Utility Energy Efficiency Programs and Systems Benefit Charges in the Southwest

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Executive Summary

The Southwest region is the fastest growing region of the country in terms of both population and electricity demand. Most of the electricity produced and consumed in the region comes from coal-fired power plants. Given the high rates of load growth, many new power plants are being constructed or planned. Utilities are mainly building gas-fired power plants, but some new coal-fired plants have been proposed as well. New power plants are often controversial due to adverse local or regional environmental impacts, water consumption, global warming concerns, and siting problems.

Only two utilities–Xcel Energy in Colorado and PacifiCorp in Utah–are implementing relatively comprehensive energy efficiency programs that include wide-ranging financial incentives. Xcel's programs include rebates for high efficiency residential air conditioning systems, a bidding program that provides incentives based on the energy savings and peak load reduction achieved in the commercial and industrial sectors, and pilot programs to increase the energy efficiency of both new and existing commercial buildings. PacifiCorp offers either prescriptive rebates or incentives based on energy savings and peak load reduction achieved in commercial and industrial facilities. PacifiCorp also is distributing free compact fluorescent lamps to its residential customers.

Total utility spending on energy efficiency programs in the Southwest region was about $32 million per year as of 2001-02, less than 0.3 percent of total utility revenues from sales to retail customers (see Table ES-1). While Arizona, Nevada, and New Mexico have adopted a Systems Benefit Charge (SBC) to fund certain "public benefit" activities, none of these states are devoting the funds collected to broad-based energy efficiency programs.

Adopting a substantial SBC in each state could greatly expand funding for energy efficiency programs. In particular, a surcharge of two tenths of a cent per kWh would raise about $290 million per year for energy efficiency efforts or about nine times current funding (see Table ES-1). This level of spending on energy efficiency programs could reduce electricity consumption in the Southwest region by about 7 percent in 2010 and 10 percent in 2020 (see Table ES-2). Projected load growth would fall by about one-quarter and around 16 large baseload power plants would be avoided by 2020. Consumers and businesses would realize electricity savings worth about 2.5 times the cost of the SBC over the 2003-2020 time period.

Adopting a substantial SBC could significantly reduce future CO_2 emissions in the region, thereby helping the region and the United States restrain growth in greenhouse gas emissions. But adopting the SBC is likely to have a relatively minor impact on SO_2 and NO_x emissions in the region because new power plants are much cleaner than older plants with respect to these air pollutants.

Table ES-1 – Current Utility Spending on Energy Efficiency Programs and Level of Spending if the Proposed SBC were Adopted

State	Energy efficiency programs as of 2001-02 (million $ per year)	Energy efficiency programs under the SBC proposal (million $ per year)
Arizona	3	95
Colorado	10	66
Nevada	3	45
New Mexico	2	29
Utah	12	37
Wyoming	2	19
Region	32	291

Table ES-2 – Incremental Electricity Savings from the SBC and Impact on Electricity Demand Growth

State	Electricity savings in 2010 (GWh/yr)	(%)	Electricity savings in 2020 (GWh/yr)	(%)	Elect. demand growth 2002-2020 (%/yr) Base Case	SBC Case
Arizona	5,570	7.4	10,740	11.1	2.5	1.9
Colorado	3,340	6.5	6,240	9.9	2.1	1.5
Nevada	2,600	7.0	5,060	10.7	2.7	2.1
New Mexico	1,560	6.9	2,900	10.6	2.0	1.4
Utah	1,460	5.1	2,780	7.5	2.5	2.0
Wyoming	960	6.7	1,790	10.1	2.0	1.4
Region	15,490	6.7	29,510	10.2	2.4	1.75

I. Introduction

The Southwest region is the fastest growing region of the country in terms of both population and electricity demand. During 1990-99, electricity consumption increased 5.4 percent per year in Nevada, 4.0 percent per year in Utah, 3.7 percent per year in Arizona, 3.1 percent per year in Colorado, and 3.0 per year in New Mexico (EIA 2001a). For comparison, national electricity consumption increased 2.4 per year on average during this period.

The Southwest region is also "coal country" and is rich in natural gas resources as well. Coal-fired power plants provided 96 percent of the electricity generated in Wyoming, 94 percent of that generated in Utah, 86 percent in New Mexico, 82 percent in Colorado, 58 percent in Nevada, and 46 percent in Arizona as of 1999. Coal-fired power plants serve load in the region and also produce a substantial amount of electricity that is transmitted to nearby states such as California. With plentiful and inexpensive fuels, electricity is relatively cheap in the Southwest region (e.g., the retail price of electricity averages 6.0 cents/kWh in Colorado and just 4.9 cents per kWh in Utah).

High electricity demand growth over the past decade eliminated surplus generating capacity built up during the late 1970s and 1980s. As a result, many new power plants and associated T&D facilities are currently under construction or proposed in the region. Utilities are mainly constructing gas-fired power plants, but some new coal-fired power plants have been proposed as well. These new power plants are often controversial due to adverse local or regional environmental impacts, water consumption, global warming concerns, and siting problems (LAW Fund 1996).

Concerning environmental impacts, the Environmental Protection Agency has issued regulations to improve visibility in national parks and wilderness areas, a policy known as the Regional Haze Rule (WRAP 2001). States in the Southwest region must develop implementation plans by the end of 2003 for cutting emissions of fine particles and other haze-causing pollutants. Rapid growth in electricity use and power generation will make it more difficult for states to comply with EPA's Haze Rule and other environmental requirements.

II. Systems Benefit Charge Overview

In order to support energy efficiency programs and other "public benefit" activities, over 20 states and the District of Columbia have enacted system benefits charges (SBCs) through a small surcharge on all kilowatt-hours flowing through the transmission and distribution grid (Kushler and Witte 2001). The amount of the SBC varies from less than one-tenth of a cent per kilowatt-hour (kWh) in some states to up to four-tenths of a cent per kWh in others. Considering that the average price of electricity paid by all customers in the United States (residential, commercial, and industrial) was about 7.2 cents/kWh in 2001, the typical SBC is equivalent to about a 2 or 3 percent surcharge on all electricity sold.

The allocation of SBC funds varies from state to state. Some states such as California, Wisconsin, and Connecticut fund energy efficiency programs, assistance to low-income

households, renewable energy implementation, and research and development (R&D). Other states apply SBC funds to only some of these purposes. In general, energy efficiency programs receive the largest portion of SBC funds (Kushler and Witte 2001).

The administration of energy efficiency programs funded through an SBC also varies from state to state. In some states such as California, Massachusetts, and Connecticut, energy efficiency programs are implemented by distribution utilities. In other states such as New York, Wisconsin, and Ohio, the funds are passed to a state agency that implements energy efficiency and other programs. In some cases, implementation occurs through contracts with non-governmental program implementors. In Vermont, policy makers created an "energy efficiency utility" to implement energy efficiency programs statewide using funds collected through the SBC. In the Pacific Northwest, a portion of funds flow to a nonprofit organization (the Northwest Energy Efficiency Alliance) that implements energy efficiency programs at the regional level.

Experience with utility energy efficiency programs in many states including California, the Pacific Northwest, New York, and New England shows that these programs have been very cost effective. The overall cost of saved energy including utility and participant costs is typically about $0.025/kWh, 50-65 percent less than the marginal cost of supplying electricity including generation, transmission and distribution costs (NRDC and SVMG 2001; NPPC 2001; Nadel and Kushler 2000). Energy efficiency programs reduce load growth and the need for costly, polluting, and often controversial new power plants; reduce the need for transmission and distribution system investments, provide a hedge against future fuel or electric power price volatility; and increase the reliability of the power grid.

Energy efficiency efforts were instrumental in helping California respond to its 2001 power crisis. Both the state and utilities greatly expanded their energy efficiency programs that year, resulting in over 7,000 MW of peak load reduction (more than a 10 percent reduction) by August, 2001 (Matthews 2001). California was able to avoid power shortages during the summer of 2001 mainly as a result of these energy and peak demand savings. California's efforts built on the base of energy efficiency education, technical assistance, and incentive programs implemented under the state's SBC. According to Scott Matthews, a senior official at the California Energy Commission, "Conservation is still the fastest and cheapest way to fix a demand/supply imbalance."

III. Status of Utility Energy Efficiency Programs and Systems Benefit Charges in the Southwest Region

Utility spending on energy efficiency programs in the Southwest region reached its peak during the early 1990s. Since then, the energy restructuring movement and other factors have resulted in less spending on energy efficiency programs. According to the Energy Information Administration, utilities in the Southwest region (AZ, CO, NV, NM, UT, and WY) spent about $16 million on energy efficiency programs as of 1999, only about 0.14 percent of their total revenues (EIA 2001b). For comparison, utilities in California, Oregon, and Washington spent 1.25 percent and utilities in New England spent 1.42 percent of their revenues on energy efficiency programs that year.

As explained below, utility funding of energy efficiency programs increased since 1999 in a few Southwest states (most notably Colorado and Utah). But funding for energy efficiency programs declined in other states (most notably Arizona). Moreover, energy efficiency program funding is well below what is justified considering the high growth occurring in the region.

Arizona

Utilities in Arizona reported spending $4.5 million on their efficiency programs in 1998 and $6.4 million in 1999 (EIA 2001b). In September 1999, the Arizona Corporation Commission (ACC) instructed utilities to include a SBC in their restructuring plans. Initially the SBC was intended to fund renewable energy, environmental, demand-side management (DSM), low-income assistance, consumer education, R&D, and nuclear fuel disposal and power plant decommissioning programs. However, the SBC currently is being used mainly to support renewable energy development in Arizona.

In May 2000, the ACC adopted an Environmental Portfolio Standard that requires utilities to derive at least 0.2 percent of their electric power from new solar and other renewable energy sources as of 2001, with the renewable energy fraction increasing to 1.1 percent by 2007. Half of this renewable generation must come from solar electric technologies. To support this renewable energy mandate, utilities were allowed to transfer public benefits funds, with the exception of low-income assistance programs, to the Environmental Portfolio Standard budget. The total SBC budget as of 2001 was approximately $28 million per year, including expenditures by IOUs, the Salt River Project, and rural electric coops (Kushler and Witte 2001). Most of this funding is devoted to acquiring renewable energy generation.

The upshot is that while utilities in Arizona are supporting renewable energy sources including solar photovoltaic power projects, they are carrying out very modest energy efficiency programs. It is estimated that utilities in Arizona spent only about $3 million (less than 0.1 percent of total revenues) on energy efficiency programs in 2001-02 (Schlegel 2002). The specific energy efficiency programs being implemented by utilities in Arizona as of 2002 include:

Arizona Public Service: promotion and financial assistance for energy-efficient home construction; on-line audits, low-income weatherization assistance, and other information dissemination programs.
Tuscon Electric Power: incentives energy bill guarantee for energy-efficient new home construction, low-income weatherization assistance, educational programs.
Salt River Project: on-line audits, lighting audits, promotion of energy-efficient new construction.

The prospects for expanding the scope of the SBC and/or increasing utility efficiency programs in Arizona do not appear promising at this time. Utilities in Arizona are focused on building additional power plants and T&D capacity, and getting regulatory approval for doing so. In 2001, Tuscon Electric Power, along with the Salt River Project, requested approval for

doubling the capacity of the 760 MW coal-fired power plant in Springerville, AZ. Environmental advocates argued for expanded energy efficiency programs to offset some or all of this proposed plant, but to date the utilities and PUC have not been supportive of this recommendation (Schlegel 2002).

The utility commission and legislature oversee implementation of the restructuring rules and related legislation. The ACC has opened a regulatory proceeding to investigate the implementation of utility restructuring in Arizona. The effect that restructuring has had on energy efficiency efforts is among the issues the ACC is considering. The ACC or legislature could review and modify the scope and size of the SBC in order to expand energy efficiency funding and programs. But considerable work is needed to educate the utility commission and legislature regarding the need for and potential benefits from expanded energy efficiency programs.

Colorado

Colorado has not yet approved electric utility restructuring legislation and has no systems benefit charge or general policy on energy efficiency programs for electric utilities. In July 2000, the Public Utilities Commission accepted a settlement proposed by Xcel Energy (previously known as Public Service of Colorado) and other parties regarding DSM programs as part of an Integrated Resource Planning proceeding. Xcel is the largest utility in Colorado and is responsible for about 60 percent of the power sold in the state. The Settlement calls for Xcel to spend up to $75 million over five years on energy efficiency and load management programs, with a goal of reducing peak load in 2005 by 124 MW.[1] Xcel Energy indicated it thought it could reduce peak demand by about 200 MW if it spent the full $75 million and the company offered to do so. But the PUC insisted that it limit its efforts to the 124 MW goal, and achieve this goal spending as little as possible.

Regarding its DSM efforts, Xcel Energy offers financial incentives for energy efficiency improvements in commercial buildings through a bidding program. Building owners, contractors, or energy service companies (ESCOs) propose projects and incentive levels, and Xcel selects the most attractive projects to support. The program goal is to achieve 22 MW of peak load reduction in the 2001-2002 program cycle, but only about 7 MW had been implemented and verified as of March, 2002 (Gruen 2002). Consequently, the program was revamped in order to make it easier for businesses and ESCOs to participate.

Xcel provides rebates to stimulate sales of high efficiency air conditioners and bill discounts to consumers that accept cycling controls on their air conditioners. The high efficiency AC rebate program also was revamped for 2002 including shifting from incentives for vendors to incentives for consumers, adding a thermal expansion valve requirement for qualifying units, and providing an additional incentive to contractors that demonstrate proper system sizing (Lawless 2002).

[1]The DSM Settlement Agreement was approved by two of three PUC commissioners but was strongly opposed by Chairman Gifford who questioned the legality and viability of such programs in Colorado.

Xcel is expanding its DSM programs in 2002, including conducting a pilot new construction design assistance and financial incentives program and a pilot re-commissioning program for existing commercial buildings. Both types of programs have been successfully implemented in other states and were judged to be cost-effective in Colorado based on a DSM potential study commissioned by Xcel Energy (Schiller Associates 2001).

Some of Colorado's municipal utilities and rural electric cooperatives are conducting energy efficiency programs as well. Fort Collins Light and Power provides zero-interest loans for home weatherization projects. The Platte River Power Authority provides rebates on Energy Star air conditioners and other measures that reduce peak electric demand to municipal utility customers in Fort Collins, Loveland, Longmont, and Estes Park. Colorado Springs Utilities offers low-interest loans for a wide range of residential energy efficiency measures. And the Delta Montrose Electric Association subsidizes the purchase of geothermal heat pumps by its customers.

An SBC proposal has been developed by a group of energy efficiency and renewable energy supporters in Colorado.[2] This proposal, shown in the accompanying box, calls for a surcharge of 0.2 cents per kWh on retail sales of electricity in Colorado. It would generate about $85 million per year with the typical household paying an additional $1 per month. Funds collected would be used to expand energy efficiency programs, low-income weatherization efforts, and support innovative renewable energy technologies. The proposal states that these activities could be implemented either by utilities or other program administrators. This SBC proposal was introduced in the Colorado legislature in early 2002, but was not approved at the Committee level in large part due to opposition by utilities in the state.

Adopting an SBC along these lines would expand funding for energy efficiency programs in the Xcel service area as well as in other parts of the state. It also would clarify that Xcel is to seek cost-effective energy savings as well as peak load reductions. A statewide scope is important because municipal utilities and rural electric cooperatives supply nearly 40 percent of electricity sold in Colorado.

There are precedents for enacting an SBC in Colorado. A bill approved in 1999 (S.B. 99-153) establishes "voluntary restructuring" for retail natural gas service. Among its provisions, it states that any gas distribution utility that voluntarily provides for consumer choice between competing gas suppliers shall implement a public benefits charge to help defray the cost of low-income energy bill assistance and weatherization programs. The charge is set at three-quarters of one percent of retail gas revenues. But the charge has not been implemented yet as gas distributors have not elected to offer consumer choice with respect to gas supply. Similarly, the Colorado legislature approved a bill in 1999 allowing use of an SBC type mechanism for recovering the cost of pollution control equipment voluntarily installed on coal-fired power plants. This provision will start to used by Xcel Energy in 2003.

[2] SWEEP took the lead in developing this proposal.

Colorado Systems Benefit Charge Proposal

1. The size of the SBC would be $0.002 per kWh sold at the retail level.

2. The SBC would be mandatory for all distribution utilities providing retail electric service in CO--investor-owned utilities, municipal utilities, and rural electric cooperatives.

3. The SBC would be used to fund energy efficiency programs, low-income weatherization efforts, incentives for innovative renewable energy technologies, and environmentally-oriented R&D activities, including activities already underway in these areas and currently included in utility cost of service.

4. Utilities would be directed to spend at least 15 percent of SBC funds on home weatherization programs, at least 50 percent on general energy efficiency programs, and at least 15% on renewable energy technologies, with the allocation of the remaining 20 percent up to the utility.

5. Funds collected under the SBC would be spent by the utility that collects them, but the utility would have the option of passing on all or a portion of the funds to other program implementors such as ESCOs, non-profit groups, or state agencies.

6. Utilities would prepare spending plans and reports on SBC expenditures and impacts annually. The PUC would provide oversight and accountability of SBC activities carried out by investor-owned utilities. Oversight of programs carried out by municipal utilities and rural electric coops would be provided by their governing authorities.

7. Any unspent SBC funds in a particular year would be carried over by the utility to the next year.

Nevada

Nevada is the highest growth state in the country in terms of population and electricity demand. In July 1997, Nevada adopted utility restructuring legislation. This legislation encourages utilities to promote energy efficiency, carry out R&D, and undertake renewable energy development, but it does not call for a formal SBC or require energy efficiency programs. In 2001, this legislation was repealed and a new restructuring bill (A.B. 661) was passed in the final hours of the legislative session. The new restructuring law includes a SBC on retail electricity and natural gas sales in order to support low-income bill assistance and weatherization programs. The amount of the charge is 0.039 cents per kWh and 0.33 cents per therm of natural gas, which yields about $13 million per year at current levels of energy use. The charge does not apply to gas sales for electricity generation or electricity use for electrolytic processes. The bill indicates that 75 percent of the funds collected should go to bill assistance and 25 percent to home weatherization.

The investor-owned utilities in Nevada, Nevada Power Co. and Sierra Pacific Power Co., have merged and together account for about 90 percent of electricity sales in the state. The

utilities reported spending no money on energy efficiency and load management programs in 1999 but restarted some modest programs in 2000. In 2001, the two utilities spent a total of about $3 million on:

- bill discounts for residential AC cycling,
- rebates for lighting efficiency measures implemented by commercial customers,
- incentives for customer-designed efficiency projects in the commercial sector,
- residential energy audits,
- grants for weatherization of low-income households, and
- energy efficiency education and promotion efforts.

With the repeal of the original restructuring legislation, the Nevada PUC again is requiring utilities to submit integrated resource plans (IRPs) every three years. In their 2001 plans, Nevada Power and Sierra Pacific Power listed a number of DSM programs "for future consideration". As part of the IRP proceeding, SWEEP and the Land and Water Fund of the Rockies proposed a collaborative process for developing and analyzing a wide range of additional DSM program options. The utilities accepted this proposal as did other parties to the proceeding. The DSM collaborative was launched in November, 2001 and concluded in February, 2002. It developed and analyzed the cost effectiveness of about 40 different energy efficiency and load management program options. Many were shown to be cost effective from a total resource perspective.

Based on the work of the collaborative, the utilities proposed expanding their DSM programs in a March 1, 2002 filing with the Nevada PUC. New programs include promotion of Energy Star appliances and new homes, incentives for high efficiency air conditioning in the residential and commercial sectors, a pilot duct sealing program, a recycling program for older refrigerators, a vending machine efficiency program, and expanded load management programs. The proposed budget for these programs is $10.5 million in 2003 and $15 million in 2004 (about 0.5 percent and 0.75 percent of total utility revenues, respectively). The Nevada PUC is reviewing this request and is likely to receive testimony from energy efficiency advocates praising the broad scope of this proposal but calling for significantly greater funding for the proposed programs.

There is no effort underway to expand the scope or size of the current SBC. If working with the utilities and PUC fails to result in greatly expanded energy efficiency programs, it may be possible to convince the legislature to add funding to the SBC for this purpose.

New Mexico

Utilities in New Mexico reported spending about $1.5 million on energy efficiency programs in 1998 and 1999 (EIA 2001b). In April 1999, New Mexico adopted utility restructuring legislation. This law creates a small SBC of 0.3 mills/kWh to fund energy efficiency, low-income assistance, renewable energy, and consumer education programs. The SBC, which totals about $6 million statewide, was scheduled to begin in 2002. But implementation of the restructuring legislation was postponed by the legislature due to the electricity crisis in California. Administration of the SBC is going forward under the Dept. of Environment which has opened a rulemaking to develop the details regarding implementation.

In the mean time, utilities in New Mexico are operating relatively minimal energy efficiency programs. Public Service Co. of New Mexico, the largest utility in the state, provides basic energy savings information through bill inserts and the internet. Xcel Energy, which bought Southwestern Public Service Co. and is the second largest utility in the state, provides low-interest loans for energy projects implemented by its commercial and industrial customers. Xcel also sells compact fluorescent lamps at a discount and is starting some energy efficiency incentive programs in 2002.

Utah

Utah has not yet approved electric utility restructuring legislation and has no systems benefit charge or general policy on utility energy efficiency programs. Utah does have IRP requirements. In May, 2000, the state utility commission established an SBC task force that was charged with evaluating the cost-effective energy efficiency potential in Utah, the success of previous utility efficiency programs, and the desirability of an SBC mechanism. The task force hired the Tellus Institute to carry out an efficiency potential study that was completed in March, 2001. It concluded that there is substantial cost-effective energy savings as well as cogeneration potential in the state (Nichols and von Hippel 2001).

PacifiCorp, the main utility in the state through its subsidiary Utah Power and Light, spent only about $2 million per year on energy efficiency programs in recent years.[1] But due in large part to the Tellus report and testimony filed in the last IRP proceeding, PacificCorp developed an expanded set of energy efficiency programs that were launched in mid-2001. The total budget for these programs is around $12 million per year. The DSM programs that PacifiCorp launched or expanded in 2001 include:

- a residential compact fluorescent lamp distribution program;
- a prescriptive rebate program for a wide range of energy-efficient lighting, HVAC, and other efficiency measures implemented by commercial and industrial customers;
- incentive payments per unit of energy and peak demand saved for customized efficiency projects implemented by larger commercial and industrial customers.

This initiative places Utah at the top of the list with respect to energy efficiency program spending as a percentage of electric utility revenues in the region (about 1 percent of revenues in Utah, compared to less than 0.3 percent of revenues for the region as a whole).

In addition to these energy efficiency programs, PacifiCorp implemented its "Power Forward" program in the summer of 2001. This program asked consumers to voluntarily reduce electricity demand during periods of high load, potential shortfalls, and/or very high

[1]PacifiCorp is headquartered in Portland, OR and operates in five states. It's Utah service area is its largest and fastest growing in terms of electricity sales.

prices in the spot market. About 100-125 MW of load reduction were achieved when these conditions occurred and alerts were issued in 2001 (Hunter 2001).

In October, 2001, the utility commission ordered PacifiCorp to consider expanding its DSM programs especially if it is determined that additional resources are needed to meet anticipated load in the summer of 2002. In response to this order, PacifiCorp proposed starting an air conditioning load control incentive program for residential and small commercial customers. Also, PacifiCorp is working with an energy efficiency advisory group to consider the savings potential and cost effectiveness of additional energy efficiency and load management programs. Finally, the utility is preparing a new IRP that is scheduled to be completed by the end of 2002. It could lead to expanded DSM programs in the future (see Wyoming discussion below).

Wyoming

Wyoming has not approved electric utility restructuring legislation and has no systems benefit charge or general policy on utility energy efficiency programs. PacificCorp is the largest investor-owned utility in Wyoming and is responsible for 70 percent of retail electricity sales. Utilities in Wyoming are conducting limited energy efficiency programs, estimated to be in the range of $1 to $2 million per year in budget. PacifiCorp, however, is preparing a new IRP in 2002 that is expected to incorporate demand-side options to a greater extent than was the case in previous resource plans. This planning process could lead to initiation of new DSM programs in Wyoming as well as Utah.

IV. Potential Impacts from Systems Benefit Charges in the Southwest Region

This portion of the report analyzes the potential energy savings, economic impacts, and emissions reductions from adopting sizable, energy-efficiency oriented SBCs in each of the Southwestern states. The key assumptions in the analysis include:

- the SBC is two tenths of a cent per kWh and it remains level in nominal terms;
- the SBC starts in 2003 and is kept in place through 2020;
- 75 percent of the money collected is used to fund a comprehensive portfolio of energy efficiency programs;
- 20 percent of energy efficiency funding is allocated to program design, administration, evaluation costs;
- SBC-funded energy efficiency programs cover one-third of the installed cost of efficiency measures;
- efficiency measures have a levelized cost of saved energy of $0.025/kWh and 13 year lifetime on average;
- 20 percent of program participants are so-called “free riders”;
- electricity prices remain steady in constant dollars and a 5 percent real discount rate is used to compute net present value;
- to determine avoided emissions, electricity savings “back out” new power plants.

An SBC of two-tenths of a cent per kilowatt-hour (kWh) is roughly the median for the 20 states that have already adopted this policy (Kushler and Witte 2001). This SBC level is an arbitrary assumption selected in order to carry out the analysis. It will support substantial energy efficiency programs and thus result in significant electricity savings, but it does not

capture all the cost-effective electricity savings potential available in the region.[1] A higher SBC could provide additional energy savings and economic benefits.

The analysis constructs a "Base Scenario" and "SBC Scenario" for each state using spreadsheets to calculate electricity use and savings year-by-year. Electricity demand growth in the Base Scenario is derived primarily from available utility forecasts. Load growth during 2002-2020 in the Base Scenario ranges from 2.0 percent per year in New Mexico and Wyoming to 2.7 percent per year in Nevada.

Table 1 shows the energy efficiency program funding levels in each scenario. In the Base Scenario, spending is assumed to remain constant at the level in 2001-2002. Total energy efficiency spending now occurring in the region–about $32 million per year–is equivalent to only about 0.27 percent of total utility revenues as of 2002. Imposing the SBC would increase energy efficiency program spending in the region to about $290 million per year, given the assumptions listed above. This is equivalent to about 2.4 percent of utility revenues from retail sales in the region. Energy efficiency program spending would range from $19 million per year in Wyoming to $95 million per year in Arizona.[2]

Imposing the SBC would result in about 7 percent electricity savings on average by 2010 and 10 percent savings by 2020, given the assumptions made (see Table 2). These savings levels are incremental to the savings from the current modest energy efficiency programs that are underway in the region. The savings are above average in percentage terms in Arizona and Nevada because these states have very limited energy efficiency programs at the present time. The savings are below average in Utah mainly because of the programs already underway there.[3]

Table 2 also shows how much the SBC would affect future load growth. For the region as a whole, load growth would average 2.4 percent per year in the Base Scenario during 2002-2020. Load growth falls to 1.75 percent per year on average if the SBC were adopted in all states. Thus, energy efficiency programs funded under the SBC would reduce projected load growth in the region by about one-quarter. There still would be a need for new power generation in the region, but not as much as in the Base Scenario. The electricity savings by 2010 are equivalent to the electricity supplied by about 8 new power plants, assuming each plant is 300 MW on average. The electricity savings by 2020 are equivalent to the electricity supplied by about 16 new 300 MW power plants.[4] Thus, the assumed SBC would reduce load growth to a more manageable level and obviate the need for numerous new power plants.

[1]This assertion is based on the preliminary results of an energy efficiency potential study that SWEEP is conducting. The study will be issued later this year.

[2]The total amount of the SBC would be 33 percent greater than this assuming 75 percent of funds collected are spent on energy efficiency programs. It is also worth noting that no assumptions are made concerning whether utilities or other parties administer energy efficiency programs funded through the SBC. .

[3]Since existing programs are assumed to continue under the SBC, less money would be dedicated to new programs in states where significant activity is already occurring.

[4]These estimates assume the plants operate 75 percent of the time and include 7 percent T&D losses.

Regarding economic impacts, Table 3 shows the net present value of the SBC (including funds that do not go to energy efficiency programs) during 2003-2020 along with the net present value of the electricity bill savings due to efficiency investments stimulated by SBC programs. The total savings of about $19.6 billion over this period is nearly 2.5 times the SBC cost. The ratio is higher in states such as Arizona and Nevada that have above average savings and electricity prices, and lower in states such as Utah and Wyoming that have below average savings and/or electricity prices. The SBC will result in a net increase in consumers' electricity bills for a few years, but the electricity savings will accumulate and more than pay for the SBC starting around the fourth or fifth year.[5]

Given the current rate of load growth and the extent of the electricity savings from the adoption of the proposed SBC, it is reasonable to assume that the efficiency improvements will reduce pollutant emissions from new power plants rather than reduce the operation of existing power plants.[6] With respect to avoided power plants, it is assumed that 75 percent of the electricity savings come from combined cycle natural gas power plants and 25 percent from new coal-fired power plants. Furthermore, it is assumed that new coal-fired plants would have state-of-the-art emissions controls including scrubbers for SO_2 reduction and selective catalytic reduction (SCR) for NO_x reduction. In the case of new gas-fired plants, we assume that they are state-of-the-art but do not have SCR for NOx reduction. This is typical of new power plants under construction or proposed for the region.[7]

With these assumptions, the average emissions coefficients for new power plants are 0.144 short tons of SO_2 per GWh produced, 0.180 short tons of NO_x per GWh, and 591 short tons of CO_2 per GWh.[8] The SO_2 emissions rate is less than one-tenth of the average rate for existing fossil fuel power plants in the region and the NO_x rate is about one-twentieth of the rate of existing plants.[9] In other words, new power plants consisting mainly of gas-fired combined cycle plants emit far less SO_2 and NO_x than existing, primarily coal-fired power plants in the region. With respect to CO_2, the assumed emissions rate for new plants is about 40 percent less than the emissions rate of existing fossil fuel-based power plants in the region.

Table 4 shows the avoided pollutant emissions by 2010 and 2020 as a result of the end-use efficiency improvements stimulated by the SBC. The SO_2 and NO_x emissions reductions are relatively minor for the reasons explained above. The avoided emissions by 2020 are equivalent to just 1.2 percent of SO_2 emissions and 0.7 percent of NO_x emissions from all power plants in the region as of 1999. The CO_2 emissions reductions, on the other hand, are

[5]This economic analysis looks at electricity bill effects only; it does not consider the participants' share of the cost of efficiency measures. Also, it does not consider the savings occurring from efficiency measures still in place after 2020. Efficiency measures on average would pass the Total Resource Cost test given the assumed cost of saved energy of $0.025/kWh.

[6]There may be some reduction in the operation of existing power plants in the initial years.

[7]New gas-fired power plants located in air quality non-attainment areas will have additional NOx controls; those in attainment areas are unlikely to have such controls.

[8]A short ton is equal to 2,000 pounds.

[9]All fossil fuel-based power plants in the region emitted 1.67 short tons of SO_2 and 3.49 short tons of NOx per GWh as of 1999.

more significant since there is no way to reduce CO_2 emissions through "smokestack controls". The avoided CO_2 emissions in 2010 are equivalent to over 4 percent of regional emissions as of 1999, and the avoided CO_2 emissions by 2020 are equivalent to over 8 percent of 1999 emissions. In addition to these avoided emissions, the electricity savings should cut emissions of mercury, particulate matter, and other pollutants to some degree.

V. Conclusion

Most utilities in the Southwest region are conducting very limited energy efficiency programs at the present time even though the region is rapidly growing. Only two utilities–Xcel Energy in Colorado and PacifiCorp in Utah–are implementing relatively comprehensive energy efficiency programs that include wide-ranging financial incentives. Total energy efficiency program spending in the region was about $32 million per year as of 2001-02, less than 0.3 percent of utility revenues from sales to retail customers. While Arizona, Nevada, and New Mexico have adopted a SBC, none of these states are devoting the funds collected to broad-based energy efficiency programs.

Adopting a substantial SBC in each state could greatly expand funding for energy efficiency programs. In particular, a surcharge of two tenths of a cent per kWh would raise about $290 million per year for energy efficiency programs, nine times the current funding level, assuming 75 percent of the SBC is devoted to energy efficiency programs. Based on the performance of large-scale energy efficiency programs in other parts of the country, this level of funding could reduce electricity consumption in the Southwest region by about 7 percent in 2010 and 10 percent in 2020. Projected load growth would fall by about one-quarter and around 16 baseload power plants would be avoided by 2020. Consumers and businesses would realize electricity savings worth about 2.5 times the cost of the SBC over the 2003-2020 time period.

Adopting a substantial SBC could significantly reduce future CO_2 emissions, thereby helping the region and the United States restrain growth in greenhouse gas emissions. But adopting the SBC is likely to have a relatively minor impact on SO_2 and NO_x emissions in the region because new power plants are much cleaner than older plants with respect to these air pollutants.

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Table 1 – Current Utility Funding for Energy Efficiency Programs and Level of Funding if the Proposed SBC were Adopted

State	Energy efficiency programs as of 2001-02 (million $ per year)	Energy efficiency programs under the SBC proposal (million $ per year)
Arizona	3	95
Colorado	10	66
Nevada	3	45
New Mexico	2	29
Utah	12	37
Wyoming	2	19
Region	32	291

Table 2 – Incremental Electricity Savings from the SBC and Impact on Electricity Demand Growth

State	Electricity savings in 2010 (GWh/yr)	(%)	Electricity savings in 2020 (GWh/yr)	(%)	Elect. demand growth 2002-2020 (%/yr) Base Case	SBC Case
Arizona	5,570	7.4	10,740	11.1	2.5	1.9
Colorado	3,340	6.5	6,240	9.9	2.1	1.5
Nevada	2,600	7.0	5,060	10.7	2.7	2.1
New Mexico	1,560	6.9	2,900	10.6	2.0	1.4
Utah	1,460	5.1	2,780	7.5	2.5	2.0
Wyoming	960	6.7	1,790	10.1	2.0	1.4
Region	15,490	6.7	29,510	10.2	2.4	1.75

Table 3 – Cost and Savings during 2003-2020 from the Proposed SBC (2002 $)

State	SBC cost (million $)	Total savings (million $)	Net savings (million $)
Arizona	2,640	8,130	5,490
Colorado	1,790	4,010	2,220
Nevada	1,290	3,170	1,880
New Mexico	780	2,050	1,270
Utah	1,040	1,440	400
Wyoming	500	825	325
Region	8,040	19,625	11,585

Table 4 – Avoided Pollutant Emissions from the Proposed SBC

State	Avoided SO2 Emissions (short tons)		Avoided NOx Emissions (short tons)		Avoided CO2 Emissions (1000 short tons)	
	2010	2020	2010	2020	2010	2020
Arizona	853	1,635	1,066	2,043	3,502	6,709
Colorado	511	950	638	1,187	2,096	3,899
Nevada	398	771	497	964	1,632	3,164
New Mexico	238	441	298	552	977	1,811
Utah	223	423	279	529	915	1,735
Wyoming	147	272	184	340	603	1,116
Region	2,370	4,492	2,962	5,615	9,725	18,434
Percent of 1999 emissions	0.6	1.2	0.4	0.7	4.3	8.2

REFERENCES

EIA 2001a. *State Electricity Profiles 2001*. Washington, DC: Energy Information Administration. www.eia.doe.gov/cneaf/electricity/st_profiles

EIA 2001b. *Electric Utility Demand Side Management 1999*. Washington, DC: Energy Information Administration. www.eia.doe.gov/cneaf/electricity/dsm99/dsm_sum99.html

Gruen, W. 2002. Presentation of William Gruen at the Xcel Energy Colorado DSM Roundtable Meeting, Denver, CO, March 13.

Hunter, C. 2001. *Power Forward*. Presentation of Carol Hunter, PacifiCorp at the ACEEE National Conference on Energy Efficiency and Reliability, Berkeley, CA, Oct.

Kushler, M. and P. Witte. 2001. *A Revised 50-State Status Report on Electric Restructuring and Public Benefits.* Washington, DC: American Council for an Energy-Efficient Economy.

LAW Fund 1996. *How the West Can Win: A Blueprint for a Clean and Affordable Energy Future*. Boulder, CO: Land and Water Fund of the Rockies.

Lawless, K. 2002. Presentation of Kevin Lawless at the Xcel Energy Colorado DSM Roundtable Meeting, Denver, CO, March 13.

Matthews, S.W. 2001. *The California Experience or, What it means to "Flex your power."* Presentation of Scott Matthews, California Energy Commission, at the conference "Conservation or Crisis, A Northwest Choice, Portland, OR, Sept. 26, 2001.

Nadel, S., and M. Kushler. 2000. "Public Benefit Funds: A Key Strategy for Advancing Energy Efficiency." *The Electricity Journal*, October: 74-84.

Nichols, D. and D. von Hippel 2001. *An Economic Analysis of Achievable New Demand-Side Management Opportunities in Utah*. Boston, MA: Tellus Institute, March.

NPPC. 2001. *An Efficiency Power Plant in Three Years: An Interim Goal for the Northwest*. Portland, OR: Northwest Power Planning Council.

NRDC and SVMG. 2001. *Energy Efficiency Leadership in a Crisis: How California is Winning*." San Francisco, CA: Natural Resources Defense Council and Silicon Valley Manufacturing Group.

Schiller Associates 2001. *Demand Reduction Market Assessment for Xcel Energy's Colorado Front Range Service Territory*. Boulder, CO: Schiller Associates.

Schlegel, J. 2001. Personal communication with Jeff Schlegel, energy consultant, Tuscon, AZ, Dec.

WRAP 2001. Fact Sheet on the Final Regional Haze Regulations for Protection of Visibility in National Parks and Wilderness Areas. Denver, CO: Western Regional Air Partnership. www.wrapair.org/WRAP/Reports/Haze-fs.htm