Utility Planning Using Least-Cost Principles and the Role of Externalities

Staff Report on a Keystone Policy Dialogue

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EXECUTIVE SUMMARY

For over two years, The Keystone Center facilitated a two-phase dialogue on Utility Planning Using Least-Cost Principles and, in the second phase, on the role of Externalities. The intent of this report is to assist policy-makers faced with decisions about changes to traditional utility regulation and planning. This report is not a consensus document, rather it is staff written summary of two years of discussion on the issues.

As a concept, least-cost planning has been discussed since the 1970's and many states have implemented such programs since the mid-1980's. Yet, the actual goals and objectives of least-cost planning remain a source of controversy between affected interest groups. Some industry observers believe that least-cost planning can help reconcile the often conflicting demands between increased capacity requirements and concerns about the external costs of power production.

In traditional utility regulation practices, capital investments are rewarded and revenue is a direct function of sales. However, a number state public utility commissions have altered their practices to allow for returns on investments in more efficient end-use equipment (also known as ratebasing conservation) and adjusting revenues to account for sales lost due to utility conservation programs. Other states are planning these types of changes. Still others are observing the impacts of the changes before they commit.

The participants in the Keystone Dialogue believed that all affected interests could benefit from, if nothing else, a summary of their discussions of least-cost planning issues.The Keystone participants focused on four primary issues areas. These issue areas helped the group to define the goals of least-cost planning, the regulatory approach that should be adopted for implementing a least-cost plan, the role of each participant in the process, and specific policies that decision-makers will want to consider as they deliberate the need for least-cost programs.

Early on in the Dialogue, an attempt was made to craft a definition of least-cost planning to ensure that all participants were using terminology in the same manner. The disagreements arising from this attempt to define terms led to wide ranging and fruitful examination of the essential issues, including how best to encourage cost-effective, demand-side management resources. For purposes of discussion, it was defined as: the process of determining the mix of demand and supply side options which provides customers of electric, gas , and other utilities with an obligation to serve with the lowest cost service over the planning horizon; service must be at desirable levels of reliability and quality and be provided in a manner consistent with all statutory and regulatory requirements and objectives. In Chapter , the factors that participants considered in defining the term are explained.

Over the course of the dialogue, however, participants determined that the focus should change to address "externalities" resulting from electricity generation. These are defined as costs imposed on others by electricity generation, which are not reflected in the price of electricity. This marked the beginning of the second phase of the Dialogue, the Keystone Dialogue on

Externalities. This was a slightly different group of stakeholders (it did include a number of participants from Phase I) attempted to define more precisely the term externalities, and we focused on how to incorporate these external costs into utility planning processes.

The purpose of the second phase of the Dialogue was not whether externalities should be included in utility planning processes, but how those states that choose to do so can move forward in considering externality policies. It should be noted that we did not focus exclusively on environmental externalities, but considered all external costs, including, for example, economic impacts and reliability.

The Dialogue participants agreed to a mechanism for evaluating the roles of regulatory authorities (state, federal; economic, environmental) and a comprehensive analysis of the various cost internalization mechanisms being utilized or contemplated. This staff report will describe the ways in which three pollutants (SO_2, NOx, CO_2) are currently internalized. It will also recommend criteria that utilities and regulators can use to determine whether pollutants should be internalized in the future.

This report will also assess the advantages and disadvantages of seven internalization mechanisms: (1) Unit specific standards (command and control); (2) Emissions trading; (3) Adders; (4) Offsets; (5) Taxes and Fees; (6) Environmental Dispatch; and (7) Set-asides. In addition, the report will discuss how each of these internalization methods was evaluated against specific criteria.

PREFACE

This dialogue was convened by The Keystone Center, a neutral, non-profit organization that facilitates national and international consensus-building dialogues among individuals representing a diversity of interests. The Center conducts dialogues in seven main substantive areas: energy; environmental quality; health; biotechnology and genetic resources; natural resources; agriculture, food, and nutrition; and science and technology. The Center brings together people from the private sector, environmental and citizen organizations, academia, and government to address pressing questions, encourage scientific inquiry, enhance understanding and appreciation of the natural world, and develop consensus on public policy issues.

The policy dialogue process provides an opportunity for people to develop a common understanding of complex and controversial issues, explore respective interests, and negotiate recommendations that shape public policy. To reach consensus, participants must be willing to compromise. The resultant give-and-take creates a consensus document with a sum that is greater than the parts. In this sense, participants may not always agree on specific positions when viewed in isolation. Taken as a whole, however, they are willing to accept the full group's position as part of an entire package to create a comprehensive agreement and further the interests of sound public policy.

Participants followed three ground rules in this dialogue:

1. People participate in the discussions as individuals, not as formal representatives of an interest group or organization.

2. All conversations are off-the-record and not for attribution.

3. No documents produced in the course of the dialogue or the final report are made public until agreed upon by the group as a whole.

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CHAPTER I
INTRODUCTION

When utilities plan to meet the electricity needs of their customers they react to a variety of factors, including economics of supply options, treatment of investments by regulators, environmental impacts, and economics of demand-side options. Few would question that utilities have planned to serve customers at the lowest cost within the goals of reliability and adequacy. What has been questioned is the range of options that utilities have considered in the planning process; of particular concern has been that conservation and other demand-side management alternatives have been ignored. Many reasons are given why this accusation is made. "Utilities are not responsible for the customer side of the meter." Utilities are penalized for conservation investments under current regulatory practice." "Utility executives are more interested in building power plants than in reducing demand." "Conservation should be a voluntary reaction to price signals not a mandatory program."

Most industry experts agree that there remain cost-effective opportunities to conserve energy, particularly the use of electricity, in all sectors of the economy. How to achieve these opportunities was the subject of discussion by participants in the Keystone Dialogue on Utility Planning Using Least-Cost Principles, the first of a two-phase project. The project was undertaken to address the concerns raised by policy makers that there remained a lack of consensus regarding some aspects of least-cost planning. The participants in this project came from all affected interest groups with a stake in the outcome of discussions surrounding least-cost planning. This report summarizes discussions held over the course of two years and hopefully offers insight into the controversy over least-cost planning, the role of externalities, and demand-side management regulation, particularly utility incentives to invest in conservation. The participants reached no consensus on policy issues related to least-cost planning. Differences arose over measurement and evaluation, bidding procedures and customer incentives in demand-side management.

Summary of Least-Cost Planning Issues

The concept of least-cost planning emerged in the 1970's to describe a process by which all options for supplying the energy needs of consumers would be evaluated and the option with the lowest total costs would be selected. At that time, energy conservation and demand-side management resources in general were seen by some analysts as the lowest cost resource, but were unable to compete against more traditional supply-side resources for a variety of regulatory and historical reasons. Least-cost planning was seen as the process for allowing them to compete against supply-side resources on an equal basis through a fair and open planning process. As the concept developed, two paths of least-cost planning have been taken.

The first path has come to be described as a planning process based on an affirmative definition theory or central planning approach, meaning that demand-side resources would not be considered on an equal basis unless state regulators required their consideration. This path has been developed mainly by certain state regulatory commissions such as those in Wisconsin, Massachusetts, and Nevada. In the extreme, this program lets the state commission dictate the types of resources that a utility will be allowed to develop with a particular emphasis on demand-side resources. The more likely approach is a collaborative one where the utility and

state regulatory agency jointly develop a resource plan that includes demand-side management (DSM) and that both parties agree to follow. The impetus for utilities to collaborate is to assure that the resources planned for and invested in will ultimately be allowed in the rate base in order to earn a return on investment for shareholders, in the case of an investor-owned utility. Otherwise, the regulators could disallow certain investments because other resources, such as DSM, were more prudent. The threat of a prudency review or rate increase refusal is the primary tool used by regulators although several states have or are contemplating mandatory least-cost planning statutes.

The second path could be described as the "free market" approach that depends on the creation of a fair marketplace in which DSM resources compete against all other resources. For some observers, this path is typified by the creation of bidding programs for utility bulk power acquisition. Theoretically, bidding programs allow utilities to select the lowest-cost resource meeting their power requirements criteria with DSM considered on an equal basis with other resources. In reality, bidding programs often have specific provisions for DSM, such as set-asides mandated by state commissions or separate bid systems for supply-side and demand-side resources. Several bidding programs have prohibited DSM bids from competing although the trend is to allow all resources to compete in all bids. An outgrowth of this view has been the idea that energy conservation and other efficiency improving investments should receive similar regulatory treatment as other supply-side options.

Background of the Dialogue

In May of 1990, the first phase of the Dialogue was initiated with a steering group meeting that attempted to define the scope of the project and identify the interest groups that should be invited to participate. The initial goal of this effort was to provide a forum for diverse interest groups with differing views on the role of least-cost planning principles in meeting the energy needs of consumers. The results of this dialogue would provide guidance to legislators as they attempt to include least-cost planning requirements in environmental legislation, to state regulators attempting to develop new regulatory incentives that encourage energy conservation, and to other decision makers concerned with the provision of least-cost energy services.

A primary result of these initial meetings was the realization among the participants that not all interest groups share the same understanding of, or expectations for, least-cost planning. Much of the discussion was devoted to developing a common understanding of the terms used in discussing planning concepts and the goals of planning exercises. Project meetings, held every six to eight weeks, would be utilized to critically review existing least-cost programs with the objective of defining least-cost concepts, and evaluating proposals for the purpose of guiding prospective state and federal efforts to more-widely implement least-cost planning programs.

It was agreed that a project agenda would be developed by scrutinizing policy issues in four areas: national energy goals to be served by a least-cost planning program, the philosophical approach to be taken in considering least-cost plans and options, roles and responsibilities of various parties that will be involved in least-cost planning processes, and the specific policy tools available to encourage the provision of least-cost energy services.

Energy Policy Goals

- What are the energy policy goals of least-cost planning? What is the relationship of least-cost planning to the National Energy Strategy?

- All energy sources should be evaluated to determine the lowest cost supply option for consumers, thus, the discussion of least-cost utility planning should be expanded to include other supply options such as natural gas.

- How can the potentially conflicting goals of reliability of service and environmental protection be measured and compared to the goals of least-cost planning? How can reliability and environmental protection considerations and their related costs be accounted for in planning discussions? What balance should be sought between reliability and environmental considerations and other goals?

- Will least-cost planning promote diversity of energy sources? What is the value of diversifying energy and fuel sources?

- Is there supply shortage on the horizon that is driving the debate?

Philosophical Approach to Least-Cost Planning

- What principles will guide least-cost planning?

- Is there a conflict between planning and competitive procurement for power resources? How can planning and competition be reconciled? Is there a conflict between least-cost planning and a competitive bulk power market?

- If the goals of least-cost planning are clear, then what regulatory approach can best meet those goals? What is the linkage between least-cost planning and the regulatory process?

- What does value-based planning mean?

- What is the economic theory behind the conservation incentives debate?

Roles and Responsibilities Of Affected Interest Groups

- What are the various roles and responsibilities of affected parties (utilities, regulators, customers) in the planning process?

- What are the roles of state and federal regulators in a least-cost planning process that emphasizes greater competition in the bulk power market?

- Which entities are responsible for decision making regarding objectives and implementation of plans? How will risk be allocated, particularly when the conditions assumed by decision makers change? What is the decision making horizon (short or long term)?

- How do municipal and cooperative utilities fit into the discussions?

- How will least-cost planning affect existing and potential power pools? Are there regional considerations in developing least-cost plans

Policy Tools and Instruments

- How can incentives be utilized to encourage least-cost planning? Can demand-side management options be regulated similarly to traditional supply-side capital investments?

- How will the results of least-cost planning programs be measured?

- Is modelling pertinent to policy discussions?

- How can we incorporate existing state and individual utility experiences in least-cost planning?

- What is the role of transmission access in the debate? Are there other competition issues affecting least-cost planning?

These broad categories and the issues which fit within them, it was agreed, would define the policy dialogue. A short paper further explaining the issues would be prepared for each category, though not intended to be proposals, they would instead provide comprehensive descriptions of the issues that will be addressed by the group. To that extent, they would focus on policy issues that participants believe will be important in the near future as Congress, regulators, and the energy industry make decisions about meeting the Nation's energy requirements.

Dialogue Participants

Affected interest groups have differing views on least-cost planning. Some environmentalists see least-cost planning as a technique by which environmental externalities and energy conservation can be given equal consideration with supply-side resources in the planning process. Independent power producers see it as creating an opportunity to compete against utilities for building new power plants through the bidding mechanisms often required by least-cost plans. Certain consumer groups see least-cost planning as a means for ensuring that energy services are provided at the lowest possible cost, while others see it as furthering centralized planning and limiting consumer options by providing utility access to the "other side of the meter." This Keystone project will focus on these competing demands and perceptions of least-cost planning.

Interest groups involved in this project include: Congressional staff who are seeking guidance from a broad-based group of industry experts as to the definition of least-cost planning, state utility regulators who are implementing least-cost programs, utilities that are embracing least-cost concepts as well as utilities that are skeptical of least-cost planning, consumer groups concerned that least-cost programs may not actually result in lower costs to all customer classes, and environmental groups who see least-cost planning as a means of internalizing the external cost of power production. A list of project participants is included in Appendices A and B.

Impetus for a Dialogue

At the time, the prospect of continued legislative and regulatory activity was a primary impetus for initiating a Keystone Dialogue. Congress had recently scrutinized least-cost planning as a means toward displacing emissions of pollutants. The acid rain provisions of the Clean Air Act reward utilities with additional allowances of sulfur dioxide emissions for implementing least-cost and conservation measures. Proposals to amend the Public Utility Regulatory Policies Act included changes to cost-of-service regulation which would reward utilities for saving instead of selling power. Least-cost planning would also figure prominently in the National Energy Strategy. Some Members of Congress, regulators, and other interest groups indicated their concern with legislative activity because they perceive a lack of consensus about the meaning of least-cost planning and how various issues, such as environmental externalities, should be considered in legislation.

CHAPTER 2
THE SCOPE OF LEAST-COST PLANNING ISSUES

First Plenary Session
October 12, 1990

In preparation for the first full meeting of Dialogue participants on October 12, 1990, four issue papers were drafted and presented. The purpose of these papers was to focus discussion on the four key issues, identified earlier by the Steering Group, that will drive the public policy dialogue regarding the implementation of least-cost planning principles. Those issue areas were: national energy goals to be served by a least-cost planning program; the philosophical approach to be taken in considering least-cost plans and options; roles and responsibilities of various parties that will be involved in the least-cost planning process; and the specific public policies available to encourage the provision of least-cost planning.

The goal of the first meeting was to reach agreement on the specific issues to be discussed during the project, as well as the approach that would be taken by participants in analyzing those issues. Given the broad scope of least-cost planning issues, participants were encouraged to identify those issues deemed vital to current policy discussions and, thus, could benefit from a Keystone Dialogue. The discussion papers were intended to stimulate ideas and discussion on the above topics, serve as catalysts for identifying the fundamental components of least-cost planning, and provide an approach for moving forward in this dialogue.

This summary will briefly address each of the four issue papers and presentations, and will summarize the key points raised in the discussions at the meeting. Before the presentations, participants addressed the goals of this Dialogue. Several participants advocated an analysis of "least-cost" from a federal perspective as opposed to a state perspective. It was believed that a federal framework would provide standard principles and would focus on all energy sources, not solely electricity. Several participants agreed that a federal-level perspective may be needed, but that it was too early in the Dialogue to make this decision. Participants agreed to revisit the issue of goals and scope of this Dialogue at a later time.

Goals of Least-Cost Planning

The central theme of the presentation on the goals of least-cost planning was that consumers should be provided with the lowest net price of energy services, and that the cost of energy services (not the price of the commodity itself) should reflect a total service cost, including the costs of externalities and levels of risk assumed. Obtaining electricity, in and of itself, is not the consumers' objective. Rather it is the service made possible by the electricity that is important. Providing the customer with energy services at the lowest possible cost requires agreement among diverse parties on how "costs" are determined, especially given differing views of how externalities and levels of risk can be quantified.

Following the presentation, it was suggested that the regulatory framework will correspond directly to the extent market forces will be allowed to operate freely. However, it was unclear

whether least-cost goals would be met through a regulatory framework which differentiated between regulated and non-regulated entities. Several participants advocated the use of an "integrated resource plan" to achieve an all-encompassing least-cost plan. Some claimed that an integrated resource plan would create a proper balance between supply and demand-side resources. Participants agreed on the need to make a fundamental decision whether this scenario requires least-cost energy services to be provided to the consumer or to society as a whole. If the decision is for the latter, it was reasoned, both the consumer and society would benefit equally.

Philosophical Approaches to Least-Cost Planning

The issue paper and presentation on philosophical approaches to least-cost planning addressed the role of governmental regulation in a system which attempts to integrate supply and demand-side options in a market which will not favor one option over the other. Two opposing approaches are described: one advocating that an interventionist role be taken by the regulatory body at the state level (the "centrally planned" approach), and another in which market forces interact freely (the "free market approach").

The assumption underlying the centrally-planned approach is that the amount of government intervention in the marketplace will dictate the maximum use of the most efficient technology, consumer behavior and allocation of resources. The government is responsible for directing the planning process to ensure that all options are fairly evaluated, as well as eliminating market imperfections and subsequent market barriers. The market barriers include, among other things, prices which do not reflect societal costs, capital constraints, and ratemaking which does not provide incentives for conservation and efficiencies.

The free market approach suggests that competitive markets will assure the most efficient behavior, use of technology, and allocation of resources. This approach is dependent upon the correct setting of price signals. The "correct" price setting formula must incorporate, among other factors, rates which equal costs incurred, time sensitive rates (higher costs incurred for use at times of peak load), elimination of cross-class subsidies, unrestricted sources of capacity, competitive bidding and transmission access. It was suggested that this approach may limit, but not eliminate, regulatory oversight.

Participants questioned the extent of regulatory interaction needed in the marketplace and raised the issue of who would decide whether the market was flawed or working correctly. Participants questioned how to know if the market is flawed and how a remedy would be fashioned. Some argue that this depends on what cost-effectiveness tests are used and what factors and assumptions are incorporated within those tests. Some participants believed that the basic thrust behind any approach may be the manner in which prices are set. Defining costs is a major aspect of price setting and prices may depend on factors such as the treatment of externalities and conservation measures.

Roles and Responsibilities of Parties

The presentation on the roles and responsibilities of the various parties presumed that the consumer has the primary role in effecting change. However, consumer behavior will be modified when it is economically beneficial to do so. Modifications of behavior are precipitated by proper price signals and incentives. Utilities, it is suggested, must provide reliable service and maximize shareholder wealth. Regulators are surrogates for the absence of competitive market forces and, as competition increases, regulation should decrease accordingly. Shareholders are limited in their role as investors. However, returns on investment should reflect the level of risk assumed.

The discussion elicited differing opinions on the role of consumers. Consumers may play a role in effecting change in some areas, such as the environment, and some contend that utilities must make the decisions for the consumer because they have greater experience, expertise and access to information. Utilities have the responsibility to provide reliable service, but opinions differed as to whether they must "maximize" shareholder wealth. The role of the regulator was highlighted as shifting from an after-the-fact review panel to a pro-active and preemptive body which attempts to avoid problems by implementing planning programs. Participants held different views on the importance of the shareholder; from those that consider them independent of the process to those who see them as the providers of capital for utility investment.

Policy Tools for Implementation

The presentation on policy tools and instruments for implementing least-cost planning established that recommendations for various implementing tools will vary according to the views of individual participants. The implementation of any least-cost plan, whether mandated by the government or implemented by providing incentives to induce market participation, will also be affected by changes in the traditional characteristics once exhibited by participants. It became clear that no universally accepted definition of least-cost planning exists and, because plans vary from state to state, the instruments and policy tools necessary to implement any least-cost plan will vary accordingly. Although the tactics used to allow demand and supply-side options to compete fairly will depend on who is making the decision, accurate measurement may be achievable through some universally accepted reliability tests. It was recommended that any least-cost program must allow for the utility to recover program implementation costs, provide incentives for participation which will reward shareholders and customers alike, and compensate the utility for loss of revenues which result from conservation measures. Some participants stressed that the only way to implement programs is to first develop a mission of what is to be accomplished and the extent of government involvement necessary. Several participants expressed concern over who would make these decisions and the information or principles that would guide the decision making process.

Direction of the Dialogue

Some participants believe that this Dialogue should focus on the federal rather than state role, as federal guidance could standardize states' definitions and concepts of least-cost planning. This may, proponents claim, prove invaluable for lawmakers who are debating the inclusion of "least-cost" language in pending legislation and for those who are preparing the National Energy

Strategy. Others insist that all least-cost plans should be designed and implemented on a state level, according to each state's individual needs, as that is where the potential for successful implementation lies and will have the most direct impact.

One point of disagreement involved the definition of "least-cost planning", as it connotes different concepts to various people. Instead of defining the concept at the outset of the Dialogue, participants agreed to discuss the goals of least-cost planning. Some believe that defining least-cost planning may not be as important as knowing the substance of what it entails. The question of who should benefit the most from least-cost planning was posed: Is it providing least-cost energy services to the customer, or to society as a whole? If least-cost energy services solely benefit the consumer, the process may preclude a full consideration of impacts on other aspects of society. The converse may be accurate as well; if every decision is weighed against its potential impact on society as a whole, then the decision-making process may become prohibitively slow and ineffectual. Several participants stressed that the term "least-cost" service is not necessarily defined as providing the lowest cost service, as it would ignore all of the variables which must be included in the total cost of energy as a service. For example, providing the lowest cost power may favor one generation fuel over another without regard for other factors, such as the environment or dependence on foreign oil.

The goals of this Keystone Dialogue were a major discussion topic. Some participants believe if the definition of least-cost planning is the goal of this project, it should then incorporate the development of integrated resource planning, which involves all aspects of energy supply not just electric utility planning. Integrated resource planning focuses on the planning process and assesses a broad range of supply, demand, transmission and rate design options. One participant described integrated resource planning as a component of least-cost planning principles. By concentrating on "utility" least-cost planning, other sectors of the energy industry are neglected and, therefore, the intended overall results may be less than optimal.

One participant stated that any discussion of the project goals must include the proposition that the current electric utility regulatory system may be inadequate to undertake least-cost planning schemes that require greater involvement of regulatory entities in the planning process. One participant maintained that as few as 10 states are fully implementing least-cost planning. Other participants pointed out that definitions of least-cost planning vary and that under some definitions as many as 40 states may be considered to be practicing least-cost planning. It was questioned whether the current system encourages utilities to purchase supply-side options over demand-side options, and if so, which would the utility choose if the playing field was level? The premise is that if conservation programs can satisfy demand, and provide a return on investment, the utility would not have to build additional powerplants. A participant phrased a primary question for this Dialogue in the following way; should utilities acquire least-cost resources regardless of whether those resources are on the supply side or demand side?

As the focus of discussion narrowed on the proper components of least-cost planning, accurate price settings emerged as one of the most important aspects of developing a least-cost plan. Most participants agreed that accurate price signals transcend arguments over free market versus

centrally-planned approaches to least-cost planning. Under either regime, the manner in which the price is set may be more important than the price itself. Setting prices requires defining which costs can and should be included, and may require the elimination of certain market barriers which impede the full realization of efficiencies. Some argue that energy costs today do not reflect all costs associated with production and delivery of that service or commodity. To be accurate they must truly reflect total "societal costs" which include externalities, such as the cost of environmental damage, costs of implementing control technologies, levels of risk, and other traditional and non-traditional costs.

The idea of including externalities as components in the cost of the energy service, however, is not universally agreed upon. Conflict further arises over which externalities should be included, how they are quantified and how conflicting externalities can and should be balanced. Some participants believe that only those prices based on "true costs" of the commodity will allow the marketplace to function competitively, efficiently and equitably. Others propose that a price signal must reflect a sense of equity in any "cost effectiveness" test developed to monitor the marketplace.

Although it seemed that all participants agreed that the consumer, the regulator, and the utility all have an important role to play in the least-cost planning process (the extent of which varies according to perspective), the role of the shareholder was debated more fully. On one hand, some argued that the shareholder's role was that of an investor with no independent function and as such, should not be included as a stakeholder in least-cost planning. However, others argue that the shareholders provide the capital and, therefore, play a major role. The shareholders, it is argued, decide to invest in a company based on the assessed risk and the potential for a reasonable return. Therefore, a company's commitment to a least-cost planning program which provides incentives or rewards for conservation investments (e.g. return on demand side management) may prove to be a deciding factor to investors.

Next Steps

The participants determined that the goal of least-cost planning should be "minimizing the cost of energy services". The terms used in this definition of least-cost have different meanings to the various participants. It was acknowledged that the process of defining each of the terms would highlight the differences in interpreting "least-cost planning". The key term highlighting the differences is the definition of "cost". The next major step of the Dialogue is defining which variables are going to be included in the costs and how externalities and various levels of risk will be quantified.

In order to more fully flesh out the differences (or similarities) among the various participants, four representatives of different interest groups were assigned to prepare a discussion paper on their views of what should and should not be included in the cost of energy services. These papers would become the focus at the next meeting.

CHAPTER 3
DEFINING ENERGY SERVICES

December 10, 1990

To facilitate discussion at the last meeting, a working definition of least-cost planning was developed for discussion purposes only. The participants determined that the goal of least-cost planning should be "minimizing the cost of energy services." The terms used in this definition have different meanings to various participants. It was acknowledged that the process of defining each of the terms would highlight the differences in interpreting "least-cost planning", with the pivotal term being "cost". The next major step of the Dialogue was to define which variables were going to be included in the costs and how externalities and various levels of risk were to be quantified.

If the participants agreed that the goal of least-cost planning was to "minimize the costs of energy services," the question was then posed as to what those costs were. In preparation for the Dialogue meeting on December 10, 1990, papers representing various viewpoints on identifying the costs of providing energy services were prepared. The goal of this meeting was to discuss the costs of energy services and to then discuss how those costs should be accounted for in planning for and pricing of energy services.

Issue papers developed by members of the group address the costs of energy services and issues related to cost identification in utility least-cost planning. Participants were also to discuss methodologies to account for the costs of energy services identified in the discussion papers. In addition, the afternoon session was reserved for continued discussion on the goals of the project and the process needed to achieve those goals.

The Role of Renewables

One of the presentations focused on renewable energy sources and their role in least-cost planning. The central theme was that current least-cost planning definitions and programs exclude many important costs which should be incorporated in the decision making process for resource planning. In evaluating traditional utility supply options, state regulators often do not include certain costs in the decision-making criteria, like variable costs and fuel cost forecasts, which has the result of favoring fossil energy plants over renewable energy plants. In addition, because supply option reviews take place at the state level, any regional, national and global benefits of renewables are usually excluded from consideration. The state planning process also excludes renewables from consideration due to reliability questions because they are usually intermittent sources of supply.

The presenter believes that the benefits of renewables are ignored. For example: (1) several smaller plants may be just as reliable, or more so, than one large fossil generator, (2) fossil plants are dependent on a supply source which is not always secure, and (3) renewables are not affected by adverse environmental regulations, like the Clean Air Act.

The ensuing discussion raised several issues. For example, renewables are usually viewed from the supply side and some argue that renewables need to be viewed in light of their demand reduction potential. It was put forth by some that renewables are not secure supply sources. Although renewables are considered intermittent sources of supply, some participants point to the fact that hydro-power is widely utilized despite being classified as intermittent. This may be because companies and regulators have had less experience with other types of renewable energy supplies and that quantification of the value of renewables does not account for numerous benefits. It was agreed by many that administrative and regulatory burdens create extra costs for would-be competitors in a competitive generation marketplace and therefore, renewable supply sources may not be as attractive to developers. Some participants also believe that in order for renewables to compete equally with fossil powered sources, the nature of regulation must change. A proactive decision-making process must take into account numerous factors, for example, environmental restrictions and diversity of their supply. In addition, states may want to include renewables in their competitive bidding programs, however, the difficult task is deciding which variables to include in the decision-making process and an even more daunting task is figuring out how to quantify certain environmental factors or externalities.

Structural Elements of Least-Cost Planning

The next presentation focused on the structural elements which comprise the least-cost planning framework. In focusing on which costs make up the bulk of energy services, it was put forth that it is necessary to fully understand how energy services are actually provided. The presenter advocated an integration of a variety of supply and demand side resources while monitoring the actual costs of providing the energy and managing the demand. Cost minimization must incorporate numerous variables and strive to balance uncertainty with reliability. The author believes there are three basic strategies to hedge uncertainty in the future for resource planning: resource flexibility, diversity and viability. In evaluating resource options, certain price and performance factors must be included and the process must also balance the value of the resource with both its costs and reliability.

Discussion following the presentation focused on the quantification or value placed on certain factors in light of various uncertainties and risk. It was pointed out that many states which have least-cost planning programs assign certain values to externalities even though there is a great deal of uncertainty and disagreement associated with the concept and practice of assigning such values. Several participants believe that externalities can not be validly quantified because each is value-laden to begin with and the opportunity for prejudice not only exists but can not be avoided. It was argued that no standards exist for quantification and to even begin to do so would not adequately protect the interests of certain participants.

The Regulatory Compact Approach

The next presentation focused on the traditional viewpoint of the "regulatory compact" where the utility, as a monopolist, is granted an exclusive franchise territory and must provide reliable service at reasonable rates. The utility's rates must reflect prudently incurred direct costs plus a fair rate of return, commensurate with the level of risk associated with the utility's investments. Consumers will only minimize their costs if they have a menu of choices to choose from and

price signals are appropriately set by regulation based on adequate information. The presentation advocates that utilities must unbundle electric services in order to give the consumer adequate choices. Utilities, it is averred, should only include in their rates the costs of meeting current laws and regulations, and to include selected societal costs not mandated by law or are not cost-based is probably illegal. In addition, including selected externalities could distort market signals and initiative and drive rates above the utilities' self-generation option, reduce competition in competitive bidding programs and result in bypass situations.

Discussion centered on several issues previously raised, but more focus was placed on the effects on the functioning of the market as a result of mandatory demand-side management programs and forced inclusion of certain externalities in the decision-making process. Participants discussed whether or not market distortions occur as a result of these programs. For example, utility bypass was cited as a market distortion by some, while others believe it to be a sign of a healthy market. Some view selected cost allocations and demand-side management programs as political in nature, and thus, previously discussed issues revolving around who ultimately benefits from least-cost programs were raised. The focus of the group's discussion again centered on the question of which externalities to include in least-cost programs, and how those costs are internalized.

Externalities

The third presentation asserts that the traditional economic-rational model for determining rates is no longer the norm and is shifting to a cost - benefit analysis of societal desires. There are two key issues to be addressed; (1) the scope of the elements of external costs to be analyzed, and (2) the range of the fuel cycle externality analysis (the inclusion of externalities which are impacted beyond the point of combustion). The decision to place a price on selected externalities is based upon the desire to promote efficient resource allocations, innovation and impact other parameters, like environmental effects, in order to meet desirable social ends. The decision to include certain externalities while excluding others varies from state to state and is indicative of the influences affecting decision makers.

In addition to deciding which externalities to include in the review process, state regulators must also decide how far upstream from the point of combustion they want their analysis of the fuel cycle to go. Essentially, the farther away from the point of combustion the fuel cycle analysis is, the more complex the issue becomes and political considerations become even more important. As some environmental issues are global in nature, state regulators have direct control over utilities, and thus, national policy and global problems are often addressed at the state level. However, policies will vary from state to state which necessarily complicates the issues.

The discussion following this presentation focused on the differences between the definitions that various states have for least-cost planning and the programs which are reflective of those definitions. In addition to varying state definitions, there is little guidance from the federal level on either the definition or the elements of a program. It was noted that the Clean Air Act, PUHCA legislation, and the National Energy Strategy all have references to least-cost planning, however none have a consistent explanation of what this entails, nor a definition.

Whether and How to Include Externalities

The final presentation addressed whether and how environmental externalities should be included in least-cost planning. Externalities were defined as unpriced damages or benefits that one firm or individual derives from another and that can be characterized as a spill-over effect. Because these costs and benefits are unpriced, uncompensated for and not reflected in the price of electricity, there is a market failure. Common property resources are a major source of externalities and because they are unpriced and accessed easily, the full cost of these resources are not reflected in the market price resulting in greater than optimal production, consumption and environmental damage. Correcting these market distortions requires putting a value on these externalities and incorporating these values into regular balance sheet items.

Participants discussed numerous aspects of the inclusion of environmental externalities in the market price of electricity. One of the most important issues raised was that although many states which are implementing least-cost planning programs are including environmental externalities, the valuation of those externalities varies from state to state. This severely complicates the planning process for multi-state utilities which are subject to varying regulations. Some participants believe that even though states cannot agree on how to specifically quantify or place a dollar figure on a certain externality, states need to include a value of those externalities beyond zero because there is a value in clean air or water.

Participants discussed the rationale and methods for including selected costs in the definition of least-cost planning. Some participants believe that the inclusion of factors such as risk or environmental damage in costs is no different than the inclusion of costs in the current regulatory process. For example, the costs of regulatory proceedings, legal fees and meeting National Environmental Policy Act requirements. Some believe that as the market becomes more competitive and as attitudes about the environment change, the transition away from a traditional, direct-cost recovery, regulatory scenario to a more market-oriented approach may be appropriate. The most challenging problem facing the group, some believe, is which externalities to include in the process and how to quantify those factors. In this regard, it was reiterated by participants that although it is difficult to quantify externalities, completely omitting these factors from the decision making process is wrong.

Next Steps

In preparation for the next meeting of this Dialogue, the participants discussed the goals of the project and the steps necessary to achieve those goals. One of the goals considered by the participants was to provide input to Congress as they contemplate legislation such as Global Warming and Public Utility Holding Company Act of 1935 which could include least-cost planning provisions. Also considered was the opportunity to provide guidance to the Department of Energy's National Energy Strategy which will address least-cost planning. Other goals for the project could include providing guidance to states that have yet to embark on least-cost planning programs in addition to recommending changes to those states which have already begun some type of least-cost planning.

Before developing recommendations for either state or federal action, the participants agreed that it was necessary to develop a common definition of least-cost planning. A working group will present ideas and proposals for defining least-cost planning at the next meeting. They also agreed that a critical review of existing state least-cost planning programs was important in gaining a common understanding of why various groups found existing programs to be inappropriate or inadequate applications of least-cost planning. Another working group was created to review existing state programs and would offer a critique of existing least-cost programs.

After discussing a definition of least-cost planning and the critiques of existing programs, the participants may then be able to develop in subsequent meetings and offer to policy makers recommendations for implementing least-cost programs that meet the needs and expectations of the broad group of interests represented in this project.

CHAPTER 4
DEFINING LEAST-COST PLANNING

February 11-12, 1991
July 10-11, 1991
November 19, 1991

On February 11-12, 1991, the Dialogue participants met in Keystone, Colorado, to address the definition of least-cost planning, and to discuss an evaluation and critique of existing least-cost programs at the state level. The participants at the December 10, 1990 meeting discussed the goals of the project and the steps necessary to achieve those goals. One of the goals considered by the participants was to provide input to Congress as they contemplate enacting legislation on such issues as Global Warming and Public Utility Holding Company Act of 1935, which could include least-cost planning provisions. Also considered was the opportunity to provide guidance to the Department of Energy as it crafts its National Energy Strategy, which also addresses least-cost planning. Other goals for the project could include providing guidance to states that have yet to embark on least-cost planning programs in addition to recommending changes to those states which have already begun some type of least-cost planning.

Before developing recommendations for either state or federal action, the participants agreed that it was necessary to develop a common definition of least-cost planning. The participants also reviewed two definitions of least-cost planning, one by the National Association of Utility Consumer Advocates (NASUCA), entitled "Net Income Neutrality Formulation", the other by the National Association of Regulatory Utility Commissioners (NARUC).

Development of a Definition

Participants in the working group, which focused on the definition of least-cost planning, developed a draft mission statement for the Dialogue, which attempted to incorporate many of the concerns of participants and provide a sense of direction for the project. The following mission statement was proposed:

> To determine how best to minimize costs of energy services to consumers utilizing integrated resource planning, and to suggest ways to promote action consistent with our analyses.

Participants were presented with several definitions of least-cost planning that had been developed by a working group, including some that have been discussed by other organizations. The purpose was to gain an understanding of the issues being addressed by other groups and to understand which factors are included in existing definitions. The working group definition embodied numerous concerns raised by participants at previous meetings and included several factors which provide insight into the meaning of common terminology. This clarification was significant because previous discussions on least-cost planning definitions highlighted the fact that participants had differing viewpoints or interpretations of commonly used terminology. Participants believed that this group's work must go beyond existing definitions and provide affected interest groups with a clear understanding of the issues.

Some participants believed that our goal in defining least-cost planning can easily become bogged down by including too many factors or details and that our definition should mirror what some believe is the ultimate goal of this project: to provide policymakers with guidelines encompassing all aspects of least-cost planning. The definition should be detailed enough to provide practical and useful information, yet broad enough to be utilized by policymakers at any level of government. For example, environmental externalities are large in number and, it is argued, that our goal should be to provide guidance on how best to incorporate these variables into least-cost programs for those who wish to include them. Several participants said our role is not to mandate which factors must be included, but to provide guidelines to policymakers who wish to include those factors.

It should be noted that the different definitions reviewed contained similar language and covered similar issues. However, some definitions emphasized some issues more than others. For example, one definition emphasizes risk and uncertainty, while another places more emphasis on flexibility. In reviewing the various definitions, participants raised several general concerns which should be addressed in the Keystone group's definition or the factors guiding the definition, including:

- Environmental externalities
- Transmission and location of facilities
- Safety and environmental concerns/costs
- Risk and uncertainty
- Flexibility
- Role of incentive regulation
- Technology
- Minimization of costs
- Time frame of process
- Electricity or energy service
- Regional regulation
- Nature of process
- EPA definition of factors

Discussion of what factors to include in the definition raised several general themes about the nature of defining least-cost planning and that, although discussed in previous meetings, participants thought they were worth revisiting. Several participants, in assessing the role of utilities and regulators in the least-cost planning process, questioned who was actually responsible for assuring that costs of energy services are minimized. This brings into question whether the utility is necessarily the best vehicle for implementing least-cost planning. Some believe that the utilities are best suited for implementing least-cost planning, but believe that least-cost planning is transitional in nature and, in the future, some other entity may bear the burden of implementing such programs. Still others believe that least-cost planning is consumer-driven and, if given adequate and reliable price signals and options, the consumer, independent of the utility, will select energy services in a least-cost manner.

Concern was raised about the Dialogue's results and possible recommendations as they pertain to the current regulatory and statutory framework. Some participants raised the concern that the results of this Dialogue and our subsequent recommendations must fall into the existing framework of law and regulation. Others believed that our recommendations may necessarily need to go beyond existing law and, indeed, may require legislation in order to be implemented.

The discussion on externalities, which can include social and environmental costs and risk and uncertainty, points to the belief held by some that all externalities are value-laden and can be either positive or negative depending on the individual's viewpoint. This highlights some participants' concerns that, in drafting the definition, the language must be fairly broad and flexible.

As a result of extensive discussion on these topics, the following draft working definition was developed:

> Least-Cost Planning is the process of determining the mix of demand and supply side options which provides utility customers with the lowest cost service over the planning horizon; service must be at desirable levels of reliability and quality and be provided in a manner consistent with all statutory and regulatory requirements and objectives.

In discussing the factors which had to be included as a part of the definition, participants agreed that the factors fell into three distinct planning categories; process, scope and implementation. Participants reviewed the process and scope factors. The next project meeting would focus on the implementation factors, in addition to considering changes to the process and scope factors. The definition incorporates the following factors:

Planning Process:

1. The planning process provides for public participation prior to approval of the plan.
2. Flexibility in the plan to take into account its scope may change over time. This recognizes that regulatory and statutory requirements and objectives may change; that planning is a continuous process; and that the plan will evolve as technologies and circumstances change. It also refers to uncertainties and risks. Plan updates and short-term action plans will be necessary.
3. Stakeholders should have input into plan development and implementation.
4. The plan should be developed by the utility and approved by the appropriate regulatory authority, which may change.

Planning Scope:

5. The plan should include generation, distribution, and transmission functions. Plans resulting from the process are judged to be least-cost for a specific area or utility system, including the flexibility to adjust to changes in technological improvements, demand and energy forecasts, input prices for fuels and environmental requirements, and other relevant social costs and objectives.

6. Any bias is eliminated in the selection of supply and demand side alternatives.
   a. least-cost planning shall fully consider and may incorporate safety risks and social and environmental costs of resource investments.

   b. Price signals should accurately reflect actual costs incurred by the utility in meeting the customer's load.

   c. least-cost planning should fully consider and may incorporate the impacts of information and education programs.

   d. The selection of supply and demand side options shall include transmission and distribution impacts.

Implementation:

7. The utility shall be required to implement any plan or filing as approved prudently.
   a. Validation of predicted performance is essential.
8. Incentive regulation should be viewed as a component of least-cost planning (including technology and conservation promotion).
9. Bidding for supply and demand side resources is an appropriate component for plan implementation.

In order to understand the factors more fully, a brief synopsis follows on some of the major issues raised during the discussion. Public participation in the planning process is essential. However, participants differed over the extent of the public involvement in the plan's development and implementation. On one hand, some believe that the policymakers, with public involvement, should develop basic criteria and objectives for the least-cost plan and then only the true stakeholders and the utilities should be involved in the planning and implementation process. On the other hand, it is argued that utilities are taking the risks of investment, have the best information and, thus, are in the best position to develop and implement a least-cost plan.

Further discussion elicited the view that perhaps two least-cost "plans" may be necessary, one which reflects society's desires and another which reflects the utility's ability to attain the objectives of the first plan. Some participants asserted that a utility's plan must be developed in light of the fact that it can only affect those issues which it has direct control over. Others disagreed that a two-plan approach was necessary and that one least-cost plan was sufficient, although it must still recognize the limitations of the utility. To highlight this, some believe that a distinction must be made between two elements in the regulatory process; the approval/oversight function of a regulatory body (or equivalent) and the utility's development and implementation of the plan. Others believe that it is not unreasonable for the public to oversee and approve the plan before and during its development, as the plan must meet public scrutiny at some points in the approval process. Because the utility is a regulated monopoly with a franchised service territory and has an obligation to serve, it is believed by some that public involvement at any and all stages of the development of the least-cost plan is warranted.

Discussion of the planning scope affirmed many participant's expectation that the process of developing a definition must take into account social objectives, but not necessarily the means to implement them at the same time. The three categories which outline the definitional factors above are distinct and, as they are developed, should have no bearing on the other (e.g. planning is distinct from implementation). In assessing social objectives in this Dialogue and in the development of the definition, many participants believe mandating specific environmental or social costs in the factors would result in a need to mandate externalities, and possibly accompanying valuations, which is not, many believe, the goal of this project nor least-cost planning. Above all, these participants assert that the effort is intended to provide guidelines which are flexible and adaptable to different situations.

Analysis of Existing Least-Cost Planning Programs

At prior meetings, participants often made reference to existing least-cost planning programs and pointed out the various pros and cons of certain programs. It was decided that in order to fully understand least-cost planning, develop a definition, and provide useful guidelines to policymakers, it was necessary to evaluate existing programs to determine if problems or gaps exist in the plans, as well as to find out which aspects of the programs are particularly useful.

The working group of participants who reviewed existing state-level least-cost planning programs determined that there is not one generic formula for developing and implementing least-cost planning. least-cost planning programs differ from state to state in the inclusion of certain factors and the amount of emphasis placed on those factors. As some participants mentioned in discussion of the goals of least-cost planning (and this project), individual states will enact programs which are tailored to their individual needs. These needs will reflect the types of generation sources they want to encourage, the balance of supply and demand side sources they wish to encourage, the type of environmental damage they want to mitigate, etc. The working group's analysis revealed that the same factors used in the development and implementation of existing state-level programs were included in the factors utilized in the formulation of the Dialogue's working definition above.

The discussion following the presentations highlighted some cardinal questions surrounding the goals and roles of participants in least-cost planning. What follows is a brief summary of some of the major issues which are common to existing least-cost plans:

◦ Goals: The goal of least-cost planning varies, however, this Dialogue's use of the phrase "minimizing the costs of energy services" brings to bear the question of what costs are comprised of, what "energy services" encompasses, and who is responsible for minimizing the costs.

◦ Roles of participants: The role of the utility is clearly one of the most divisive issues. Some participants assert that the utility is not the best provider of least-cost planning services because its role is seen as a supplier of a service and only the customer drives the demand. Some maintain that the utility has an obligation to serve and maximize its utilization of resources and that this incompatible with programs which force it to reduce demand. Others conclude that because the utility has this obligation to serve and is the most knowledgeable of the industry, it

is natural that the utility educate commercial and residential consumers about how to implement demand side management programs.

◦ Externalities: The essential questions of what constitutes an externality, how and why that externality is included in the least-cost program, and how it is valued become central to the least-cost planning debate. Externalities can include such issues as market risk, fuel risk, and environmental and social costs.

◦ Sources of risk: Questions involve reliability of sources, performance and availability of resources, fuel price volatility, financial considerations, and operational flexibility.

◦ Implementation: least-cost planning can be implemented in various manners, including the choice of either "command and control" measures or "market-based" incentives; through all-source competitive bidding, mandates from the regulatory/oversight body, or through pricing incentives.

◦ Evaluation: An evaluation mechanism to test the effectiveness of least-cost planning has not been discussed at length, however a thorough, objective review is seen as essential to the success of any program. A key aspect of the discussion on least-cost planning is whether the utility should be compensated for the amount of demand reduced through its least-cost planning program, which is sometimes referred to as "net income neutrality", and ability to earn a profit on investments in DSM resources.

Refining the Definition

At the meeting on July 10-11, there were three goals. First, they would attempt to draw to a close the discussion on the working definition of least-cost planning that was tentatively agreed to at the February plenary session. Second, they would continue the discussion on factors that should be reviewed by entities implementing a least-cost program. Finally, participants would discuss a proposal on environmental externalities. The proposal was intended to focus discussion on the costs from environmental externalities that are not accounted for in the utility planning or ratemaking processes. The proposal sets out a market-based approach on one externality that is drawing much attention, namely carbon dioxide produced from the combustion of fossil fuels. Much of the proposal is embodied in recently introduced legislation as referenced in the accompanying explanatory testimony. While this legislation addresses all sources of CO_2, our discussion will focus on the production of CO_2 from the generation of electricity.

Revised Working Definition

Least-Cost Planning is the process of determining the mix of demand and supply side options which provides customers of electric, gas, and other utilities with an obligation to serve with the lowest cost service over the planning horizon; service must be at desirable levels of reliability and quality and be provided in a manner consistent with all statutory and regulatory requirements and objectives.

The above definition was reached by incorporating the following factors:

Planning Process:

1. The planning process provides for public participation prior to approval of the plan or any of its elements.

2. The planning process shall take into account flexibility. This recognizes that regulatory and statutory requirements and objectives may change; that planning is a continuous process; and that the plan will evolve as technologies and circumstances change. It also refers to taking into account uncertainties and risks. Plan updates and short-term action plans will be necessary.

3. Stakeholders should have input into plan development and implementation. Stakeholders include, but are not limited to, regulators, utilities, intervenors, customers, municipalities, cooperatives, QFs, IPPs, and energy service providers.

4. The plan should be developed by the utility and approved by the appropriate regulatory authority(ies).

Planning Scope:

5. Plans resulting from the least-cost planning process may be judged to be least-cost for a specific area or utility system when they result in the utilities lowest total revenue requirement while satisfying reliability and quality of service constraints, which shall include (at a minimum) the flexibility to adjust to changes in technology, demand and energy forecasts, input prices for fuel, environmental regulations, consumers' operational requirements, and other relevant costs and benefits.

6. Any bias is eliminated in the selection of supply and demand side alternatives.

    a. Least-cost planning shall consider, and may incorporate, uncertainties, risks, and potential costs and benefits associated with social, safety, and environmental concerns.

    b. Review and verification of planning assumptions, models and inputs is essential.

    c. Least-cost planning shall consider, and may incorporate, rate and rate design impacts.

    d. Least-cost planning shall consider, and may incorporate, the impacts of information and education programs.

e. The evaluation of supply and demand-side options shall include transmission and distribution impacts.

7. Supply-side options include generation, wholesale transactions, energy efficiency, transmission, and distribution alternatives.

Implementation:

8. Approval of a plan does not relieve the utility of the responsibility for prudent implementation. The utility shall verify performance, savings and impacts.

9. Least-cost planning shall consider, and may incorporate, incentives.

10. Bidding for supply- and demand-side resources is acceptable for plan implementation, as long as the bidding process ensures the quality of the resources provided.

Participants could not agree on the definitional factors, but did agree to describe the differences that could not be resolved in developing the definition of least-cost planning and writing papers that describe differing points of view on significant policy issues encompassed. These issues include: regulatory and planning treatment of demand-side management resources, treatment of externalities, the role of rate making in least-cost planning, procedure and process of planning at state commissions, and uncertainty and risk in least-cost planning.

The discussion of definitional factors to be included in the planning process resulted in consensus of most of the factors with the exception of two items which pertain to the scope of least-cost planning. The first is factor number 5 describing how plans are to be judged. One participant maintained that plans should be judged to be least-cost when they minimize the revenue requirement for the utility, while another participant said they were least-cost when they minimized the cost of energy services for customers. These participants also disagreed on factor number 6(a) which sets out the non-monetary costs that least-cost planning is to address.

The other major result of the meeting was an outline of issues that are driving the debate on least-cost planning. Following the presentation of a proposal to address environmental externalities, the participants agreed that the multiplicity of viewpoints on externalities necessitated a broader look at the externality issues encompassed in least-cost planning rather than just a discussion of one approach to ensuring externalities are included in the planning process. In this context then, a small group of participants presented outlines of the major issues around which there is significant controversy. After presentation to the full group of participants, the list was further amended and extended.

The first issue that would be addressed is demand side management or DSM. It was agreed that a paper would be prepared which explains the issues surrounding the role of the "no losers" test, the role of DSM bidding in implementing least-cost planning, verification of DSM, the role of incentives, and simultaneous evaluation of supply and demand side resources.

The second issue to be addressed was externalities. A paper on the following issues would be prepared: identification of externalities to be considered in planning; impacts from externalities for which there already are regulations, for which there are about to be regulations, and for which no regulations are expected; implementing consideration of externalities (altruism versus mandate); and consistency of treatment of externalities from utility and non-utility resources.

During participant discussion, three other issues were identified that should be addressed in issue papers. The first was the role of rates and rate design in the planning process. The second was the role of state procedures and approval of plans. The third was addressing uncertainty and risk in the planning process. The description of the issues will be the subject of the next meeting.

Divisive Issues

The meeting on November 19, 1991, built on the participant discussion at the July 10-11 meeting where it was agreed to focus on fundamental issues that create diversity on least-cost planning principles and definitions. Accordingly, the issue papers identify the major positions taken by different participants on demand-side management and externalities. In addition, participant issue papers address pricing, the role of commissions, and uncertainty in least-cost planning. The goal of the meeting was to discuss these papers to determine if they comprehensively and concisely identify the major issues in least-cost planning discussions. If participants could agree on a list of issues and concerns that are driving the debate, it would be easier to ascertain where consensus is achievable and where further discussion is required.

Discussion

Presentations were made on the primary issues driving least-cost planning discussions. Three issues were discussed by project participants in detail: demand-side management, ratemaking and pricing of resources, and environmental externalities. Papers on uncertainty in the planning process and the role of state commissions in the planning process had been prepared for discussion but due to time constraints, participants were unable to discuss them. The purpose of the papers and discussions were to elicit descriptions of the major issues which lack consensus and which are of concern to affected interest groups. The discussion was not designed to create consensus, rather to ensure that all participants clearly understood the different viewpoints on the issues.

The discussion began with presentations of two papers with different approaches to demand-side management. The first issue was the preference of one type of cost-effectiveness test over another. Total resource cost tests, based on the goal of maximizing all cost-effective resources, were preferred by most participants. Several participants preferred the no-losers test, wherein no group of ratepayers subsidized another group. Another major issue was the use of competitive bidding procedures to acquire demand-side and other resources. There were disagreements as to the relative advantages and disadvantages of bidding programs, although most of the disagreements focused on implementation systems rather than the goals and objectives of the resource acquisition system. Major disagreements were also noted on the role or need for utility incentives for DSM. There was consensus on the need for measurement and evaluation of the

effectiveness of DSM programs, although disagreements were noted on whether DSM programs should proceed without measurement and evaluation systems in place.

Pricing discussions occurred both within the context of demand-side management issues and as a wholly separate topic. There were two essential issues raised in these discussions. The first was whether pricing alone was a sufficient signal to the market to encourage investment in DSM, absent some type of incentive from utilities or energy service companies. The second issue was determining which pricing mechanism could send the best signals to the market and, in particular, whether time-of-use rates were significantly more effective than other rate designs.

Related to rate design issues was the issue of the cost-basis for rates. Some participants maintained that embedded cost pricing sent inaccurate signals to consumers in terms of encouraging conservation. They believed that marginal costs were a more accurate price base. Other participants were concerned that marginal cost rates would lead to profits above or below those that would have occurred under an embedded cost pricing system.

Externality issues were presented in the form of a matrix that categorized approaches to incorporating externalities into planning in three general areas: already regulated pollutants, about-to-be-regulated pollutants, and unregulated pollutants. The matrix sets out implementation mechanisms for including or excluding the cost of the pollutant in planning. Many participants agreed that there were severe problems with many of the valuation methodologies for determining costs of externalities. Several participants thought that other externalities, particularly positive non-environmental externalities should be included in the discussion. Other participants questioned whether already regulated pollutants should be considered externalities given that their costs were internalized through regulation. Finally, many participants agreed that it was very difficult to consider the costs of externalities without legislation or regulation.

Next Steps

Based on discussions and agreements reached at this meeting, the Keystone Dialogue participants decided to amend its focus and to directly address externalities resulting from electricity production. More specifically, participants agreed that the project should focus on public policy approaches and options for incorporating external costs into the price of electricity. It was believed that further discussions on least-cost planning would not yield further agreements and the best course of action would be to focus on externalities, because the participants agreed that no common definition of least-cost planning exists and, because plans vary from state to state, the instruments and policy tools to implement any least-cost plan will vary accordingly.

CHAPTER 5
TRANSITION TO AN EXTERNALITIES DIALOGUE

March 16-17, 1992
May 18-19, 1992

On March 16-17 and May 18-19, 1992, participants in the Keystone Dialogue on Externalities met in Keystone, Colorado and Washington, D C. The purpose of the first meeting was to discuss the transition of the dialogue from its original focus on least-cost planning to a focus on the issue of the inclusion of externalities in the least-cost planning process. In so doing, participants focused on both policy and implementation issues associated with externalities, with the objective of identifying some of the threshold questions that are arising in discussions of externalities. The purpose of the May meeting was to sharpen the debate and narrow the focus surrounding the threshold questions raised in Colorado by reviewing several discussion papers developed by participants.

On November 19, 1991, participants in the Keystone Dialogue convened to review presentations on the primary issues driving least-cost planning discussions. Three issues were discussed by project participants in detail: demand-side management, ratemaking and pricing of resources, and environmental externalities. The purpose of the papers and discussions was to elicit reactions to issues which are of concern to affected interest groups and to which there is currently not a consensus. The discussion was not designed to forge consensus, rather to ensure that all participants clearly understood the different viewpoints surrounding the issues.

Externality issues were presented in the form of a matrix that categorized approaches to incorporating externalities into planning in three general areas: already regulated pollutants, about-to-be-regulated pollutants, and unregulated pollutants. The matrix set out implementation mechanisms for including or excluding the cost of the pollutant in the planning process. Many participants agreed that there were problems with the mechanisms for quantifying externalities. Many participants thought that other externalities, particularly positive non-environmental externalities (economic development, national security, etc.) need to be considered in the discussions of externalities. Other participants questioned whether currently regulated pollutants should be considered externalities given that their costs have been internalized through legislation or regulation (e.g., SO_2).

The participants agreed that no common definition of least-cost planning exists and, because plans vary from state to state, the instruments and policy tools to implement any least-cost plan will vary accordingly. Individual states, it is believed, will enact programs tailored to individual needs and these needs will reflect the types of generation sources they wish to encourage, the mix of supply and demand-side sources they believe are appropriate to meet state requirements, and the environmental problems associated with power supply they are seeking to mitigate. Although participants did not reach consensus on a specific least-cost approach, the Dialogue was important in fleshing out the central issues in the debate and different approaches that can be utilized to implement least-cost planning.

Participants did agree, however, that externalities are being considered and implemented within numerous least-cost planning programs across the nation and that a dialogue could provide a valuable service to those states contemplating the inclusion of externalities within the state processes and to other affected interests. Participants agreed to conclude discussion on least-cost planning and issue an interim report on the discussions to date. Therefore, participants from the Least-Cost Dialogue met in Keystone, Colorado in March to determine whether, in fact, Keystone should initiate a dialogue.

In order to provide the Dialogue with expanded expertise on the subject, the group of participants was expanded to include some key leaders from various states with experience in incorporating externalities in the planning process. To determine the feasibility of such a project, two issues papers were disseminated prior to the meeting and were the basis of the group's discussions. The papers were designed to initiate discussion by highlighting some of the "threshold" questions that arise regarding externalities.

Presentation of Issues
The first paper presented to participants identified key issues in the debate and clarified positions of stakeholders. The presentation and paper outlined the following issues:

- Why externalities are being examined in the IRP process?
- Whether regulators have the authority to include external costs in utility planning and resource acquisition processes?
- Whether regional or global externalities should be addressed by the federal government or the states, and the subsequent competitive impacts?

The paper and presentation then focused on the following implementation issues:

- What is the scope of externalities to be included?
- Which methodology, if any, should be utilized to incorporate or account for externalities in the planning process:
  - Qualitative
  - Percentage adders
  - Direct quantification/monetization
- Why should externalities be incorporated in the resource acquisition process?
- Which methodology should be utilized in the resource acquisition process?

The second approach, similar to the first, focused on whether externalities should be considered in least-cost planning, economic dispatch and rate setting and attempted to address the issues that follow.

- What are externalities?
- Scope of externalities
- Methods of dealing with externalities:
  - Emissions standards
  - Allowance trading, offsets and credits
  - Taxes or emissions fees
  - Adders

- Relationship of least-cost planning to environmental regulation:
  - Already regulated pollutants
    - Residuals
  - Impacts subject to pending regulation
  - Unregulated impacts

Should Externalities be Considered in Least-Cost Planning?

The issue of whether environmental externalities should be considered in utility planning processes is complex and controversial. Currently, approximately half of the states consider externalities in resource planning or acquisition processes and other states are in various stages of considering externalities. In discussing whether externalities should be included, the fundamental question of what constitutes an externality was raised and generated a wide range of thinking. According to the authors of one discussion paper, an externality is an "unpriced damage or benefit that results from the production of a good or service by a firm or individual. It represents a direct economic consequence of the production of the good or service not faced by the decision maker."

In general, least-cost planning or IRP processes allow regulators to compare and integrate both supply and demand-side resource options for meeting the short and long term needs of customers at the lowest possible cost. Traditional utility planning, many assert, has not historically incorporated the true costs associated with a supply decision, thereby ignoring certain risks and damages. Such an approach, some argue, will bias resource planning and acquisition decisions in favor of fossil-based supply options in lieu of other less damaging supply and demand-side resources.

If, as some suggest, externalities represent a market failure then the price for a good or service does not reflect the total costs, resulting in greater than optimal production and consumption levels. In order to address this, a range of approaches have been implemented in regulatory processes and others are still being considered, including environmental adders to approximate the environmental costs of certain generating sources, environmental dispatch, and taxes.

Role of Regulators

The question of whether to include externalities in the utility planning and resource acquisition process necessarily raises a fundamental question as to which type of regulator should possess the authority to make this judgement (economic, environmental), and at what level of government (state, federal) this should occur. Some participants believe that the federal government is in the best position to legislate and set environmental standards and that meeting federal requirements effectively internalizes the damages associated with a certain pollutant. Others believe that states not only have the authority to set their own standards that go beyond federal requirements, but believe that minimum federal standards do not result in optimal levels of pollution and that states can provide a remedy.

The issue was raised as to whether state utility regulators may appropriately address environmental externalities. Some participants believe that it is not appropriate for economic

regulators to set environmental standards, as such authority is necessarily a function of either the state legislature or environmental agency. Others believe that environmental, health and other effects are external costs which cause market distortions, and that such costs affect the costs of electricity and resource option risks and, thus, are appropriate for state commissions to consider. Future risks associated with fuel choice decisions and environmental regulations, for example, may impose significant costs on consumers and, as such, utility regulators should scrutinize resource options. In addition, it was raised that utility commissions are imbued with the responsibility to protect the health and welfare of the public and, thus, should fulfill this responsibility, either alone or in conjunction with environmental regulators. Therefore, it is reasoned, regulatory decisions that have such impacts are properly within the purview of the utility commission. Those impacts include not only environmental and health effects, but also impacts such as economic development/opportunity and national security.

Scope of Externalities

Participants believed it was necessary to gain an understanding of the scope of externalities that the Dialogue should focus on and attempt to address in electricity generation, including the effects from the front-end and back-end of the fuel cycles. By doing so, some participants felt that focusing solely on air impacts of electricity generation was too narrow and that if some impacts were addressed, then other effects, if not all other effects, should also be addressed. For example, external costs impact land, water, health, wildlife, agriculture, property values, etc., as a result of activities like mining, transportation of fuels, and waste disposal. External benefits may include economic growth, employment, an increase in standards of living, and national security. The range of impacts is quite large and cumbersome for those states attempting to incorporate all externalities possible, therefore decisions must be made on the scope of externalities that will be included in planning and resource acquisition processes.

One issue which generated significant discussion was the geographic impact that may occur when one state enacts an approach to deal with an environmental issue. Because impacts do not stop at a state's geographic border, determining whether the positive or negative impacts on bordering states becomes a decisional factor to address. Another key issue was whether external costs will be solely associated with electricity generation. If this occurs, industrial customers will naturally seek to avoid higher cost energy and opt for self-generation, raising concerns about stranded utility investment or higher rates for other customers.

Residual Impacts

Participants discussed the problems associated with residual environmental impacts which exist even when externalities are fully internalized, for example when regulated emissions of a pollutant are not fully offset by a control measure. Attempts to address residual impacts require regulators to consider whether such impacts are: (1) de minimis and should be ignored; (2) best left unregulated, as marginal control costs would exceed the incremental benefits of controlling them; or (3) quantifiable and addressed accordingly. According to the presenters, there are two preferred methods of addressing such impacts. One approach would determine a "societal consensus" for the optimal level of pollution deemed acceptable through legislative or regulatory standards. This is appropriate, some believe, because determining the optimal pollution level

where marginal damages and marginal control costs intersect on a marginal cost curve is nearly impossible. Another approach would only take into account significant and quantifiable residual impacts, unless emissions caps or offsets are required. This would result from a determination that performance standards on each source of pollution will result in marginal control costs not equaling marginal damages.

Some participants are concerned that residual pollution, for example, emissions which exceed nationally regulated levels, may indeed still be an externality at the local level, the costs of which were not contemplated and, therefore, not borne by the polluters. Other participants believe that determining the actual damages caused by a pollutant is difficult to estimate and that nationally regulated emission levels (for example, SO_2) have been established to account for perceived damages. Thus, eliminating 100% of a certain pollutant's emissions is unnecessary. The issue facing Dialogue participants is whether residuals can be considered externalities and, if so, how they should be addressed.

Proposed Definitions of Externalities

In order to further discussion, it was thought that the concept of externalities may be better understood if a common understanding or definition could be developed. For discussion purposes only, a definition was drafted as follows:

> Externalities are certain costs and benefits of production and consumption activities that are not borne by producers or consumers.
>
> Externalities can be either positive (beneficial) or negative (harmful), and upstream or downstream. Externalities are ubiquitous; they are everywhere. Externalities are not limited to the environment.
>
> The concept of externalities is derived from economic theory. [Theory states that resources are optimally allocated when markets are perfectly competitive and in long-run equilibrium. In such markets, all prices are equal to marginal costs.] Social welfare is said to be maximized only when marginal social costs equal marginal social benefits. However, social welfare is not maximized if marginal private costs do not equal marginal social costs, i.e., externalities exist.
>
> Once an externality is fully internalized, it is still possible to observe residual impacts - either positive or negative. For example, residual impacts on the environment will continue to exist even <u>after</u> all externalities have been fully internalized. These residual damages are not externalities that lead to inefficient decisions. They have been internalized and, in the context of economic theory, there is nothing left to be done. These residual impacts are efficient because the societal costs of reducing them further are greater than the societal benefits.
>
> The internalization of environmental externalities must meet the following principles: (from P. Joskow)

I. Any given target level of emissions for a particular pollutant should be achieved at the lowest possible cost for abatement and mitigation. The marginal cost of control must be equalized within and across all sources.

II. The optimal level for a particular pollutant in the relevant pollution region should be selected by balancing the incremental benefits against the [least-cost] incremental cost of reduced emissions.

III. The prices and quantities of final goods and services should reflect the costs of achieving the emissions levels defined by "II", using the least-cost abatement strategies indicated by "I", plus the societal value of the residual emissions that will result from a marginal increase in output evaluated at the optimal emissions level.

Following discussion of this definition, another working definition of externalities was created:

"THE WORKING "STORY"

Electricity production and energy use results in environmental impacts, including air, land and water impacts. These damages impose costs on society, including health and economic impacts. Some of these costs are considered in the electricity production process and are already internalized in the price of electricity. Some of these costs are not internalized. The issue is how much, if any, of these non-internalized costs should be internalized, and how. Note that there should be consideration of benefits as well as costs, and that there are non-environmental effects, such as economic development and national security, which should be considered.

Although participants did not agree that either definition was optimal, both did provide a good lead-in to further discussion. In particular, participants put forth their ideas to determine what is meant by the "costs and benefits" of production and consumption activities. Discussion highlighted some issues that were believed to represent "certain costs", including diversity of sources, national security, economic development, upstream and downstream effects, considerations of new technology, etc. Another key issue discussed was how to determine what the optimal level of pollution should be, which some argue is when marginal control costs equal marginal damage costs.

Participants also identified certain general goals that should be accounted for within this dialogue. Although this is not necessarily a comprehensive list, it does provide insight to those issues which participants believe are important, including:

- Coordination of decision makers and players in planning, including utilities, regulators, unregulated utilities, coops, and munis.
- Anticipate environmental and regulatory changes over time and take into account what costs might be or create insurance to hedge against future costs.
- Cost effective environmental protection
- Process for integrating all concerns

- Allocate risk and responsibility relative to the decision (pre-approval, planning process)
- Least-cost supply of energy
- Identify the "cross over point", where "x" and "y" meet (marginal control costs equal marginal damage costs)
- Economic efficiency
- Full realm of impacts
- Procedural equity
- Competitiveness (utilities not singled out)
- Full cost and benefits accounting

In addition to the goals listed above, participants narrowed the focus of discussions to several key questions that should be address as the dialogue progresses, including:

- Is it appropriate to consider externalities in the planning process?
- How do we define externalities?
    - What is the scope?
    - Do we need a working definition?
- How should externalities be implemented, which methodologies are best?
- Which entity should implement them and who decides?
- Do authorities exist to address externalities?

CHAPTER 6
REFINING THE ELEMENTS OF EXTERNALITIES

May 18-19, 1992

On May 18-19, 1992, participants in the dialogue convened in Washington, DC. The purpose of the meeting was to continue discussions initiated in Colorado and to focus on several papers to address the issues raised in Keystone. To serve as a starting point for discussion, several participants drafted issues papers on the subjects listed below:

1. Scope of Externalities
2. Environmental Costs in the Regulatory Process
3. Informational Needs of Regulators
4. Residual Impacts
5. Adders and Alternatives (Mechanisms for quantification)

Scope of Externalities

The first issue paper focused on those externalities that could be considered by state commissions. According to the author, externalities are "societal costs or benefits of production of consumption which are not borne or received through the price system by the firm or household which produces or consumes it." Such external costs and benefits must be included in the price of a good or service in order to reflect its true market value and result in proper consumption levels.

Current approaches in California, Nevada, New York and Massachusetts have all applied a narrow a definition of the externalities addressed within their state processes. These externalities are the costs to society of residual air pollutants and, in some cases, water and land pollutants, from electric power resources which are not internalized by current regulation. Such an approach, it is argued, adversely impacts commission decisions. As an alternative, the author outlines an approach in which all external effects for all fuels used to produce electricity ("or other end-use services that supply heat, light, motion and other capital or labor savings") are considered in a broad framework. The framework consists of six axes, described briefly below, each representing a direction in which the externality argument could be expanded:

1. Fuel Cycle and Manufacture: This axis represents the range of the fuel cycle and manufacturing activities. This assesses not only combustion operations, but the front and back ends of the fuel cycle. This would include the impacts, costs and benefits, from the mining or drilling of the fuel and extends through to the energy service at the point of delivery, and concluding in the disposal of the waste.

2. Nature of Impact: This axis represents the nature of the impacts on society and the environment, and raises the extent to which these impacts should be assessed.

3. Type of Impact: This represents the types of pollutants currently evaluated in terms of externalities and the damage caused to the environment (air, water, land). However, the author notes that other impacts can be added to this axis if impacts are measurable and if benefits

outweigh compliance costs, including "aesthetics, noise, groundwater contamination, and worker family impacts."

4. Economic: This axis reflects those externalities that could be evaluated for economic costs and benefits, including such things as national security, labor multipliers, and economic development.

5. Risk: This represents the level of risk that is involved in utilizing a particular energy source, including current and possible future risks, such as accidents, price risk, or future environmental regulation.

6. Operational: This axis refers to where and how the externality is incorporated in the state process, either the planning or resource acquisition process. This approach could also determine that externalities could be incorporated in operational decisions (dispatch) or whether to maintain or decommission facilities. Such internalization of externalities could be accomplished through taxes, command & control measures, or market-based incentives (offsets, permits).

The author concludes the following:

- The scope of externalities currently being incorporated within state processes is limited
- If the scope is to be expanded, a cost/benefit analysis must be undertaken to determine whether the impact of the externality is large enough to require a remedy.
- Expansion beyond current externalities is not justified by current data.
- All competing energy sources must be evaluated and externalities applied consistently

According to the author, the key to determining if and how the axes should be expanded is having a common understanding of what the goal of including externalities would accomplish. For example, if the goal is to improve the environment then the operational framework must work to that end. The same is true if the goal is to create decision-making that does not bias the use of supply- or demand-side measures to meet customer requirements.

Environmental Costs in the Regulatory Process

One paper focused on which environmental costs should be considered within the regulatory process. According to the author, environmental costs include both the direct costs of regulatory compliance and the indirect environmental costs, such as externalities. From a regulatory standpoint, the following issues (amended to reflect discussion) for which environmental costs should be considered are:

1. Clean Air Act compliance.

2. Pricing: both in terms of developing a revenue requirement and rate design. This issue also includes which environmental costs are appropriately considered as part of avoided costs and whether non-utility generators should be paid based upon environmental costs.

3. Incorporation of environmental costs into DSM evaluation.

4. Incorporation of environmental costs into DSM incentives.

5. Selection of resources that minimize social costs in integrated resource planning.

6. The design of bidding systems to implement resource planning process.

7. The dispatch of generating units in policy and planning contexts, including economic and environmental dispatch.

8. Facility siting determinations.
   a. determination of need
   b. selection of best alternatives
   c. selection of best site
   d. selection of best control technologies and best control levels

9. Evaluation of utility investments in alternate technologies, beyond core generation and DSM.

10. Marketing (green tariffs).

11. Evaluation of research and development programs.

Regulator Information Requirements

Two papers were presented on the informational needs that regulators require in order to make decisions on externalities in the planning process. The authors examined the issue by reviewing how siting agencies and rate regulatory agencies currently function, with particular focus on how externalities could be accounted for within an IRP process.

From a siting agency perspective, a review of externalities arises in four areas. First, siting agencies use information on externalities to compare alternatives to proposed facilities by reviewing such factors as fuel choices, technologies, and site options. Second, a comparison of costs and benefits of a proposed project allows for an evaluation against a "no action" alternative, which ensures that the overall benefits of a project must outweigh the costs of doing nothing. Third, the granting of a certificate is often conditioned upon the project sponsors agreeing to implement certain mitigation and control measures, for example to mitigate certain environmental damages. In order to determine the socially optimal trade- off between cost and environmental damage, specific information on control and damage costs are necessary. Fourth, socioeconomic impacts of large projects must be taken into account. Mitigation and compensation, such as infrastructure improvements and taxes, can be conditioned within a certificate. In all of the above cases, the comparison of costs and benefits must be completed regardless of whether exact values can be placed on certain externalities and is done by utilizing the best available information.

In the context of an IRP process, the author points out that several state regulatory agencies have placed monetary values or adders on certain environmental externalities. However, some siting

agencies address a broader range of environmental and other impacts (health, socio-economic, etc.) than have economic or environmental regulators. This raises concerns about inconsistent regulatory treatment of externalities. It was stated that to provide a fair and comprehensive review of utility planning, the types of externalities considered and the valuation of costs and benefits related to a particular course of action must be consistent among state agencies. State agency coordination and consistency in developing and administering IRP will reduce the risk that resource decisions would be made that conflict with decision-making values utilized by other agencies.

Potential inconsistent regulatory treatment raises the issue of where the locus of decision-making should rest, whether under the jurisdiction of the utility commission, environmental agency or the siting agency. According to one author, problems associated with IRP under PUC jurisdiction may include:

- Although PUCs have taken the initiative for utility planning, they only recently began to address environmental concerns, while siting agencies have been doing this for years.

- PUCs may only have jurisdiction over IOUs, thus exempting some entities (coops, munis, certain non-utility generators, etc.) from such regulation.

- As some PUCs have authority to implement post hoc prudence reviews, approving IRPs provides the utility with no assurance about future cost recovery.

- Accounting for externalities will be costly and will require experience and expertise not currently residing in most PUCs, thus agency resources are a major concern.

The benefits of having IRP under the PUC jurisdiction may include:

- Utilities will receive clear signals about how expenses incurred for environmental mitigation will be accounted for.

- Utilities will be assured that actions taken to mitigate future risks will understood by regulators.

- Utilities will be assured that cost-effective DSM measures will be rewarded

Residual Impacts

Residual impacts were the topic of another discussion paper, the focus of which was to clarify the definition of "residuals" and point out why such impacts must be accounted for in externality discussions. According to the author, the goal of IRP and accounting for environmental impacts into utility planning and decision-making is to minimize total social costs of a decision by balancing total internal and external costs (residuals are part of the external costs). The social cost of building and operating a new powerplant is the sum of the private capital necessary to finance the investment, operating costs and the external damage cost. Reducing overall social

cost will require the installation of emission control technology that is equal to or less expensive than the external damage costs. The optimal social cost is where marginal control costs equal marginal damage costs. However, even after marginal damage costs and control costs are balanced, external costs or residuals may still exist if the costs of controlling those impacts exceeds the damage costs. Thus, if a plant controls emissions optimally, the concern is whether those residuals need to be valued.

According to the author, several problems arise if residual impacts are not accounted for, including:

- plants may be dispatched at a higher level than originally planned for, thus emitting more pollutants than anticipated;
- economic dispatch does not take into account social cost-minimizing opportunities; and
- future resource acquisition and planning decisions may be flawed if social cost minimization is accounted for.

Adders and Alternatives

Currently, several states apply values (adders) to account for the costs associated with emissions resulting from electric power generation in order to encourage the selection of resources that will result in the least-cost to society. Some have been concerned that it is extraordinarily difficult to accurately apply values to such pollutants. As a result, it was deemed necessary to take a closer look at the purpose of adders and how adders are used in utility planning. According to a presenter, adders evolved as a result of state utility commissions implementing least-cost planning and determining that not only is identifying direct costs of a resource option necessary, but assessing social costs were required as well. Utilizing adders, some believe, promotes long range planning that accounts for future cost projections, risk and more stringent environmental regulations.

Utilizing adders in the bidding process for new resources provides a more level playing field for selection among resources, allowing more expensive (direct cost) options, like DSM, to compete with less expensive, but environmentally damaging options. Adders provide regulators with a quantitative means of comparing environmental costs, instead of traditional qualitative methods. However, determining the value that should be imposed on a particular resource raises significant concerns. The greatest problem with adders is that determining the "right" numbers is fraught with uncertainty, thus leading some states to apply any "reasonable" numbers, with the belief that some value is better than none at all. In addition, some believe that adders should approximate damage costs, while others assert that adders should represent control costs, which they believe are somewhat easier to define.

Applying adders to various resources raises competitive concerns. If only applied to the electric utility industry, other resources are given a significant competitive advantage in the marketplace. Not only do utilities compete with fuel oil and gas, but the impacts of higher rates may drive industrial load to alternative sources of energy or self-generation.

Some environmentalists do not favor adders because they have only been applied to new sources and, thus, any environmental benefits will not be recognized in the near term. According to the author, if adders were applied to existing sources the result would be "cost shock and not the least-cost means of achieving environmental improvement."

In light of some of the difficulties that arise when utilizing adders, many participants believed exploring alternatives that provide similar social outcomes would be desirable. One such approach is to set environmental targets for one or more pollutants on a state or regional level and "give utilities the flexibility to meet them." This approach might take the form of a collaborative effort among regulators (environmental and economic), utilities, and the public and other interests, as such a process is as much political as data driven. For this approach to be successful, the rationale behind the resource decisions must be understood and well articulated. Secondly, accurate compliance cost information must be made available in order to balance costs and potential benefits. In this collaborative effort, utility systems would be modeled to determine the best resource mixes and strategies to pursue in order to achieve desired levels of pollution control. Until a multi-agency collaborative process is developed and a different approach developed, adders could be used as a "placeholder"

Other alternatives to adders include a taxes imposed on emissions, emissions limits or applying a percentage advantage to conservation, similar to what has been implemented in Vermont, Wisconsin and in the Pacific Northwest.

Discussion

The following outlines some of the discussion held and highlights where some convergence of opinion exists. A significant amount of discussion focused on whether regulators could include certain externalities in planning or other processes while not including others. Additionally, several participants raised questions as to when states should attempt to account for externalities in the planning process (consensus language was developed and subsequently refined). Other areas of significant discussion were on the appropriate level of governmental authority to address externalities, whether pollutants which have already been internalized require any additional regulation, and the pros and cons of various mechanisms to internalize externalities.

Some believe that if some externalities are incorporated into the planning process, then all external costs and benefits must be addressed. Some participants believe that all areas of industry, the economy and impacts should be considered, in particular the electricity producing industry where competition is increasing. Although many believe that such an approach seems only fair, it was agreed that it would make this process unworkable and that focusing on electricity planning narrows the scope. However, it was agreed by the group that if environmental externalities are considered, impacts on economic growth, employment, national security and other impacts must be considered as well.

Subsequent discussion and papers on which level of government should exercise authority over various pollutants culminated in a proposal to develop a matrix that would articulate which levels of government exercise jurisdiction over pollutants and where such authority should be optimally

exercised. A paper would also be put forth which discusses the pros and cons of different levels of government exercising jurisdiction over externalities.

By identifying where jurisdictional authority currently rests (or should) lie, the next step in the process would be to determine the pros and cons of the various methodologies for incorporating externalities in the planning process. As with identifying the optimal locus of decision-making, participants agreed to develop a matrix that sets out a range of methodologies and examine the relative advantages and disadvantages of each approach. In short, a convergence of opinion was reached that this Dialogue should focus on the following three points:

1. Incorporating environmental considerations through existing federal and state law and commission orders.

2. Locus of decision-making: Determining where the optimal decision-making should be and the pros and cons of placing decision-making in various state and federal fora.

3. Determining the pros and cons of the various mechanisms of incorporating environmental consideration through existing state and federal law and processes.

The dialogue participants have agreed to focus on the means of accounting for environmental externalities through existing federal and state law and commission orders. However, implicit in these discussions will be the impact that the incorporation of such considerations will have on achieving other societal and economic goals. To guide further discussion, the following was drafted, discussed and agreed to in principle:

> In evaluating utility planning for future capacity and fuel needs, it would be appropriate for utilities and regulatory bodies to anticipate future environmental regulation and act accordingly. Thus, utilities and regulatory bodies may well consider such emissions and by-products of the production of electricity, such as CO_2 and mercury, which may not be regulated now or may be regulated differently in the future than they are today, in formulating utility plans and evaluating such plans. Such anticipation and consideration is entirely consistent with such traditional evaluations of risks, costs, and the allocation thereof, on such issues as fuel price, supply forecasts and facility siting.
>
> Some state commissions have the legal authority to move beyond presently existing environmental regulation. Through such independent action and other means, regulatory bodies may also influence future environmental regulation.

Such language led participants to discuss additional goals and principles, including:

- Achieving targeted emissions levels at the lowest possible cost for abatement and mitigation, while equalizing the marginal cost of control within and across all sources.

- Achieving optimal levels of pollution in a region by balancing incremental benefits against incremental costs of reduced emissions.

- Prices and quantities of goods and services should reflect the costs of achieving optimal emission levels, utilizing least-cost abatement and mitigation strategies, and the societal value of residual emissions.

- PUCs should become active advocates at the state and federal levels of efficient mechanisms to reduce emissions so that the benefits of a cleaner environment can be obtained by imposing the least burden on ratepayers and the economy.

- PUCs should encourage utilities to experiment with and demonstrate the most efficient ways to meet tighter environmental constraints.

- PUCs should stop imposing arbitrary adders, establish clear environmental goals, and allow utilities to meet them at least-cost.

Next Steps

At the next meeting, several participants agreed to present a matrix that will articulate where the locus of authority over certain pollutants currently exists (or is exerted) and where it ought to be. Project participants will discuss where existing authority lies, if at all, and the pros and cons of placing authority in each category. Another matrix will be developed that sets forth a similar framework to determine the pros and cons of the various mechanisms being utilized to internalize externalities.

CHAPTER 7
EXTERNALITY MATRICES REVIEW

July 14, 1992

The purpose of the meeting was to address and potentially determine the optimal locus of governmental authority for addressing externalities and to determine the pros and cons of various mechanisms being utilized to account for externalities. A working group developed a matrix to assist the group in determining the pros and cons of different levels of government exercising jurisdiction over externalities (see matrices below).

Pros and Cons of Current Locus of Governmental Authority
In evaluating the attached matrix, the work group established a framework by which externalities are currently being accounted for by various authorities.

1. "General"- The purpose of this heading is to place into context the general jurisdictional framework for the listed authorities.

Federal Legislation:

- Authority derived from Constitution
- For most of the environmental considerations listed, federal legislation sets out standards with which utilities and others must comply (RCRA, CAAA, SDWA, CWA).

EPA:

- Implements federal programs and ensures state compliance.
- Responsibility for implementation of national trading under CAA.

FERC:

- Authority derived under Federal Power Act.
- No certification or siting authority over utility investment.
- Role limited to ratemaking authority over utility compliance investment.

State legislation:

- Authority derived from state constitution.
- Federal preemption is limited to areas delegated in the Constitution, and areas not so delegated are reserved to the states.

Matrix of Where Authority Should Lie for Externalities (Wessler)

Pollutant	Authority					
	Fed. Leg.	*EPA*	*FERC*	*PUC*	*DEP/Siting*	*State Leg.*
General Comments	Only restricted by Fed. Constitution	Derived from Fed. Legislation	Derived from Fed. Legislation	Derived from state legislation	Derived from state legislation	Derived from state constitution
CO_2; no local impacts, global impacts	Set minimum fed. standards	Design and implement national market	Approve ratemaking consequences	Approve: technology choice; system operation; ratemaking	Approve technology choice	Policies consistent with national CO2 market
NO_x Mostly regional, some local impacts					Damage avoidance; technology choice	state standards based on local considerations
SO_2						
Heavy Metals; mostly local impacts		R & D support			Implementation of local standards and methods	Local standards and methods for internalizing environmental costs
Water						
Land Use						
Solid Waste						

Matrix of Where Authority Should Lie for Externalities (Norden)

Pollutant	Authority					
	Fed. Leg.	*EPA*	*State Leg.*	*PUC*	*DEP*	*Siting Agency*
CO2	Set standards based on prudent avoidance or MC= MB	Implement fed. legis and standards; delegate to states and oversee state implementation	Provide for consistent state regulation regardless of ownership,	Require incorporation of state siting standards and state health standards in	Set state standards consistent with state facility siting regulation	Ensure technology and site chosen to minimize total social cost (MC=MB) regardless of actions
NOx	Set minimum health standards and minimum requirements for state regulation	↓	technology, or site	resource planning and acquisition; ensure system operation consistent with siting tradoffs;	↓	by other jurisdictions (subject to min. fed and state standards)
SO2	↓	↓	↓	appropriate rate passthrough	↓	↓
Heavy Metals	↓	↓	↓	↓	↓	↓
Water	↓	↓	↓	↓	↓	↓
Land Use	None	None	↓	↓	↓	↓
Solid Waste	↓	↓	↓	↓	↓	↓
Social, Visual, Archeological	↓	↓	↓	↓	↓	↓

◦ May set standards that either meet or exceed the federally mandated standards or in the absence of federal requirements.
◦ Examples include California tailpipe emission standards.

State PUC:

◦ Authority derived from state constitution or legislation.
◦ Authority may encompass ratemaking approval, the incorporation of externalities within Integrated Resource Planning (IRP), and final siting decisions.
◦ Some states have developed methods to internalize environmental costs, e.g., California and New York for SO_2, CO_2, etc.

State DEP/Siting Agency:

◦ Authority derived from state legislatures.
◦ Role is in approving technology choice, facility siting and implementing state programs.

2. "CO_2"- At present, there is no federal regulation of CO_2 emissions, although the House provisions in the energy bill would allow utilities to receive credit for voluntary reductions and apply them against any future mandatory requirements. However, some states have been exercising authority by attaching damage levels to CO_2 or taking emissions into account in planning or resource acquisition processes.

Pros of federal authority:

◦ Establishes a minimum standard.
◦ Would establish a formal mechanism by which utilities could begin complying with provisions of the recently signed climate change protocol.
◦ Would eliminate any economic disadvantage to states acting alone.
◦ Would facilitate energy efficiency and encourage use of less polluting resources.

Cons of federal authority:

◦ Uncertain science could impose significant costs for unknown or minimal benefits.
◦ Could have adverse implications for national security.

Pros of state authority:

◦ Because no global, federal, or regional remedies exist to account for CO_2 emissions, states are taking the lead in addressing a pollutant thought to be the leading cause of global climate change.
◦ States considering CO2 as a hedge against future federal standards which would reduce future compliance costs.
◦ States may take the lead in order to affect environmental change.

Cons of state authority:

◦ Climate change has global and national impacts, and state efforts will not impact climate change problem significantly.

- Regulating on a state-wide basis could adversely affect sources and ratepayers in those states compared to sources in neighboring states.
- State approach is piecemeal and federal standard may be preferable.

3. "Nitrogen Oxides, Heavy Metals"- Impacts are regional and local in nature. Reductions of NOx are required by the Acid Rain provisions of the CAAA.

Pros of federal authority:

- Establishes a minimum standard.
- Federal programs, with EPA monitoring, are most appropriate to account for regional impacts.
- Allows states to set stricter limits if local impacts are not adequately addressed.
- Internalizes the externality.

Cons of federal authority:

- Standards may not account for local impacts and concerns.

Pros of state authority:

- States may take the lead in order to mitigate environmental damage.
- Allows states to set stricter limits if local impacts are not adequately addressed (health).

Cons of state authority:

- Federal programs already internalize the costs.
- Stringent state standards which exceed federal standards brings into question how much control over residual impacts is necessary.
- These pollutants have regional impacts and state efforts may not effect the impacts within that region.
- Regulating on a state-wide basis beyond federal standards could adversely affect sources and ratepayers in those states compared to sources in neighboring states.

4. "SO_2"- Impacts are regional and local in nature. Current federal law establishes an emissions cap at 8.9 million tons of SO_2 and requires a permanent reduction of 10 million tons of SO_2 through a flexible program.

Pros of federal authority:

- Establishes a minimum standard.
- A federal market-based program can achieve efficient reductions by allowing least-cost compliance and includes more players than a state program.
- Market based approach is flexible and allows states to meet federal standards and reduce compliance costs through a flexible program.
- All states must participate which eliminates problems associated with states acting alone.
- Internalizes the externality.

Cons of federal authority:

- Some believe that the problem did not justify the costs (uncertain science imposes unjustified costs).

Pros of state authority:

- Stricter state standards allow them to affect environmental change to account for local impacts (health).

Cons of state authority:

- Federal laws have already internalized the pollutant.
- Acid rain has regional and national impacts, and state efforts to go beyond federal standards may not effect acid rain within the state.
- Regulating beyond federal requirements could adversely affect sources and ratepayers in those states compared to sources in neighboring states.

5. **"Water, Land Use"-** Same as above, except that land use may be truly local, with limited regional impacts.

6. **Solid, Hazardous and Nuclear Waste"-** Same as above, with emphasis on regional impacts, particularly for hazardous and nuclear waste.

After assessing the matrix, the work group drafted a statement and listed some agreed upon questions to guide policy-makers:

> State and federal constitutions and laws are unlikely to change dramatically over time. States have authority to establish any standards they desire, as long as they achieve or exceed federal standards. This means there will always be the opportunity for significant diversity among states in the regulations they establish to meet their state environmental and energy needs. Therefore, the question we are addressing may not be "where" best to locate jurisdictional authority, but rather how the different levels of government can work together to meet certain goals. In determining whether there exists an optimal locus of decision-making, the following principles should be considered:
>
> - It is important to distinguish whether pollutants have national, regional or local impacts. This is important in determining which level of government should address the problem.
>
> - Need to determine the reasons for mitigating environmental impacts:
>   1. Environmental quality?
>   2. Health impacts?
>   3. Reduction of risk of future compliance/control costs?

- In deciding how hard to push for reductions, need to consider:
    1. Various types of information on environmental impacts, control costs, etc.
    2. Economic impacts
    3. Political will to act

- If states are active in areas where there are federal standards, some believe that it should be for the purpose of accounting for local considerations (health problems)

- Should state action on externalities be done as a legislative matter, with implementation by DEP?

- Are PUCs the agencies best equipped to take action, is this a function of legislation or environmental agencies and experts?

Another working group developed a matrix and discussion paper on the approaches that can be utilized to internalize externalities. The matrix (below) outlines some of the pros and cons of utilizing various mechanisms to internalize certain externalities. The dialogue participants agreed to focus on the means of incorporating environmental considerations through existing federal and state law and commission orders. However, implicit in these discussions was the impact that the incorporation of such considerations would have on achieving other societal and economic goals.

KEYSTONE DIALOGUE ON EXTERNALITIES - MATRIX OF APPROACHES TO INCORPORATE ENVIRONMENTAL CONSIDERATION IN ELECTRIC POWER PLANNING AND OPERATING DECISIONS

Envir. Pollutant or Concern	General Comments	Emission/Effluent Standards - Unit-Specific	Emission/Effluent Standards - Other	Market-Based (Caps, Trading and Allowances)	Adders	Offsets	Set-Asides	Taxes & Fees	Envir. Dispatch	Planning Impact	Operations Impact
Sulfur Dioxide	Envir. laws in place that internalize (cap, trading). Should work within CAAA, encourage allowance trading.	All units now have to meet NAAQS and other requirements.	Some states have Company-wide rate limits, e.g to meet state acid rain law.	National acid rain allowance program.	Some state PUC's require. Because of cap and trading, adders will yield no add'l benefit.					Current issue in some states	Future issue in some states
Nitrogen Oxides	Envir. laws in place that internalize (ozone attainment, acid rain). Regulations in development. Adders inappropriate; work to encourage trading.	Many units have limits now. More will have in future due to acid rain law and ozone attainment strategies.	Company-wide or broader limits possible under acid rain averaging provision.	Trading system under study in Calif. and NESCAUM areas as part of ozone attainment strategy.	Some state PUC's require.	Required in ozone nonattainment areas for new sources at more than 1:1. Banking under consideration for acid rain law; this could avoid use of alt. limits.					
Greenhouse Gases	NAS recommendation is to focus on low-cost ways to reduce GHG.				Some state PUC's require.	H.R. 766 gives credit for voluntary GHG reductions including by offsets. Should allow, encourage as prudent cost.		Under consideration in some National legislation.			
Air Toxics	Under CAAA, EPA must do 3-4 year study of utility steam generating units before nationally regulating under Title III.	Most units have particulate emission limits. Some state envir. agencies require toxic controls or risk studies to get permits.			Some state PUC's evaluating.						
Water Issues very site-specific (fresh water consumption, cooling/wastewater discharge, etc.)		National/state envir. agencies regulate.		Some state envir. agencies allow use of other's discharge water as source vs using lake/river water.	Some state PUC's evaluating.	Some state envir. agencies allow use of other's discharge water as source vs using lake/river water.		Some state envir. agencies require.		Site specific.	Site specific.
Land Use Issues very site-specific. Variety of interests- coastal zone, scenic, etc.		State envir. agency regulates.			Not applicable.			Some state envir. agencies require.	Not applicable.	Site specific.	Not applicable.
Solid Waste		State envir. agency regulates.			Some state PUC's evaluating.			Some state envir. agencies require.		Site specific.	Site specific.

BHS:keystcht.692
July 2, 1992

CHAPTER 8
FINAL RECOMMENDATIONS ON EXTERNALITIES

September 3, 1992

The purpose of the meeting was to reach a general agreement as to the tests that utilities and regulators should consider when determining when pollutants should be further internalized. In addition, the group tried to reach general agreement that the internalization methods have been characterized accurately and that all evaluation criteria are accurate and complete.

During participant examination of externalities resulting from electricity generation, with particular to attention paid to public policy approaches and options for incorporating external costs into utility planning processes, the Dialogue participants came to some tentative agreements. As described earlier, the underlying purpose of the dialogue is not to debate whether or not externalities should be included in utility planning processes, but to provide guidance to those states moving forward in considering externality policies. It should be noted that we did not exclusively focus on environmental externalities, but all external costs, including for example, economic and reliability issues.

The Dialogue participants tentatively agreed to a process mechanism for evaluating the roles of regulatory authorities (state, federal, economic, environmental) and a comprehensive analysis of the various internalization mechanisms being utilized or contemplated. This chapter describes the ways in which three pollutants (SO_2, NOx, CO_2) are currently internalized and the criteria utilities and regulators should consider as to whether the pollutants should be internalized to a greater extent in the future.

General conclusions on externality policy that the group has agreed to include:

The Goals and Principles of Externality Policy should focus on:

1. Achieving optimal levels of emissions by balancing incremental benefits against incremental costs of reduced emissions.

2. Achieving targeted emissions levels at the lowest possible cost for abatement and mitigation by equalizing the marginal cost of control within and across all sources.

3. Prices and quantities of goods and services should reflect the costs of achieving efficient emission levels.

4. PUCs should become active advocates at the state and federal levels of efficient mechanisms to reduce emissions so that the benefits of a cleaner environment can be obtained by imposing the least burden on ratepayers and the economy.

5. PUCs should encourage utilities to experiment with and demonstrate efficient ways to meet environmental standards.

At the conclusion of the dialogue, participants had tentatively agreed to the following conclusions:

1. In evaluating utility planning for future capacity and fuel needs, it is appropriate for regulatory bodies and utilities to consider both present and anticipated future environmental requirements. Thus, in their evaluations, rate regulators may deem it appropriate to consider environmental criteria related to the production of electricity (e.g. emission of air pollutants, use of fresh water) where such criteria may or may not be regulated now, or may be regulated differently in the future. Such consideration is consistent with traditional evaluation and allocation of risks and costs, such as in the areas of fuel price and supply forecasts and facility siting. However, in establishing just and reasonable rates, regulators should give appropriate consideration to those costs which are incurred in anticipation of future environmental requirements.

2. It is important to recognize that changes in legislation, such as Clean Air Act Amendment of 1990, materially effect the level of internalization of environmental impacts.

3. There is a need to view resource planning in a holistic fashion, i.e., consider environmental, economic, and reliability of service issues concurrently.

4. Market approaches are preferable to non-market approaches because market approaches provide greater assurance that environmental protection will be accomplished at minimal cost. Programs to internalize externalities should be designed so that utilities are given flexibility to develop environmental control strategies that minimize their costs.

5. Proceed cautiously to internalize environmental externalities due to potential significant unintended consequences associated with piecemeal applications and current early stage of consensus on environmental damage estimates.

Review of Internalization Mechanisms

The seven internalization mechanisms that were considered by project participants:

1. Unit specific standards (command and control)
2. Emissions trading
3. Adders
4. Offsets
5. Taxes and Fees
6. Environmental Dispatch
7. Set-asides

The participants created a list of fourteen evaluation criteria by which to review the internalization mechanisms.

1. Substance is controlled by specifying or limiting one or more of the following:
    a. Emission rates by unit or groups of units (in lbs/MMBtu or other measure)
    b. Total emissions (by unit or group of units, in tons/yr, or other measure)
    c. Pollution levels (in atmosphere or water body, in ppm other measure)
    d. Cost per unit of emission
    e. Total cost of pollution control
    f. System operation
    g. Other
2. Enforceability (implementation can be certified or monitored from regulators point of view).
3. Degree of certainty in achieving desired emission reductions.
4. Extent of administrative requirements or burden.
5. Likelihood of leading to least cost way to society of achieving desired reduction in pollution levels.
6. Extent of "piecemeal effect" or market distortion, (i.e., only certain types of facilities affected).
7. Contradicting regulations not created and/or coordination encouraged (rate v. environmental agencies).
8. Consistent with existing laws.
9. Adequacy of information to design and implement the approach.
10. Are there jurisdictional complexities of implementing an approach (i.e., does it require a multi-state agreement to implement the approach in states where multi-state power pools exist?).
11. Extent to which approach may be influenced by politics.
12. Likelihood of stimulating innovation.
13. Degree of flexibility in investment decisions by the utility.
14. Process is "self-adjusting" and approach has longevity.

Approach Attributes Assessment: Set-Asides

1. Pollution control or reduction measurement will depend on method of set-aside.

2. Approach verifiable through evaluation of set-aside.

3. Uncertain achievement desired environmental results.

4. Has the potential to create burdensome administrative requirements. However, the approach does not have to create administrative problems.

5. Will not lead to least cost way of achieving desired reduction in pollution levels since cost of projects are above avoided costs.

6. Piecemeal effect could be significant because set-asides would be expected to apply only to electric utilities.

7. Probably no contradicting regulation, if set-aside by PUC and added cost recoverable.

8. Set-asides have been found to be legally acceptable.

9. There is inadequate information as to how much should be set aside for uneconomic projects. For example, how much above avoided costs should an environmentally acceptable project be worth?

10. Does not require a multi-state approach.

11. Set-asides can be politically influenced as there are a number of areas where data does not exist and judgement can be applied.

12. Could stimulate significant technical innovation in the areas of renewable energy such as wind, solar, biomass, etc...

13. Causes some degree of flexibility in investment decisions in new generation by the utilities.

14. Usually short-term until the technology fits the market.

Environmental Dispatch

1. Cost per unit of emission is established for incorporation in the dispatch.

2. Approach requires monitoring of dispatch for incorporation of adder. Also, for emission corresponding to adder.

3. No certainty in the environmental result. In fact, could be perverse if other pollutant emissions increased.

4. Administrative burden is not created. However, determination of adder for dispatch can be a lengthy, litigious process.

5. Not likely to lead to least cost pollution reduction since this approach does not incorporate other responses utilities can take to reduce pollution, such as fuel switching and new controls, which may lower the cost to implement.

6. This is a piecemeal approach only dealing with electric utilities.

7. This approach, if implemented by a rate regulatory agency, could be contradictory to actions taken by the environmental regulatory agency.

8. There is no consistency problem with existing law.

9. The adequacy of information to determine values for dispatch adders is poor.

10. A multi-state government would be necessary to implement in multi-state power pools with a centralized dispatch.

11. The values and the type of adders for dispatch to be considered are subject to significant political manipulation.

12. This will encourage some innovation to lower the total cost of dispatch.

13. Utilities would have some flexibility to lower the total social dispatch cost.

14. This process is not self-adjusting. Adders must be revisited periodically with likely contentious process.

Taxes and Fees

1. Cost per unit of emissions.

2. Approach requires monitoring of emissions, tax reporting and fines for penalties.

3. No certainty in the environmental result. If the tax is set too low, polluter will pay tax rather than reduce pollution. Complete response to energy tax may take ten years or more years. Intervening economic events may require adjustments in the tax regardless of whether it was set correctly to begin with.

4. Burden depends on how complicated that tax becomes. Administrative burden of how to spend or distribute tax revenues and how to achieve revenue neutrality, if that is the goal.

5. Will provide incentive to individual firms to control more cheaply than level of tax. Difficult to determine what level of tax will yield desired reduction level. In case of greenhouse gases, unless rebates are given for offsets, many cost effective reduction options will be excluded.

6. Piecemeal effect depends on how broad based the tax is. This approach is conducive to avoidance of piecemeal effects. However, it is unlikely to be achieved in a fair and consistent manner as the damage costs may vary by location. Clearly, a better approach for global pollutants as opposed to local pollutants.

7. No.

8. Dependent on application, it is consistent with law. A state tax may have Commerce Clause implications. For environmental goals, would not be necessary in conjunction with emissions cap and trading system.

9. Response to tax is unknown, therefore converting an environmental goal into a level tax is extremely difficult given available information.

10. No agreements are required.

11. Level at which the tax is set is extremely likely to be influenced by politics. May be difficult to set tax at a level high enough to reach environmental goal.

12. May encourage individual polluters to seek lower control costs. Will encourage some new technology but only if direct cost per ton of control at individual unit is below tax.

13. Yes, individual unit can do anything that costs less than tax compliance. Cannot be shared by two units so flexibility is not as great as with a trading system. This is especially true for CO_2, where offsets represent low cost control options.

14. Level of tax is not self-adjusting. Will, in all probability, need to be reset to achieve goal.

Offsets

1. Total emissions from one source are controlled to offset emissions from another source.

2. Enforceability requires development and demonstration of a number of criteria including verifiability, monitorability, and measurability.

3. There is certainty in environmental result, given acceptability of the criteria for enforcement.

4. Administration may be burdensome.

5. Conducive to developing least cost pollution reduction. Highly economic in that lowest cost and source offset can be used first.

6. Can mitigate piecemeal effects by incorporating cross-sector offsets. Care in state action needs to be taken (e.g., out-of-state offset).

7. Unlikely to result in contradictory regulations.

8. Caution at state level with Commerce Clause.

9. Adequacy of information is dependent on the pollutant. NOx offsets are more likely to have adequate information than some CO_2 offsets.

10. Agreements would be necessary to implement across state lines.

11. Political influence is highest where offsets are distant from the source being offset.

12. Conducive to stimulating innovation.

13. Yes.

14. Yes. The market sets the value of the offset.

Adders (planning only)

1. The adder essentially acts as a tax to represent a cost per unit of emission, but only for planning purposes.

2. Adders are implemented in the planning process for new resources so they are easily enforced by the PUC if it simply requires their use.

3. No certainty in environmental result. In fact, when used only in planning stage, perverse environmental outcomes can occur-- such as increased utilization of dirtier, existing plants when new, cleaner, but more costly, plants come on line.

4. Does not create burdensome administrative requirements. (assuming value for adder is per-determined). However, the determination of adders can be a lengthy litigious process.

5. No. It is not clear that adders will achieve the desired level of pollution reduction. Further, the way new electricity is generated will be determined based on an arbitrary adder value that may have no relationship to least cost. Significant potential for no cost recovery.

6. Piecemeal effect is significant because adders are applied only to regulated electric utilities.

7. There is significant potential for PUC's implementing adders to create contradictory regulation to the state environmental regulators.

8. Adders may be completely unnecessary and inconsistent with existing law if these laws adequately internalize the cost of pollution from new generation. For example, SO_2 trading should require all new sources to buy allowances to offset emission and insure that the overall limit specified in the law is met. Requiring an SO_2 adder will only cause the price of electricity to rise in the state for which

it is required, without reducing emissions below the overall SO_2 cap established in Federal law. Consistency with existing laws may vary from state to state, if applied at the state level.

9. Range of values used indicates inadequacy of information and process for determining a good value.

10. No agreement is required.

11. Both the value used for adders as well as the type of adder to be considered is subject to political manipulation to a greater extent than in other methods.

12. Adders can be manipulated to favor one existing technology over another. Unlikely to stimulate significant technical innovation, as the rewards for change are limited.

13. No.

14. Not self-adjusting. Adders must be revisited periodically, with resultant contentious process.

Marketable Permits

1. Total emissions for group of units are set. Individual plant emissions are measured and an allowance is set. The market determines the cost per unit of emissions as the value of an allowance. NAAQS cannot be violated by an allowance trade.

2. Marketable permits are enforced by monitoring emissions, tracking allowance transactions, and levying penalties on those not in compliance. Monitoring emissions of SO_2 is done by CEMS. The way emissions are monitored or measured depends on the pollutant controlled.

3. Environmental results are more certain.

4. Level of administrative burden is dependent on the pollutant. SO_2 should not create undue burden. CO_2 on an international level, taking into account other greenhouse gases and absorption of CO_2 by forestry will be more burdensome. Tracking of allowances is straightforward. Participation of financial institutions facilitates trading. Monitoring is necessary to insure unit specific standards are working as well. By decentralizing decision-making, government and industry each focus on what they do best.

5. A major advantage of marketable permits is that they provide an incentive for least cost control and stimulates new, lower cost technologies. Takes advantage of cost differences among suppliers of pollution reduction.

6. Entire electric system, both existing and new units, will be affected. Industrial sources may opt in for SO_2 trading. In general, trading should extend to all sources in a geographic area in which trading is allowed. This approach has the potential to minimize piecemeal effects depending on how the tradeable market is defined.

7. Educational efforts need to be undertaken to make sure that emissions trading is understood and supported by all agencies and regulatory bodies tat can influence its success. This approach is conducive to the avoidance of contradictory regulations by environmental and rate regulatory agencies.

8. Yes. Could be subject to court challenge by local groups.

9. Adequacy of information is dependent on the pollutant. SO_2 has adequate information. CO_2, on an international level, creates greater challenges.

10. Laws or regulations must be established to allow trading across state lines.

11. Standards are specified in legislation. In case of SO_2, they were the result of lengthy political battle and are not likely to be overturned. The market, not politics, will determine price of allowances.

12. Yes. Incentive is provided by trading to find new, lower cost ways to comply.

13. Yes. Utilities control the investment decisions, subject to state PUC approval.

14. Process is self-adjusting through market dynamics. Reasonable long-term approach depending on market size and function.

Unit Specific Standards

1. Emissions rates on unit specific bases or site(specific technology).

2. Approach is enforceable with monitoring and fines.

3. Difficult to assure regional environmental result including accommodating growth.

4. Administrative burden is less than most other approaches with the exception of extreme growth cases.

5. Unlikely to be least cost. Costs can be significantly higher than with trading.

6. Piecemeal effect can be avoided if implemented by an authority with sufficiently road jurisdiction, as it is possible to implement the approach universally to many sources of a pollutant.

7. This approach is typically administered by the environmental agency and therefore, avoids contradiction with environmental agency.

8. Yes.

9. Regulators do not have adequate information to determine best, most cost-effective control technology.

10. No agreement is needed.

11. The unit is standard relative to other approaches is not likely to be politically driven.

12. Unlikely to stimulate much technological innovation.

13. No flexibility.

14. Not self-adjusting.

Pollutant Discussion

Carbon Dioxide

There are currently no laws regulating carbon dioxide (CO_2). Some states are considering laws to reduce CO_2 emissions, while some state Commissions have implemented policies to limit regulations that incorporate the use of adders or adders combined with offsets to address CO_2 emissions. It is believed that further internalization may be appropriate. The key "authority attributes" are:

1. Range of impact is global - majority outside of U.S. and will increase in proportion to the U.S. share.
2. Man-made sources are varied - majority outside of electric utility industry.

Thus, due to the global nature of emissions and varied sources, the best approach to internalization is at the federal level in a manner that encompasses all major sources, not just electricity production, and be consistent with international agreements. Several approaches for addressing CO_2 have been considered at the federal level, including carbon taxes and offset approaches. Provisions included in the recently enacted Energy Policy Act create a voluntary emissions reporting program and reporting of mechanisms initiated to reduce emissions.

In the Framework Convention on Climate Change signed in Rio, and ratified by the U.S. Senate, the United States agreed to reduce CO_2 emissions and emissions of other greenhouse gases not included in the Montreal Protocol, with the aim of returning to 1990 emission levels by the year 2000. Principles for meeting this obligation include cost-effectiveness and that all sources and

sinks be included. Also, parties to the convention may implement compliance measures jointly, meaning CO_2 reductions or CO_2 -equivalent reductions from investments made by U.S. companies outside its borders can be counted toward its obligation. The treaty requires that emissions inventories and related reports will be submitted to a governing body. Each nation is required to develop an action plan to meet the goal. Whatever actions utilities or regulators take to limit CO_2 emissions should conform with this agreement.

The CO_2 issue is global in nature and there are no local impacts of CO_2 emissions. Emissions result from the combustion fossil fuels and deforestation. The electric utility industry in the U.S. is responsible for about one-third of all anthropogenic CO_2 emissions in U.S., and the U.S. contributes about one fifth of all global emissions, with its share declining as developing nations and countries with economies in transition industrialize. The transportation sector is also responsible for about one-third of the U.S. emissions. The two considerations expressed above (namely, no geographic restrictions should apply to where reductions can be achieved and all sources and sinks should be considered to reduce CO_2 and other greenhouse gases) need to be taken into account in policy approaches to regulating this emission.

Since CO_2 is not internalized yet by law or regulation, it is reasonable for utilities and states to incorporate the risk and probability in decision making as there may eventually be federal laws to limit emissions of CO_2 which could have long-term consequences. However, many believe it would not be prudent for utilities to spend significant amounts of money to reduce CO_2 emissions if not related to a decision being made on a new resource (fuel switching at an existing plant, retiring an existing plant, or environmental dispatch should not be done if costly). The National Academy of Sciences (NAS) recommendation is to implement low or no cost measures to reduce greenhouse gas emissions until consensus is reached at the federal and international levels as to targets and timetables for reducing emissions. To do otherwise will "inappropriately distort energy markets".

The NAS recommends: Despite uncertainties, the threat of global warming is a serious enough problem to "merit prompt response". The NAS recommends adoption of no-cost, low-cost, multiple-benefit reduction measures that make sense anyway and are justified for reasons other than global climate change and will serve as an insurance policy against global warming. These measures include conservation, increased demand and supply-side efficiency, increased auto efficiency, fuel switching to natural gas or renewables, coal bed and landfill methane recovery, forestry projects that include preservation, reforestation and improved forest management practices. Adopting measures consistent with NAS recommendations is a prudent response to potential future regulation. The original voluntary offset legislation and programs conform with the NAS recommendation.

The method chosen by the utility and state to anticipate federal action should be flexible enough to reflect a range of possible federal actions and possible timing of implementation. Future taxes can be studied using a range of costs implemented at various times, discounted to reflect the probability of the tax being instituted. Future caps, such as those designed to keep CO_2 emissions at or below 1990 levels, can be studied by looking at the effect on system emissions

of new sources. The differential value of the new sources is based on the best estimate of the cost to reduce the system emissions to the lower level of the option. Thus a "least-cost of control value" is a reasonable approach to calculate the value of a lower CO_2 emitting source in attaining a system cap on CO_2 emissions. Knowledge of the value of avoiding the global warming damage, if available, should be considered in the analysis. If the least-cost of control far exceeds the estimate of the value of avoiding the damage, then the cap may not be set as stringently if the federal action occurs to create a cap. Since the entire concept of anticipation is so judgmental, the utility should have the obligation to consider various factors and present its judgments to its regulators in the context of new resource selection. The regulators then have the ability to agree or disagree, as they do with many other judgments made by utilities in selecting new resources to meet customer needs.

Efforts to better understand the value of avoiding damages and the least-cost to control damages provide valuable insights to make the above judgments and should be encouraged even though they may be expensive undertakings on their own.

Nitrogen Oxides

NO_x is highly regulated today, given the 1990 Clean Air Act Amendments that heightened the importance of NO_x in controlling ground level ozone, as well as reducing acid rain. Reductions of NO_x are required by Title I of the 1990 Clean Air Act Amendments at levels dependent upon the location of industrial facilities and the attainment status of such areas. More stringent controls are required in higher levels of non-attainment areas. The Acid Deposition Title of the 1990 amendments requires certain power plants to reduce emissions by 2 million tons through the installation of technology. As a result of these new programs, emissions of NOx will be reduced. Thus, no further internalization is appropriate at this time. Efforts should be focused on making the recent laws work. This includes establishing RACT rules, developing State Implementation Plans (by Environmental Agencies), exploring NO_x trading approaches to lower implementation costs, developing NO_x rules for Title IV (acid rain), and integrating the requirements of Title I and Title IV.

NO_x is not part of the trading system as is SO_2 in Title IV. However, averaging of NO_x emissions rates is allowed and there is the potential for NO_x banking. To comply with Title I requirements (ozone non-attainment), state and regional environmental agencies are considering trading, offset banking, and ways to integrate stationary and mobile sources through these market mechanisms. These mechanisms should be encouraged to promote lower cost compliance.

Recent studies related to the ozone NAAQS suggest that at some time during this decade there is the possibility of a lower ozone health standard (i.e., below the current level of 120 parts per billion). Utilities and regulators should consider this possibility in new resource decisions and in major capital additions to existing sources to meet the current standard. Overall system plans must be tested against a lower NO_x standard to provide reasonable assurance that major expenditures will not be rendered obsolete by a lower NO_x standard should a more stringent standard be established in the future. Differences in the incremental cost to comply with a lower NO_x standard for options to comply with the current standard is a measure of the risk associated

with different options. This is an overall system approach versus resource specific approaches such as adders or emission standards.

Sulfur Dioxide

SO_2 is highly regulated and internalized today by the Acid Deposition title of the 1990 Clean Air Act Amendments. This provision is designed to achieve a permanent reduction of 10 million tons of sulfur dioxide (SO_2) and a two million ton reduction of nitrogen oxide (NO_x) achieved through the requirements of Title IV and other titles for NO_x. To achieve these intended utility reductions, emissions of SO_2 were capped at 8.95 million tons, beginning in the year 2000. The title utilizes market-based mechanisms to encourage flexibility and least-cost compliance.

The market-based approach is designed to achieve reductions in two phases. Reductions required in Phase I must be achieved by the end of 1995, and Phase II reductions must be reached by the end of 2000. Essentially, each existing utility fossil unit in the country greater than or equal to 25 MWe (with some exceptions) is provided allowances of sulfur dioxide (SO_2). Allowances are assigned initially by multiplying an emission rate of SO_2 per million BTU (MMbtu) by the unit baseline fuel consumption divided by 2,000. Phase I imposes a cap on SO_2 emissions from 110 utility units. Phase II imposes an emissions cap on most power plants. To achieve the cap, utility units are able to install technology to achieve emissions reductions, switch to lower sulfur coal, natural gas, or renewables, implement demand-side management programs; or buy and sell allowances. It is hoped that a utility will buy allowances to meet the cap if its incremental costs to achieve reductions are greater than the price of allowances being sold in the market place. On the other hand, if a utility can reduce its emissions more cheaply than the price of allowances, it can over control its emissions and sell allowances in the marketplace. In concept, buying and selling allowances provides utilities with opportunities to reduce costs of compliance with Title IV of the Act. Many industry observers believe that this flexible approach potentially could allow for an estimated $1-$2 billion cost savings per year when compared to the traditional "command and control" approach. Internalization is achieved through the value of allowances established by the market.

As implementation of the 1990 amendments has just begun, no further internalization is appropriate at this time. Efforts should be focused on making the recent laws work. This includes finalizing all rules related to the SO_2 tradeable permits and encouraging the development of effective markets. While it is always appropriate to consider the possibility of tighter environmental requirements in the future, nothing is sufficiently imminent to take further actions at this time.

APPENDIX A
UTILITY PLANNING USING LEAST-COST PRINCIPLES
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