf of members of the DSM Advisory Group, filed for extensions to the deadlines established by the UPSC.[1]

The DSM Advisory Group was also mindful of the Commission order to study the Low-Income Weatherization program and "consider the optimal level of state funding."[2] In several Advisory Group meetings, and particularly the meetings held on March 24, 2004 and April 7, 2004, low-income weatherization was discussed. Understandably, a diversity of opinion exists among members of the DSM Advisory Group with regard to this program. The full public policy implications of DSM programs requiring cross subsidies between groups of natural gas customers are complex and difficult to quantify.

[1] "Motion for Extension of Time for Completion of Demand-Side Management Study," Before the Public Service Commission of Utah, In the Matter of the Application of Questar Gas Company for a General Increase in Rates and Charges, Docket No. 02-057-02, Submitted August 28, 2003. "Motion for Extension of Time for Completion of Demand-Side Management Study," Before the Public Service Commission of Utah, In the Matter of the Application of Questar Gas Company for a General Increase in Rates and Charges, Docket No. 02-057-02, Submitted February 2, 2004.

[2] In the Matter of the Application of Questar Gas Company for a General Increase in Rates and Charges, Utah Public Service Commission, Docket No. 02-057-02, December 30, 2002.

2.0 OVERVIEW OF NATURAL GAS DEMAND-SIDE RESOURCES

2.1 Defining Demand-Side Resources

Demand-side management (DSM) consists of market interventions to increase the productivity with which natural gas (or other forms of energy) is used. DSM originated over two decades ago when some electric utilities experiencing rapid load growth decided to develop programs to reduce customer demand during the peak and near-peak hours that were driving load growth. From its specific early focus, DSM matured rapidly during the late 1980s and early 1990s to encompass a broader perspective, energy efficiency.

Energy efficiency refers to reducing energy input compared to useful energy output. Energy efficiency encompasses a range of demand-side technologies and practices that could increase the productivity (or efficiency) of gas consumption. The range of options is substantial, though not as extensive as in the area of electricity use. An example of a gas energy-efficiency technology would be the use of highest efficiency residential gas furnaces so as to reduce the natural gas required for space heating. High efficiency furnaces have an Annual Fuel Utilization Efficiency (AFUE) of 90-95 percent, compared to standard new gas furnaces which are in the 78 to 85 percent AFUE range. The high efficiency furnace costs more, as efficient technologies often do, but then saves fuel costs every year over its long operating lifetime. Other examples would include such measures as:

- Installing insulation in homes.
- Sealing leaks in the ducts that carry air from the furnace to living spaces.
- Programmable thermostats.
- Installing highest efficiency domestic gas water heaters.
- Other appliances -- efficient washing machines, cooking equipment, etc.
- High efficiency commercial space heating equipment and controls.
- High efficiency commercial water heating equipment and controls.
- Food service equipment (ovens, steamers, griddles).
- Other efficient commercial/industrial technologies.

Utility energy-efficiency programs often include combinations of information, education, marketing, technical assistance, and financial incentives and/or financing arrangements. A common design approach is to target technologies or efficiency practices which, while commercially available, are only penetrating a given market to a low degree due to market barriers. Again, the high AFUE gas furnace would be an example. The informational and financial resources of a program are then targeted to customers, retailers, wholesalers, manufacturers, building managers, energy service contractors, and/or other market actors based on where the greatest leverage to influence behavior lies given the structure of the market.

2.2 Rationale for Natural Gas DSM Programs

Investing in cost-effective DSM has the potential of producing long-term benefits to both the utility and public. DSM may extend the supply life of limited Company-owned, cost-of-

service natural gas resources, may mean a smaller (and therefore less costly) transmission and distribution infrastructure, may mean less pollution, and may reduce stress on lands and water resources. For consumers, the efficient and wise use of natural gas lowers energy costs and increases discretionary income. For businesses, cost-effective DSM lowers energy costs and can improve competitiveness.

Effectively designed DSM programs also promote the development of a diversified natural gas supply portfolio (one of integrated resource planning's goals) and provide an alternative strategy for addressing the resource needs of the Questar system. Increased population and economic growth in Utah, especially along the Wasatch front, poses supply-side challenges in the long run, including increased investment in natural gas distribution systems and upward pressure on natural gas prices. Implementation of DSM can help meet the challenges facing the development of traditional supply-side resources, distribution system expansion, and natural gas price volatility. A balanced portfolio of cost-effective demand-side and supply-side resources is a strategy that can mitigate capacity constraints and provide resource alternatives. Additionally, adoption of programs to acquire cost-effective DSM helps preserve environmental quality by reducing emissions, while at the same time potentially lowering the future costs of energy services to consumers.

In summary, for a natural gas utility, DSM can be an important component of a balanced resource portfolio. Where additional supplies of natural gas resources can be supplanted by DSM resources at a lower cost then DSM is an attractive resource supply alternative for the utility and ratepayers.

2.3 Barriers to Demand-Side Management Programs

Before implementation of any programs that appear to be economically viable can take place, a number of issues need to be addressed. First, numerous data assumptions are utilized in the development of DSM studies. A process of validation needs to take place to verify, where possible, the integrity of the data utilized. Secondly, some of the uncertainty associated with the implementation of DSM programs can be mitigated by starting with carefully selected pilot programs (those most likely to be successful) and then phasing-in implementation gradually. Such an approach can generate ongoing performance data that can be used to justify further funding levels of program measures.

The third issue that needs to be addressed prior to implementation of DSM measures has to do with the regulatory treatment of demand-side resources. For any given rate structure, based on some determination of customer usage, the implementation of DSM programs that have the effect of reducing demand will result in a revenue stream to QGC that will be lower than it would be otherwise. As the Utah Commission is aware, the continual decline in per-customer usage and the accompanying revenue attrition for QGC is an issue of major consequence to QGC. Given the potential magnitude of the GDS Study, Questar Gas Company's ability to meaningfully embrace DSM measures seems inextricably linked to finding a solution to this problem. The importance of this issue is reflected in the following Commission–approved language in the DSM Stipulation; "Recommendations for tariff changes or DSM programs resulting from the examination of DSM alternatives in the IRP will be addressed, as appropriate, in future regulatory

proceedings." Further, the Utah Commission directed the Cost of Service Task Force to "study separately" this issue. The Cost of Service Task Force has studied the issue and has not reached a consensus on how to solve the problem, which makes it very difficult to accurately model proposed DSM programs. QGC looks forward to continuing the ongoing DSM dialogue with Utah regulatory agencies and interested stakeholders.

Once the issues above are recognized and resolved, implementation may present another set of challenges. QGC does not have any resident expertise in natural gas DSM programs. QGC will likely rely on contractor expertise for the initial programs as the in-house expertise is developed. There is limited DSM program design and implementation expertise at the Utah Energy Office, however, there is substantial experience in weatherization within the Low-Income Weatherization program at the Utah Department of Community and Economic Development. In addition, and as PacifiCorp has demonstrated, there are a number of companies in the region with the expertise and experience to effectively run and operate DSM programs under contract to utilities. This expertise, should in part, be applicable to natural gas, but the availability of sufficient local resources for programs of the magnitude suggested by GDS is uncertain.

Finally, attaining a consensus amongst the parties involved and affected has proven to be a challenging process. There are justifiably, numerous points of view and competing interests that will need to be addressed, satisfied, or adjudicated.

3.0 Overview of DSM Programs Offered by Natural Gas Utilities in the U.S.

Substantial experience with demand-side energy-efficiency programs has accumulated in the 20 plus years since they were pioneered by some western states. For this project, the GDS Team conducted a survey on gas DSM practices with twenty-nine North American gas utility companies. This survey was conducted to determine the types of gas DSM and energy-efficiency programs offered by selected gas utilities in North America. The survey was targeted at the natural gas utilities that are active members of the Consortium for Energy Efficiency (CEE) as well as natural gas utilities in several Western States. Specifically the survey examined why, or why not, DSM programs were offered by these twenty-nine gas utilities, cost recovery mechanisms for utilities to recover costs of DSM or energy-efficiency programs, including shareholder incentive mechanisms, cost-effectiveness tests employed by Commissions to evaluate DSM programs, and methodology for estimating avoided costs and treatment of avoided costs.

3.1 Natural Gas DSM Programs Offered

GDS found that there are many different gas DSM programs offered by the natural gas utilities surveyed. The twenty-one companies offering gas DSM programs are listed below in Table 3-1 along with the number of programs each offers to their customers. From Table 3-1 we can see that the number of programs offered ranges from 1 to 20. The average number of programs offered by these twenty-one utilities is eight programs. Table 3.1 only includes the gas companies that currently offer gas DSM programs. Of the thirty gas utility companies included on the list of companies to be surveyed, twenty-nine responded. Twenty-one offer some type of DSM program. The main reasons they do offer DSM programs include:

- To meet the requirements of the regulatory agencies
- To provide customer service
- To help their customers save money
- To delay the need for further capital investment

The survey also revealed that the main reasons the other eight do not offer DSM programs include:

- There are no regulatory requirements for them to conduct such programs
- They are concerned about lost revenues
- They are concerned about the difficulty of getting cost recovery for program expenditures
- There is no demand from their customers for such programs
- There are no Federal or State laws mandating that they conduct such programs

Fourteen respondents had DSM studies conducted for their service area. Many of them did have data on DSM measures regarding incremental costs, savings, and useful lives. All of the companies were interested in receiving the results from this survey.

	Table 3-1	
No.	**Company**	**Number of Gas DSM Programs Offered**
1	Enbridge Gas	20
2	Gaz Metropolitan	20
3	Puget Sound Energy	20
4	Xcel Energy – Minnesota	16
5	KeySpan Energy Delivery	14
6	Southern California Gas	13
7	Pacific Gas & Electric	12
8	MidAmerican Energy	9
9	Berkshire Gas	8
10	Vermont Gas Systems, Inc.	6
11	Bay State Gas	5
12	Public Service Electric & Gas	5
13	South Jersey Gas	5
14	Unitil (Fitchburg Gas & Electric)	5
15	Madison Gas & Electric	4
16	Avista	3
17	NW Natural	3
18	New England Gas Company	2
19	Northwestern Energy & Gas	2
20	Questar Gas Company	2
21	Intermountain Gas Company	1
	Average Number of Programs Offered Per Gas Utility (For those 21 gas utilities listed above)	8

3.2 Cost-effectiveness Tests Employed by State Commissions

The most frequently used cost-effectiveness test for DSM programs is the Total Resource Cost (TRC) Test (eleven). Others were the Societal Test (five) and Utility Cost Test (five). Thirteen of the utilities surveyed forecast the avoided costs of natural gas and ten of these forecasts are publicly available.

3.3 Treatment of Avoided Costs

Thirteen of the twenty-nine survey respondents do have a forecast of natural gas avoided costs, and most (10) of these forecasts are publicly available. It is very important to note that *sixteen* of the survey respondents agreed with the statement that "successful gas DSM programs or energy efficiency information programs can avoid gas distribution costs." In addition, the majority of the ten publicly available avoided cost forecasts do include avoided gas distribution system costs.

3.4 Cost Recovery Methods

For those twenty-one gas utility companies that do offer gas DSM programs, there are different methods for cost recovery of the expenditures on the programs. Twelve out of the twenty-one gas utility companies receive recovery through their gas rates. Pacific Gas & Electric, Southwest Gas, South Jersey Gas, and Unitil (Fitchburg Gas & Electric) have a system benefits charge applied to every therm of gas sold. Xcel Energy-Minnesota recovers costs through a rider on their gas rates. Avista, New England Gas Company, Public Service Electric & Gas, and Southern California Gas were compensated in other forms.

Six companies were allowed to collect shareholder incentives. Most shareholder incentives were based on actual therm savings, program specific metrics, or benefit/cost metrics. Fourteen of the twenty-one companies offering programs were not allowed to collect any type of shareholder incentive.

4.0 Natural Gas Demand Side Management in Utah

4.1 Natural Gas Integrated Resource Planning and DSM

The Federal Energy Policy Act of 1992 defined integrated resource planning in part as the " . . . systematic comparison between demand-side management measures and the supply of gas by a gas utility . . . taking into account necessary features for system operation such as diversity, reliability, dispatch ability, and other factors of risk. . . ." Since the inception of the integrated resource planning process in the State of Utah, Questar Gas Company has periodically engaged in the systematic comparison of demand and supply side resources. In its first integrated resource plan filed with the UPSC on September 30, 1991, Mountain Fuel Supply Company (now known as QGC) discussed potential demand-side programs and the criteria against which they would be measured.

4.2 Questar's Demand-Side Resource Programs

On September 25, 1992, the Company filed an application with the Utah PSC seeking approval of four DSM pilot programs. Those programs were: 1) Upgraded Building Standards For New Home Construction (insulation and triple-pane windows), 2) Load Balancing For New Home Construction (gas dryers and gas ranges in new homes), 3) Upgraded Furnace Efficiency in Existing Homes, and 4) Low-Income Weatherization. On December 10, 1992, the UPSC approved the four pilot programs. On February 4, 1993, the Company informed the UPSC that the Phase I participation levels did not provide sufficient data to adequately analyze the programs. On September 27, 1993, the Company filed its IRP with an update on Phase II of the pilot programs. At that time, the furnace replacement program appeared to have the greatest potential.

During July of 1994, an informal technical conference was held to discuss DSM programs and assumptions. A follow-up technical conference was held on September 9, 1994, where the results of the evaluation of nine potential DSM programs were presented. Those programs included: 1) Attic Insulation, 2) Builder Incentive, 3) Commercial Cooling, 4) Energy Education, 5) In Concert with the Environment, 6) Setback Thermostat, 7) Showerhead, 8) Upgraded Furnace, and 9) Water Heater Booster. Assumptions were discussed and agreed to by the participants.

On May 5, 1995, the Company filed its IRP which discussed the results of the nine DSM programs included in the SENDOUT modeling process. All programs failed the ratepayer impact measure (RIM) test. The Showerhead, Setback Thermostat, and Attic Insulation programs passed all other tests without utility incentives suggesting that rational, informed consumers would implement these technologies on their own.

During 1998, the Company evaluated five DSM programs as part of its integrated resource planning process. These programs were 1) Electric to Gas Water Heater Conversion, 2) Electric to Gas Clothes Dryer Conversion, 3) Set-Back Thermostat, 4) Furnace Efficiency Upgrades, and 5) Restricted Flow Showerheads. It was concluded that it was not advisable to

conduct any DSM programs at that time. Incentives sufficient to cause the programs to pass the Participant Test resulted in failure of the RIM Test.

The Company currently provides annual funding for the Low-Income Weatherization program directed by the Utah Department of Community and Economic Development. The Company also supports research and development activities conducted by the Gas Technology Institute (GTI). Much of GTI activities are dedicated to developing more energy efficient furnaces, water heaters and other appliances that continue to contribute to the decline in the average usage per customer on the Questar Gas system. The Company also provides training for internal employees and for heating and plumbing contractors on how to install and adjust appliances so they will operate more efficiently. On the Company's website, information is provided to educate the customers on conservation measures that can reduce the usage of natural gas in their homes. The costs of these DSM measures have been approved for recovery in rates by the Commission. To date, there is no rate mechanism to compensate the Company for revenues that are lost from declines in customer usage as a result of these DSM activities.

4.3 Regulatory Treatment of Questar's DSM Expenditures

Currently QGC provides a fixed amount, $250,000, annually to supplement funding for a low-income weatherization program administered by the Utah Department of Community and Economic Development. This amount is expensed and included in the Company's general rates. QGC does not have in place a separate cost recovery mechanism applicable to DSR expenditures. With expense treatment, recovery of DSR expenditures, on a going forward basis, is determined by the level, included in the "test period" in the Company's most recent rate case. Any change in the level of DSR expenditures, or decline in customer usage attributable to DSR would not be reflected until the completion of the next rate case.

5.0 NATURAL GAS USAGE IN THE QGC SERVICE TERRITORY

Using the data provided by the Utah Demand-Side Management (DSM) Advisory Group and QGC, the GDS Team developed a characterization of natural gas usage and the customer base in the QGC Utah service territory. GDS collected existing data and the latest QGC natural gas demand forecast for Utah to develop the description of how natural gas is used and how usage is expected to change over the next decade. Types of data collected for the QGC service area include the following:

- Natural gas demand-sales forecasts for Utah
- Historical sales and/or deliveries of natural gas by residential, commercial and industrial sectors
- Number of customers by class of service (residential, commercial, industrial)
- Projections of future natural gas sales by customer class
- Information on future expansion of the QGC gas distribution network over the study period
- Utah demographic and economic information expected to affect gas use
- Usage per customer data
- Gas appliance saturation data
- Square footage of commercial space

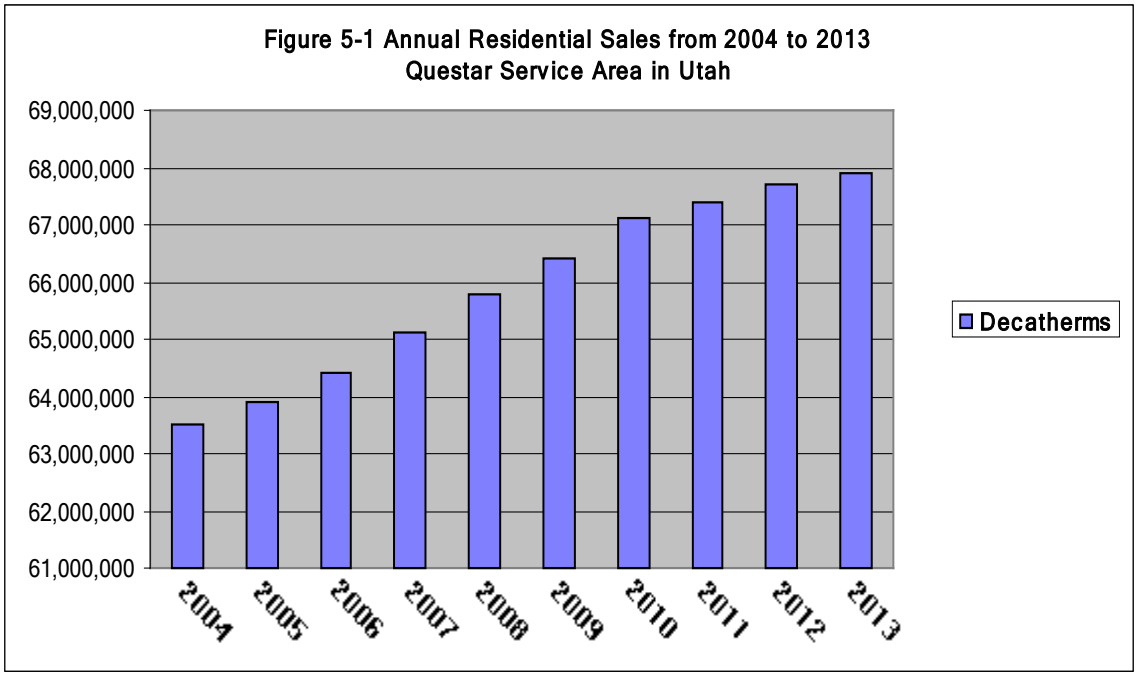
Questar Gas Company's May 2003 Integrated Resource Plan (IRP) Base Case Forecast served as the source of data for Utah service area natural gas sales used in the study. The May 2003 IRP reports that system gas sales are projected to increase from 98.3 million decatherms in 2003 to 108.5 million decatherms in 2013, or about one percent a year.

TABLE 5-1 NATURAL GAS DEMAND FORECAST BY CLASS OF SERVICE 2003 TO 2013 - BASE CASE FROM MAY 2003 QUESTAR IRP

Year	Residential (Dth in Millions)	Commercial (Dth in Millions)	Industrial (Dth in Millions)	Total Dth in (Millions)	Total Sales - Annual % Change
2003	62.7	29.4	6.2	98.3	NA
2004	63.5	29.9	6.3	99.7	1.4%
2005	63.9	30.5	6.3	100.7	1.0%
2006	64.4	30.9	6.4	101.7	1.0%
2007	65.1	31.3	6.4	102.8	1.1%
2008	65.8	31.7	6.5	104.0	1.2%
2009	66.4	32.1	6.6	105.1	1.1%
2010	67.1	32.5	6.7	106.3	1.1%
2011	67.4	33.0	6.7	107.1	0.8%
2012	67.7	33.4	6.8	107.9	0.7%
2013	67.9	33.8	6.8	108.5	0.6%
Average Annual Compound Growth	0.8%	1.4%	1.0%	1.0%	NA

The market sector with the fastest growing sales is the commercial sector that is projected to experience an estimated sales growth of 1.4% per year through the forecast period. The residential sector will experience annual growth rates of less than one percent, estimated to be .8% in the 2003 IRP, though this sector will continue to be the largest market for natural gas and account for 63% of Questar Gas Company's sales through 2013.

Residential Sector -- Natural gas usage for the 680,349 residential customers in 2003 was projected to be 62.7 million decatherms with space heating and hot water heating representing the most common uses of natural gas in the residential sector. In 2003, Utah consumers were projected to use 37.6 million decatherms of natural gas for space heating and 18.3 decatherms for hot water heating, representing over 89 percent of natural gas used by the residential sector. Cooking, clothes drying and use by secondary appliances make up the remaining 11 percent of sales.

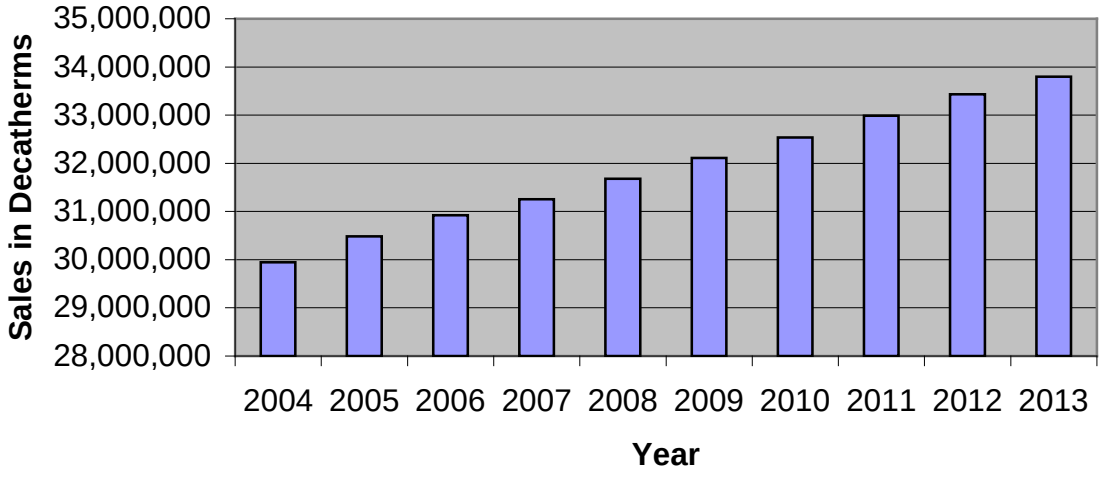


Over the forecast period of 2004 through 2013, over 205,000 new residential customers will be added to Questar's system in Utah. While the number of customers is expected to increase 30 percent, natural gas use by the residential sector is only projected to increase 5.2 million decatherms to 67.9, an increase of only 8.3%. The fastest growing residential end uses will be for secondary appliances and cooking, even though these uses will still only account for 12 percent of sales in the residential sector. Sales of natural gas for space heating are actually projected to decline from 37.6 to 37.3 decatherms between 2004 and 2013. The second largest use of natural gas, hot water heating, will see an increase of 14%.

TABLE 5-2 FORECAST OF RESIDENTIAL SALES BY END USE 2003 TO 2013 - BASE CASE FROM MAY 2003 QUESTAR IRP							
Year	**Forecast of Residential Customers**	**Secondary Appliances (Dth in Millions)**	**Cooking (Dth in Millions)**	**Clothes Drying (Dth in Millions)**	**Space Heat (Dth in Millions)**	**Water Heat (Dth in Millions)**	**Total Residential Dth in (Millions)**
2003	680,349	4.6	1.2	1.0	37.6	18.3	62.7
2004	702,009	4.8	1.2	1.0	37.8	18.6	63.5
2005	724,902	5.0	1.3	1.0	37.7	18.8	63.9
2006	745,114	5.3	1.3	1.1	37.6	19.1	64.4
2007	766,648	5.5	1.4	1.1	37.8	19.4	65.1
2008	786,362	5.7	1.4	1.1	37.9	19.7	65.8
2009	806,583	5.9	1.5	1.2	38.0	19.9	66.4
2010	826,279	6.1	1.5	1.2	38.1	20.2	67.1
2011	845,937	6.3	1.6	1.2	37.9	20.5	67.4
2012	865,538	6.5	1.6	1.3	37.6	20.8	67.7
2013	885,611	6.7	1.6	1.3	37.3	21.1	67.9
Average Annual Compound Growth Rate	2.7%	3.8%	3.2%	2.6%	-0.1%	1.4%	0.8%

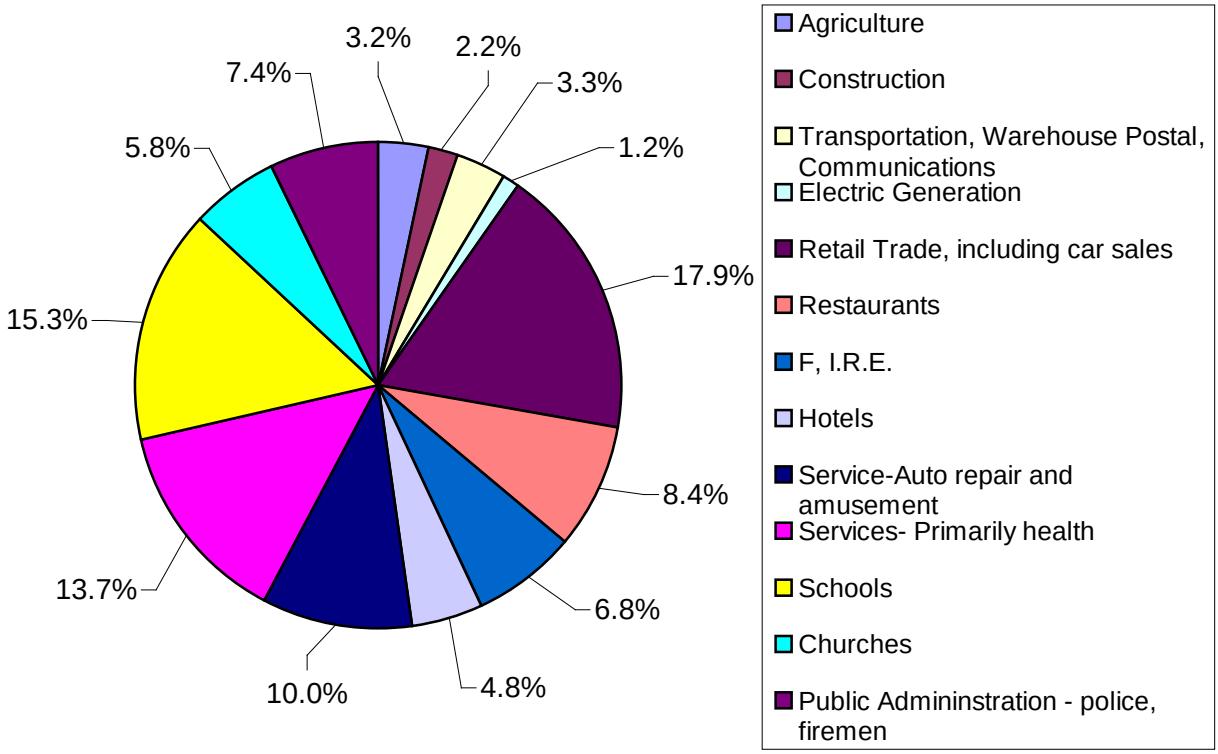
Commercial Sector -- Natural gas sales to the estimated 55,823 commercial sector customers in 2003 was projected to be 29.4 million decatherms, representing nearly 30% of total sales.

Figure 5-2
Annual Commercial Gas Sales Forecast (Dth)



The largest consuming end-use markets were SIC code categories 5 – Retail Trade; 8 – Services Primarily Health Care; 82 – Public Schools; 7 – Other services, and 58 – Restaurants. Space heating and hot water heating appliances were the most common uses of natural gas in the commercial sector.

Figure 5-3 Utah Commercial Gas Sales by Market Sector - 2004



Over the forecast period of 2004 through 2013, 14,216 new commercial customers are projected to be added to Questar's system in Utah. Natural gas use by the commercial sector is estimated to increase 4.4 million decatherms to 33.8, an increase of 1.4% per annum.

6.0 ESTIMATE OF ACHIEVABLE NATURAL GAS DSM IN UTAH

The GDS study was prepared to provide information and analysis for the use of the advisory group in its evaluation of natural gas energy-efficiency issues. The study focused on the question of the nature, extent, and magnitude of untapped natural gas demand-side energy-efficiency opportunities within the state.

The study assessed the potential of achieving natural gas demand savings by accelerating the market penetration of known and available gas-efficiency technologies and programs. The focus is on demand-side measures and practices that reduce energy users' need for natural gas through energy efficiency.

The point of departure of the study is the potential for new and additional savings, after taking into account the effects of past DSM as well as existing market trends and policies. One key element of the study is the economic costs of these demand-side measures, i.e., the costs of saving demand or energy through efficiency technologies. Additionally, the study estimates the economic value of incremental efficiency savings, in order to provide members of the advisory group with insight into the potential range of economic benefits associated with feasible new program initiatives. Finally, the study provides an overview of non-energy benefits that would result from the DSM measures incorporated in the analysis.

The study quantifies the entire technical potential of cost-effective demand-side savings. However, the real focus of the analysis is on savings that are cost-effective and achievable through the application of new DSM program funding that can produce significant energy savings, with projected benefits in excess of projected costs.

6.1 Overview of GDS Methodology

The objective of the GDS Study was to determine the maximum achievable cost-effective potential for residential and commercial gas DSM measures in Questar's Utah service territory over the ten-year period from 2004 through 2013. The GDS Study provides an assessment of the cost effectiveness of the DSM measures included in the maximum achievable cost-effective potential portfolio using the tests and general methodology contained in the latest version of the California Standard Practices Manual. Benefit/cost results are presented for the Total Resource Cost (TRC) Test, the Participant Test, the Utility Cost Test and Rate Impact Measure (RIM).

The definitions used in this study for energy-efficiency potential estimates are the following:

- **Technical potential** is defined in this study as the complete penetration of all measures analyzed in applications where they were deemed technically feasible from an engineering perspective.

- **Maximum achievable potential** is defined as the maximum penetration of an efficient measure that would be adopted given unlimited funding, and by determining the

maximum market penetration that can be achieved with a concerted, sustained campaign involving highly aggressive programs and market intervention over the next decade.[3] The term "maximum" refers to efficiency measure penetration, and means that the GDS Team has based estimates of gas DSM potential on the maximum realistic penetration that can be achieved by 2013. The term "maximum" does not apply to other factors used in developing these estimates, such as measures energy savings or measure lives.

- **Maximum achievable cost-effective potential** is defined as the potential for maximum penetration of energy-efficient measures that are cost effective according to the Total Resource Cost Test, and would be adopted given unlimited funding, and by determining the maximum market penetration that can be achieved with a concerted, sustained campaign involving highly aggressive programs and market interventions.

To develop estimates of the maximum achievable cost-effective potential for the residential and commercial sectors in Utah, the GDS analysis utilized the following models and data:

- GDS Associates energy-efficiency potential supply curve spreadsheet model
- detailed information relating to the current and potential saturation of gas energy-efficiency measures in the State of Utah
- available data on gas DSM measure costs, energy savings, operations and maintenance savings, and useful lives.

The methodology used in the determination of the potential for natural gas DSM in Questar's Utah residential and commercial sectors included the following steps:

1. Identification of data sources to be used in this study
2. Identification of measures to be included in the assessment
3. Determination of the characteristics of each measure including its incremental cost, energy savings, operations and maintenance savings, and useful life
4. Calculation of initial cost-effectiveness screening metrics (e.g., the total resource cost [TRC] benefit cost ratio, the utility cost test, the participant test and the rate impact measure test) and sorting of measures from least cost to highest cost
5. Collection and analysis of the baseline and forecasted characteristics of the natural gas market in Utah, including natural gas equipment saturation levels and consumption, by market segment and end use over the forecast period
6. Integration of measure characteristics and baseline data to produce estimates of cumulative costs and savings across all measures (supply curves)

[3] This definition is consistent with the standard practice used in other recent maximum achievable potential studies in other states, such as California and Connecticut. GDS Associates has used this definition in this study in order to develop a credible estimate of the remaining amount of cost-effective gas DSM potential in Utah. The term "unlimited funding" refers to the base case assumption where no limits are placed on funding, and it is assumed that highly aggressive programs are pursued for ten years. GDS has included in this Executive Summary in Table 1-3 a solid estimate of the Total Resource Costs required to achieve the maximum achievable cost-effective gas DSM potential.

7. Determination of the cumulative technical and maximum achievable potentials using supply curves.
8. Determination of the annual maximum achievable potential over the ten-year forecast period.

A key element in this approach was the use of energy-efficiency supply curves. Conservation supply curves rank energy conservation investments alongside investments in energy supply in order to assess the least cost approach to meeting energy service needs. The energy-efficiency supply curve provides a clear, easy-to-understand framework for summarizing a variety of complex information about energy-efficiency technologies, their costs, and the potential for energy savings.

The gas DSM potential estimates and Total Resource savings provided in this report are based upon the best and most recent natural gas load forecasts, appliance saturation data, economic forecasts, data on DSM measure costs and savings, and DSM measure lives available to GDS at the time of this study. All input assumptions and data have been thoroughly reviewed over a six-month period by GDS, staff of the Utah Energy Office, staff of Questar Gas Company, and staff of the Southwest Energy-Efficiency Project. GDS conducted extra research to ensure that data for DSM measure costs and savings are applicable to the State of Utah. For example, GDS conducted in-depth interviews with several weatherization service providers in Salt Lake City to ensure that data on DSM measure costs, savings and market potential were accurate. In addition, GDS used home and building energy analysis simulation models (REM/Rate, Energy 10) to ensure the validity of energy-savings estimates and gas DSM potential estimates for the State of Utah.

6.2 Summary of Findings of Potential Cost-effective Gas DSM in Utah

The GDS Study shows there are significant savings potential in Utah for implementation of new, long-lived natural gas energy-efficiency measures. If all energy-efficiency measures analyzed in this study were implemented immediately where technically feasible, the study estimated that overall natural gas cumulative annual savings for Questar in Utah would be 41.2 million decatherms (Dth) by 2013 (a 38% reduction in the projected forecast for natural gas sales in Utah in 2013). More realistically, if all measures that are cost effective were implemented, and consumer acceptance trends and the timing of equipment replacements in the market are factored in, the maximum achievable cost effective potential natural gas savings would amount to 21.4 million decatherms, a 20% reduction in the projected 2013 sales forecast for natural gas sales in Utah.

The net present savings to Questar's residential and commercial customers from implementation of cost-effective natural gas DSM programs identified in the GDS Study was over $1.5 billion in 2004 dollars.[4] The Total Resource Cost benefit/cost ratio for the maximum achievable cost-effective potential savings scenario was 2.39 for residential and commercial DSM programs analyzed in the study.

[4] The $1.5 billion in total resource savings includes savings of natural gas, electricity and water.

Table 6-1
TOTAL RESOURCE COST TEST BY SECTOR
FOR MEASURES WITH A TRC BENEFIT COST RATIO OF GREATER THAN 1.0

	Total Resource Benefits, Costs, and Net Benefits			
	Present Value Benefit	Cost	PV of Net Benefits	Benefit-Cost Ratio
Commercial Sector	$227,743,350	$100,914,338	$126,829,012	2.26
Residential Sector	$2,369,367,929	$986,723,672	$1,382,644,257	2.40
All Sectors	$2,597,111,280	$1,087,638,010	$1,509,473,270	2.39

Values were calculated using version 10 of the "NSTAR" model, with Questar estimates of the avoided costs for natural gas

The Total Resource Cost (TRC) Test is a standard benefit-cost test used by many of the public utilities commissions in the US and other organizations to compare the value of the avoided natural gas costs to the costs of demand-side resources acquired through energy-efficiency measures and program activities necessary to deliver them. The present value of TRC costs in 2004 dollars to achieve the maximum achievable cost-effective potential savings in Questar's Utah service territory is $1.088 billion. It is important to note that the TRC benefits presented in Table 6-1 include the natural gas, electricity and water savings achieved due to the implementation of gas DSM measures. To achieve the net present value savings of $1.5 billion, Questar would need to incur costs for program design, program administration, marketing, data base development, program reporting, and program evaluation. These costs are included in the cost figures shown in Table 6-1 in the "Cost" column.

6.3 Residential Sector Gas DSM Potential

Twelve residential natural gas programs were included in the analysis for the residential sector. The set of gas DSM measures considered was pre-screened to include the 10 measures that are presently commercially available and listed in Table 6.2.

The analysis by GDS indicates there is a large potential for natural gas savings in the existing and new construction market segments of the residential sector in Questar's Utah service territory. Technical energy-savings potential for the residential sector is estimated to be 31.3 million decatherms (Dth) by the year 2013, equivalent to 46.2 percent of forecast residential natural gas consumption in 2013. This is the maximum technical potential for gas DSM without consideration of cost effectiveness. The maximum achievable cost-effective potential in the residential sector is 26.0% of the residential gas sales forecast in 2013. Table 6-2 below presents a summary of the residential sector potential for gas DSM in Utah in the year 2013 by type of gas DSM measure.

Table 6-2 Maximum Achievable Cost-Effective Potential for Gas DSM In Utah By 2013 Residential Sector			
Measure #	**Measure Description**	**Total Annual Therm Savings Maximum Technical Potential in 2013**	**Annual Maximum Achievable Cost-Effective Therm Savings Potential in 2013**
	Existing Construction Potential Savings		
1	Programmable Thermostat - Single Family Homes - (Do-It Yourself)	10,782,432	7,045,020
3	Natural Gas Water Heater Blanket - (Do-It-Yourself Kit)	10,011,800	7,067,153
4	Energy Star Clothes Washer (Energy Factor=2.5) with electric dryer (49% of households in Utah)	6,815,785	3,864,621
5	Energy Star Clothes Washer (Energy Factor=2.5) with gas clothes dryer (20% of households in Utah)	2,781,953	2,075,521
6	Energy Star Windows - (Do-It Yourself)	38,922,112	8,649,358
8	Energy Star High-Efficiency Gas Heating Equipment - Gas Furnace	59,351,535	21,762,230
9	Energy Star High-Efficiency Water Heating Equipment	16,262,483	8,432,399
10	Residential Insulation and Weatherization Program	87,874,630	54,921,644
11	Low-Income Program	9,377,645	6,698,318
	New Construction Potential Savings		
12	Energy Star Homes (new construction)	71,208,068	55,957,320
Total Savings in 2013 (Therms)		313,388,443	176,473,583
Total Savings in 2013 (Dth)		31,338,844	17,647,358
Total Projected Residential Natural Gas Sales in 2013 (Dth)		67,900,000	67,900,000
Total Savings As A Percent of 2013 Gas Sales		46.2%	26.0%

Figure 6-1 Residential Gas DSM Supply Curve for the State of Utah

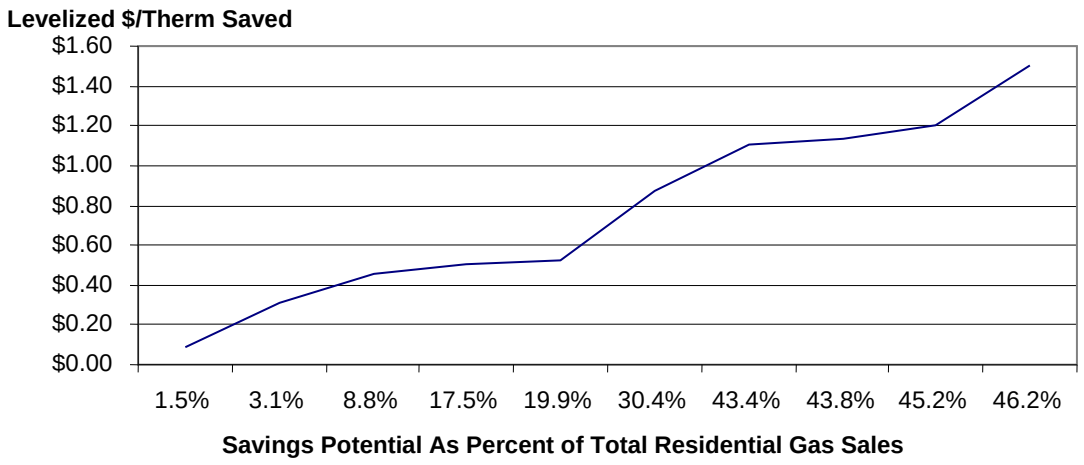
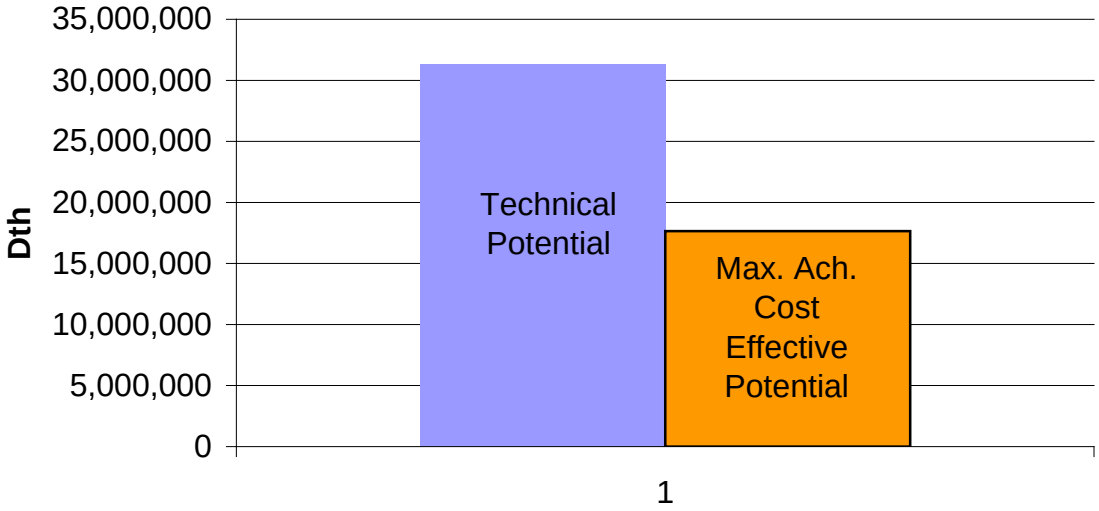


Figure 6-2 - Technical Potential and Maximum Achievable Cost-Effective Potential for Gas DSM In Utah in 2013 - Residential Sector



Space heating energy-efficiency measures represent the largest end-use savings potential. Water heating potential savings also represents a significant portion of the total technical potential savings. In terms of natural gas savings, insulation and weatherization measures hold the position as the measures with the largest potential at 32 percent of total technical potential in the year 2013. Energy Star Homes represent 23% of the technical potential savings, followed by high-efficiency gas condensing furnaces at 19% of the total potential. The remaining measures together represent 26 percent of the total technical potential.

The overall TRC benefit/cost ratio for the residential sector is 2.40 for the maximum achievable cost-effective potential scenario, thus the overall portfolio of residential programs is cost effective according to the TRC test. But it is also important to note that each individual program is also cost-effective according to the TRC benefit/cost test. All residential DSM programs were also found to pass the Utility Cost and Participant tests as well while failing the Ratepayer Impact Measure test.

Table 6-3: Cost Effectiveness Tests Benefit/Cost Ratios for Residential Programs

1	2	3	4	5	6
		TRC Test	**Utility Cost Test**	**Partici-pant Cost Test**	**RIM Test**
Program #	**Program Description**				
1	Programmable Thermostat	2.89	3.89	6.19	0.74
2	Natural Gas Water Heater Blanket	7.28	10.89	9.92	0.78
3	Energy Star Clothes Washer/ electric dryer	2.30	1.14	4.72	0.21
4	Energy Star Clothes Washer/gas clothes dryer	1.82	1.43	4.35	0.29
5	Energy Star Windows Do-It Yourself	5.67	6.73	12.31	0.68
6	Energy Star High Efficiency Gas Furnace	1.01	4.48	1.42	0.66
7	Energy Star High Efficiency Water Heating	1.99	3.25	5.05	0.37
8	Residential Insulation and Weatherization Program	2.05	2.44	4.28	0.66
9	Low Income Program	1.87	1.00	0.00	0.44
10	Energy Star Homes	3.50	3.40	8.10	0.66
	Total Residential Sector	2.40	2.87	4.85	0.61

6.4 Commercial Sector Gas DSM Potential

There are also significant, still-available, untapped natural gas savings potential in the commercial sector though some uncertainty surrounds these results.

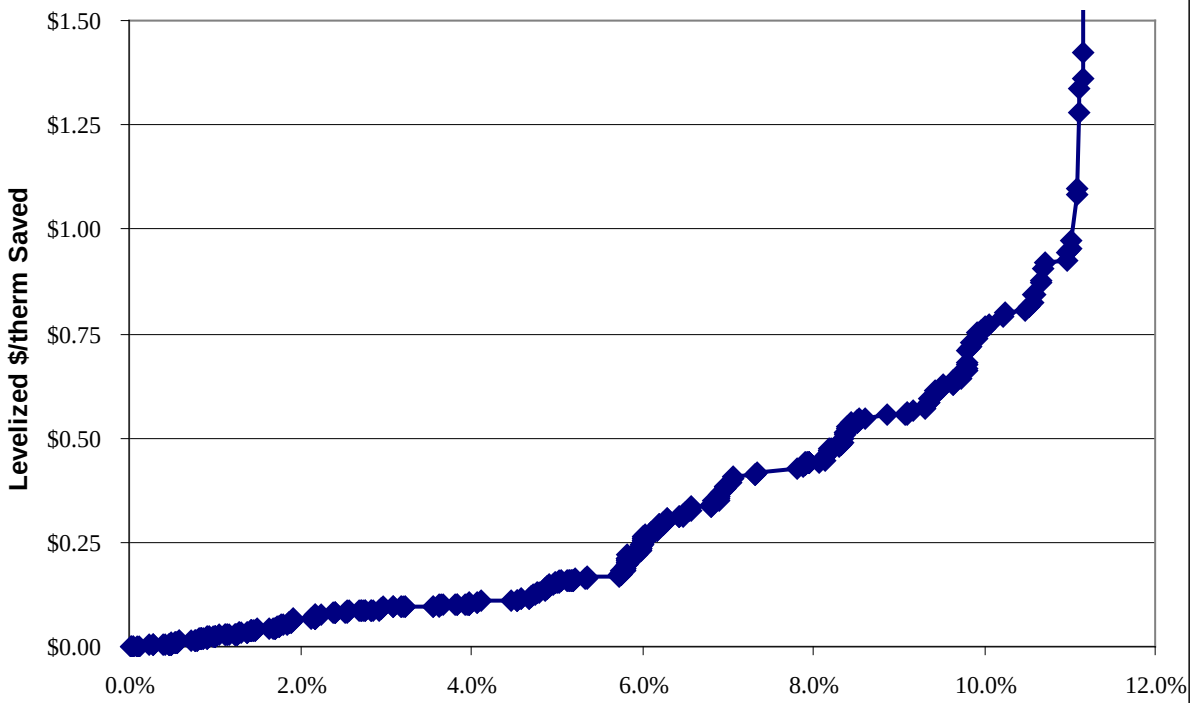
A total of 40 commercial natural gas measures were used in the analyses of commercial DSM potential in Utah including 21 measures for space heating, 9 water heating, 6 cooking, 3 pool heating, and 1 drying measure. The complete set of measures considered was limited to include only those measures that are currently commercially available.

Table 6-4 Commercial Sector Energy-Efficiency Measures

Space Heating	**Savings Range**
Ceiling Insulation	6%-15%
Double Pane Low-Emissivity Windows	8%-22%
Duct Insulation Installed	1%-3%
Duct Leakage Repair	1%-7%
High-Efficiency Furnace/Boiler	10%-11%
Boiler- Heating Pipe Insulation	1%-6%
Boiler Tune-Up	2%
EMS install	11%-22%
EMS Optimization	4%-11%
Stack Heat Exchanger	5%
Heat Recovery from Air to Air	7%-22%
Programmable Thermostats	7%-16%
Weatherization	10%-27%
Heating/cooling duct cleaning	1%-3%
Infrared heating	19%
Boiler Reset Controls	10%
Boiler O2 Trim Controls	2%
Boiler blowdown heat exchanger (steam)	4%
Repair malfunctioning steam traps	8%
Insulate steam lines/condensate tank	2%
Retrocommissioning	9%
Water Heating	
Eff Gas Water Heater System 95% Eff	20%
Instantaneous Water Heater <=200 MBTUH	10%
Circulation Pump Time clocks	3%
Tank Insulation	6%-13%
Pipe Insulation	2%
Low Flow Showerheads	1%
Faucet Aerator	1%-3%
Solar DHW System Active	60%
High-efficiency Clothes Washers	3%-7%
Cooking	
Efficient Infrared Griddle	2%-7%
Convection Oven	2%-14%
Infrared Conveyer Oven	4%-15%
Infrared Fryer	1%-15%
Power Burner Oven	1%-4%
Power Burner Fryer	1%-4%
Pool Heating	
High Efficiency Pool Heater, eff.=.97 320 kbtu	16%
Pool Cover	35%
Solar Pool Heater	35%
Clothes Drying	15%

The analysis of measures was segmented by commercial sector and building types in those sectors and then analyzed for the most important end uses, i.e. space heating, hot water heating, cooking, pool heating and drying. Accordingly, the end uses for which energy-efficiency potential was analyzed account for approximately 99.4 percent of total commercial natural gas use, or about 27,600,000 Dth, in 2003.

Figure 6-3 Total Commercial Sector Supply Curve



Technical energy-savings potential in the Commercial sector is estimated to be approximately 9,883,268 Dth, maximum achievable potential is estimated to be approximately 6,510,967 Dth and maximum achievable cost-effective potential is estimated to be 3,773,950 Dth (or between 11.2 and 29.2 percent of expected commercial gas consumption in the year 2013).

In other words natural gas savings potential from implementation of DSM programs could cost-effectively offset all but 0.7 million decatherms or more than 86 % of projected growth in natural gas use by the commercial sector by 2013.

Figure 6-4 Estimated Technical and Maximum Achievable Cost-Effective Potential for Natural Gas in the Commercial Sector

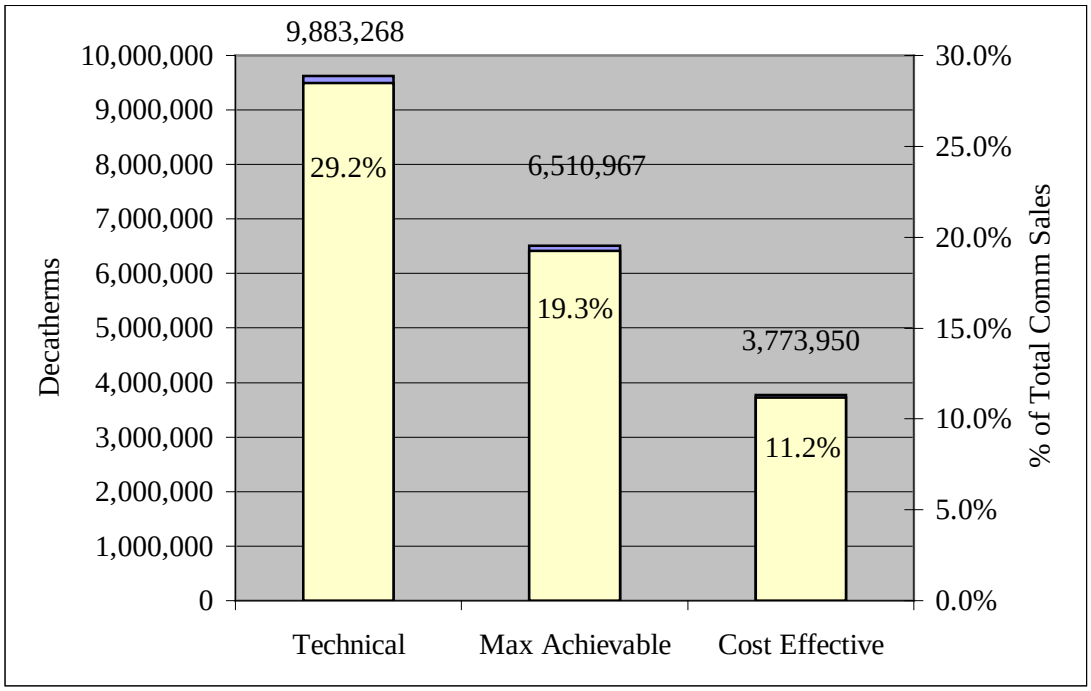


Table 6-5, presents estimates of maximum achievable cost-effective savings potential by end use in terms of energy saved in the year 2013 and in terms of percent of base end use energy consumption. Space heating is the end use with the largest technical potential at 2,201,795 Decatherms in existing buildings and 270,181 Decatherms in new construction.

Table 6-5 2013 Commercial Gas Maximum Achievable Cost-Effective Savings by End Use

End Use	Existing Buildings Savings Potential (Dth)	Savings Potential (% of Base Sales)	New Construction Savings Potential (Dth)	Savings Potential (% of Base Sales)
Space Heat	2,201,795	16.9%	270,181	8.7%
Water Heat	518,236	6.3%	80,572	4.1%
Cooking	376,946	13.1%	89,967	13.1%
Pool Heat	144,537	17.4%	34,497	17.4%
Drying	46,194	6.0%	11,025	6.0%

7.0 NON-ENERGY BENEFITS OF NATURAL GAS DSM

In addition to energy cost savings, increased natural gas DSM also results in positive impacts on the economy, the environment, and public health. These non-energy benefits increase the societal value of DSM programs which, for some people and businesses, provide a greater incentive to participate in DSM programs than do the actual energy savings.

Economic Benefits: DSM results in economic benefits to society. DSM decreases both household and business utility expenses. For residential users, this means more discretionary income to spend on other goods and services. Investments in energy efficient home improvements and appliances can have a positive impact on property values. For the business customer, a reduction in energy costs reduces costs of production and improves price competitiveness of products and services. It also makes capital available for other business related investments.

Studies indicate that increased spending on DSM creates jobs in the energy-efficiency sector and enhances local economic activity associated with increases in spending on energy products and services. A study to evaluate the benefits of DSM investments in Wisconsin reported 46 new full-time jobs are created for every $1 million of investment in energy-efficiency programs in that state.[5]

In addition, well-designed energy efficient buildings have been found to be more comfortable for building occupants and in the case of commercial buildings, associated with increased productivity of workers.

Finally, natural gas price volatility and higher gas prices have negative impacts on economic activity. Investments in energy efficiency can contribute to putting downward pressure on natural gas prices. A recent study by the American Council for An Energy-Efficient Economy (ACEEE) found that reduction in natural gas and electricity consumption in the U.S. through modest improvements in energy efficiency and increased use of renewable energy could reduce wholesale natural gas prices by 20%. [6]

Environmental Benefits: Natural gas DSM has positive impacts on air quality. Natural gas DSM reduces pollutants associated with natural gas combustion, which include carbon dioxide, carbon monoxide, oxides of nitrogen, volatile organic hydrocarbons, fine particulate matter and sulfur dioxide (CO2, CO, NOX, VOCs, PM 2.5 and SO2). Reducing criteria pollutants benefits ecosystems and public health. If the Maximum Achievable Cost-Effective natural gas DSM is realized according to Table 1-1 in the GDS report the emission reduction is substantial, especially

[5] *Beyond Energy Savings: Review of the Non-Energy Benefits Estimated for Three Low Income Programs,* ACEEE Paper 326, Nick Hall, TecMarket Works, Jeff Riggert, Tec Market Works, 2002 ACEEE Summer Study Proceedings.
[6] R. Neal Elliot, et. al., *Natural Gas Price Effects of Energy Efficiency and Renewable Energy Practices and Policies, ACEEE, December 2003.*

with respect to CO_2.[7] For every therm of natural gas saved, NOx emissions are reduced by .01 pounds, and SOx is reduce by .00006 pounds. Over the study period, 2003--2013, pollution reductions associated with investments in natural gas DSM could result in emission reductions of 2.1 million pounds of NOx, 12.6 thousand pounds of SOx and 1.3 million tons of CO_2.

Public Health Benefits: DSM programs have been found to increase health and safety of building occupants.[8] More efficient appliances and combustion of natural gas reduce emission of carbon monoxide and reduce the risk of build-up of lethal carbon monoxide gases in homes and businesses. DSM measures resulting in proper sealing, insulation and ventilation of homes and businesses have also been found to reduce mold-related illnesses. The NO_X emissions associated with natural gas combustion can contribute to summer ground level ozone problems along the Wasatch front. Elevated ground level ozone concentrations are associated with childhood and adult asthma.

Benefits of Low-income Weatherization: In addition to saving energy, natural gas DSM has a particularly positive effect on low-income households that spend a disproportionate share of their limited incomes on energy. Reduced energy usage reduces the size of bills, making it easier to pay and leaving more money to spend for other critical essentials such as food, clothing, medications, childcare and transportation. Generally, weatherizing low-income households reduces drafts and provides the ability to have a warmer house. This not only increases comfort levels but can also have a positive impact on health, decreasing health care costs and sick days from work and/or school. Work on these homes often uncovers severe potential health risks such as cracked heat exchangers, dangerous venting and other problems that can lead to CO poisoning and/or death.

From a utility and non-participant standpoint, by reducing costs to low-income households and increasing the ability to pay, natural gas DSM can help reduce arrearages, bill collection costs, disconnections and reconnections, and bad debt write offs leading to lower costs to the utility and ultimately to other ratepayers.

GDS conducted a literature search on the non-energy benefits of programs targeted at low-income households. The most comprehensive study of low-income program non-energy benefits was completed for five investor-owned utilities in California in April 2001.[9]

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[7] For perspective this is equivalent to removing over 9,400 vehicles from our highways, based on average fuel economy data provided through EPA's website www.fueleconomy.gov. In ten years, through cost-effective DSM we can prevent over 1.2 million tons of CO2 per year, equivalent to removing over 147,000 vehicles from our highways.

[8] State of Wisconsin Department of Administration Division of Energy. *Focus on Energy Public Benefits Statewide Evaluation. Quarterly Summary Report: Contract Year 2, Second Quarter, March 31, 2003.* Prepared by PA Government Services Inc., Focus Evaluation Team.

[9] TecMRKT Works, Skumatz Economic Research Associates, and Megdal & Associates, Low-income Public Purpose Test, (The LIPPT), Final Report, Up-Dated for LIPPT Version 2.0, A Report Prepared for the RRM Working Group's Cost-Effectiveness Committee, April 2001. This report provides a description of each non-energy benefit included in the KeySpan analysis of non-energy benefits, and provides the methodology for calculating the value of each category of non-energy benefits.
TecMRKT Works, Skumatz Economic Research Associates, and Megdal & Associates, User's Guide for California Utility's Low-Income Program Cost-Effectiveness Model, The Low-Income Public Purpose Test, Version 2.0, A Microsoft Excel Based Model, Prepared for The RRM Cost-Effectiveness Subcommittee, May 25, 2001

Table 9-1 below provides examples of non-energy benefits that are applicable to weatherization and insulation programs targeted at low income customers identified by the California study.

Table 7-1

Summary of Low-Income Program Non-Energy Benefits

Benefit Number in LIPPT Model	Name of Non-Energy Benefit	Non-Energy Benefit Description
	Utility Perspective	
7A	Carrying cost on arrearages	Energy-Efficiency Programs reduce customer bills, improving the likelihood that customers will be able to keep up with payments
7B	Lower bad debt write-offs	Makes energy bills more manageable for program participants, potentially reducing the bad debt for these customers
7C	Fewer shut-offs	As a result of the customers ability to pay their bills, a similar reduction in the number of customers with service disconnects is expected
7D	Fewer reconnects	As a result of the reduction in the number of shut-offs, the number of reconnects needed would also decline.
7E	Fewer notices	More affordable energy bills lead to more on-time payments and fewer notices from the utility
7F	Fewer customer calls	More affordable energy bills lead to more on-time payments and fewer customer calls
7H	Red'n in emergency gas service calls	
7J	Transmission and/or distribution savings (distribution only)	
	Societal Perspective	
8A	Economic impact	Estimate of economic impact to regional economy based upon using local labor for energy-efficiency services instead of importing energy, and using bill savings being spent into local economy.
8B	Environmental benefits	Provides environmental benefits due to their role as a pollution prevention strategy. These include assisting in meeting Clean Air Act requirements, reduction in acid rain, and a variety of other benefits.

	Participant Perspective	
9B	Fewer Shutoffs	Providing customers with services and education that reduces energy use also helps customers reduce bills and presumably improves their payment record. As a result, participants experience fewer arrearages and are less likely to be disconnected.
9C	Fewer Calls to the utility	Without payment problems the customer is less likely to make calls to the utility concerning payments.
9D	Fewer reconnects	Reconnections are reduced in response to the lower shutoff numbers.
9H	Moving costs/mobility	High energy costs can make it difficult for residential customers to keep up with all of their household bills, including rent or mortgage payments. By keeping their bills down, this will reduce non-payment on living expenses.
9I	Fewer Illnesses and lost days from work/school	Households with sufficient and continuous heating may experience changes in the number of colds and other illnesses per year.
9K	Net Household Benefits from More Comfort, Less Noise, net of negatives	Weatherization of homes allows these homes to be kept warmer at lower costs, reduces drafts, and insulates them from noise and weather outside their homes.
9K	Net Household Benefits from Additional Hardship Benefits	The additional hardship benefits are those associated non-dollar benefits from reduced disconnects, reconnects, and bill collection, such as reduced stress as perceived and valued by participant.

8.0 LOW-INCOME WEATHERIZATION

The Low-Income Weatherization Program (LIWP) for Questar Gas was initially established in Docket No. 99-057-20, In the Matter of the Application of Questar Gas Increase in Rates and Charges. The program, funded through general rates, made available $250,000 to supplement the efforts of the Utah Department of Community and Economic Development (DCED). The Utah Public Service Commission (Commission) found the program to be in the public interest based on the criteria set forth in the Commission's May 24, 2000 Order approving a lifeline rate in Docket No. 99-035-10, specifically:

1. The need is real and not being met by direct-payments programs.
2. The program is successfully targeted and does not overly burden other customers.
3. The benefits offset negative impacts on objectives.
4. The program is easy and inexpensive to administer.

In its Order approving funding for the LIWP, the Commission states:

"We conclude that ratepayer funding of the proposed weatherization program is in the public interest and will allow recovery of the expenditure through general rates. In support of this conclusion, we find that the program meets the criteria set forth in the Commission's May 24, 2000 Order approving a lifeline rate in Docket No. 99-035-10. In addition, we find that this program will promote cost-effective energy-efficiency measures that will conserve resources and provide environmental benefits. The program will minimize administrative costs while providing benefits to participants and non-participants. The program also addresses a safety issue that may otherwise be difficult to alleviate. For these reasons, we approve the funding to $250,000 for weatherization to be administered by DCED."

Subsequently in Docket No. 02-05-02, In the Matter of the Application of Questar Gas Company for an Increase in Rates and Charges; Salt Lake Community Action Program (SLCAP), Crossroads Urban Center (CUC) and Utah Legislative Watch (ULW), collectively sought to increase the funding for the LIWP to $500,000. The additional funding was requested to meet all the current and near-term needs of Questar Gas customers served by the program and for furnace duct repairs, natural gas piping, and other measures not normally covered by Department of Energy (DOE) funding. Since the program's approval, increasing and additional funding sources for low-income weatherization had become available resulting in more homes being weatherized, but likewise identifying more furnaces needing repairs or replacements. However, the other funding sources often did not provide resources or restricts the resources necessary to do the furnace repairs or replacements.

While acknowledging the value of the LIWP, the Commission was hesitant to double the funding for it.

> "We believe it is too soon to conclude that additional state funds are necessary. We are not willing to consider doubling the funding in every subsequent Questar rate case and, therefore direct the DSM task force established by this order to study the optimal state funding for this program. In addition, we encourage DCED to take up additional state funding for weatherization with the state legislature."

The Commission's Order specifically directed the Demand-Side Resource Task Force (the "Advisory Group") to "study the program to consider the optimal level of state funding." An "optimal" funding level is dependent on program design and the criteria used for program evaluation. The Commission's Order appears to implicitly request an evaluation of the LIWP as a Demand-side Resource. This has caused some confusion and controversy for the Advisory Group. Several parties are concerned that this ignores the "public interest" value of the program that it has been approved on to date. One party, Light and Truth, has consistently objected to any level of funding from utility rates on legal and philosophical grounds. Light and Truth believes the Advisory Group should have investigated additional matters stating that:[10]

> *"While the Task Force reviewed at length the program expenditures and possible results of those expenditures, it did not study the source of the funds. Similarly, the GDS study did not consider the funding source.*
>
> *The Task Force did not review possible legal impacts of the Weatherization study. It did not consider [1] possible Third Party Billing problems in obtaining the funds, [2] possible charitable contribution problems in expending the funds or [3] possible question of the Public Service Commission having authority to regulate ratepayers (as opposed to regulating utilities) in assessing the funds.*
>
> *The Task Force did not fully review the basis upon which the Weatherization program was initially created and funded. While some health and safety issues were briefly discussed, the earlier claims of benefits to non-participants were not investigated."*

The Advisory Group has spent considerable time examining the Commission's request, but has not agreed with Light and Truth's position that it was tasked to examine the non-DSM issues surrounding funding. The Advisory Group tasked GDS to model the low-income weatherization program in its study. GDS did so in §7.7 of its study, however it did not model the furnace repair and replacement aspects of the current LIWP. Subsequently the Advisory Group, with funding from the Division Of Housing and Community Development, hired GDS to specifically study the Utah LIWP. This additional study, *Optimal Level of Funding for the Utah Weatherization Program*, was undertaken late summer of 2004 and completed on December 8, 2004. The full report appears in this report as Appendix V.

The Commission has previously established the four cost-effectiveness tests – Total Resource Cost (TRC), Participant Cost Test (PCT), Utility Cost Test (UTC) and Rate Impact Measure (RIM) – contained in the California Standard Practices Manual as the criteria to evaluate

[10] Excerpt from *Light and Truth's* April 7, 2004 memorandum. A complete version of Light and Truth's memorandum is found in Appendix IV.

DSM programs on the electric side. This criteria significantly differs from and is more rigorous than that applied to a lifeline rate. To receive Commission approval for cost recovery purposes, an electric DSM program is required at a minimum to pass the TRC. The Commission has not formally approved criteria for the evaluation of gas DSM. There is some concern among members of the Advisory Group as to whether the criteria established for the evaluation of electric DSM apply equally to gas DSM due to the differences between the industries in the capital expenditures associated with resource procurement. However, for purposes of this study the Advisory Group directed GDS to use the cost-effectiveness tests contained in the California Standard Practices Manual.

The results of the GDS Optimal Funding study on the LIWP are subject to all of the same caveats as the rest of the larger GDS study. However, the GDS Optimal Funding study strongly suggests that the utility investment in the Utah LIWP is a cost-effective DSM program in addition to having a number of important societal benefits. Similar to the other programs studied in the larger GDS study, Utah's LIWP passes the TRC with the GDS assumptions, but does not pass the RIM test. Also, it clearly produces lost revenues to Questar Gas, which are an economic barrier to the pursuit of gas DSM. Currently, Questar has no regulatory mechanism in place that would make it indifferent to the pursuit of DSM. The GDS Optimal Funding study suggests there are sufficient opportunities for Questar to acquire cost-effective demand-side resources from the Utah LIWP to justify an increase in the LIWP budget to between $3.5 to $15.8 million per year, depending on which of the five scenarios GDS evaluated are considered.

The LIWP Administrator, along with SLCAP and Crossroads Urban Center, believe that the GDS Optimal Funding Study demonstrates the value of substantial additional investment by Questar Gas in low-income Weatherization. GDS also confirms the LIWP administrator's comments regarding the urgency for additional funds to address the current demand for Weatherization services and the need to reduce/eliminate significant ongoing backlogs.

The GDS study presents a range of potential approaches and corresponding funding levels that the Commission could consider to determine an appropriate level of utility funding for the program in the future. Some of those options are to:

1. fully utilize the existing production capacity of 1,659 homes which would require an additional $626,500 per year;
2. capture all the cost-effective energy-efficiency potential in the low-income residential housing sector identified by GDS over a 10 year period which would require an additional $13.3 million per year for 10 years;
3. capture all the cost-effective energy-efficiency potential in the low-income residential housing sector identified by GDS over a 20 year period which would require an additional $4,261,400 per year for 20 years; or
4. address the current backlog of 1,353 homes over a period of five years (at a cost of $605,564 per year) plus fully utilize the existing production capacity described in Option 1 which would require a total additional investment of $1,232,064 per year for 5 years.

These options recognize a unique benefit of the LIWP - the fact that the program receives non-utility monies that contribute to the total level of funding needed as indicated by the GDS DSM analysis. However, funding sources can vary greatly from year to year due to changes in

federal funding and other funding sources. A stable, sustainable level of investment by Questar Gas can provide the ability to maintain a well-trained and experienced network of weatherization workers throughout the state, which in turn contributes to the success and cost effectiveness of the efficiency of the program.

As funding from Questar is added to the Weatherization budget, it may be more logical to start at a conservative funding level. Subsequently, as experience with natural gas DSM increases and funding mechanisms are refined, low-income weatherization could be ramped up over time to address the eligible households over a prescribed time period.

The DPU noted that the GDS Optimal Funding study assumed DSM programs with unlimited funding and a concerted sustained campaign involving highly aggressive programs and market intervention. Although higher funding levels can result in the acquisition of more cost-effective DSM, there are diminishing returns, as was demonstrated by Figure 5-5 in the larger GDS study, *Residential Gas DSM Supply Curve for the State of Utah*. Additionally, the administrative structure to pursue such an aggressive program is currently not in place.

In the performance of the duties, powers, and responsibilities committed to it by law the Division is to provide for just, reasonable, and adequate rates. Just, reasonable, and adequate encompasses promoting efficient management and operation of public utilities and stability in rate levels for customers and revenue requirements for utilities from year to year. In this context, the Division has adopted a policy of gradualism with respect to the implementation of DSM programs. Although the current low-income program has been evaluated by the Division on an on-going basis and the Division believes it to be cost effective, the Division would not recommend funding that would exceed the capability of the current administrative production capability. Any additional funding should be determined by an analysis of the current LIWP weatherization activity, staffing and funding sources. Additionally, the Division has adopted a policy of removing disincentives for utility management to implement and pursue cost-effective DSM. The Division recognizes the barrier imposed by lost revenues resulting from DSM activities and supports the development of a regulatory mechanism to address cost recovery for DSM programs.

The Southwest Energy Efficiency Project ("SWEEP") recommends a gradual but substantial increase in the LIWP through contributions by Questar Gas Co. Since Questar Gas would be reimbursed for these contributions from its customers, in effect all gas customers would support these energy efficiency improvements and help reduce the heavy energy cost burden faced by low-income households.

In particular, SWEEP recommends increasing Questar's contribution to the LIWP by $500,000 in year 1, $1.0 million in year 2, $2.0 million in year 3, and $3.5 million in years 4 and beyond. This will enable the program to gradually scale up over time and eliminate the current backlog within three years. It will also enable the program to serve about twice as many homes per year compared to the 2004 level once the funding fully ramps up. Considering current gas prices, Questar's total revenues are on the order of $800 million per year. The addition of $3.5 million per year to the utility's revenue requirement is less than one-half of one percent, something that is very reasonable in our view in light of the value of weatherization in addressing

the heavy energy cost burden faced by low-income households in a cost-effective and permanent manner.

Questar is concerned mainly with the effect on its revenues without a mechanism in place that deals with its overall problem of declining use. Questar is also concerned that key GDS assumptions, such as acceptance of the TRC as opposed to consideration of the other California Tests, and its assumptions about the penetration rates and aggressiveness of the program, must be decided on a policy level before its funding recommendations can be fully tested. In any event, the company would have to explore this option in its SENDOUT model in conjunction with all other recommended programs before it would feel comfortable with identifying an "optimal" number. For example, a policy decision that limits the amount to spend in developing all DSM programs would necessarily affect a recommendation for the LIWP or any other individual measure.

With the exception of Light and Truth, the Advisory Group does believe that the LIWP appears to be a good DSM program and given the quantitative analyses provided by the GDS Optimal Funding study, it very likely merits substantial increased funding. However, there needs to be further analysis and consideration, including an analysis of current LIWP weatherization activity, staffing and funding sources; determination of appropriate criteria by which to evaluate gas DSM, and the development of a regulatory mechanism to address cost recovery for gas DSM.

9.0 FINDINGS AND RECOMMENDATIONS

Based on the working sessions conducted by the Advisory Group and the results of both GDS studies, the Advisory Group offers the following recommendations to the Utah Public Service Commission for their consideration:

1. The Advisory Group believes that the GDS Report should be viewed as a credible indicator that there is strong potential for increased utility investment in cost-effective demand-side management for natural gas. The Advisory Group does not, however, feel that the Commission should accept the GDS quantifications without further testing of the GDS assumptions. Questar has agreed to use the GDS data as applicable in its IRP examination of DSM, including the utilization of its SENDOUT model. The Advisory Group recommends that this is an appropriate way to proceed.

2. The Advisory Group recommends that QGC examine the use of pilot or demonstration programs to gain experience with program design costs and implementation issues before necessarily committing to the scope and cost of the programs identified in the GDS Report.

3. The Advisory Group recommends that the Commission provide QGC with guidance concerning the cost-effectiveness criteria on which potential DSM programs are evaluated. Parties have varying viewpoints about the assumption followed by GDS, which judged cost-effectiveness by the Total Resource Test. There are also issues concerning potential differences between gas and electric systems, which should be evaluated when choosing the appropriate cost effectiveness test for DSM programs sponsored by Questar.

4. The Advisory Group has identified several barriers to the successful implementation of Gas DSM. It is recommended that the Commission address the policy issues that act as barriers. The primary example is the issue of Questar's economic sensitivity to the loss of gas load that increased DSM would foster.

5. The GDS Study presumed an aggressive DSM effort with sufficient funding to pursue all DSM that was "cost effective" and "achievable" under the GDS assumptions. The Advisory Group has identified determination of the appropriate level of funding from Questar for the LIWP as a policy issue that must be addressed by the Commission.

6. As a topic of discussion among the Advisory Group members and as detailed in the study *Optimal Level of Funding for the Utah Low-Income Weatherization Program*, increased Questar funding for the LIWP can be justified on the basis of both economic and societal benefits. It is recommended that the Commission address, as a matter of policy, whether or not additional funding of LIWP is to be determined solely on the basis of cost-effectiveness and its value as a demand-side resource in Questar's resource portfolio or whether consideration should be given to broader societal needs such as health, safety, and financial assistance to economically disadvantaged as advocated by some in previous

cases. The GDS Optimal Funding study limited its findings to the potential contribution the Utah LIWP could make to the pursuit of cost-effective demand-side resources by Questar for its resource portfolio; but these findings are subject to all of the reservations expressed in the LIWP section of this report, many of which require further commission guidance.

7. There are cost-effective natural gas and electric savings associated with a number of residential and commercial natural gas DSM programs analyzed in the GDS Study. The Advisory Group recognizes the potential synergies and opportunities to improve administrative efficiency and lower costs of DSM program delivery if some DSM programs were jointly implemented by PacifiCorp and Questar. Accordingly, the Advisory Group recommends the Commission investigate and consider regulatory mechanisms that would enable coordination and/or joint implementation of DSM programs by Utah's gas and electric utilities for those programs that would result in substantial, cost-effective natural gas and electric savings for ratepayers.

8. The Advisory Group recognizes the value of continued collaboration between Questar and the parties that participated on the Natural Gas DSM Advisory Group and recommends Questar continue to involve and consult with the Advisory Group on the design, evaluation and implementation of future natural gas DSM programs.

APPENDICES