PLANNING UNCERTAINTIES, MARKET RISKS AND NEW ENVIRONMENTAL CHOICES: WINNING LEAST COST PLANNING COMBINATIONS

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INTRODUCTION

Utility demand and supply-side planners will face new challenges from environmental regulations. Under current proposals, every ton of pollutant will have a cost to utilities, not just the tons that put them over the allowable limit. Planners will have to account for these new costs. To do this, planners need to start tracking emissions implementation actions today, and begin strategizing for future regulatory changes. Current legislative proposals include a tax on the carbon content of fuels to curb emissions of greenhouse gases and substantial reductions in sulfur dioxide and nitrogen oxide emissions. The important issue for planners is the flexible compliance requirements within these regulatory changes. The acid rain proposals, for example, include a market-based emissions trading system for emissions allowances. Whenever there is a competitive market, there are market risks, and potential winners and losers. Utilities need to be prepared to analyze and mitigate these risks. Integrated least cost planing is one way a utility will have to meet this challenge.

Planning involves uncertainty and risk. The wide array of compliance choices create countless combinations of strategies for utilities to comply with the new emissions regulations. Deciding upon an optimal strategy will involve some risk and gaming techniques...much like a card game. *But how to draw a winning hand?*

NEW COMPLIANCE STRATEGIES

Planners will need new compliance strategies and tools in the future. A compliance decision will no longer be a straight-forward technology fix. Under proposed legislation, every ton of sulfur dioxide (SO_2) or carbon dioxide (CO_2) will have a potential cost or opportunity for sale; not just the tons that put the utility over the emissions limit. The proposed acid rain legislation includes an annual emissions target (in tons) for every utility unit that emits SO_2. A corresponding number of allowances (the right to emit one ton of SO_2) will be issued by the EPA to the utilities with affected units. Utilities can meet their target by reducing emissions at an individual unit with pollution control equipment, or by reducing load on high-emitting plants and transferring the extra allowances to low-emitting plants that will be run more often to compensate for the reduced generation. The total national emissions target is fixed, so that as new units are built, they will have to acquire allowances through emissions trades or purchases.

Every ton of SO_2 will have a cost. The finite number of emissions allowances combined with the allowance trading provisions will create value to every ton of SO_2 that is emitted. For example, a utility could choose to add pollution control to a high-emitting unit and then sell the extra allowances on the market to offset the investment in pollution control. The same utility could even bank the excess allowances and save them for future units that are planned to meet increased demand. With emissions banking, there is great incentive for utilities to hedge the emissions target. Rather than just meet the target every year, utilities with low-emitting base load plants (ie. nuclear units) might choose to reduce generation from their high-emitting units and bank allowances to compensate for outages at the low-emitting unit.

This environmental reserve margin could become a new requirement in least cost planning. A reserve of emissions allowances or available non-emitting capacity will be required to stay under the annual emissions target in case of an emergency that

requires high-emitting plants to run longer (ie. an outage at a nuclear plant). With a penalty of $2000 per ton for every ton emitted in excess of the annual target *and* a reduction in the following year's target by tons exceeded, non-compliance under the acid rain provisions will have severe financial consequences for utilities. This risk penalty under non-compliance will motivate utilities to include an environmental reserve margin in their planning. The stakes in the environmental compliance game have been raised.

DEMAND-SIDE MANAGEMENT AS A COMPLIANCE STRATEGY

Demand-side management (DSM) is now a compliance strategy. Any scheme that reduces generation at high-emitting plants will make it easier for utilities to meet their emissions target, including reduced generation from these plants. DSM could play an important role in a compliance strategy as a way to reduce the demand for high-emitting plants, or to shift the load to lower-emitting units.

However, using DSM is not fool-proof. For example, if one utility pursues an aggressive DSM program as part of its compliance plan and also is a member of a centrally dispatched power pool, there is no guarantee that this utility will receive credit for the conservation achieved. Instead, the reduced load may result in lower utilization of a second utility's plants, and the first utility would not see any reduction in emissions from its plants.

SOLUTIONS TO DSM TRAPS

Studies have shown that DSM is most effective in combination with environmental dispatch (or least emitting first). DSM alone does not ensure the emissions reduction, because the saved energy or generation needs to be taken from high-emitting units. If a utility implements a peak-shaving program and all of its peak units are low-emitters, a reduction from these units will have little effect on overall emissions. If, however, the same utility implements a DSM program that targets its high-emitting units use patterns, or re-dispatches the system to maximize the DSM savings at high-emitting units, the emissions savings could be significant. One study noted that energy conservation alone could reduce the cost of achieving one utility's share of a 10 million ton SO_2 reduction by 40% [1]. Whatever the compliance strategy, every utility will have to assess the feasible compliance combinations for their system, much like a good card player evaluates the potential of his hand. The difficult part for utilities will be deciding upon an optimal strategy. Do you draw into an inside straight? Or stay with a pair of queens? A lot will depend on the other players, just as neighboring utilities and power pools will play an important role in compliance planning.

COMPLIANCE STRATEGY GAME

Some new opportunities for cooperation between utilities will arise under the proposed legislation. Emissions pooling is expected to spawn from the acid rain provisions. The economics of emissions pooling closely parallel those of power pooling and are based on the common goal of reducing the risk of exceeding the emissions target. In one year, a given utility may have emissions allowances to spare. This could result from high availability of nuclear plants. Another utility, part way through the year, may find that they are unlikely to meet the cap. An emissions pool could be established that automatically contains contract provisions for short-term lease of allowances. This would allow utilities to trade allowances on short notice without protracted negotiation. The negotiation would have been completed earlier as part of the pool agreement. Because emissions allowances are not bound by transmissions lines, pooling agreements could be struck between utilities throughout the country, not just neighbors.

CONCLUSION

Pooling and leasing, in combination with environmental reserve and dispatch will add new dimensions to utility least-cost planning. Utilities will be required to estimate the different supply/demand-side/compliance plans and integrate the costs of control within an overall least-cost plan. This will require new techniques and data beyond those traditionally employed by utilities. Some utilities may already have the deck stacked against them with

high-emitting plants. Other utilities (with nuclear plants) may suddenly find their playing position greatly improved. Devising a winning strategy under changing environmental regulation will require careful planning, new tools and new interaction between utilities for playing all of the right cards.

REFERENCE

1. The Center for Clean Air Policy, *Acid Rain and Energy Conservation*, July, 1987.