BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF UTAH

IN THE MATTER OF THE APPLICATION OF PACIFICORP FOR AN INCREASE IN ITS RATES AND CHARGES	)))))	DOCKET NO. 01-035-01

DIRECT TESTIMONY OF DAVID NICHOLS

ON BEHALF OF THE UTAH ENERGY OFFICE

UTAH DEPARTMENT OF NATURAL RESOURCES

Q. Please state your name, position, and address.

A. I am David Nichols, vice president and senior researcher at Tellus Institute, 11 Arlington Street, Boston, Massachusetts 02116.

Q. On whose behalf are you testifying?

A. I am testifying on behalf of the Utah Energy Office (formerly Office of Energy and Resource Planning) (UEO) in the Department of Natural Resources of the State of Utah.

Q. What is the purpose of your testimony?

A. I have been asked by the UEO to identify the implications of a study, completed in March, for new demand-side management which PacifiCorp might reasonably commit to undertake as part of this proceeding.

Q. Please identify the study to which you refer.

A. I refer to the study *An Economic Analysis of Achievable New Demand-Side Management Opportunities in Utah,* prepared by Tellus Institute for the Energy

Efficiency Advisory Group to the Utah Public Service Commission. I will cite this as "the Study."

Q. Please outline your testimony.

A. The balance of my testimony addresses these topics: the nature and results of the Study; a new DSM initiative by PacifiCorp that I judge would be reasonable in light of the results of the Study; its impact on avoided near-term power supply costs; sharing the utility's financial savings from DSM with the ratepayers; general issues of cost recovery for such a DSM initiative; and recommendations to the Commission. Appended to the testimony are exhibits containing my qualifications, Exhibit (DN__1); the main volume of the Study, Exhibit (DN__2); and an excerpt from a report explaining what factors contribute to high levels of participation in DSM programs (Exhibit (DN__3). The Study was submitted to the Energy Efficiency Advisory Group on March 31, 2001. In preparing this testimony, some small numerical errors were detected and corrected. The corrections are reflected in the Study as attached to this testimony.

Summary of Testimony

Q. Please summarize your testimony.

A. There is a huge potential for DSM that has not yet been tapped in Utah. If effectively pursued, the savings that can be achieved through DSM in Utah would bring both immediate and longer-run economic benefits to both PacifiCorp and its retail customers. I propose that PacifiCorp immediately embark on a substantial DSM initiative. I set forth a framework that will give the Company the means and the incentive to do this. I propose that the Company's revenue requirements going

forward be adjusted to include $35 million to fund the first year of a multi-year DSM initiative. The framework I set out includes sharing of the utility's near-term financial benefits from DSM with the ratepayers.

The DSM Study

Q. Please describe the DSM Study.

A. The Study was designed to assess the potential for achieving cost-effective electric energy and demand savings in Utah through new and additional demand-side savings, after taking into account the effects of past electric DSM as well as existing market trends and policies. New load management, energy efficiency, and combined heat and power ("CHP") measures were evaluated and a portfolio of DSM options was assembled. The Study modeled implementing this new DSM through a multi-year initiative, with a year 2001 phase-in and full-scale operation during 2002 through 2006. Beyond 2006, the lifetime savings from measures installed during that period are included. Simple program features — the costs for administration and marketing of programs to increase the market penetration of measures, and financial incentives to induce customer participation in programs — were incorporated in order to motivate a realistic analysis of achievable DSM. However, these were not specific program proposals. The major residential sector options included in the DSM portfolio evaluated in the Study were load control of air conditioners, efficient cooling equipment, efficient lighting, and recycling of existing refrigerators and freezers. The major options in commercial buildings and facilities were load control of air conditioners, load management, efficient cooling equipment and systems, efficient lighting, efficient refrigeration, and CHP. The

DSM Study: Major Elements		
Residential Options	Commercial and Institutional Options	Industrial Options
• Load control of central air conditioners (CACs) • Efficient cooling equipment • Efficient lighting • Appliance recycling	• Load control of CACs • Load management • Efficient cooling equipment and systems • Efficient lighting • Efficient refrigeration • Combined heat & power	• Load management • Efficient motors • Motor drive improvements (fans, pumps, compressed air systems) • Combined heat & power

Table 1

major industrial sector options were load management, efficient motors, improvements in systems using motor drive (fan, pump, and compressed air systems), and CHP. These options are summarized in Table 1 following.

Q. What were the results of the Study?

A. The Study found that there is substantial potential for achieving cost-effective electric energy and demand savings through a new generation of DSM in the State. Reductions in statewide summer peak demand would grow to 680 megaWatts (MW) in 2006. Annual electric energy savings would grow to 2,300 gigaWatt-hours (GWh) in 2006. Cumulative energy savings would total 40,700 GWh through 2025. As these are end-use savings, generation savings would be even greater, when reduced losses in transmission and distribution are added in.

Q. What is meant by "cost-effective" savings?

A. Future electric energy and capacity costs can be avoided through demand-side measures. The value of these avoided cost savings is likely to be far greater than the total costs of implementing the DSM portfolio. DSM costs consist of the incremental technology cost of demand-side measures, the costs for administration of programs to increase the market penetration of measures,

financial incentives used to induce customer participation in programs, and any additional resources used by the electric DSM measures (such as gas to fuel CHP systems). In fact, the avoided costs — i.e., the economic savings achieved by implementing DSM measures — are at least four times greater than the total costs of achieving the DSM evaluated in the Study. The total costs of energy services to Utah households, firms, institutions, and governments would thus be reduced by implementing the DSM in the Study. As well there would be environmental benefits.

Q. What do you mean by "environmental benefits?"

A. Environmental benefits are reductions in the land use, water use, and air emissions impacts associated with producing and delivering electricity. These benefits are real but were not quantified as economic benefits in the Study.

Q. You referred to the costs of DSM programs. Where would the monies to fund the DSM investments the Study evaluated come from?

A. The study assumed that $283 million (present value year 2000 dollars) would be raised over six years through a DSM charge levied on electricity ratepayers. These monies would be used for program administration, marketing, technical assistance, and financial incentives. The remainder of the costs for the DSM options consists of expenditures for program measures on the part of program participants.

Q. What would be the impact of a DSM charge on electricity rates?

A. The long-run impact of the DSM options on average rates was estimated based on projections of PacifiCorp's current rates. It was found that as a group, the energy

efficiency and load management options would reduce rates. That is because the electricity supply cost savings they yield are greater than the sum of DSM funding and utility lost revenues. The rate impact estimates were based on cumulative present value over the entire analysis period. DSM involves up front expenditures that produce streams of savings over subsequent years. Under ordinary circumstances, this may create rate impacts that are less favorable in the early years than they are after the investment period. However, the extraordinarily high wholesale electric price levels in Western markets at this time were not included in that analysis. The level of these prices is such that, if DSM is implemented beginning in 2001, its near-term savings are likely to reduce rate levels (compared to the situation without DSM) beginning with the next rate setting proceeding following the present case. Additionally, I will discuss below an approach whereby DSM savings can begin to benefit rates even before another rate case.

Q. You stated that the Study is statewide in scope. Are its results valid for the PacifiCorp service area?

A. The results described above are indeed for Utah as a whole. But PacifiCorp supplies over 80 percent of the electricity sold at retail in the State. Given the strong preponderance of PacifiCorp's service area in terms of population, economic activity, and energy use, the Study's data and results are largely based on the nature, benefits, and costs of DSM opportunities in the Utah Power service area. However, the magnitude of achievable DSM for each option and overall would be somewhat less in the PacifiCorp service area than the totals found for the State as a whole.

Q. Did the Study make recommendations about DSM programs and funding?

A. No. The Study was intended as an informational resource. I draw on it here to develop a new DSM initiative that I am suggesting be undertaken. Others might reasonably draw on it to propose DSM initiatives that differ from the one I set out here.

A DSM Initiative for the PacifiCorp Area

Q. What approach did you use to develop your proposed new DSM initiative?

A. I developed an initiative that is largely based on the kinds of measures assessed in the Study. I considered the residential and non-residential markets separately, since approaches to marketing DSM vary between these two groups. In the residential market, I incorporate load control of air conditioning, promotion of efficient cooling equipment, appliance recycling, and a program to promote the use of compact fluorescent lamps. For non-residential markets, I incorporate load control of small commercial air conditioning, additional load management, promotion of efficient lighting, and an umbrella marketing approach that will allow promotion of different mixes of efficiency measures on a facility-by-facility basis. The major elements of the proposed initiative were listed in Table 1.

Q. What budget levels and performance targets do you recommend for a DSM initiative?

A. I recommend funding at a level of $35 million in the first year, reflecting both the urgency of using DSM to counter current power market prices and the need to incur some start-up costs for a multi-year effort. In subsequent years the amounts I recommend are based on sixty percent of the utility costs included in

the Study. Table 2 below summarizes this proposal, as well as the savings in electricity input requirements expected to result from it. The variations in utility costs during the years 2002-2006 arise from the differing phase-in rates of the options included in the Study. The energy and peak demand savings projected for the years 2002 through 2006 are also based on sixty percent of the savings for those years from the Study.

Q. Should the Company's performance in implementing DSM be monitored?

A. Yes, it should. It is the regulatory norm to require periodic reporting of the implementation of DSM plans and programs. Reporting compares actual spending, participation, and estimated savings with their budgeted levels. Additionally, independent evaluations of the electricity savings realized by DSM,

Proposed DSM Initiative for PacifiCorp

	Total Initiative			Utility Costs by Sector			
Year	Utility Cost (1,000)	Energy Savings (GWh)	Peak Reduction (MW)	Non-Residential (1,000)	Resi-dential (1,000)	Non-Residential Cost (%)	Resi-dential Cost (%)
1	$35,000	240	98	$17,328	$17,672	50%	50%
2	$29,966	416	146	$18,271	$11,695	61%	39%
3	$29,244	723	229	$21,050	$8,194	72%	28%
4	$29,588	992	308	$20,610	$8,978	70%	30%
5	$33,058	1304	394	$23,243	$9,815	70%	30%
6	$35,692	1639	484	$24,990	$10,702	70%	30%
Average:	$32,091			$20,915	$11,176	65%	35%
Total:	$192,549	5,316		$125,492	$67,056	65%	35%

Table 2

and its impact on retail markets, are usually provided for. Of course, performance should certainly be monitored by the Commission and the Division of Public Utilities.

The Residential Market

Q. Please describe your proposed residential DSM initiative, beginning with load control.

A. Residential load control programs typically cycle central air conditioners off for short periods during peak hours through central control equipment operated by the utility. Sometimes water heaters or pool pumps are included as well, but control of these appliances is less cost-effective. The Study included a central air conditioner load control program implemented at the six largest electric utilities in Utah during 2001 through 2006.

I suggest that the Company develop a load control program that can be in place as soon as possible, certainly by the beginning of the 2002 cooling season. The Company could target marketing to customers with higher than average usage, perhaps setting a minimum summer usage threshold of 4,000 kWh for June-September so that customers whose cooling use is likely to be low are not enrolled in the program.

Q. Please describe your proposed efficient cooling program.

A. There are many steps households can take to minimize the use of electricity for cooling. Some of these are unique to a dry climate like Utah's. A general hierarchy of approaches to cooling, from those with the lowest environmental impact and energy cost to those with the highest, is: 1) use fans and shading in

order to do without refrigerative cooling; 2) use evaporative cooling instead of refrigerative cooling; 3) use the highest-efficiency room air conditioners; 4) use highest-efficiency central air conditioners, properly sized and with equipment and air ducts maintained; and 5) use standard efficiency refrigerative air conditioning equipment without particular attention to optimal sizing and maintenance. The Study evaluated two sets of measures: use of evaporative cooling instead of central air conditioners, and use of high efficiency central air conditioners, properly sized and commissioned, instead of standard efficiency air conditioners.

I suggest a PacifiCorp residential cooling initiative comprised of educational outreach as well as technical and financial assistance to promote installation of evaporative cooling and higher efficiency central air conditioners. The outreach and education element should strongly emphasize that the best approach to cooling is to rely on fans and shading, without (other) electrically driven equipment; that the next best is to use well maintained evaporative cooling; and that if refrigerative air conditioning is used the equipment with the highest SEER ratings (Seasonal Energy Efficiency Ratio) will yield the lowest electricity bills and environmental impacts; and that ducts carrying cooled air through the home can develop leaks which should periodically be checked for and sealed.

In order to arrest both the gradual decline in the use of evaporative cooling that is occurring, and the increasing market penetration of central air conditioning systems with relatively low SEERs, the Company should also work with dealers and trade allies to implement two kinds of financial incentives for efficient cooling. First, financial incentives equal to the typical incremental cost of central

air conditioning equipment at or above SEER 13 should be made available, with the requirement that qualifying equipment be properly installed and sized. Second, financial incentives should be made available for the installation of evaporative cooling in new residential construction or to replace existing central air systems. These latter incentives should be equal to or greater than those for the high-SEER central air systems. This program should be operated over several years for a sustained market impact.

Q. Please describe the appliance recycling program.

A. Appliance recycling provides a modest incentive to customers to allow their operable refrigerators or freezers to be disposed of. Because this program has been operated successfully in several regions outside Utah, its operating procedures are well developed and the electricity savings well documented. A recycling company is contracted to collect appliances and dispose of them in an environmentally responsible way. One effect of the program is to remove second refrigerators that consume a good deal of electricity. Another effect is to move household purchases of new appliances moved forward in time, which produces substantial savings because new refrigerators and freezers are much more energy-efficient than the units that were on the market in the past.

I suggest that the company issue an RFP to choose a contractor to operate an appliance recycling program. Because economies of scale come from minimizing transport, this could be conceived of a one-time “blitz” program beginning immediately and aimed at picking up the maximum number of units

with a relative short period of time. A bounty (assumed to be $50 in the Study) would be offered to participating customers.

Q. Please describe the residential lighting program.

A. Compact fluorescent light bulbs (CFLs) use much less electricity than do standard incandescent light bulbs. Though CFLs are available in retail stores in Utah, only nine percent of households responding to a 1999 PacifiCorp residential customer survey indicated that they had purchased a CFL within the past three years. For this reason the Study included a residential CFL option, which I also include in the DSM initiative proposed here.

Q. Should the Company limit a new residential DSM initiative to the four programs you have put forward?

A. No, not necessarily. I put forward these four programs as clear winners that can be considered priority programs. The Study pointed out that there are other cost-effective residential electric efficiency measures available. Additional efficiency measures might be delivered as part of the programs I have presented, or as separate programs.

Nonresidential Load Management

Q. Please discuss your nonresidential proposals, beginning with the area of load management.

A. The Study included two non-residential load management options. I believe the Company should pursue programs based on both of them.

One program is to extend the residential load control program, as recommended above, to include small commercial facilities in which the central

air conditioner technology is similar. The experience of electric utilities which include a commercial component to their load control program suggests a target for participating small commercial customers equal to five percent of the households enrolled in the residential load control program.

The other program is a new curtailable load program aimed at medium and large sized commercial and industrial customers. PacifiCorp already has special rate contracts with its largest electricity users that include provisions for interruption. For the DSM study we considered additional load management among PacifiCorp customers, focusing on Utah customers whose annual demands fall in the 1 to 10 MW range, and who could offer at least 200 kW of non-firm load. The Study evaluated a program pursuant to which participating customers would receive a rate credit derived from an incentive of $50 per kW-year of non-firm (i.e., curtailable) load. Such a credit is lower than the resource value of demand reductions. The Company should aim to enroll sufficient customers to yield an additional 25 MW of interruptible load within two years. Another "block" of new curtailable load could then be considered depending on the speed with which the first 25 MW materializes. This new curtailable load initiative is distinct from and complementary to the Demand Exchange program that PacifiCorp is trying to introduce in Utah. The latter is a pilot program designed to secure economic benefits for PacifiCorp during periods of high power market prices. Participants would receive a quoted market price for hourly electricity demand that they reduce, less what they would have paid for that electricity under their rate schedule. Such a program could co-exist with the curtailable load

program, as it is common for utilities to offer a mix of voluntary load management products.

Nonresidential Energy Efficiency

Q. Please discuss your nonresidential energy efficiency proposals.

A. The nonresidential market is comprised of commercial, institutional, industrial, and agricultural facilities. The Study quantified achievable benefits from several technologies in the areas of space cooling, lighting, commercial refrigeration, electric motors, and motor-driven systems. The Study also pointed out that there are likely to be other cost-effective electric efficiency measures available in addition to those it incorporates.

There is no one "right way" to structure and deliver energy efficiency programs for the nonresidential market. In Utah and elsewhere, a variety of programmatic approaches have been used to deliver nonresidential efficiency measures. Energy efficiency programs are complex. They are aimed at the owners and managers of facilities, and they must include elements to capture their attention and then encourage and facilitate their adoption of program measures. But programs must also effectively enlist other market actors. Depending on the nature of a program it may aim to enlist equipment manufacturers, equipment dealers, HVAC contractors (businesses that install and service heating ventilation, and air conditioning systems), engineering consultants, energy service companies, builders, architects, financial service providers, or other trade allies. There is an extensive literature evaluating the effectiveness of different energy efficiency programs and program designs. Much of this evaluation work has taken place in

the Western U.S., particularly in the Pacific Northwest and in California. This body of work can provide program designers with a sense of what elements are important. In addition, PacifiCorp itself has several ongoing DSM programs which its DSM managers monitor to assess what works best in target markets.

I attach a list from an early assessment of the market penetration of efficiency programs (Exhibit (DN__3)). I have found it useful in conveying a sense of the elements involved in developing good programs. Important features for a program (based on the list) include: simplicity and convenience for participants, having a trusted and credible sponsor, using financial incentives, effective marketing, good marketing message, providing training and performance incentives for personnel doing the marketing, duration (available over several years), and quality control features such as warranties. Contextual factors that contribute to high participation include: the commitment of the program sponsor (including its top management), sufficient program resources (budget and staff), rising energy prices/expected energy shortages, and, overall, a favorable political and social climate.

My proposals for new efficiency programs address the defining elements of program design. As the above discussion implies, the full development and eventual success of each program depends critically upon how the program sponsor structures the detailed features of the program, and how it budgets, staffs, markets, and operates the program.

Q. Please present the nonresidential efficiency programs you would recommend.

A. The main program I would recommend is one similar to the Company's FinAnswer programs as currently operated in its Oregon and Washington service areas. These programs provide expert advice and financial incentives for a range of energy efficiency measures. A lighting retrofit program for facilities of any size applies to a range of efficient lighting measures. For smaller facilities, a retrofit program applies to air conditioning and heating measures. Finally, there is a custom FinAnswer program to address potential projects for new construction, any industrial project, or projects at large commercial facilities. The custom program provides technical support and financial incentives for any energy efficiency measures that are cost-effective from PacifiCorp's perspective as well as the participating customer's. The financial incentive consists of either PacifiCorp paying for the installed measures, with the customer repaying PacifiCorp through on-bill financing, with interest; or an up front PacifiCorp incentive payment to the customer for the estimated kWh annually saved by the measures installed.

FinAnswer's financial incentives are thus either fixed (in the case of lighting and the small commercial cooling/heating measures) or per kWh (in the custom program), and are generally capped at fifty percent of incremental measure cost. PacifiCorp's FinAnswer programs as operated in Oregon and Washington are broadly similar to effective commercial/industrial efficiency programs operated in several other jurisdictions.

Q. How do the efficiency measures targeted by the FinAnswer programs in Oregon and Washington compare with those included in the Utah Study?

A. In the case of lighting, FinAnswer's eligible measures are almost the same as in the Study. In the case of other measures, there are more differences. The Study used a set of representative measures to motivate the analysis — five efficient cooling technologies, six measures relating to motor driven industrial processes, and several commercial refrigeration measures. Through its program using a custom site-specific approach to identify cost-effective opportunities, FinAnswer encompasses these and numerous other specific measures as well. This is to be expected; the Study points out that "real-world DSM programs often have flexibility to incorporate custom measures which pass basic cost-effectiveness criteria." With the exception of CHP, the range and types of measures FinAnswer promotes correspond well with those used to motivate the Study's nonresidential efficiency assessment. A nonresidential efficiency program similar in design to FinAnswer, adequately funded and vigorously implemented, is a good way to tap the efficiency savings potential identified in the Study.

Combined Heat and Power

Q. What is the role of CHP in your recommendations?

A. The Study highlighted the substantial amount of centrally supplied electricity that can be saved if on-site CHP systems are installed in commercial and industrial facilities in Utah. Curiously, DSM initiatives seldom include programs to promote CHP despite its potential to save electricity and its greater overall energy conversion efficiency. Even electric utilities that deliver substantial DSM programs often resist promoting CHP, perhaps fearing too great a loss of retail load. I do not know what PacifiCorp's attitude to CHP may be, but in Utah at any

rate their small FinAnswer program has not supported CHP projects. The full-scale nonresidential efficiency program I recommend for Utah should certainly include custom site-specific CHP installations as an eligible efficiency measure.

Q. Is CHP a form of distributed generation?

A. Yes. The kind of decentralized on-site CHP that the study evaluated is indeed a form of distributed generation ("DG"). There are larger issues concerning assessment and encouragement of DG which were beyond the scope of the Study. However, if the Commission were to undertake a comprehensive investigation of the potential for and market and regulatory barriers to DG, any consequent ratemaking reforms —for example, in the areas of rates for back-up and stand-by power — would likely affect on-site CHP as well.

Q. Are there other ways to deliver non-residential energy efficiency besides the expanded FinAnswer-type approach you have set out?

A. Yes, there are. An approach used in some jurisdictions is the so-called standard performance contract (SPC) approach. In this approach, the utility or other program sponsor develops a standard performance contract with incentive payments for energy or demand savings. The contract terms are offered to all utility customers and to energy service companies and other vendors on a first come, first served basis. Payment is made to the customer or upon delivery of verified units of energy or demand savings. Any customer or energy service company willing to deliver energy or demand savings under the terms and conditions for the standard incentive payments can sign a contract with the utility. Payment is made to the customer or energy service company upon verification

that measures to provide energy or demand savings have been installed and savings are being delivered. SPC type programs have been used in New Jersey, California, and other jurisdictions, and are well suited to non-residential markets where a variety of measures may be installed in each facility. SPC may be considered a pay-for-savings approach, whereas the FinAnswer type of program discussed above is more of a pay-for-technology approach. But both approaches provide incentives for installation of efficiency measures and thereby produce energy and demand savings. In some jurisdictions both approaches are used.

Q. Would you recommend an SPC program for the PacifiCorp area?

A. For practical reasons the speedier approach is probably a prompt and very substantial expansion of a FinAnswer approach. The Company is already using such an approach in other retail jurisdictions. If for some reason PacifiCorp is unwilling or unable to deliver an expanded FinAnswer in Utah, then as an alternative an SPC program approach might need to be considered.

DSM in Market Context

Q. Isn't the Company already undertaking DSM in Utah?

A. Yes, but only just barely. The Company has a few programs. But they are extraordinarily small given the huge wholesale power market prices it faces.

Q. What are the current price conditions the Company faces in the power market?

A. The recent and forecasted prices are described in the testimony of Mr. Widmer. In his supplemental testimony dated February 12, 2001, in response to the question

of whether the power market prices show signs of decreasing back toward historic levels, Mr. Widmer stated:

> No, not in the next year. Even more damaging than 2000 prices is the ominous evidence that market power prices in 2001 are expected to be even higher (page 3).

Mr. Widmer further stated that while the average short-term market price adopted in Utah Docket No. 99-035-10 was $22 per MWh, the average midpoint of forward prices for the year of February 2001-January 2002 was $288 per MWh (page 4). Clearly, these are extraordinary times in the power market.

Q. Did Mr. Widmer identify steps the Company is taking to respond to higher wholesale market prices?

A. Yes. In his supplemental testimony he states that one of the things the Company is doing to respond to the calamitous wholesale market he describes is "the exploration of load management opportunities" (page 5). Given the market conditions he describes, this effort seems inadequate. The susceptibility of the regional power markets to underlying price pressures and price spikes had been clear for well over a year before the date of Mr. Widmer's testimony. Yet he mentions only exploring load management, and says nothing of other aspects of DSM, like energy efficiency, which can save marginal demand in all hours of the year including the highest price hours. During the past two years regulators and utilities in New York, New Jersey, Texas, California, Colorado, and other states have agreed on significant increases in DSM, usually with the explicit purpose of combating near-term power market price pressures. I believe the Company could

be directed to vigorously pursue DSM at this time, as implied in my conclusions below.

Q. How can DSM help the Company avoided near-term power supply costs?

A. The Company both sells and buys in wholesale power markets. Any reduction in retail load in Utah enables it to either sell more into or buy less from the power market, at the prevailing price.

Q. At what level of purchased power prices would the savings from DSM exceed its costs?

A. The costs of DSM to the utility are, first, direct expenditures to fund the programs, and, second, indirect costs in the form of lost revenues when sales are reduced from successful DSM. Dealing with the second element, the Company is requesting rates approximately equal to $60 per MWh sold overall. If avoided purchased power prices are $52 (reflecting avoided losses), the Company has been made whole with respect to lost revenues.

Q. At what level of purchased power prices would the savings from DSM exceed both its direct costs and the "lost revenue" component?

A. This level will vary because of the changing relationship between DSM expenditures and savings over time. DSM expenditures are largely up-front investments which generate savings over a multi-year period. During each year of the lifetime of DSM measures, energy savings increase the cumulative economic benefits relative to the up-front investment costs. I have prepared Table 3 to show the purchased power price at which the Company can recover both the up-front

direct cost element and the lost revenue element. Table 3 is based on the multi-year DSM initiative set out in Table 2.

Table 3 shows years in its first column. I include the six years of the DSM investment initiative I propose, plus a seventh year to show how savings continue even though direct utility DSM costs drop down to modest operation and maintenance levels. The second column shows the proposed utility DSM program

Year	Utility DSM ($$1000)	Sales Reduction (GWh)	Input Reduction (GWh)	Breakeven Price Utility ($/MWh)	Breakeven Price Ratepayer ($/MWh)
1	35,000	204	240	$52	$190
2	29,966	352	414	$52	$117
3	29,244	611	719	$52	$85
4	29,588	838	986	$52	$74
5	33,058	1,102	1,297	$52	$70
6	35,692	1,385	1,630	$52	$66
7	3,946	1,363	1,604	$52	$47

Table 3

expenditures. The third column is the reduction in electricity sales from the DSM investments. As the Study explains, there is nothing chimerical about these electricity savings projections, for they are based on measured results from similar programs to those I propose here. The fourth column scales up from retail sales losses to avoided generation inputs, using a 15 percent loss factor. The fifth column is the power market price ($52) that equates to the unit revenue loss to the Company, assuming an average base rate of $60 per MWh. The final column shows the power market price that is equal to the sum of both utility lost revenue

and the direct cost of DSM, on a per MWh of input basis. If avoided purchased power prices are above $52, the Company should quantify the avoided power supply costs above that level, and credit them to ratepayers, to help pay down the direct costs of DSM. For example, if there is a DSM cost recovery rider, these purchased power winnings could be credited to it, and the rider would be reduced accordingly.

Q. How would DSM initiatives achieve the reductions in electric energy sales and requirements that are shown in your table?

A. The specific DSM initiatives I propose are those I described above. They are based largely on the Study.

Q. If the Company adopts the program budget you propose and spends new monies on DSM, will that help it cope with near-term power market price pressures?

A. Yes, it will. Monies spent on DSM will produce savings in the Company's purchased power expenses that should equal or exceed amounts spent on DSM. It will also produce financial savings to the Company from other sources. In short, under the framework I propose, the Company will recover its DSM expenses dollar for dollar, while at the same time the DSM dollars it spends are likely to produce financial savings at least equal to and quite possible substantially in excess of the sum of those dollars and utility lost revenues.

Q. Please explain.

A. The first full year of DSM would cost the utility $190 per MWh saved, as shown in Table 3 above. Note that this is below the purchased power prices in the COB

cited by Mr. Widmer. If power market prices are at $190 per MWh, the Company will save over $47 million in expenses, and break even. As the electricity savings mount from year to year, the financial savings from DSM are very likely to increase to well over the total costs to implement the program. The actual financial value of the DSM savings will depend on both the near-term course of prices in the regional power market, and the underlying trends in avoided generation, transmission, and distribution costs. Table 3 simply shows the rapid decline in the breakeven purchased power price required to offset DSM costs.

The Company should track DSM impacts and the purchased power market savings resulting from them, so that the costs of DSM to the ratepayers can be reduced on a current basis, without waiting for another base rate case. Given current power market conditions, these winnings might bring the costs of DSM in rates or a DSM rider to zero within as short a time as one year.

Q. Should the Company's performance in implementing DSM be monitored?

A. Yes, it should. It is the regulatory norm to require periodic reporting of the implementation of DSM plans and programs. Reporting compares actual spending, participation, and estimated savings with their budgeted levels. Additionally, independent evaluations of the electricity savings realized by DSM, and its impact on retail markets, are usually provided for.

Q. How would the expenditures on DSM that you propose be recovered by the utility?

A. The expenditures for DSM programs approved by the Commission should be recovered from ratepayers. In order to invest in new DSM, the Company will

likely require assurance of full recovery of its spending on pre-approved programs. Pre-approval means that the reasonableness and prudency of pursuing these programs will not be questioned in any future proceeding, though of course prudency in management and implementation might be subject to review. Assurance of cost recovery generally entails the use of special cost recovery mechanisms.

Q. Why are special mechanisms used to recover utility DSM costs?

A. Mechanisms which allow the utility to recover from ratepayers only the actual amount it spends on approved DSM programs or activities are designed to eliminate the business incentive to under-spend on DSM. Once rates are set, every reduction in operating expenses is a contribution to the utility's bottom line. This is a desirable incentive for managerial efficiency that is embedded in traditional ratemaking. In the special case of DSM, however, one wants the utility to expend the agreed monies, and not to pocket them. Only if the monies are spent will the efficiency gains be realized. A DSM cost recovery mechanism removes the utility's incentive to spend as little as possible on DSM, because with such a mechanism money unspent is money unrecovered. In most jurisdictions, the cost recovery mechanism allows for some flexibility for the utility to go above the spending levels included in an approved DSM plan, within various limits, and still recover its full program costs. In most cases tariff riders are used.

Q. Do you believe that the Company needs positive incentives to reward successful performance in implementing DSM?

A. If the Company is assured of dollar for dollar recovery of its expenditures on a timely basis, this in itself constitutes a degree of cost recovery certainty that is lacking for other expenses included in base rates. Given the current power market context where the Company stands to realize the financial benefits we have been discussing, it does not appear that incentives beyond cost recovery are warranted. Note that there are a variety of additional financial benefits to the Company even beyond those relating to the purchased power savings discussed above — among them pure capacity savings from the load management elements in the program, some congestion benefit relating to the Company's transmission and distribution constraints in the Salt Lake Valley, and reduced sulfur dioxide emission allowance costs.

Conclusions

Q. What conclusions do you believe the Commission can draw from your testimony?

A. I believe that on the basis of the record the Commission can find as follows:

- In the Company's Utah service area there is a substantial untapped potential for load management, energy efficiency, and customer-sited combined heat and power, the total resource costs of which would be much less than the cost of supplying the equivalent retail electricity.
- To the degree it successfully reduces retail demand from the level that will otherwise occur, the Company will realize near-term financial benefits in its wholesale power transactions.

- Ratepayers will realize long-term financial benefits through a cumulative reduction in rates amounting to over $130 million in present value dollars.
- The $35 million first year DSM initiative proposed by me is feasible, and a substantial level of DSM funding continuing for five further years is reasonable.
- The Company has the capacity to immediately begin to implement this DSM initiative.
- A DSM cost recovery rider can match the Company's DSM revenue with its DSM expenditures in an accurate and timely fashion.

Q. Does this conclude your testimony?

A. Yes, it does.

Exhibit____(DN-1)

TELLUS INSTITUTE
Resource and Environmental Strategies

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Education

Ph.D.	Political Science, Massachusetts Institute of Technology
A.B.	Government, Clark University

Experience

1977-Present — Tellus Institute for Resource and Environmental Strategies:

- Co-founder, Tellus Institute, Inc.
- Manager, Energy Efficiency Program
- Research and consulting on energy efficiency strategies and programs, energy rate design, and energy and environmental planning.

1974-1978 — Associate Professor, State University of New York at Albany. Allen Center, then Graduate School of Public Affairs.

1973-1974 — Assistant Professor, Department of History and Political Science, Rensselaer Polytechnic Institute.

1973 — New York Civil Service Public Administration Intern, Department of Environmental Conservation, Albany.

Testimony*

Rate Design & Cost Allocation

Testimony before: Maryland Public Service Commission, docket 7456 (1981); Nevada Public Service Commission, docket 94-7001 (1995); New Hampshire Public Utilities Commission, docket DR 86-122 (1986); New York Public Service Commission, cases 91-E-1185 (1991), 27461 (1979); Ontario Energy Board, H.R. 24 submission (1996); Rhode Island Public Utilities Commission, docket 2036 (1992), docket 1888 (1987); South Carolina Public Service Commission, docket 86-188-E (1986).

Energy & Demand Forecasting

Testimony before: Arizona Corporation Commission, docket U-1345-85-156 (1986); Kansas Corporation Commission, dockets 120,924-U/142,098-U (1985), 120,924-U/142,099-U (1985), 120,924-U/142,100-U (1985); Massachusetts Department of Public Utilities, dockets 1656/1657 (1985); Missouri Public Service Commission, dockets ER-85-128/EO-85-185/EO-85-224 (1985); Nevada Public Service Commission, docket 81-660 (1982); Oklahoma Corporation Commission, cause 26669 (1980); Vermont Public Service Board, docket 4622 (1982).

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Testimony before: Colorado Public Utilities Commission, docket 99A-377EG (1999); docket 00A-008E (2000); Connecticut Department of Public Utility Control, dockets 85-10-22 (1986), 82-07-01 (1982), 81-06-02/04 (1981); Connecticut Power Facility Evaluation Council, docket F-80 (1980); Delaware Public Service Commission, Docket 94-83 (1995); Federal Energy Regulatory Commission, dockets ER82-481 (1982), ER81-179 (1981); Maine Public Utilities Commission, dockets 91-213 (1992), 82-112 (1984), U.3238/3239/3356 (1981); Massachusetts Department of Public Utilities, dockets 84-49/50 (1985), 84-84 (1985), 84-140 (1985); New Jersey Board of Public Utilities, dockets EX99050347 et al. (2000), EX99050347 et al. (1999), EE98060402 (1998), EX94120585U et al. (1998), ER97020101 (1997), 829-764 (1983), 8012-914C (1982), 822-116 (1982); New Jersey Senate, Energy & Environment Committee (1983); New York Energy Master Planning Board (1981); New York Public Service Commission, case 28223 (1983); North Carolina Utilities Commission, docket E-100 (1990); Ohio Public Utilities Commission, cases 91-700-EL-FOR et al. (1993), 92-708-EL-FOR, 92-1123-EL-ECP (1992), 88-170-EL-AIR (1989); Ontario Energy Board, EBROs 497 (1998), 495 (1997), 487 (1994); Pennsylvania Public Utility Commission, docket R-80011069 (1980); Rhode Island Public Utilities Commission, docket 1440 (1982); Vermont Public Service Board, dockets 5330 (1990), 5270 (1988), 5248 (1988); Virginia State Corporation Commission, docket PUE 800076 (1981); Wisconsin Public Service Commission, AP7 (1995).

Other Energy Analysis

Testimony before: Connecticut Siting Council, docket 74 (1987); Federal Energy Regulatory Commission, dockets ER85-106-000 (1986), ER85-646-000/ER85-647-000 (1986); New Jersey Board of Public Utilities (1983); New York Public Service Commission, case 28025 (1982); Texas Public Utility Commission, dockets 2606 (1979), 2572 (1979).

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*Testimony listed here was defended before agencies noted. Testimony that was filed but not heard is located in subsequent sections.

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1999 *Regulatory Incentives for Demand-Side Management.* Report to West Kootenay Power DSM Committee. Study 98-211.

1999 *Funding for Energy-Related Public Benefits: Needs and Opportunities With and Without Restructuring.* Report to the Colorado Governor's Office of Energy Management. Senior Author. Study 98-002/C2.

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1993 *GASCO, Inc. Integrated Resource Plan Report*, before the Public Utilities Commission of Hawaii. Docket No. 7261. Study 92-181. Co-author.

1992 *Evaluation of Public Service Electric & Gas Demand-Side Management Resource Plans*, Docket No. EX-90040304. Report to the N.J. Rate Counsel Division, Department of Public Advocate. Study 92-055. Principal investigator.

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1990 *Savings from the Smart Money Program: An Audit of the 125 MegaWatt Demand Reduction*. Report to Wisconsin Electric Power Company and the Wisconsin Public Service Commission. Study 89-127. Principal investigator.

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1988 *Toward a Conservation/Load Management Power Plant for the Centerior Energy Corporation Service Area*. Study 88-38D/1. Co-author.

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1988 *An Evaluation of Central Maine Power Company's Proposed Purchase of Power from Hydro Quebec.* Study 87-30. Co-author.

1988 *Commercial Sector Electricity Savings in Arizona: New Programs for Economic Efficiency in Energy Use*. Study 87-112. Project manager.

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1988 *1988 Annual Report to the Governor and the General Assembly.* Prepared for the Connecticut Energy Advisory Board. Study 87-097. Author.

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1986 *Kansas City Power and Light Company's 1985 Peak Load Forecasts and Models: Review and Critique*. Study 86-13/A. Principal investigator.

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1985 *Generating Plant Operating Performance Standards, Report No. 1: Survey of Existing Standards*. Study 85-22/1. Co-author.

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2000 Paper, "What's A Policy Maker To Do?" Western Regional Air Partnership Air Pollution Prevention Forum, Scoping of Energy Efficiency. San Francisco, CA, 31 May.

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1998 *Incentive Rate Regulation and Integrated Resource Planning.* Pre-filed testimony on behalf of The Regroupement national des Conseils régionaux de l'environnement du Québec. Co-author.

1998 *Incentives for DSM Performance by Consumers' Gas Company.* Pre-filed testimony on behalf of Enbridge Consumers Gas; Ontario Energy Board EBRO 497-01, Exh. C., Appendix D.

1997 Paper, "Industrial Eco-Efficiency and Total Cost Assessment: An Opportunity for Utilities." Presented at the Association of Energy Services Professionals Conference, Boca Raton, Florida. December.

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1990 Article, "The Conservation Utility: A New Institutional Approach," in UNEP *Industry and Environment Review*, Volume 13, No. 2. Co-author.

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1985 Paper, "Evaluation of the Massachusetts Energy Conservation Service," in *Proceedings: The Second National Conference on Energy Conservation Program Evaluation*, Argonne National Laboratory, Chicago.

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Other Professional Activity

1999 Lead instructor, U.S. Agency for International Development training course in Electric Resource Planning. Boston.

1998 Presentation to the Advisory Committee on Resource Planning of The Quebec Energy Board, Montreal.

1998 Panelist, Pollution Prevention & Energy Efficiency Training Session, Pollution Prevention Roundtable Conference, Cincinnati.

1996-2000 Consultant to the New Jersey Division of the Ratepayer Advocate for:

- comments on draft electricity & gas restructuring legislation, Tellus project 97-203;
- advice to Consumer Protection Task Force (restructuring issues), Tellus 96-145;
- evaluation of off-tariff rate agreements, Tellus 96-062;
- evaluation of gas and electric utilities' DSM cost recovery, Tellus 97-032, 97-213, 97-295; and
- development of policies and programs for public benefits funding of energy efficiency and renewable energy, Tellus 98-173.

1996 Consultant to the Kentucky Attorney General—technical assistance on DSM cost recovery. Tellus project 96-102.

1995-1998 Consultant to Massachusetts Division of Energy Resources for development of program and cost-effectiveness frameworks for gas utility demand-side management. Tellus projects 95-091C, 96-180.

1995 Consultant to Nevada Office of Advocate for Customers of Public Utilities for assessment of Sierra Pacific Power integrated resource plan, Docket 95-5001. Tellus project 95-153C.

1994-99 Consultant to Enbridge Consumers Gas (Ontario) for development and implementation of DSM programs. Tellus projects 95-051, 96-001, 97-001, 98-001, 99-001.

1994-98 Consultant to TGC (The Gas Company, Hawaii) for development of gas DSM programs. Tellus projects 93-271, 96-244.

1992-95 Technical agent to the commissioners, D.C. Public Service Commission, Formal Cases No. 917 and No. 917, Phase II. Tellus projects 92-107, 94-196.

1993-4 Consultant to the Staff of the Arkansas Public Service Commission for review of the integrated resource plans of three electric utilities. Tellus project 92-153C.

1993 Technical agent to the commissioners, D.C. Public Service Commission, Formal Case No. 929. Tellus project 93-141.

1992-93 Consultant to Ohio Office of Consumers' Counsel for training of staff and assessment of utility integrated resource plans. Tellus projects 92-41, 92-165.

1990-93	Consultant to Long Island Power Authority for implementation of conservation programs and participation in New York PSC cases 28223, 91-E-0382, and 92-E-0291. Tellus project 91-67.
1992	Consultant to Minnesota Office of Attorney General for assessment of Northern States Power integrated resource plan, Docket E-002/RP-91-682. Tellus project 91-254.
1990-91	Consultant to Connecticut Municipal Electric Energy Co-operative. Commercial customer surveys, end-use data base development, and DSM option screening. Tellus project 90-04.
1990	Presenter, "Evaluating Residential Conservation Programs," Workshop at "Affordable Comfort IV" Conference, Philadelphia.
1990	Consultant to Wisconsin Gas Company for preparation and implementation of DSM bid. Tellus project 89-145.
1989	Presenter, "New Ways to Deliver Energy Efficiency," Panel at "Making Housing More Affordable Through Energy Efficiency" Conference, Alliance to Save Energy, Washington, D.C.
1988-90	Independent representative on three-party panel administering Madison (Wisconsin) Gas & Electric Company conservation competition pilot program. Tellus project 88-79.
1989	Presenter, "Roundtable on Natural Gas Issues," 42nd Annual Symposium, New England Conference of Public Utilities Commissioners, Hartford.
1987	Advisor to Hull (Massachusetts) Municipal Light Plant in developing its Action Plan of demand-side programs for energy efficiency. Tellus project 86-88.
1987	Advisor to the Governor's Office of Energy Assistance, Rhode Island: utility rate design and conservation programs; electric resistance heating task force. Tellus project 86-78.

Other professional activity prior to 1985 available upon request.

04/01

Exhibit___(DN-2)

An Economic Analysis Of Achievable New Demand-Side Management Opportunities In Utah

Prepared for the System Benefits Charge Stakeholder Advisory Group
to the
Utah Public Service Commission

DOCUMENT FILED UNDER SEPARATE COVER

Volume I
Report

May, 2001

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Exhibit ____(DN-3)

Characteristics Associated with High Program Participation Rates

Program context
- High commitment of sponsor (including top management)
- Not supply constrained (enough budget, manpower, and materials to meet demand)
- Rising energy prices
- Expected energy shortages
- Favorable political and social climate

Program features
- Trusted, credible sponsor (e.g., local community groups, trade allies)
- Simplicity and convenience (one-step, direct installation)
- Financial incentives (no cost to customer)
- Marketing
  - Most effective techniques used (direct personal contact, door-to-door canvassing, telemarketing)
  - Market segmentation used
  - Targeted groups involved in program planning
  - Features matched to customer needs by market segment
  - Variety of barriers addressed
  - Duration (program lasts five years or more)
  - Sales training and rewards for program personnel
- Communication factors
  - Vivid, personalized information
  - Peer testimonials
  - Stress current loss instead of future gains
- Risk reduction
  - Quality control
  - Warranties
  - Guaranteed savings

Customer characteristics
- Residential
  - High income
  - High education
  - Middle-aged
  - Homeowner
  - Attitudes and lifestyle match program features
- Commercial
  - Large size
  - Hotel/motel

Community characteristics
- Rural, often with public power
- Well-integrated
- Conservation ethic

Source: Linda Berry, 1990. *The Market Penetration of Energy-Efficiency Programs*. Oak Ridge, TN: Oak Ridge National Laboratory, ORNL/CON-299.