The Reality: Externality Requirements Do Little for DSM

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Environmental externality requirements are thought to promote demand-side management (DSM) because the environmental impacts of DSM programs are small relative to those of many conventional generation options. This paper summarizes the impact of environmental externality requirements on the level of utility DSM in eight jurisdictions that have specified monetary values for the externalities of combustion resources.

Utility commissions in seven states that specified monetary values for externalities prior to 1994 and the Bonneville Power Administration were surveyed to determine the effect of externality requirements on the level of utility DSM activity. While conclusive evidence on the requirements' effect on the level of DSM activity is not available, our survey results suggest that environmental externality requirements have had only a small (less than 10%) impact on DSM activity to date.

This paper is not intended to make any commentary on whether externality requirements are desirable or undesirable, effective or ineffective. Rather, it is intended only to illustrate that, contrary to popular belief, externality requirements alone do not necessarily increase the level of DSM activity appreciably.

Introduction

Overview of State Externality Requirements

Twenty-six states require electric utilities to consider environmental externalities in resource selection decisions. [1] These requirements vary widely in scope and complexity. Seven states have specified monetary values for selected externalities. One state requires use of a fixed 2 cents per kWh adder for combustion-related externalities.

Where monetary values have been specified, they relate primarily to air emissions. Monetary values are specified for up to nine air pollutants. However, the magnitude of the environmental externality value (in cents per kWh) for virtually all combustion options is dominated by the sulfir dioxide (SO_2), nitrogen oxides (NO_x) and carbon dioxide (CO_2) emissions.[2]

The Bonneville Power Administration also quantitatively considers externalities in resource planning and evaluation procedures. It has specified monetary externality values for selected air emissions, and it uses a 10% DSM bonus, although the DSM bonus is not motivated strictly by environmental concerns.

Effect of Externality Requirements on DSM

Quantitative consideration of environmental externalities in resource selection decisions should influence the total amount of DSM pursued and the type of DSM programs chosen. When the costs of supply options are adjusted for their environmental externalities, DSM programs should become relatively more attractive since they are usually assumed to create virtually no environmental externalities. [3]

Use of monetary externality values should make DSM programs targeted at energy savings more attractive relative to programs designed to reduce peak demand. The environmental externalities associated with conventional generation options vary with the level of electricity produced. Assigning a monetary value to externalities makes the energy savings achieved by DSM programs more valuable in the applicable cost-effectiveness tests. Thus, energy efficiency programs should become relatively more attractive.

For an externality requirement to have an impact on DSM resource choices, it must cause a utility to base its

resource selection on total social cost. This condition, however, is not sufficient to guarantee that the environmental externality requirement will have an effect on the level of utility DSM activity. DSM programs must compete with supply options on criteria such as reliability, lead time, and nature of the resource addition required, as well as cost. The change in relative cost due to incorporation of externalities may have little impact on the mix of resources chosen.

Nevertheless, it is generally expected that environmental externality requirements, especially those involving specified monetary values for externalities, should increase utility DSM activity. Barakat & Chamberlain surveyed utility commissions in selected states and BPA to determine the impact of their environmental externality requirements on utility DSM.

Survey Methodology

We surveyed utility commissions in seven states where we believed the environmental externality requirements would be most likely to have an effect on the level of DSM activity. Because monetization of externalities is generally considered the most aggressive approach to accounting for externalities in utility resource selection decisions, we selected the states with such requirements for our survey.[4] We surveyed public utility commissions in the six states that specified monetary values for externalities prior to 1994 (California, Massachusetts, New York, Nevada, Oregon, and Wisconsin), the one state that has a fixed monetary adder for externalities (New Jersey), and the Bonneville Power Administration.[5]

The six states surveyed that have specified monetary values for externalities based those values on the cost of control method. We have observed from our work in this area that utility commission-endorsed values based on control costs are generally higher than utility proposed values based on damage costs or other valuation methodologies. The seventh state surveyed—New Jersey—has established a two cents per kWh externality value that is of comparable magnitude to the control cost values. We assume that externality requirements are most likely to stimulate DSM activity in these states because of the use of relatively aggressive externality values.

We also surveyed BPA. While BPA uses damage-based externality values which are generally lower than the control cost values endorsed by state commissions, BPA was the first to use monetary externality values and as such has had the most opportunity for externality analyses to impact resource choices.

We contacted an individual knowledgeable about externalities at the utility commission in each of our seven target states and at BPA. We asked each individual if and how consideration of externalities has affected the cost-effectiveness, aggressiveness, and type of DSM programs adopted by affected utilities. The survey was conducted by telephone.

Survey Findings

Our survey findings for each jurisdiction are summarized below.

California

The California Public Utilities Commission (CPUC) requires that utilities consider environmental externalities in resource planning and evaluation of bids.[6] Monetary values for selected air emissions were established for different regions based on the costs of control in those areas. The CPUC approved the first utility resource plans to incorporate externalities in April 1992.[7]

Values for externalities are embedded in the avoided cost calculations used to estimate the benefits of DSM. CPUC staff estimated that inclusion of externalities increases avoided cost by approximately 10%. However, CPUC staff suggested that this increase in avoided cost has probably had little or no effect on the level of utility DSM .

The DSM programs proposed by California utilities are usually competitive with supply options even before the costs of those options are adjusted for their environmental externalities. CPUC staff suggested that proposed DSM programs are usually either easy winners in the benefit/cost (B/C) test, or they lose by large margins. Staff suggested that typical successful programs have B/C ratios of 3.0 or greater, and few, if any, proposed DSM programs are marginal (i.e., close to 1.0 in the B/C test).[8] Since only marginal programs would be affected by consideration of externalities, and there are few (if any) marginal programs, consideration of environmental externalities has little effect on the level of DSM activity.

California utilities have financial incentives to aggressively implement DSM programs. Thus they have an incentive to select all cost effective DSM programs that can help meet their resource needs. The environmental externality requirements have not had a noticeable impact on the level of DSM activity pursued by California utilities.

Massachusetts

The Massachusetts Department of Public Utilities (DPU) has required consideration of environmental externalities in integrated resource planning and DSM planning since

1988. Specified monetary values for environmental externalities have been required in all filings involving resource cost-effectiveness tests since 1990. The DPU also requires companies to evaluate the collective environmental impacts of all proposed resources—new and existing.

Although the DPU has specified the monetary values for externalities to be used by all utilities, environmental externalities do not affect resource selection decisions in the same manner for each utility. Each utility is allowed to determine for itself the importance of environmental externalities relative to such considerations as reliability and system compatibility.[9] Boston Edison, Massachusetts Electric, and Commonwealth Electric are among the utilities that have considered externalities in DSM cost-effectiveness tests.

The effect of including monetary values for externalities is to increase the B/C ratio of DSM programs considered. According to DPU staff, commercial and industrial programs typically have B/C ratios of 4.0 to 6.0 or higher and are cost-effective even without the consideration of monetized externalities. Programs that are marginal (e. g., a B/C of 0.8) may be cost-effective when externalities are considered. Staff suggested that some residential programs fall into this category.

According to DPU staff, there was an expansion of DSM activity at most utilities in Massachusetts in the early 1990's. This entailed increased DSM program activity, larger DSM targets, increased program participation, and increased DSM expenditures as a percentage of revenues.[10] However, staff cautioned that the environmental externality requirement was probably a relatively small influence. The amount of DSM has been affected more by other factors such as a collaborative proceeding, an environmentally proactive state, and a utility corporate culture that favors DSM.

Nevada

The Public Service Commission of Nevada (PSC) has required quantitative consideration of environmental externalities in resource planning since 1991.

Consideration of air, land, and water impacts within or outside of Nevada is required. The PSC has proposed default values for air emissions, although the utilities are allowed to propose their own. The values of land and water impacts are left to the utilities to determine on a site-specific basis. Environmental costs are integrated into the present worth of societal costs (PWSC), an alternative criteria used to rank resource options. [11]

Planning in Nevada involves calculating the total social cost for each proposed resource, and estimating both the total private cost and the total social cost of each plan. However, resources are *selected* on the basis of their private costs; although utilities estimate the total social cost, resource selection is not based on social costs. Thus, to date, the environmental externality requirement has had virtually no effect on resource choices.

PSC staff stated that consideration of externalities *could* have an effect on the resources selected by a utility since the PSC could override a utility's recommendation and select the resource plan with the lowest social cost. That decision would be binding on the utility. To date the Commission has not required a utility to adopt a resource plan based on lowest social cost. Consequently, the environmental externality requirement in Nevada has had no impact on DSM activity.

New Jersey

The New Jersey Board of Regulatory Commissioners (BRC) requires consideration of environmental externalities in DSM planning and in the granting of DSM incentives. The BRC is currently considering integrated resource planning rules that may require consideration of externalities. [12]

To receive BRC approval and be eligible for DSM incentives, proposed DSM programs must have a B/C ratio of 1.0 using the total resource cost test. The avoided environmental impacts must be explicitly reflected in the net benefits calculation. Externalities are not embedded directly in the avoided cost calculations, but are included in the TRC test as a separate component. For electric utility DSM programs, the BRC has valued externalities at two cents per kWh saved.

BRC staff stated that four electric utility DSM plans have been submitted since the externalities and incentives regulation has been in place, and two of those plans have been approved to date. Based upon a review of these plans, BRC staff suggested that there has been a marked increase in DSM since the regulations were implemented. However, staff cautioned that the increase in DSM resulted from the combination of the externality requirement and the DSM incentive, and it is difficult if not impossible to separate the relative effects. Much of the increase in DSM activity may be due to the financial incentives granted to utilities rather than the externality requirement.

Staff did state that additional programs have passed the cost-effectiveness screen due to inclusion of environmental externalities, but could not provide specific examples.

New York

The New York Public Service Commission (PSC) requires consideration of environmental externalities in DSM planning and DSM incentive calculation. Programs that promote energy conservation are credited with 1.4 cents per kWh, programs aimed at peak clipping are credited with 0.9 cents per kWh, and programs aimed at load shifting with 0.04 cents per kWh ($1989). The maximum environmental credit of 1.4 cents per kWh was based on the environmental impacts (air, land, and water) of a coal-fired power plant that just meets New Source Performance Standards (NSPS).[13]

The PSC requires bidding for all new supply and demand resources other than core DSM programs. The bid evaluation process must include quantified environmental externality costs. The use of the monetary externality adder for DSM occurs in the calculation of program cost-effectiveness. PSC staff suggested that some programs have passed cost-effectiveness tests due to externalities; programs with a B/C ratio of about 1.2 or 1.3 were probably made cost-effective by the inclusion of externalities.

Based on an internal review of 1993-1994 DSM filings, staff said that 96% of the DSM programs found to be cost-effective would have been cost-effective without the inclusion of externalities. Thus 4% of New York's DSM programs were considered cost-effective only because monetized externalities were considered. According to staff, DSM programs that reduce energy use derive the most benefit from consideration of externalities.

Oregon

The Oregon Public Utility Commission (OPUC) requires utilities to consider environmental externalities in integrated resource planning and bidding. Environmental externalities are to be considered in the cost-effectiveness evaluation using a range of specified values for selected air emissions. Externalities are to be considered for both proposed and existing resources.[14]

The first resource plans to be filed using the required externality analysis were filed in January 1994, and are in draft form. Consequently, PUC staff suggested that it is too early to say if and how consideration of externalities will affect DSM.[15]

The OPUC may have only limited authority to require utilities to make resource choices based on externality analyses. An OPUC administrative law judge recently offered an informal opinion that the OPUC can only base resource decisions on externalities to the extent that the values are representative of the cost of compliance with future environmental regulations. It remains to be seen how this limit of OPUC authority will impact utility resource selection decisions.

Wisconsin

The Wisconsin Public Service Commission (PSC) requires the use of monetary values for greenhouse gas emissions when comparing resource options in planning and in DSM program planning. The first utility resource plans to incorporate the monetary externality adders were filed in January, 1994.[16]

PSC staff reported that definitive data are not yet available on how consideration of externalities affects proposed utility resource choices. The PSC will formally assess the effects of considering externalities on resource choices later this year.

PSC staff did offer some anecdotal information on how consideration of externalities may affect proposed DSM activity. Based upon an initial review of the recently filed plans, staff suggested that consideration of externalities probably resulted in the inclusion of some additional DSM technologies, as well as more aggressive DSM program implementation. Staff noted that the effect of considering externalities is more pronounced for energy saving programs, especially those targeted at off-peak savings. However, staff cautioned that the precise causal relationship between externalities and DSM levels is difficult to ascertain because externalities are embedded in avoided cost calculations.

PSC staff reported that use of the previously required 15% externality adder had little or no impact on the level of DSM activity.

Bonneville Power Administration

BPA requires use of monetary externality values in resource planning. In resource planning, BPA includes monetary externality adjustments in the calculation of system avoided cost, which is used in determining the amount of DSM to pursue. BPA also increases system avoided cost by a 10% DSM "bonus." However, the bonus is a mechanism to promote DSM in general and is not motivated by environmental concerns alone.

BPA staff suggested that increased DSM levels on the order of 10% have been observed due to the combined externality and DSM bonus adjustments to system avoided cost. However, it is difficult to determine what portion of the increase is due to the externality adjustments alone.

Summary of Survey Findings

The effects of environmental externality requirements on the level of utility DSM activity appear to be small (less than 10%). In New York, the externality requirement was estimated to have enabled 4% of the DSM programs to pass the cost-effectiveness test. In California, Massachusetts, Nevada, New Jersey, Wisconsin, the impact of the externality requirement on utility DSM was qualitatively estimated to be small or nonexistent to date. For BPA, the combined effect of the monetary externality adjustments and the 10% DSM bonus is to increase DSM activity by up to 10%. While survey respondents were not able to provide quantitative data to support their observations, they were able to provide anecdotal examples of how externality requirements have or have not affected DSM.

Since most DSM programs are cost-effective without accounting for externalities, it is not surprising that externality requirements have only a relatively small impact on the level of DSM activity.[17] Survey respondents in both California and Massachusetts noted that most winning DSM programs had benefit/cost ratios of three or greater. This suggests that utilities probably have numerous additional DSM options that can pass the total resource cost test and hence that they are on the relatively flat section of the DSM supply curve. This means that the scale of DSM programs reflects criteria other than cost, not a limited supply of cost-effective DSM options.

Impacts seem to be more pronounced for DSM programs targeted toward energy savings than those that seek to reduce peak demand. This effect has been observed in New York and Wisconsin.

To have an impact on the level of utility DSM activity in practice, it appears that a state environmental externality requirement must mandate quantitative treatment of externalities *and* require resource selection decisions based on total social costs. Neither Nevada nor Oregon require resource *seleclion* based on benefit/cost analyses which include externalities. The Nevada survey respondent suggested that there have been no observable effects on DSM for this reason. The Oregon respondent agreed that this may be a factor, but that it is too soon to reach any conclusions because the first plans to consider externalities in DSM planning are still in draft form.

Finally, other factors such as economic incentives to utilities for effective delivery of DSM programs may have greater influence on the level of DSM activity than do environmental extemality requirements. While respondents from Massachusetts, New York, Wisconsin, and BPA suggested that externality requirements may have resulted in increased DSM in particular cases, respondents from Massachusetts, New Jersey and BPA noted that it is difficult to segregate the impacts of externality requirements from other factors (e.g., DSM incentives, BPA's DSM bonus).

Conclusions

Environmental externality requirements are thought to promote DSM because the environmental impacts of DSM programs are small relative to those of many conventional generation options. A survey of the effects of externality requirements on the level of utility DSM activity in eight jurisdictions with monetary externality adjustments, however, suggests that this anticipated impact is small (less than 10%).

The reason for the limited impact of externality requirements on utility DSM appears straightforward. Because the externality requirements raise the costs of the most economic supply options by less than 30%, only DSM programs with a benefit-cost ratio between 0.7 and 1.0 in the absence of the externality requirement would benefit. But, a great many potential DSM programs already have a benefit-cost ratio greater than 1.0 before externalities are considered. The effect of the externality requirement, then, is a limited increase in the DSM potential available to a utility.

Survey results suggest that externality requirements have a greater impact on energy saving programs than peak reduction programs. The environmental externalities associated with a conventional generation option vary with the level of electricity production. Assigning a monetary value to the externalities makes the energy savings achieved by DSM programs more valuable in the cost-effectiveness tests.

This paper is not intended to make any commentary on whether externality requirements are desirable or undesirable, effective or ineffective. Rather, it is intended only to illustrate that, contrary to popular belief, externality requirements alone do not necessarily increase the level of DSM activity appreciably.

Endnotes

1. Externalities occur when the production or consumption of a good or service have consequences for one or more third parties, and the price of the good or service responsible for the impacts does not accurately reflect the full costs or benefits to society. When externalities take the form of damage to human health or the environment, they are called environmental externalities.

In recent years, some utility regulators in the U.S. have required the consideration of environmental externalities in new electric resource selection decisions to reduce the financial and environmental regulatory risks associated with unaccounted for environmental damages, and to encourage development of an electric resource mix that is optimal from society's perspective.

For an introductory discussion of what externalities are and why they are of interest in the electric utility industry, see: Electric Power Research Institute, *Environmental Externalities: An Overview of Theory and Practice.* EPRI CU/EN-7294, Palo Alto, CA, May 1991.

2. F. Krause, J. Busch, and J. Koomey, *Incorporating Global Warming Risks in Power Sector Planning: A Case Study of the New England Region,* vol. I, LBL-30797, Energy & Environment Division, Lawrence Berkeley Laboratory, Berkeley, CA, November 1992, notes that "over a range of generation technologies approximately 95% of the total externality surcharges (sic) is due to three pollutants: sulfur dioxide, nitrogen oxides, and carbon." p. 54. The remaining 5% or less is due to particulate, carbon monoxide, volatile organic compounds, and greenhouse gases other than CO_2.

3. While demand-side programs can also have externalities associated with the manufacture, use, and disposal of products and materials used and replaced in DSM programs, these externalities are generally considered small relative to those of supply-side options. No state utility commission systematically requires utilities to quantify these impacts. See Haites, Erik and Julie Hashem (Barakat & Chamberlain), *Survey of Processes Used By Electric Utilities to Assess the Environmental Impacts of Proposed DSM Programs,* Prepared for Hydro-Québec, May 1991.

4. We hypothesize that qualitative externality requirements may not have an apparent impact on the level of utility DSM activity since they do not affect the basis for the selection of resource additions. A qualitative externality requirement does not affect the cost of any of the options under consideration and so is unlikely to affect the mix of options chosen. Thus states with qualitative environmental externality requirements were excluded from the survey.

5. Because the Minnesota Public Utilities Commission only endorsed monetary values for specified air emissions in February 1994, we did not include Minnesota in our survey. We also did not survey the two states that require use of a percentage adder for externalities. Our initial research indicated that the 15% adder formerly in use in Wisconsin had little or no impact on DSM activity. Given that the two states that currently require utilities to use percentage adders—Iowa and Vermont-require adders of only 5%, we assume that the adders have probably had little or no impact on DSM in Iowa and Vermont.

6. Externalities must be applied to both new and existing facilities in the California integrated resource planning process.

7. Barakat & Chamberlin. *EPRINET's Environmental Externalities Clearinghouse,* Electric Power Research Institute, January 1994.

8. However, staff suggested that smaller residential programs such as appliance programs could in theory be marginal without consideration of externalities and could be cost-effective only when externalities are included.

9. Barakat & Chamberlin.

10, This increase is said to have plateaued in 1991-1992. Staff estimated that the amount of DSM in Massachusetts as a whole increased an average of 5 %, with increases at individual utilities ranging from 2% to 15%.

11, Barakat & Chamberlin.

12. Barakat & Chamberlin.

13. Barakat & Chamberlain.

14. Barakat & Chamberlain.

15. Oregon uses a 10% adjustment to regional avoided cost to provide a boost to DSM. However, this adder is not an externality per se and consequently is not considered here.

16. Barakat & Chamberlin.

17. Respondents from four of the eight jurisdictions surveyed-Massachusetts, New York, Wisconsin, and BPA–suggested that some programs were probably made cost effective by inclusion of externalities.