The Rebirth of Utility DSM Programs in Nevada

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ABSTRACT

The two main electric utilities in Nevada, Nevada Power Company and Sierra Pacific Power Company, reinstituted a set of energy efficiency and load management programs for residential and smaller commercial and industrial customers in the spring of 2003. The programs, which are funded initially at $11.2 million per year, grew out of a demand-side management (DSM) collaborative involving the utilities, state Public Utility Commission staff, the state's consumer advocate, industry, and public interest groups. The results for the first year show the programs are surpassing original estimates of energy savings and peak load reduction. Based on these results, the programs are being refined, and new DSM programs are being developed by the collaborative. This paper reviews the background on DSM in Nevada, describes the new programs and their initial results, and summarizes other recent developments.

Background

Nevada adopted its first comprehensive statutory least-cost utility planning (now referred to as integrated resource planning, or IRP) process in 1983, drawing on the experience at the time of California and Wisconsin. The IRP process required all Nevada retail electric distribution utilities under the jurisdiction of the Public Service Commission[1] to file every two years a resource plan detailing their future 20-year resource acquisition strategy to meet customer growth. That plan, by statute, had to consider not only new generation options to meet load growth, but also the means to reduce load growth through energy efficiency and load management (also known as DSM) programs. This led Nevada Power and Sierra Pacific Power, the primary electric distribution utilities in Nevada, to implement an array of DSM programs from the mid-1980s through the mid-1990s. These programs enjoyed moderate success. For example, the two utilities reported spending about $11 million per year on DSM programs in 1993 and 1994, and saving 350 GWh/yr as of 1994 due to cumulative DSM efforts (EIA 1995).

In the late 1990's, Nevada, like many other states, was swept up in the public policy experiment to create competitive retail markets for electricity (generically termed "electric deregulation").[2] That experiment hypothesized that a radical change in the historical structure of providing electric service would reduce electric rates, increase reliability, and improve energy services for customers. Under restructuring, the traditional electric services of generation, transmission, and distribution supplied to retail customers by a single vertically-integrated electric utility granted a monopoly franchise to provide these integrated services would be unbundled into "competitive" and "non-competitive" services. The competitive services would

[1] The Commission was then designated in statute as the Public Service Commission of Nevada or referred to as the PSCN, but it is now designated in statute as the Public Utilities Commission of Nevada or referred to as the PUCN.
[2] Commonly referred to as "Electric Deregulation" the process actually entailed restructuring of the electric industry to competitive (lesser regulated) and non-competitive (regulated) components.

be provided by multiple electric service providers licensed by the state, and the non-competitive services would continue to be provided by monopoly utilities under state regulation.

Nevada embraced this model of electric restructuring in legislation passed in 1999.[3] The PUCN was responsible under the law for developing regulations to implement electric restructuring for Nevada's two jurisdictional electric utilities, Nevada Power Company serving the Las Vegas area, and Sierra Pacific Power Company serving Reno, Carson City, and Northern Nevada.[4]

As part of those regulatory determinations, the PUCN concluded that DSM programs were competitive and, therefore, were deregulated. Deregulating these programs meant the utility revenues derived from ratepayers were no longer available to fund such efforts. Sierra Pacific Resources (the holding company for both Nevada Power and Sierra Pacific Power at this time) decided to spin off its DSM programs into an unregulated subsidiary call "e-three". That entity was solely funded outside of the revenues of its subsidiary utilities, Nevada Power and Sierra Pacific. As a result of this PUCN ruling, existing DSM programs of the two subsidiaries were substantially halted as no ratepayer funds were available to support them.

In the spring of 2001 in the middle of the Western Energy Crisis, electric restructuring was repealed in Nevada.[5] This provided impetus for the utilities in the state to consider reinstituting customer-funded energy-efficiency and load management programs. In the early spring of 2001, Nevada Power (the Company) was also anticipating power supply shortages for the upcoming summer. In response, the Company formed a new department to launch its "Take Control" energy-efficiency effort. This effort was intended to educate customers on the efficient use of electricity and to capture immediate energy and capacity savings. DSM program scope and funding was relatively limited initially, about $2 million per year as of 2001 and $3 million in 2002. These programs were included as "trial programs" in the Company's refiled 2000 Resource Plan[6].

When it filed its Integrated Resource Plan (IRP) in 2000 and reinstituted limited DSM programs, the utilities also indicated that they would evaluate a wider range of DSM options. Other parties to the IRP proceeding suggested that potential DSM programs should be systematically examined. The PUCN agreed, which led to the formation of the DSM Collaborative in late 2001 as an adjunct to the IRP process.

At this point, several intervenors participating in the resource plan process joined with Nevada Power and Sierra Pacific (the Companies) to assist in the development of additional trial DSM programs. The participants in that process included the Companies' representatives, the Staff of the Nevada PUC, the Attorney General's Bureau of Consumer Protection (BCP), the public interest non-profit Land and Water Fund of the Rockies[7], the Southwest Energy Efficiency Project (SWEEP), Washoe County Legal Services, and other industry and higher education representatives.

The collaborative worked on DSM program design and analysis for about nine months, leading to a set of programs that passed the Total Resource Cost test and were supported by all members of the collaborative. The package of programs, with an estimated budget of $11.2

[3] SB 438, 70th Legislative Session.
[4] Independent of, but coincident with the passage of the 1999 Nevada restructuring statute, Nevada Power and Sierra Pacific Power merged under one parent company, Sierra Pacific Resources in July of 1999.
[5] AB 369, 71st Legislative Session. Large Customers over 1 MW were still provided the opportunity to acquire electricity through direct retail access. See AB 661, 71st Legislative Session.
[6] PUCN Docket No. 01-7016
[7] The Land and Water Fund of the Rockies has changed its name to Western Resource Advocates.

million per year, was proposed to the PUCN via a stipulation from all the parties to the collaborative, and it was later approved by the PUCN in October 2002. The utilities then worked on detailed program design, put out RFPs for contractors, selected contractors, and prepared for program launch. These activities were done relatively quickly, and the new programs were launched in April 2003.

One unique aspect of the collaborative was the compromise among the Staff of the PUC, the Land and Water Fund, SWEEP, and the BCP on the issue of the extent of DSM program implementation. The Staff argued in the collaborative meetings for limited program implementation based on concerns of ratepayer impacts and potential inequities in the distribution of program funds. The Land and Water Fund, SWEEP, and the BCP argued for more extensive program funding and implementation based on demonstrated benefits to the entire utility system. Eventually a compromise was reached, providing $11.2 million in annual funding for the new programs.

As part of the compromise, the PUNC Staff desired to implement an effective time-of-use (TOU) rate for residential customers. Nevada Power has one of the worst load factors in the country (less than 50%), primarily due to the heavy residential air-conditioning loads in Las Vegas. The Staff argued that this load factor could be improved with an effective TOU rate program for the residential customer class. In an effort to accommodate this need, the other parties to the stipulation agreed to couple a TOU rate for the residential class with a high-efficiency air-conditioning incentive program. This compromise broke the stalemate in the collaborative and allowed all parties to move ahead with a robust set of "trial programs."

Program Descriptions

Air-Conditioning Rebate Program with Time-of-Use Rate Component

This innovative program promotes TOU rates along with central air-conditioning (CAC) system efficiency improvements. Residential customers that accept TOU rates are eligible for an incentive if they replace their CAC system with a high-efficiency unit, tune up their current CAC system, or seal their duct work. Rebates on high-efficiency CACs are on a sliding scale starting with a SEER rating of 13 or greater. By combining TOU rates with air-conditioning energy efficiency, it is expected that the peak load reduction is increased, although this still needs to be verified through program impact evaluation.

Air-Conditioning Load Management

These programs promote the installation of CAC cycling controls in homes on a voluntary basis. In the Las Vegas area, the control interrupts CAC operation for 7.5 to 10 minutes per 30 minutes during periods of high temperature, high wholesale electricity prices, or any other system or regional power emergency. CAC cycling occurs June through September, and customers who accept the control are given a $15 per month bill credit during these months. Most of the installations are simple one-way controls. But a newer two-way control was tested in 42 homes in 2003. This more sophisticated control provides greater peak load reduction per home, more reliable interruption capacity, monitoring of customer behavior during the interruption, and improved customer-utility interaction. This trial will continue with another 160 units in 2004 and 800 units in 2005.

ENERGY STAR® Appliances

This program provides incentives for the purchase of ENERGY STAR®-qualified refrigerators, clothes washers, dishwashers, and room air conditioners, as well as higher efficiency electric water heaters during a two-month period in 2003. In addition, incentives were restarted for ENERGY STAR clothes washers later in 2003 in combination with the national ENERGY STAR clothes washer "Double Your Savings" campaign.

Second Refrigerator Collection

This program encourages customers to recycle old refrigerators by giving them a $30 rebate and picking up the old refrigerator from the customers' home. The main target is to recycle second refrigerators, although primary refrigerators as well as freezers are also accepted. The refrigerators and freezers that are collected are shipped to California where they are recycled. In 2004, the CFCs in the insulation are being recovered and destroyed, along with the CFCs in the cooling system.

Residential CFL Promotion

This program encourages the purchase of ENERGY STAR-qualified compact fluorescent lamps (CFLs) by offering "Buy 1, Get 1 Free" sales at a wide range of stores. The program also educates retailers and consumers about the benefits of CFLs. The program has been very successful, exceeding its initial goals.

Commercial and Industrial Sector Incentives

This program provides incentives to small- and medium-sized commercial and industrial customers in order to encourage them to implement cost-effective energy efficiency improvements. The program offers prescriptive incentives on common lighting, HVAC, and motor efficiency measures as well as custom incentives for measures not covered under the prescriptive rebates. In addition, eligible customers can receive technical support. In 2004, the program was extended to all commercial and industrial customers.

Vending Miser®

This program provided incentives for installing the Vending Miser® on vending machines. The Vending Miser turns off the refrigerator compressor circuit and the advertising lighting when there is no traffic in front of the vending machine. A pilot program showed 15-50% electricity savings. The $100 rebate is offered directly to the manufacturer, reducing the cost of the Vending Miser from $179 to $79. Most of the 700 units installed in 2003 were within the Clark County School District.

Builder Support and ENERGY STAR New Homes

This program funds energy efficiency education for builders in partnership with the local building community, helps to demonstrate innovative home designs and construction techniques, and co-funds the highly successful ENERGY STAR new homes partnership program in the greater Las Vegas area. For the first three quarters of 2003, 46% of all new homes in Las Vegas qualified as of ENERGY STAR new homes. This is up from 25% in 2002.

Low-Income Weatherization

The utilities support Nevada's weatherization assistance program through contractor training, financial assistance, inspection and monitoring. In particular weatherization contractors and state Housing Division staff were trained in duct sealing in 2003. The utilities also help to educate occupants of weatherized homes.

Technology Testing and Demonstration

This program focuses on evaluating promising technologies and in communicating the associated energy savings and other benefits to consumers. The following technologies were analyzed in 2003:

- Next generation evaporative cooler
- Electric motor voltage controller
- Water-cooled residential central air-conditioning systems
- Advanced refrigerant management system for large commercial air-conditioning systems

The water-cooled CAC systems showed 40-60% energy and peak demand savings over similar air-cooled unites, but with some increase in water use.

Other

Other DSM programs implemented by the Nevada utilities include home energy audits, grants to non-profit agencies for energy-efficiency projects, incentives for residential photovoltaics (PV) systems, and general energy-efficiency education.

Results

Tables 1 and 2 show the program budgets, number of measures installed, estimated energy savings, and peak demand reduction for calendar year 2003. The energy savings and peak demand estimates in the table are mainly engineering estimates based on standard industry values or procedures. To support these estimates, most programs included monitoring and verification activities to check the estimated savings values.

The estimated energy savings from the first year of program activity, about 34.8 GWh/yr for the two utilities combined, were 145% of the projected energy savings at the start of the

effort. Similarly, the combined peak demand reduction, 16 MW, was 112% of the projected peak demand reduction at the start of the programs. The programs as a whole are surpassing original savings goals and, consequently, are very cost-effective from a Total Resource perspective, since all programs combined were designed to have a benefit-to-cost ratio in excess of 1.0 using the Total Resource Cost test. Furthermore, the energy savings estimates are conservative -- no savings are assumed where the utilities are contributing to broader energy-efficiency efforts (e.g., the Las Vegas ENERGY STAR new homes program or the state's low-income weatherization program).

Considering specific programs, the commercial and industrial incentive program and the CFL program both significantly exceeded initial savings projections. On the other hand, the residential CAC program was running well below original participation and savings targets. This is attributed to the complexity of combining acceptance of TOU rates with the CAC efficiency measures. However, participation in this program increased steadily throughout the year. Also, participation in the irrigation program in Northern Nevada was relatively limited in 2003.

The appliance rebate program was very successful; in fact the initial rebate budget was nearly exhausted after only three weeks. The appliance rebates were extended by shifting funding from other programs. The nearly 5,000 appliances that received rebates during the two-month campaign was nearly twice the original target (Zugel et al. 2004).

As can be expected, there was some shifting of resources and refinement of program design and marketing strategy during the first nine months, and some program changes were implemented in 2004. For example, some of the rebate levels were reduced and the ENERGY STAR refrigerator rebate was coupled to recycling an old refrigerator. Nevada Power is increasing its marketing of high efficiency CAC units as well as ENERGY STAR appliances and CFLs to the new homes market. In the commercial sector, the Vending Miser measure was incorporated into the broader C&I incentive program.

Regarding the air-conditioning efficiency program, air-conditioner tune-ups and duct sealing incentives were decoupled from the acceptance of TOU rates, but this linkage was maintained for the high-efficiency CAC incentive. Focus groups have indicated general customer satisfaction by those program participants who were required to switch to the TOU rate in order to get the CAC incentive. More experimentation and evaluation will be necessary to determine the relative benefits and barriers that such coupling produces.

New Developments

The Nevada DSM Collaborative is continuing to review and provide feedback on the programs begun in 2003, as well as suggest new programs that could be initiated in the future. In early 2004, the Collaborative developed and analyzed six potential new programs including a commercial new construction program, an "ENERGY STAR +" new homes program, a schools program, a cool roofs program, a PC power management program, and a program targeted to high usage households. Initial screening showed that all the programs appear to pass the Total Resource Cost test.

The schools program is likely to begin in 2004 using currently available funding. The other programs are under review by the utilities, and they are likely to be proposed for initiation in 2005 with support from the DSM collaborative, and/or included in future IRP filings by the utilities. A new IRP will be filed by Sierra Pacific Power in mid-2004 and a new IRP by Nevada Power in 2006.

Table 1. 2003 DSM Program Results, Nevada Power Company

Program	Annual Budget (Million $)	No. of Units	Electricity Savings (GWh/yr)	Peak Demand Reduction (MW)
Low-income & Senior ACLM	1.10	4,447	0.16	5.3
Residential ACLM	1.40	3,464	0.13	4.2
High Eff. CAC with TOU rates	1.64	376	0.52	0.32
AC Tune-ups with TOU rates	0.625	1,033	0.41	0.26
AC Duct Seal with TOU rates	0.475	130	0.12	0.08
Second Refrigerator Collection	0.51	3,387	5.23	0.90
Residential CFL	0.20	32,649	1.85	--
Energy Star Appliances	0.55	4,240	1.42	0.13
Vending Miser	0.15	700	0.84	--
C & I Incentives	0.80	158	13.90	2.8
Low-income weatherization support	0.87	178	--	--
New homes	0.10	--	--	--
Other	0.78	--	--	0.17
Total	9.20	--	24.58	14.16

In summary, the rebirth of DSM programs in Nevada in 2003 was considered successful, exceeding the original energy savings and peak demand reduction goals by a significant margin. The DSM collaborative is considered an important part of this effort, both for bringing forward good ideas with respect to DSM program design and for developing broad support for the programs before they are submitted to the PUCN for approval.

DSM spending is still at a relatively modest level in Nevada, specifically about 0.5% of total utility revenues as of 2003 and 2004. But considering the high demand growth occurring in the state, the large potential for cost-effective electricity savings, the success of the 2003 DSM programs, and the states' IRP framework, it is fair to assume that Nevada will increasingly pursue its energy efficiency and load management resources in the coming years.

Table 2. 2003 DSM Program Results, Sierra Pacific Power Company

Program	Budget (Million $)	No. of Units	Electricity Savings (GWh/yr)	Peak Demand Reduction (MW)
Irrigation pump and motor education and rebates	0.16	8	0.24	0.26
Second Refrigerator Collection	0.19	1,591	2.44	0.38
Residential CFL	0.03	8,133	0.44	--
Energy Star Appliances	0.315	2,032	0.76	0.06
Vending Miser	0.04	36	0.04	--
C & I Incentives	0.33	86	6.26	1.12
Low-income weatherization support	0.45	117	--	--
New homes	0.10	--	--	--
Other	0.39	--	--	--
Total	2.00	--	10.18	1.83

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