DOE/IR/05106--T161

DE93 005624

March, 1992

"A MUNICIPAL GUIDE TO LEAST COST UTILITY PLANNING"

Energy Task Force
of the Urban Consortium

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MASTER

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PREFACE

YEAR 11 ETF PUBLICATION

The Urban Consortium for Technologies (UC) is composed of over forty of the largest cities and urban counties by population in the United States. The Consortium provides a unique forum to define urban problems common to its member governments and to develop, apply transfer and commercialize technologies and innovative management techniques to address those problems.

The Urban Consortium conducts its work program under the guidance of Task Forces structured according to the functions and concerns of local governments. The Urban Consortium Energy Task Force (UCETF), with a core membership of 20 large cities and counties, was formed in 1979 to help improve urban energy management decision-making through applied research and technology transfer. The UCETF focuses on developing and sharing new approaches and innovative solutions to energy management problems with interested local governments. Projects with similar subjects are organized into Units with each unit managed by a selected Task Force member.

A description of the Units and projects included in the 1990 program are as follows:

ALTERNATIVE VEHICLE FUELS

Alternative vehicle fuels offer a very strong potential to aid in the reduction of US dependence on foreign oil supplies, with the concomitant benefits of decreased air pollution in urban areas. Local governments can play an instrumental role in realizing this potential through practical applied research and highly visible demonstrations for alternative fuel and technology options. Projects in this topic area place a strong emphasis on the examination of all potential alternate fuels with support from teaming and partnership activities among cities and counties, utilities and other relevant private sector organizations that have matching interests. The 1990 Alternative Vehicle Fuels unit consists of:

Albuquerque, NM -- *Alternative Fuel Vehicles in Municipal Duty Cycles*
Broward County, FL -- *Dual Fuel Conversion Demonstration*
Detroit, MI -- *Assessment of AFV Availability to Meet Emergency Contingency Planning and Long Term Public Fleet Integration*
Denver, CO -- *Alternative Fuels and Transportation Management Associations*
Houston, TX -- *CNG Fueled Vehicle Comparison*
New York, NY -- *Alternative Transportation Fuels: Infrastructure Issues*
Pittsburgh, PA -- *Compressed Natural Gas as an Alternative Vehicle Fuel*
San Diego, CA -- *Siting Alternative Fuel Filling and Maintenance Stations*

ELECTRICITY MANAGEMENT

Energy costs can place a severe burden on residents and limit economic growth for both energy-intensive industries and the vital small business sector that provides the majority of today's employment opportunities. Urban governments, therefore, need to have the ability to manage both the use and demand for electricity supplies. The emphases on the 1990 electricity management projects include attention to broad issues of electricity cost as an economic factor in commercial development decisions, procedures for the design of major new public facilities, and the feasibility of emerging decentralized and/or alternative sources of electrical energy. This 1990 unit consists of:

Chicago, IL -- *Central Station DHC Phase I Feasibility Analysis*
Columbus, OH -- *Electricity Demand Impacts of New Indoor Air Quality Standards*
Dade County, FL -- *Global, Automated Urban Government Energy System (GAUGES)*
Detroit, MI -- *Hydraulic Waste Energy Recovery City of Detroit Water Distribution System*
Kansas City, MO --*Use of Cogeneration System to Control Electrical Demand*
Montgomery County, MD -- *Integrated Energy Planning for a New Detention Center*
New York, NY -- *Strategies to Reduce Electricity Cost in New Commercial Construction*

ENERGY, ENVIRONMENT AND ECONOMIC DEVELOPMENT

Today's urban centers face critical and continuing problems that constrain their ability to provide affordable housing, to reduce congested highways, and to improve air quality, waste management, and economic development. The efficient use of energy and the development of alternate, clean energy resources can help address these broad community problems and contribute significantly to achieve truly sustainable, environmentally responsible, and economically viable communities. This unit, therefore, deals with community problems, from affordable housing to alternate clean energy resources. Urban strategies to improve energy-sustainability will require attention to both broad based institutional changes, as well as specific projects designed to encourage the application of appropriate technology and community development practices. This 1990 unit consists of:

Phoenix, AZ -- *Impact of Heat Islands on Cooling and Environment*
Los Angeles, CA -- *Heat Island Mitigation*
Pima County, AZ -- *Tucson Solar Village*
Portland, OR -- *The Sustainable City: Phase II*
San Jose, CA -- *The Sustainable City: Phase II*
San Francisco, CA -- *The Sustainable City: Phase II*
St. Louis, MO -- *Pilot Program for Energy Efficient Mortgages*
Washington, DC -- *Energy Efficiency in Public Housing*

WASTE MANAGEMENT

Effective and environmentally sound waste management is a concern of local government that only promises to grow in its significance through the decade. Urban strategies for waste management are evolving into coherent approaches that integrate traditional collection and disposal practices with new emphases on waste source reduction, separation and isolation of hazardous wastes, and practical recycling procedures. This year's unit consists of:

Hennepin County, MN -- *Household Hazardous Waste Processing - Phase II*
Houston, TX -- *Solid Waste Integrated Cost Analysis Model: An Applied Decision Making Tool for Municipalities*
Memphis, TN -- *Sludge Storage Lagoon Biogas Recovery*
New Orleans, LA -- *Pyrolysis Disposal of Scrap Tires*
San Diego, CA -- *Mixed Plastics Recycling*
Seattle, WA -- *Evaluation of Hazardous Waste Management Programs*

Reports from each of these projects are specifically designed to aid the transfer of proven experience to other local governments. Readers interested in obtaining any of these reports or further information about the Energy Task Force and the Urban Consortium should contact:

Energy Program
Public Technology, Inc.
1301 Pennsylvania Avenue, NW
Washington, DC 20004

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ABSTRACT

"MUNICIPAL GUIDE TO LEAST COST UTILITY PLANNING"

The recent track record of "traditional" electricity planning, which entails selection of supply side resources to meet forecasted demand, has not been good. There are numerous examples of utilities incorrectly forecasting demand and over-building generating capacity while others underestimated growth and have had to cut demand and find alternate power sources to avoid outages. A potential solution to this problem is the continuing development of Least Cost Utility Planning (LCUP). Regulatory commissions, consumer advocates and utilities are increasingly relying on LCUP as the most responsible way to avoid construction of new capacity and alleviate anticipated shortages caused by cancellation of construction projects, load growth, or natural replacement of aging capacity.

The purpose of this report is to provide municipalities a starting point for evaluating their servicing utilities or states' least cost plan. This was accomplished by:

- Identifying key issues in LCUP.
- Reviewing examples of the collaborative and classic approaches to LCUP in Illinois, California, New York State and Michigan.
- Cataloging municipal authorities and strategies which can influence or support LCUP activities.

Results of the project indicate that through a basic understanding of LCUP processes and issues, municipalities will be in a better position to influence plans or, if necessary, intervene in regulatory proceedings where plans are adopted. Constraints to municipal involvement in LCUP include statutory limitations, resource constraints, and a lack of knowledge of indirect authorities that support the LCUP process.

If recent history is an accurate indicator for the future, new planning processes must be identified that fashion strategies to avoid past mistakes. That perspective is especially appropriate in the field of electricity planning, given the combination of distant planning horizons, uncertainty, conflicting policy objectives, and the vast array of demand and supply-side options available to meet energy needs. In response to these circumstances, the concept of LCUP has gained acceptance among regulatory commissions, consumer advocates and utilities.

A study performed for the Electric Power Research Institute (EPRI) showed that at least 43 states have functioning LCUP strategies or are considering, developing, or implementing a planning process that will ensure the most cost-effective mix of new generating facilities and DSM.[2] The same survey polled regulatory commissions to ascertain factors influencing LCUP adoption. In response to inquiries regarding motivation, some of the contributing factors fall into the broad categories of capacity constraints, capacity surplus, relatively high rate increases, and "ideological" commitments. With respect to capacity, regulators felt that LCUP may provide the most responsible way to alleviate anticipated shortages caused by cancellation of construction projects, unanticipated load growth, or natural replacement of aging capacity. The desire to avoid construction of new capacity whenever practical was often cited as a primary reason to consider LCUP. The survey also indicated a relationship between electric rates and LCUP development trends; the seven states showing no interest in LCUP all have lower than average electric rates.[3]

The LCUP process might be said to begin where traditional planning ends. LCUP seeks to utilize all available resources for meeting future demand, including load management, renewable energy resources and cogeneration, as well as traditional, central generating station supply choices. The National Association of Regulatory Utility Commissioners (NARUC) defines LCUP as a: "*strategy to provide reliable electrical services at the lowest overall cost with a mix of supply-side and demand-side resources as potential contributors integrated into a common framework that helps utilities and regulators respond to uncertainties and to cope with risks, while making it easier to strike a balance among traditional regulatory goals of economic efficiency, reliable service, environmental protection, and equity...*"[4]

The Northwest Power Planning Council (NPPC)[5] developed North America's first official least cost plan in 1983. Its goal was to indefinitely defer construction of large-scale power plants and make conservation the Pacific Northwest's dominant source of new electricity supply. DSM resources often form the basis for a LCUP strategy because energy efficiency improvements are, for a broad range of end-use requirements, often the most cost-effective of all resource options. NPPC noted the following advantages to DSM:

* **Flexibility:** DSM is a flexible means of acquiring energy supplies because mid-course corrections to account for changing conditions can be accommodated.

* **Short Lead Time:** the relatively short lead time required to design and implement DSM avoids the need to make large capital investments far ahead of the time when a new resource is expected to be needed.

* **Closer Match With Needs:** the small incremental size of each conservation activity permits a closer matching of supply with new demand.

* **Better Economic Tracking:** DSM opportunities tend to track economic cycles, ensuring that the resource is largest when the need for it is greatest.

* **Reduced Risk:** DSM savings occur simultaneously with the expenditure of the investment, thus reducing the risk of investing large sums of capital in projects that may never actually produce power.[6]

The urgency of DSM is underscored by the "lost opportunity" feature that is characteristic of many long-lived measures. These "lost opportunity" resources are cost-effective resources that would lose their cost-effectiveness if not developed or maintained now or in the near term. A primary example of such a resource is the energy efficiency of new buildings. Since many energy saving measures cannot be installed cost-effectively later, buildings constructed without these measures will continue consuming energy inefficiently.[7]

IV. THE LEAST COST UTILITY PLANNING PROCESS

Regulatory commissions and/or state energy offices typically enjoy authority to develop LCUP guidelines which will determine the resource mix ultimately selected, the time frame for resource acquisition and the nature of the implementation plan, e.g., pilot programs or full scale acquisition of resources. Guidelines can be procedural in nature (requiring utilities to file demand forecasts and other data and information) and/or substantively oriented (requiring utilities to devise specific programs or meet specific), and are generally intended to assist utilities to better perform their planning functions while assuring consistency among plans filed by utilities in a state. Appendix 2 provides a representative sample of statutory mandates that have resulted in LCUP activities and illustrates the degree to which legislative initiatives influence LCUP development.

According to NARUC, LCUP typically consists of **eighteen** discrete steps[8] which are highlighted below in Table 1. Appendix 3 provides more detail on these steps, as well as an overview of the LCUP process.

TABLE 1

STEPS IN THE LEAST COST UTILITY PLANNING PROCESS

STEP 1: Identify the objectives of the plan.

↓

STEP 2: Develop one or more load growth forecasts.

↓

STEP 3: Determine the levels of capacity expected for each year of the plan.

↓

STEP 4: Identify resources needed to bridge the gap between expected loads and capacities.

↓

STEP 5: Evaluate all resources in a consistent fashion.

↓

STEP 6: Select the most promising options for fashioning an effective, flexible, and responsive plan.

↓

STEP 7: Integrate methods of supplying needed power with methods for controlling and moderating demand.

↓

STEP 8: Construct scenarios, pitting the selected mixes of options against possible economic, environmental, and social circumstances.

↓

STEP 9: Evaluate the economic and technical success of each mix of options under the circumstances of various scenarios. For example, low, moderate and high load growth scenarios.

↓

STEP 10: Analyze the uncertainties associated with each possible plan of action.

↓

STEP 11: Screen the alternatives to eliminate those that are not suitable.

↓

STEP 12: Rank order the alternative courses of action.

↓

STEP 13: Test each alternative for cost-effectiveness from a variety of viewpoints.

↓

STEP 14: Reevaluate the alternatives considering economic, environmental, and societal factors.

↓

STEP 15: Select a plan for implementation, one that most nearly satisfies all the objectives of the plan.

↓

STEP 16: Develop a plan of action.

↓

STEP 17: Implement the plan of action to bring about the least cost provision of electric power.

↓

STEP 18: Monitor and evaluate the operation of the utility under the plan and revising the plan as necessary.

A. APPROACHES TO LEAST COST UTILITY PLANNING

There are two standard approaches to LCUP: **Classic** and **Collaborative**.

The Classic Approach starts with development of statutory guidelines for utilities to follow in producing a plan for their individual service territory. It is a legal/regulatory process with exact procedures, timetables, and rules. It is interventionist, with parties submitting expert witnesses, testimony and cross examining one another before the regulatory commission.

The Collaborative Approach is a variation to the Classic but largely follows many of the same planning and methodological requirements. The process, though often sanctioned by regulatory and other governmental bodies, largely takes place outside adjudicatory, i.e., hearing room setting, and seeks to avoid the adversarial consequences of the Classic approach. It emphasizes flexibility, programmatic accomplishments, partnerships, trial and error, is process and consensus oriented, and is responsive to political and other outside influences.[9] The process, envisioned as a structured negotiation, involves traditional adversaries coming together to jointly design, implement, and monitor programs. Fundamental differences between collaborative participants may not be successfully resolved; each party maintains its prerogative to address these differences through litigation. If and when this happens, however, the debate on such issues should be better focused and better informed through the work that has gone on among parties.

ENDNOTES - CHAPTER ONE

1. The Energy Task Force funded 33 research projects in municipal and county jurisdictions throughout the U.S. in 1990.

2. "*Status of Least-Cost Planning in the United States,*" prepared by Barakat, Howard & Chamberlin,Inc., Oakland, California, December 1988. Among major electricity stakeholders, there exist various definitions and interpretations of LCUP, thus making it difficult to unequivocally categorize the status of its adoption in individual jurisdictions.

3. Ibid., p 8. A statistical analysis of potentially influential economic factors (electric rates, rate increases, nuclear share of generating capacity, and planned capacity additions) demonstrates no significant relationship between those indicators and the status of LCUP.

4. "*Least-Cost Utility Planning Handbook For Public Utility Commissioners,*" Volume 1, October, 1988, National Association of Regulatory Utility Commissioners, funded via a grant from the U.S. Department of Energy.

5. NPPC is an interstate compact formed by Idaho, Montana, Oregon and Washington after authorization by the Pacific Northwest Electric Power Planning & Conservation Act of 1980. The Act charged the Council to develop a 20 year electric power plan that will guarantee adequate and reliable energy at the lowest cost to the Northwest. NPPC continues to refine and revise its regional plan, and has developed extensive expertise on energy efficient building codes and residential weatherization.

6. California regulators recently added another major item to this list. Uncertainty in demand forecasting can be lessened by systematically improving energy efficiencies. The uncertainty introduced by economic growth projections -- for example future commercial floor space totals -- can be reduced by lowering per unit consumption which results from more efficient building and appliance designs. Report to the Legislature on Joint CEC/PUC Hearings on Excess Generating Capacity (SB 1970), at 11-7 to 11-8 (Nov 1987).

7. Northwest Power Planning Council, *A Review of Conservation Costs and Benefits*, 2 (October 1, 1987).

8. National Association of Regulatory Utility Commissioners, Least-Cost Utility Planning: A Handbook for Public Utility Commissioners, at II-10 (Volume 2, December 1988).

9. The breakthrough alliance was formed by the Conservation Law Foundation, a Boston environmental group, and New England Electric System, which serves customers in three New England states. Together, they jointly drafted the first of three new rate rules and ushered them through state regulatory channels. As a result, New England utilities are committed to spending between $1 and $2 billion on collaborative conservation programs between 1990 and 1994.

CHAPTER 2. LEAST COST UTILITY PLANNING IN ILLINOIS

I. BACKGROUND

Chapter 2 seeks to explain the relationship between statutory planning guidelines and policy recommendations and one utility's response to developing a least cost plan consistent with these requirements. Specifically, the Chapter will illustrate this relationship be examining the guidelines developed by the Illinois Department of Energy and Natural Resources (DENR) and the plan of Commonwealth Edison (CECO).

As a first step in the utility resource planning process required by the new Illinois Public Utilities Act (PUA), DENR prepared a comprehensive energy utility plan for the State, consistent with PUA objectives and requirements. Sections 8-401 and 8-402 of the PUA prescribe that utilities provide energy services at the lowest possible cost to all Illinois energy consumers and to the extent practical, use all economic means of conservation, nonconventional technologies relying on renewable resources, cogeneration, and improvements in energy efficiency as the initial sources of new supply. DENR has the authority to design and recommend programs as necessary to achieve the purposes of the PUA, and to implement the recommendations of its plan.[1]

The *Illinois Statewide Electric Utility Plan* "*...examines in broad terms the environment of the state's electric utility system and suggests directions for state policy,*" by adopting a "*Strategic Approach*" and "*Systems Perspective*" to form a conceptual and policy framework for the conduct of LCUP in Illinois.[2] Specifically, the plan examines:

* policies for ensuring the delivery of energy services at the lowest cost to customers,
* possible barriers to the delivery of energy services,
* economical means of conservation, load management, nonconventional technologies relying on renewable resources, cogeneration, and improvements in energy efficiency as the initial sources of new supply, and
* effects of uncertainty on demand, supply, and potential policies.

Each plan is required to include:

* 20 year demand projections,

* 20 year projections of available sources of supply, including generating capacity, utilization of cogeneration and non-conventional technologies and energy conservation,

* a demonstration that the proposed plan represents the least-cost means of satisfying energy service needs consistent with the objectives of the PUA,

* a discussion of how the utility has determined the appropriate evel of reliability to be used in its forecasts and plans, and

* with respect to the planned construction of any new generation or production facility, a discussion of sites, environmental consequences, fuel mix, capital and operating costs, and impact on system reserve margins.

A. THE PLANNING PROCESS

The process used to develop the Statewide plan involved three steps:

Step One - Goal Setting: The plan requires clear articulation of goals and their operational expression, including achievement of efficiency, equity, reliability and environmental quality. The overall objectives include:[3]

* reduce real prices in ways that produce the largest decrease in prices and reduce, (or, at minimum, not increase) prices if conditions change unexpectedly,

* reduce the variance or spread in prices between highest and lowest while not increasing lowest prices,

* reduce the impact of real price shocks caused by rapid changes in circumstances,

* reduce the present value of revenue requirements while not causing increases in real prices,

* reduce the spread in revenue requirements between highest and lowest possible present values while increasing neither the lowest present value nor prices.

* smooth increases in revenue requirements.

* reduce the need for construction of new generating units without raising prices.

Step Two - Understanding The Utility System: Step two requires understanding those variables that have the greatest effect the utility performance, as well as those which decision-makers have some control -- the system's pressure points -- so that utilities can be made to respond in a favorable way. Pressure points are described as: "*...generic actions available to policy makers at various points in the utility/regulatory system that can be taken to control certain elements of system performance [e.g.,] demand management programs, rate design, resource acquisition policy, fuel choice and financial policy.*"

The most difficult aspects of understanding system behavior are those associated with the large elements of uncertainty that result from variables outside the direct control of a utility. Accordingly, for planning purposes three alternative assessments - High Future, Low Future and Baseline - were developed for: peak demand, total sales, need for new resources, allowed revenues, prices, energy demand detail, and availability of cogeneration & small power production. Alternative planning scenarios were also simulated to gauge the effects of key assumptions, including: natural gas, coal and oil price changes, inflation, and economic growth rates.[4]

Step Three - Identifying Barriers: Step three requires identification of barriers to achieving the goals of LCUP, and designing strategies for removing them or lessening their impact.

B. POLICY ACTIONS AVAILABLE TO IMPROVE SYSTEM BEHAVIOR

DENR identified four policy actions that would -- using as standards for improvement reductions in prices and revenue requirements -- make the utility system work "better" under a variety of circumstances.[5] These are demand management & energy efficiency, supply-side bidding, firm power purchases, and generating unit life extension.

1. Demand Side Management and Energy Efficiency Programs

The process of building the capability to turn potential improvements in end use efficiency (i.e., demand side resources) into available resources includes technical and market research and development, pilot programs, and marketing tests designed to gather information, test incentive designs, and assess and build delivery mechanisms. The plan requires Illinois utilities to:

* investigate demand management programs that will enable them to defer the need for additional generating capacity over the planning horizon in a cost effective manner, and
* examine in detail the potential for improvements in end use appliance efficiency in the residential and commercial sectors, and to design specific programs for achieving the potential identified.

In order to determine whether or not specific DSM programs are cost-effective, the plan requires utilities to examine the cost-effectiveness of the program to the utility, upon customers, including nonparticipants, and upon society as a whole. The Cost-Effectiveness Test adopted by the Illinois Commerce Commission considers programs cost-effective if net benefits (i.e., estimated savings and marginal cost of energy cost to participants) are positive.

The emphasis placed on conservation and improvements in energy efficiency by the Public Utilities Act suggests that attention should be focused principally on strategic conservation[6] -- an approach guided by current excess capacity conditions. Such an approach is preferred by DENR because "*initiating actions that lower demand at a time when there is excess capacity in the state should translate into higher prices, as the fixed costs of power production are picked up by fewer customers.*"[7] In various case scenarios run by DENR, strategic conservation actions were able to postpone construction by one or two years. However, as a result of excess capacity and lower load factors due to base load reduction in energy, strategic conservation results in higher average system costs in the near term compared to base case average costs. Only when DSM actions defer construction or reduce the use of very expensive generation will average costs decline.

In general, those actions that improve the efficiency of appliances comprising the utility's base load are less beneficial to the system in the near term than are actions affecting uses associated with peak load. This suggests that actions to save energy on the system's baseload can reduce prices, revenue requirements and bills for all customers if implemented closer to the time when new capacity would be needed.[8]

2. Supply Side Bidding

The plan requires utilities to consider the appropriateness of a competitive bidding process for acquiring future capacity resources, including firm power purchases and power produced by qualified facilities.[9] The plan concludes cogeneration, small power production, and independent power production can be less expensive options for acquiring new generating resources than utility plant construction.

3. Firm Power Purchases

Utilities must analyze the potential for wholesale firm power purchases to reduce capacity needs based on currently available supplies of power.[10]

4. Generating Unit Life Extension

Uncertainties associated with the siting and construction of and cost recovery for new generating units has increased interest in the extension of the useful lives of generating units. The State plan requires utilities to evaluate and determine the technical feasibility and cost-effectiveness of such actions.[11]

5. Other Recommendations

Among those programs and policies meeting price reduction objectives, utilities must prioritize those actions that provide assistance to low-income customers. Likewise, DENR recommended that actions otherwise meeting pricing objectives but which might adversely affect low-income customers should be

rejected. Actions which would otherwise meet pricing, revenue requirements and/or construction objectives, but which are reasonably likely to adversely affect the environment should also be rejected. Finally, of those policies meeting pricing objectives, those that offer the greatest increase in environmental quality should be preferred. DENR made 12 additional recommendations that utilities must follow:

* investigation of the potential for improvements in end use device efficiency in the residential and commercial sector, and develop a set of target efficiencies for use in the design of specific programs,

* the ICC in conjunction with the state's utilities should begin development of a capacity bidding system for use in determining amounts of and prices for cogeneration and small power,

* preparation of a formal assessment of the mid- to long-range price and availability of firm power for purchase in lieu of new capacity additions,

* preparation of an assessment of the potential for life extension of units scheduled for retirement over the planning horizon,

* the ICC, utilities and DENR should undertake a formal, cooperative effort to improve the amount and quality of end use data available in Illinois,

* legislation should be drafted to clarify and enhance the siting process for transmission facilities, consistent with the recommendations of the National Governor's Association,

* the ICC in conjunction with the state's utilities should begin development of a bidding system for acquisition of demand-side resources,

* the ICC should consider establishment of a clear and consistent policy with respect to cogeneration deferral and standby rates,

* the ICC could consider development of a new flexible pricing regime for large customers,

* the State should develop and articulate its views on transmission access and pricing,

* the ICC should develop and clear strategy for addressing issues of corporate restructuring, and

* the State should begin consideration of the design of a process for implementing any acid rain legislation that might be enacted.

II. COMMONWEALTH EDISON'S LEAST COST UTILITY PLAN

A. BACKGROUND

The least cost plans of Illinois utilities must be prepared in accordance with statutory requirements of Section 3-105 of the PUA and the planning objectives and requirements of the *Illinois Statewide Electric Plan*. CECO, like all Illinois electric utilities, must consider the overall objectives of the statewide plan.

CECO filed its first least cost plan with the Illinois Commerce Commission (ICC) on January 8, 1990, or almost one year to the date that the ICC approved DENR's Statewide plan. A pre-hearing conference was held on February 7, 1990 at which the ICC Hearing Examiner directed all parties to participate in workshops[12] and develop a Pre-hearing Memorandum that set forth disputed issues to be resolved and stipulations agreed to by all parties.

The significance of legislative requirements in the promulgation of CECO's plan is evident in the company's overall planning goal: *"Provide customers with the electric services they desire as efficiently as possible...taking into account CECO's obligation to deliver adequate, safe and reliable electric services, and balance the objectives of equity, efficiency and environmental quality contained in the Illinois Public Utility Act."*[13]

B. DEMAND-SIDE MANAGEMENT ANALYSIS

1. Development of Demand Projections

The first policy action evaluated by CECO was demand side actions. A utility's current capacity situation and short and long-term demand requirements represent two critical planning variables. The basis for integrated resource planning at CECO and many other utilities begins with a comprehensive and complicated analysis of future demand requirements: *"demand forecasts translate assumptions regarding alternate scenarios into quantitative requirements, thus providing CECO's planners with a way to set goals in an environment characterized by uncertainty."* [14]

CECO's growth forecasts -- baseline 2%, high 2.5%, and low 1% -- for peak demand and total usage are based on a combination of econometric models, statistical analysis and professional judgement.[15] Utilities are required by DENR to provide forecasts for all three scenarios. Judgmental factors also play a role in the design of the models themselves; the selection of values for input variables;[16] the normalization of peak and output; and the selection of an "official" forecast. To supplement its econometric forecasting models, CECO has also begun to collect data for end-use models which may be valuable for policy analysis and design of DSM management programs.[17]

CECO's plan states that existing capacity is adequate to meet projected load requirements until 1996 even under high demand scenarios, and without additional demand-side management programs. Additional capacity needed to maintain a 15% reserve margin in 1996 could, moreover, be potentially met by combustion turbine peaking units, a direct load control or interruptible rate program.

2. DSM Planning Objectives

CECO's current capacity situation provides direction for the company's near-term planning efforts which do not focus on full scale detailed planning, but rather on enhancing the company's "*capabilities to analyze alternative resource strategies...and reducing the level of uncertainty surrounding resource investment decisions.*"[18] CECO sees the period between 1990 and 1996 as "*a window of opportunity to expand its portfolio of resource options and its abilities to analyze...options.*"[19] Since CECO is a summer peaking utility their overall DSM planning objective is to reduce summer and winter peak demands while strategically increasing electric sales during off-peak hours. Peak clipping, load shifting, strategic conservation and flexible load shape were proposed as CECO's primary summer load management objectives while valley filling is of secondary importance. Load shifting is CECO's primary winter DSM objective, while valley filling is of secondary importance. As a result of CECO's current capacity situation, the company's proposed near term activities will concentrate on expanding its abilities to:

* conduct baseline market research needed to identify, design, implement and evaluate DSM resource options,[20]
* assess the cost and performance of DSM technologies and programs,[21]
* develop a Marketing Information Decision Support System as a centralized database containing data needed to select, design and evaluate DSM management programs,[22] and
* refine company methods for selecting among alternative DSM programs.

3. DSM Program Screening

CECO's method of screening DSM options involved:

* preliminary analysis of DSM technologies that are consistent with DSM objectives, e.g., load shedding, peak clipping,
* quantitative analysis of technologies passing first screen,
* analysis of potential benefits and costs of remaining programs, and[23]
* selection of programs for inclusion in a portfolio of DSM resources to be analyzed in the integration phase.

Data acquired during "preliminary market research activities" were used to identify a set of potentially cost-effective DSM programs for possible inclusion in this first plan. The integration step used two planning models in combination -- EGEAS and MIDAS -- to weigh factors such as uncertainty,

dispatchability, reliability, technological maturity, and environmental impact.[24] Resource options that successfully pass through an "integration" process are then analyzed to determine the optimum resource mix able to economically meet the broadest range of likely loads. The uncertainty of the planning environment dictates the characteristics required of options that will become part of CECO's resource plan. These include short lead time, small size, and discrete implementation steps. Resource options are assessed according to:

* System costs to all customers (total costs of providing electric services),
* CECO Revenue Requirements, and
* Revenue Requirements/kWh (average rate paid by CECO customers).

These factors comprise a preliminary screening device which is used to eliminate technologies whose economics are clearly unfavorable. The technological risk associated with the application of new, unproven technologies is accounted for by excluding such technologies from the set of resource types that will be considered.

Initially, the applicability of a set of 110 DSM end-use combinations were assessed. Two primary inputs were used to rank these technologies -- the relative importance of CECO's DSM objectives and the ability of candidate technologies to meet these objectives.[25] Major reasons for eliminating most options included low market potential and/or market penetration, obvious lack of economic benefits in the foreseeable future, and forthcoming national appliance efficiency standards that CECO asserts make comparable utility-sponsored programs unnecessary.

4. DSM Pilot Programs Selected

Of the 110 DSM programs analyzed, three programs were judged to be most promising under the range of benefit/cost tests conducted, as well as the most promising focus for building DSM capabilities:

* Direct Load Control of Residential Air Conditioners;
* Commercial Demand Management Cooperative; and
* High Efficiency Motor Rebates For Industrial Customers.

Introduction of all three DSM programs under the high demand scenario reduces peak load at the end of the forecast period by almost 200 MW. This reduction in peak allows one peaking unit and two

compressed air energy systems (CAES) units to be deferred, reducing Present Value Revenue Requirements (PVRR) by nearly $60 million over the 1990-2010 planning period. Under the baseline scenario, DSM programs allow construction of two 80 MW peaking units to be postponed indefinitely and the building of a 100 MW CAES to be deferred for one year, reducing PVRR by some $7 million.

CECO's initial examination of the net benefits from DSM programs indicated that the present value of net benefits could be improved by delaying program start dates. Their analysis suggests that DSM programs do not become cost-effective resources until after new capacity is required and resource costs attributable to construction can be deferred. CECO readily admits, however, that ***"the potential for greater reductions in PVRR as a result of later implementation of DSM programs must, however, be weighed against the potential lost opportunities for programs such as high efficiency motors."***[26]

CECO asserts that the reliability of DSM programs is more difficult to measure than the reliability of supply-side options because most generating resources have well-defined reliability characteristics. Similarly, CECO asserts that performance uncertainty is high for DSM programs which rely on the actions of many people and are often more experimental in nature. These concerns may be unfounded. Utilities, particularly those in the Pacific Northwest and East Cost, have had excellent experiences with implementing reliable and cost-effective DSM programs.

C. EVALUATION OF SUPPLY-SIDE RESOURCE OPTIONS

Statutory guidelines require 20 year projections of available supply resources. These options fall into four categories: interutility purchases, new nonutility capacity, modifications to existing equipment, and new owned capacity. A brief summary of each category is provided below.

1. New-Owned Capacity

The resource options rejected during the initial screening included: nuclear plants; coal gasification systems; fuel cells; large scale solar generation technologies. Pumped hydro storage and large scale battery storage systems are presently considered unattractive for economic reasons, technical risk, high capital costs, and long lead time.

2. Modifications To Existing Equipment

The categories evaluated include: retirement, mothballing, derating recovery, repowering, and flexibility improvements. Studies conducted by CECO indicate that, barring unexpected problems, it will be cost effective to continue CECO's existing plants in service through at least 2010. CECO maintains that unit retirement and replacement would have an adverse effect on revenue requirements. CECO also maintains

that mothballing one or more plants decreases system reliability and results in unfavorable economics.[27] Repowering of retired units is deemed to be a relatively minor potential supply-side resource.

3. New Nonutility Capacity Options

These are generally utility programs which encourage cogeneration, renewables, and independent power production. CECO's plan asserts that "over the next several years, the availability of economically attractive generating capacity supplied by nonutility generators represents a limited source of supply."[28]

4. Interutility purchases

Purchased power supplements system generation in years where additional supply is needed. However, CECO contends that *"the availability and economic advantage of purchased power is impossible to predict almost a decade in advance."*[29]

5. Supply Side Resources Selected

Based on an initial screening, CECO prefers four supply-side resource options:

* Combustion turbines -- which have the advantage of low capital cost ($400/kW) and are appropriate choices to satisfy initial resource needs for peaking capacity;
* Compressed air energy storage -- which has the potential to meet two of CECO's least-cost planning objectives, improving the off-peak utilization of nuclear and coal units and offering potentially cost-effective peaking-to-intermediate power;
* Combined cycling units; and
* Pulverized and Fluidized bed coal units.

Because supply-side resources are not required over the 1990-92 period, CECO's supply-side implementation efforts over this period emphasize development of improved information and capabilities. Specifically, *"Edison views the 1990-92 period as an opportunity to strengthen its capabilities in supply-side planning, and to expand its portfolio of options, so that when the need arises for additional supply-side resource, Edison will be in a position to choose the best from among the widest possible set of alternatives."*[30]

D. POTENTIAL BARRIERS TO LEAST COST PLANNING

The Illinois Statewide plan requires utilities to address possible barriers to the delivery of energy services. CECO's plan identifies several major regulatory issues which they contend *"inhibit full consideration of all resources or otherwise constitute barriers to the least-cost planning process."*[31] These barriers include:

1. **Cost Recovery**

Traditional regulation -- by denying utilities the opportunity to earn a return on DSM investments -- often fails to provide the proper incentives for utilities to consider DSM. CECO urges that its pilot proposals accepted by the ICC be exempt from future decisional prudence review. "*Failure to protect against such future prudency reviews provides inappropriate incentives, which discourages pursuit of a least cost strategy in favor of a risk minimization approach that relies exclusively on short lead-time, supply-side options.*"[32] CECO asserts that over-reliance on DSM programs and a failure to provide mechanisms for cost recovery can threaten profitability and the utility's viability. This would be primarily attributable to stranded investment, inappropriate timing in implementation, and improper allocation of risk.

2. **Acid rain legislation**

Recently enacted acid rain legislation did not represent a major source of uncertainty to CECO because of its relatively high reliance on nuclear and its predominant use of Western, low-sulfur coal in its plants. However, the company argued that it could become a barrier if legislators force CECO and its customers to help pay other utilities' compliance costs under the Clean Air Act's Cost Sharing Proposal.[33] Cost sharing, according to CECO, would represent a barrier to LCUP because it limits the ability of individual utilities to develop their own least cost resource mix.

3. **Bypass**

CECO contends that non-economic, and in some case economic, bypass of the utility system is a barrier to LCUP. Uneconomic bypass represents a clear barrier to LCUP because it is the replacement of utility power with wheeled or self-generated power whose cost exceeds the utility's marginal cost. Economic bypass is not a barrier to least cost planning if it substitutes genuinely lower cost power for that provided by the utility. It does, however, represent a barrier if bypass customers do not pay their fair share of the cost of maintaining the system. Both economic and uneconomic bypass raise rates for customers who remain on the grid and must pay for the services it provides.[34]

4. **Competitive bidding regulations**

Competitive bidding offers the potential to transfer some risks - such as those associated with capital costs, operating performance, and non-fuel O&M costs - away from utility customers and shareholders to those who bid new supply. Demand-side competitive bidding can be a useful method of offering as many participants as possible incentives to develop and implement cost-effective DSM programs. Competitive bidding, according to CECO, is a potential barrier because it hinders the ability of the company to develop in-house capability building efforts.

III. CONCLUSIONS

The legal framework for reviewing Commonwealth Edison's plan consists of three parts:

(1) the least cost planning provision in Section 8-402 of the Public Utilities Act which requires utilities to prepare energy plans for their service territories and file those plans for Commission review and approval,

(2) the Least Cost Planning Rule approving DENR's Statewide Plan and revisions made to it as issued by the Illinois Commerce Commission, and

(3) the Statewide Electric Plan drafted by DENR.

The ICC's review on the adequacy of CECO's least cost plan focused on whether CECO met certain filing requirements, e.g., adequacy and appropriateness of planning goals and objectives, implementation and resource plans. Consistency is to be demonstrated by a showing that CECO has considered the programs and policies recommended in the Statewide plan. The intervening parties in Docket 90-0038 (Proceeding to Adopt an Electric energy Plan for CECO) agreed that the plan met all of the procedural filing requirements specified by law, including an analysis of the economical opportunities for wholesale power transactions and implementation of nonconventional power supply or demand side programs. The Commission ultimately ruled that CECO adequately analyzed cogeneration, renewable resources and improvements in energy efficiency as the primary sources of new supply, and found that CECO's plan would *"result in adequate, efficient, reliable and environmentally safe energy service at the lowest cost to consumers."* The Commission also ruled that CECO met the requirements of Recommendation VIII concerning cost recovery, agreeing in concept with the Rider mechanism proposed by CECO. No party questioned CECO's ability to provide reliable service under its proposed plan. Most parties generally agreed that the DSM goals and objectives -- cost effectively reducing summer peak -- identified were appropriate.

Intervenor parties, nevertheless, took exception to the substance of CECO's plan on a number of issues. The most significant was the definition of the nature and purpose of least cost planning in Illinois. CECO identified the purpose as the identification of cost effective and reliable resources to be acquired when new resources are needed. The City of Chicago, in contrast, argued that the purpose was to produce the lowest cost of meeting the energy needs of the utility's customers both when new resources are needed and when no resources are needed, and that "whatever costs there are to minimize" should be reviewed in the least cost planning process. The ICC, however, disagreed with the City's contention by concluding that the fundamental nature and purpose of the LCUP process in Illinois is the selection of new resources when such resources are needed. The Commission also concluded that the administrative rule on LCUP is focused

on utility planning for new resources. The rule requires an electric utility to conduct analyses and consider alternative resource options when planning for new resources.

Second, the City and other parties argued that use of the nonparticipants test in evaluating potential DSM resources is prejudicial to the selection of those resources because that test is not applied to supply-side resources. (The importance of this is explained further in Chapter 5 section on inequities) The Commission disagreed with the City by arguing that a special set of cost/benefit tests has been developed to evaluate DSM resources in the screening process since the operating characteristics, system impacts, and availability of DSM resources are quite different from those of generating sources, and the costs and benefits of DSM resources are generally distributed differently from those of supply-side resources.

The City was, however, upheld on several points. The Commission approved a City recommendation that CECO be ordered to enter into a "collaborative approach" to resolve issues relating to DSM program design and selection.[35] CECO was also ordered to reexamine those programs which passed the societal and utility tests. The Commission also concluded that CECO did not fully comply with Recommendation XIII (regarding lost efficiency opportunities) by directing CECO to refocus it attention in this area as part of its capability building efforts.

The Commission agreed with the City's argument that CECO's capability building activities and the likelihood of achieving least cost energy service would be enhanced, if in addition to entering into a cooperative process, CECO undertake additional analyses. Specifically, the Commission ordered that the cooperative process identify additional cost effective programs, or alternatively, modify the plan by adding one pilot program for each load shape objective in each customer class. The Commission agreed that CECO retain the right to select those resources it deems most appropriate and that pilots should not be implemented until sufficient knowledge about the targeted customer classes has been acquired to assure the programs are properly targeted. Pilots selected must, at minimum, pass both the societal and utility cost tests and be practical in terms of costs, start up time and penetration estimates given CECO's current capabilities.

ENDNOTES - CHAPTER TWO

1. Amendments to the New Illinois Public Utility Act, Sections 8-402 to 8-407, on utility and state energy planning requirements.

2. The report was prepared by the Illinois Department of Energy and Natural Resources Office of Research and Planning Strategic Planning Section, Karen Witter, Director, January 1989. Based on projections of real state economic growth averaging slightly under 2% per year, and oil and gas prices rising over the period at around 4.5% in real terms. Peak demand for power grows at a compounded rate of about 1% per year. Total electricity sales increase at 1.25%. Average system-wide electricity prices rise by about 4% per year in nominal terms.

3. The Illinois Statewide Electric Utility Plan Volume II: Analysis and Recommendations, p.290.

4. Of these factors, the one with the most profound affect on various models is economic growth. These include: "Big Shock" - rapidly changing economic conditions which invalidate estimates about the duration of high growth periods, and result in a substantial injection of excess capacity; Sustained High Growth - which would stimulate the need for substantial new resources; Extreme Weather - an assumption that future summer weather is 30% warmer than the historical average, thus immediately boosting peak demand; and Nuclear Plant Phase-In.

5. Ibid p.47.

6. Ibid. p. 310. "...a general reduction in electricity sales, using pricing and/or incentive policies." Generic strategic conservation actions include peak clipping and load shifting. Strategic Conservation has been defined by Cambridge Energy Research Associates as those demand-side management programs that "reduce overall electricity use by increasing the efficiency of end-use technologies." Common forms of strategic conservation programs are those offering incentives for the purchase and installation of high efficiency appliances. The impact of such programs will vary according to the particular load and cost characteristics of individual utilities.

7. Ibid. p.334.

8. Ibid. p. 356.

9. Ibid. p. 34. Special attention to be given to resolving potential problems with the certification and siting of independent power producers.

10. Based upon survey responses, it is estimated that 600 MW of power are available for purchase through the year 2000.

11. Ibid. p.406. The value of a life-extension program, however, depends critically on the specific characteristics of individual utility systems and generating units.

12. Nine workshops were held between January 25 and April 27. The Commission also held fifteen hearings on Edison's plan in its Chicago offices.

13. CECO Least Cost Plan, Main Report, December 1989.

14. Ibid. p. II-1

15. For example, peak load models forecast from a 15 year historical base. One model is a one equation, log differentiated peak load model that predicts peak load as a function of income, weather, and the number of residential customers. A second model forecasts load as the total of the base load and the weather-sensitive load. Independent variables used to predict the 3 system peaks include: Real per capita income, Four-day weighted average temperature humidity index, Temperature Humidity Index at 8 AM on the peak day, Number of residential customers times 3-hour average temperature, and Dummy variable to account for an unusual peak in 1985.

16. Selection of input values involves knowledge of data sources and reliability as well as an ability to distinguish reasonable from unreasonable values. Judgement is also used to weigh the relative effects of weather and economic factors.

17. In contrast to econometric models, where forecasts are based on expectations about economic and demographic variables, end-use models aggregate forecasts from detailed functional information about specific electricity uses. End-use models are very data-intensive and require knowledge about all current and expected future technologies and costs that could effect electricity demand.

18. Ibid. p.I-5.

19. Ibid. p. I-6

20. Initial steps involve collecting, classifying and centralizing all available in-house data, and determining what additional data are required.

21. CECO is developing a database of DSM management technology and program costs and performance by combining existing data with literature reviews and information supplied by outside experts, including, for example, the Alliance To Save Energy and various Electric Power Research Institute documents.

22. The initial step in customer preference research is to determine the key needs and wants of a utility's customers. CECO will develop a comprehensive list of specific customer service requirements that can be acted upon by the company. CECO will continue to investigate the benefits and costs of different types of end-use data for DSM program planning, and will collect actual data as needed. This will include specific data on market segmentation, equipment saturation, load shape estimation, and research and pilot program impact estimation.

23. The costs and benefits of candidate DSM programs were estimated using DSMPRO a DSM program screening and impact assessment model and three tests: Society - present value of the net benefits to society; Revenue Requirements -- present value of the net change in utility costs; and Nonparticipants -- present value of revenue losses resulting from a DSM program.

24. EGEAS -- Electric Generation Expansion and Analysis System -- is a modular software package that develops optimum expansion plans on the basis of annual costs, operating expenses, and carrying charges on investments, as well as average system costs or financial ratios. MIDAS -- Multiobjective Integrated Decision Analysis System -- is a planning tool designed primarily to assess the impact of uncertainty on utility planning decisions. MIDAS is built around a decision tree analytical framework, with forks in the tree representing either decisions faced by the utility or chance events with given probabilities.

25. DSM objectives were weighted on a scale of 0-to-10 -- with "10" indicating primary importance and "0" indicating no importance. The applicability of each technology was indicated on a 0-to-2 scale. A "2" indicates high applicability; a "1" moderate applicability and a "0" no applicability. Given CECO's DSM objective weights, the highest score a technology could achieve is 108. The highest score achieved by any of the 110 applications analyzed in CECO's initial effort was 78.

26. Ibid. p. VI - 9

27. For example, mothballing Fisk 19 -- the unit presenting the most favorable economic opportunity for mothballing -- would increase systemwide revenue requirements between $18 and $225 million.

28. Ibid. p. III 19. The Company asserts that the declining price of electricity relative to natural gas is expected to diminish the economic attractiveness of cogeneration and self-generation projects.

29. Ibid. p.III - 22.

30. Ibid. p. III - 25

31. Ibid. V - 1

32. Ibid. p. V - 2

33. One Congressional proposal suggested sharing of compliance costs among the entire electric utility industry. All but 4% of the electricity generated by CECO comes from facilities that comply with proposed standards. CECO also opposes cost-sharing because it has already invested to meet clean air standards.

34. see Edison Plan Page V - 8. "If bypass is to be eliminated as a barrier to least cost planning, power obtained by bypass customers -- whether self-generated or acquired from a third party -- should not be cheaper simply because these customers do not pay their share of the cost of maintaining the electric grid. Standby and transmission access charges should reflect the true costs of providing adequate, efficient, reliable, and environmentally safe service."

35. The Commission ordered that parties to the cooperative process follow certain stipulations recommended by CECO: *"parties participating [must] provide the necessary technical analyses and data to support their proposals. The failure to provide sufficient information to allow for an analysis of the costs and benefits of a particular program option would be a sufficient basis for CECO's rejection of that proposal."*

CHAPTER 3. CLASSIC AND COLLABORATIVE APPROACHES TO LEAST COST PLANNING

I. INTRODUCTION

Chapter 2 presents a representative sample of Classic and Collaborative approaches to Least Cost Utility Planning (LCUP) by highlighting collaborative activities in California and Michigan, and the Classic approach in New York State. The least cost plan of Commonwealth Edison also represents an example of the Classic approach. The intent is not to judge the merit of individual plans or processes, but to compare and contrast planning approaches and examine those characteristics that are both common and unique.

II. A COLLABORATIVE APPROACH TO LEAST COST PLANNING - MICHIGAN ELECTRIC OPTIONS STUDY

A. BACKGROUND

The first example of a Collaborative Approach is the Michigan Electric Options Study (MEOS). The MEOS initiative was a joint private and public sector research effort to identify and analyze the costs and potential contributions of the major demand and supply side electric resource options available to Michigan in the 1990's and beyond. The MEOS, performed by the Michigan Department of Commerce, involved nearly 200 participants from over 90 organizations, including state government, utilities, commercial and industrial users, business associations, universities, environmental organizations, and consumer and other interest groups. The study documented the need for a comprehensive and integrated approach to resource assessment in Michigan, including development of a quantitative analytical structure that took account of extensive data and assumptions for comparing resource options as well as comprehensive technology and cost analysis.

B. MAJOR PROJECT GOALS AND OBJECTIVES

The project had four non-technical and unwritten goals that were as important as the official written rules and objectives:[1]

* taking major steps away from traditional regulatory combat,
* broadening the common ground of agreement between parties and reducing the number of issues over which to do battle,
* facilitating better understanding between parties of other's needs, problems and tasks, e.g., learning what really goes on in utility planning, and

* creating the political context (the broader consensus) within which good planning and regulation can occur.

Establishing a cooperative process for integrated resource assessment was important because it permitted the project to draw upon the knowledge, skills and perspective of many different organizations and individuals. The participants made significant contributions to framing the study's approach and developing its contents, assumptions, conclusions, findings, and recommendations. Although the project's assumptions and, ultimately, its findings, conclusions and recommendations, reflect substantial agreement among participants, they do not necessarily represent a complete consensus.[2]

An important product of the process was the interaction and communication among the parties, and the education of all participants about the concerns of other stakeholders in utility planning. The approach was adopted in the belief that a cooperative effort on the part of utilities, regulators and consumer groups was needed to adequately address the many complex issues associated with an integrated planning process. Further, project management believed that cooperation was essential for the project's design to be widely accepted, its results deemed credible, and its recommendations effectively implemented.

The written objectives of the MEOS included:

* assess the state's current electricity usage, existing power supply system and forecasts of future electricity demand,
* analyze the costs and other characteristics of resource options now available to Michigan,[3]
* develop a "least-cost" approach to resource assessment,[4]
* examine the tradeoffs between minimizing costs and meeting other important planning objectives,
* address the uncertainties and risks associated with alternative planning decisions, and
* make MEOS information and tools available to parties interested in the utility planning process.

The MEOS conducted basic research to develop essential data and models. To accomplish this task, the MEOS developed a structure consisting of an Advisory Committee, a Project Director, a Project Staff, a Project Consultant, and six Work Groups.

Work Group #1 assessed power plant life extension; fuel conversion[5]; improvements to the transmission system[6]; purchases from outside of the state, and increased power plant ratings through efficiency and improvements.

Working Group #2 analyzed the technical and achievable potential, as well as the costs and benefits of 36 DSM activities and groupings[7] in the residential, commercial and industrial sectors. These included:

RESIDENTIAL	COMMERCIAL	INDUSTRIAL
Hot Water Heating	Lighting	Variable Speed Controls
Shell Improvements	Shell Improvements	Air Compressor System
Efficient Refrigerators	Refrigeration	Overhaul
Efficient Freezers	HVAC	Melting System
Indoor Lighting	Heat Pumps	Welding System
Outdoor Lighting	Thermal Storage	Heating System
Whole House Demand Subscription	ASHRAE 90.IP Standard	Efficient Motors
Variable Speed Furnace Fans	Lighting System Retrofit	Lighting
Central and Room Air Conditioning		
Thermal Storage, Water Heating Cycling, Load Shedding		

Working Group #3 analyzed non-utility supply and displacement options. The group estimated how much electricity displacement or supply could be expected from non-utility resource options under alternative economic and technical assumptions.[8] The non-utility options analyzed included: industrial cogeneration; commercial and institutional cogeneration; waste-to-energy (municipal waste incineration and landfill gas recovery); biomass (waste wood); and solar thermal and wind resources.

Working Group #4 analyzed new utility power plant options. Primarily coal, oil and gas -- but excluded from analysis: wind, hydroelectric, solar thermal, solar photovoltaic, fuel cells, and compressed air storage. The process of selecting power plant options involved the consideration of various factors, including costs and the risk and uncertainty of cost estimates, lead times, social effects and environmental and health effects.

Working Group #5 analyzed current electricity use and future demand projections. The group analyzed economic, demographic, structural and behavioral factors to estimate growth rates. Two demand projections -- high and low -- were used for integrative analysis. This dual demand scenario was used to heighten the focus on load growth uncertainty and emphasize the relative rather than absolute. Alternative growth rates result in substantially different implications for the amounts and types of resource options selected for implementation in the integrated resource assessment process.

Working Group #6 performed integrative analysis, i.e., analyzing issues, assumptions and methodologies.

C. INTEGRATED ANALYSIS

Electricity planning at any level involves multiple and competing objectives where decisions often involve trade-offs among objectives. The attainment of one objective may mean a diminished chance of reaching another. The MEOS -- through use of an Integrated Planning Model (IPM)[9] -- identified and analyzed planning trade-offs in the context of alternative assumptions about future demand. IPM can also provide a simultaneous and fully integrated assessment of demand-side, non-utility, and utility supply options, as well as identify the lowest cost combinations of resource options. Four major resource option scenarios were selected for analysis:

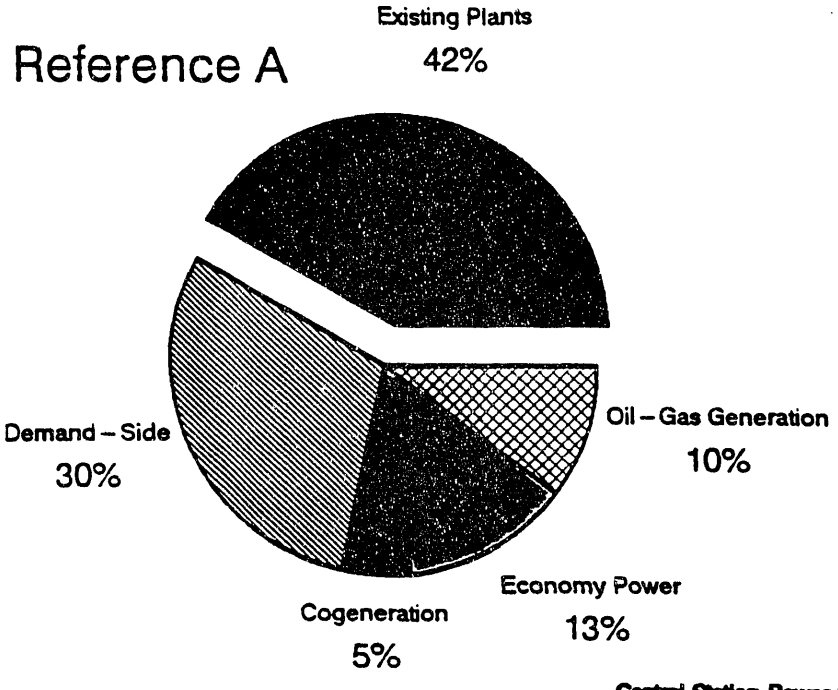
* **Broad Options:** This scenario included most of the resource options identified by the work groups.
* **Central Station Power:** This scenario included mostly larger, traditional utility supply options.
* **Small Diversified:** This scenario included the smaller traditional utility supply options, including all economic demand-side options.
* **Reduced Environmental Impact:** This scenario included resource options that would permit an assumed reduction of about 25% of future sulfur dioxide emissions by the year 2000.

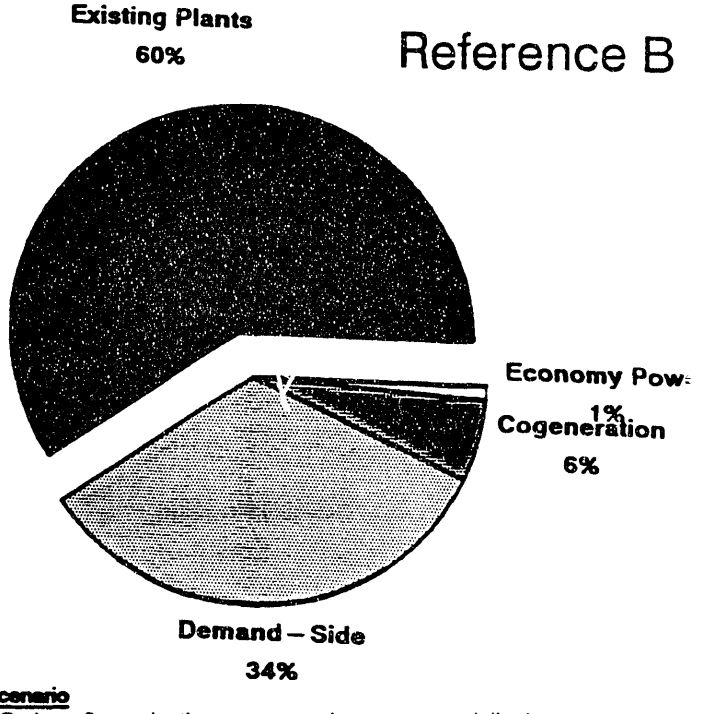
Figure 1 summarizes the results of the integrated resource analysis, as well as the major contributions of the above noted resources in meeting the overall generation requirements in Michigan. The analysis also demonstrates how different planning objectives and demand forecasts potentially change the resulting resource mix of a particular utility. In summary, it shows the fundamental tradeoff between costs calculated as net present value, rates and capital requirements - and environmental considerations. The importance of these two variables will be discussed in greater detail in Chapter 4.[10] Table 2 shows the resource mix under various scenarios.

Figure 1
Resource Mix Under Various Scenarios

Broad Options Scenario

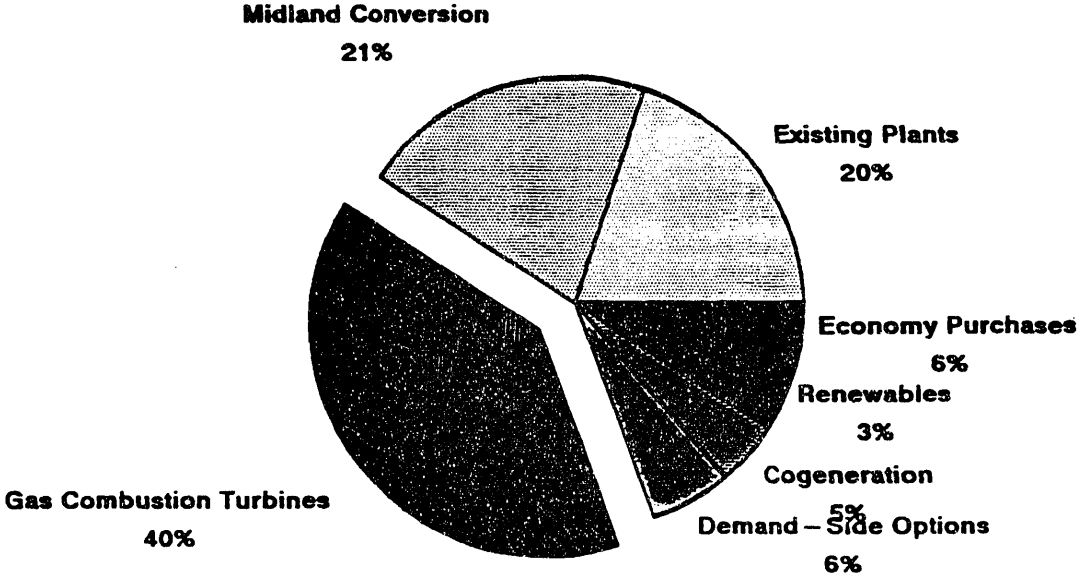
No new central generating station is required in this scenario. The resource mix is essentially the same, with the major difference being the contributing amounts of a particular resource resulting from differences in demand forecasts.





Central Station Power Scenario

No central generating station is required in this scenario. As in the Broad Options Scenario, the resource mix stays essentially the same, with differences only in the individual contribution of a particular resource.



Small Diversified Scenario

The results of the Reduced Environmental Impact Scenario are similar to those of the Small Diversified case.

Reference A

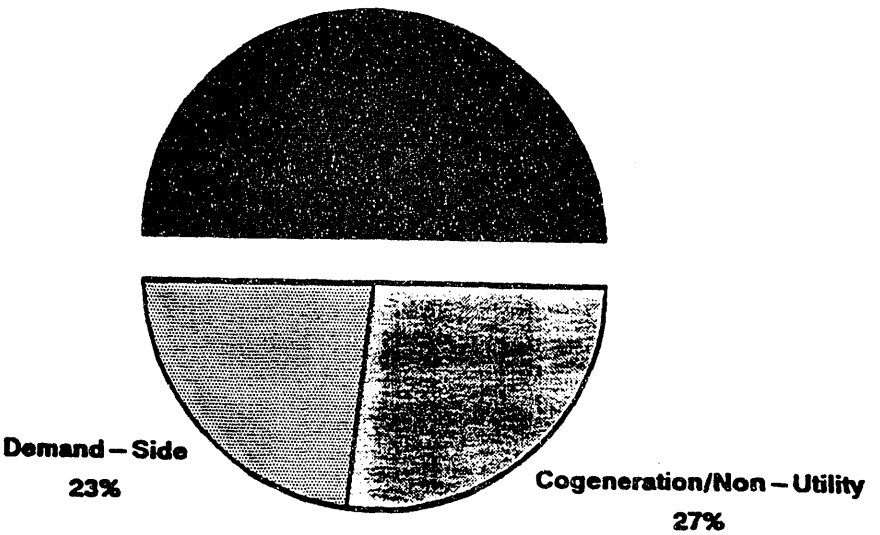


Table 2
OVERVIEW COMPARISON OF ALL REFERENCE SCENARIOS

Broad Options	Central Station Power	Small Diversified	Environmental[11]
Net Present Value (NPV) - $45.2 Billion	Highest NPV - $47.1 Billion	NPV - $46.5 Billion	Highest NPV
Capital Requirements (CR) - $14.7 Billion	CR - $17.7 Billion	CR - $16.0 Billion	-
Revenue Requirements (RR) - $4.74 Billion	RR - $5.26 Billion	Mid-range to High RR	Mid-range RR
Next to lowest rates through 2000 and lowest by 2005.	Lowest rates through 2000 but moving higher thereafter compared to other scenarios.	Highest rates in all years although the difference decreases over time.	-
Next to lowest NOx emissions.	Highest NOx emissions in all years.	Second to highest NOx emissions.	Lowest NOx emissions.
Highest SO2 emissions 1995 but next to lowest in 2000 and 2005.	Next to lowest SO2 emissions through 1995 highest beyond 2005.	Second to highest SO2 emissions.	Lowest SO2 emissions through 1995 by a substantial margin.

D. GENERAL CONCLUSIONS AND RECOMMENDATIONS

The independent and voluntary participation of a broad base of electricity stakeholders is a unique feature of MEOS, distinguishing it from comparable studies required by legislative mandate or regulatory order. The more important insights gained from MEOS' broadly participatory process include:

* A forum for airing alternative views and for open, objective analysis is important if the resulting decisions are to receive the support of important stakeholders.

* Any planning process must recognize multiple and competing objectives explicitly and be capable of identifying and quantifying the trade-offs among them.

* There are many gaps in information, and it is scattered among organizations and stakeholder groups. Broad participation by stakeholders opened the door to compiling the available information, helped identify information gaps, and facilitated collection and development of new information.

* The MEOS process successfully provided jointly-contributed resources for developing needed analytical tools and persuaded participating organizations to contribute the time of many talented and knowledgeable staff.

* The experience of participating in the process has served to broaden everyone's understanding of the tasks involved in resource assessment and integrated resource planning. It has served to acquaint participants with the viewpoints of other stakeholders, and it has broadened the network of organizations and individuals who have interest in -- and resources to contribute to -- future planning activities.

* Progress was made in comparably and fairly evaluating both supply- and demand-side options. The MEOS process supported a commitment to a "level playing field" approach to options evaluation by establishing a demand-side Work Group, by allocating substantial resources for demand-side contractual studies, and by specifying that the integrated planning model should be designed to handle demand-side options similarly to supply-side options.

The MEOS' recommendations for future action also address the cooperative nature of the planning process. The recommendations include:[12]

* additional cooperative research on load, market share, cost, performance, and availability,

* steps to initiate the design, testing, and piloting of demand-side resource options which appear to be highly cost-effective,

* Michigan Public Service Commission (MPSC) resources should be devoted to coordinating and supporting the maintenance and improvement of MEOS data bases, analytic tools, and making integrated planning resources available to other electricity stakeholders, and

* a procedure should be established for periodically updating information on long-term power supply needs... to encourage participation by the state's utilities, the Michigan Public Service Commission Staff, and other public and private parties with interests in the utility planning process.

III. AN ENERGY EFFICIENT BLUEPRINT FOR CALIFORNIA - THE COLLABORATIVE PROCESS

A. BACKGROUND

Between the late 70's and mid 80's, California utilities were pioneers in designing and implementing DSM programs, as well as recognizing and addressing related issues such as the cost of environmental externalities and cost recovery. Between 1984 and 1987, however, utility spending for conservation in California dropped 55 percent, from $164 million per year to less than $74 million.[13]

Early in 1989, California's major energy policy stakeholders began to revisit the state's commitment to DSM and suggested that program development might be better resolved through a collaborative process in which parties with a stake in energy efficiency could meet and develop a consensus approach. The Public Utilities Commission of the State of California (CPUC) requested a blueprint "to establish what the programs should be for the next century." Heretofore, the typical meeting place for environmental and consumer groups, utilities, major industries, and governmental officials had been the hearing room. The emphasis was not on cooperation, and problems would typically be remitted to adversarial processes. Appendix 4 lists policy principles from the California Collaborative.

All this changed when parties to the collaborative[14] set a six-month agenda and produced *An Energy Efficient Blueprint for California*, which called for a doubling of conservation spending from 1988 levels. The goal was to spend $147 million more each year on conservation programs by 1991. CPUC President Wilk suggested that: *"The collaborative proposals mark a new era for energy utilities and for this commission...The collaborative applications give us a chance to prove that everyone can be a winner; consumers can save money on their electric bills, and utilities can make money on conservation through carefully planned incentive programs."*[15] Pacific Gas & Electric (PG&E), the nation's largest utility, expects conservation programs to meet three quarters of its new demand for electricity by 2000. Appendix 5 illustrates how PG&E's electric savings will grow along with rising demand to offset the need for power plants.

B. OBJECTIVES AND ACCOMPLISHMENTS

The members of the Collaborative established three objectives.

* improve and expand utilities' DSM programs with emphasis on energy efficiency programs,
* identify promising options for creating performance-based incentives for utilities to operate energy efficiency programs, and
* define a mutually agreeable framework for determining appropriate levels of DSM investment and activities and frame for policymakers the major unresolved policy issues surrounding the integration of DSM into utilities' resource and investment plans.

The related tasks were approached in two phases:

1. **Phase One - Develop Demand-Side Resource Options**

Phase one explored new programs, techniques, and technologies to enhance the role of DSM in California's regulatory scheme. Southern California Edison (SCE) assembled an expert advisor team consisting of staff from the California Energy Commission (CEC), the Division of Ratepayer Advocates of the CPUC, and Natural Resources Defense Council (NRDC) for its commercial-sector new construction program. San Diego Gas & Electric (SDG&E) initiated discussions among utilities, the CEC, and California Building Industry Association (CBIA) to investigate the ways to implement new construction programs, and is discussing with the Utility Consumers Action Network the establishment of an advisory panel of experts for other programs.

PGE underwrote several substantial research endeavors. For example, a Lighting Technology Center will aid architects and builders choose the most efficient means of lighting their facilities. PG&E is also considering a Food and Agricultural Technical Center for Northern California that would study efficiency in both food production and processing. PG&E has also brought together Lawrence Berkeley Laboratory and the Natural Resources Defense Council to conduct a multi-year investigation of advanced lighting, building design, electric motor and other efficiency technologies. In addition, to the extent possible, utilities have agreed to coordinate their program expansion plans in areas that will benefit from joint planning. Of major significance is the mutually agreed-upon plan that the utilities filed at the CPUC on March 1990, outlining in detail and requesting funding for expanded energy efficiency programs and shareholder incentive mechanisms. These are listed below in Table 3:

TABLE 3
UTILITY PROPOSALS FOR PROGRAM REDIRECTION

	PG&E	SCE	SDG&E
ENERGY EFFICIENCY INCENTIVES			
Residential appliance efficiency	Maintain	Expand	Establish
Residential weatherization retrofit	Expand	Maintain	NA
Commercial EM incentives	Expand	Expand	Expand
Industrial EM incentives	Expand	Expand	Expand
Agricultural EM incentives	Expand	Expand	NA
NEW CONSTRUCTION			
Residential	Expand	Expand	Establish
Nonresidential	Expand	Expand	Establish
SERVICES AND DIRECT ASSISTANCE			
Direct Assistance	Maintain	Expand	Establish
Residential EM services	Maintain	Maintain	Maintain
Commercial EM services	Maintain	Maintain	Maintain
Industrial EM services	Maintain	Maintain	Maintain
Agricultural EM services	Maintain	Maintain	Maintain
GENERAL SUPPORT PROGRAMS			
Measurement & evaluation	Expand	Maintain	Expand

a. Addressing and Resolving Utility Barriers

Potentially, one of the major barriers to DSM resource acquisition is the inherent disincentive created by regulatory systems which reward utilities, via higher profits, for increased electricity sales. Energy efficiency advocates and utility regulators nationwide have expressed interest in providing a clear link between efficiency investments and profits earned. Regulators also addressed the problem of utility incentives for implementing DSM programs by granting utilities that succeed in meeting or exceeding efficiency goals a higher overall profit margin. Conversely, utilities that fail to meet or exceed the state's efficiency goals can lose some of their granted profit margin. Some of the reasons cited for pursuing incentive programs include:

* the possibility of increased earnings can encourage management to search actively for new efficiency opportunities and implement programs aggressively,
* incentives can balance utility preferences for generation projects and efficiency investments,
* incentives potentially produce greater strides toward achieving a least cost resource plan, ratepayers will clearly benefit from the increased resource value from DSM programs and the lower overall bills that will be achieved, and
* incentive mechanisms can create a structure whereby utilities will pursue efficiency objectives with less need for the CPUC to monitor the details of program implementation.

2. Phase two - Decision-Making Process

Phase two began with the idea of identifying the underlying principles or issues that incentive mechanisms must address. These include:

* stability - "ground rules" governing utility incentive mechanisms should be clear and remain stable during the duration of the mechanisms,
* programs must promote durable, persistent, and reliable efficiency savings,
* minimum performance requirements/accountability,
* incentives should be based on measurement of participation levels and energy savings achieved by DSM programs,
* explicit quantification of rate impact,
* avoidance of cream skimming, and
* reflection of resource value for program.

Each of the collaborating utilities then explored which incentives would best support increased conservation spending. A hearing on July 20, 1989, led to the formation of an informal group composed of parties representing many different perspectives on DSM. With the encouragement of the CPUC, the group met for six months and issued a report recommending innovative approaches to financing DSM investments. Subsequently, the participating electric utilities -- PG&E, SDG&E, and CE, filed applications based on recommendations of the report. The following interim approach to financing conservation options was adopted: "*The loss of revenues [resulting from the conservation items] will be accounted for in the Electric Rate Adjustment Mechanism (ERAM)....Direct costs of the conservation items should come out of the utility's existing budget for demand-side management....If the existing budgets are exhausted, requests for additional funding for these conservation items will be considered in connection with the approval of individual special contracts.*"

PG&E proposed to account for sales under special contracts by booking credits to the utilities' various balancing accounts. Specifically: "*....for all sales under special contracts, PG&E would book a credit to Annual Energy Rate [AER] and to each balancing account, except ERAM, at the appropriate rate component for the particular schedule that would apply to the customer in the absence of the special contract. The credit booked to the ERAM account would be reduced to reflect the difference between the appropriate tariff rate and the rate under the special contract. This procedure has the effect of booking full credits to all accounts except for ERAM, and the rate shortfall resulting from the special contract would be reflected entirely in the ERAM component.*"

IV. LEAST COST UTILITY PLANNING IN NEW YORK STATE - A CLASSIC APPROACH

A. BACKGROUND

New York State represents an example of the Classic approach to LCUP. On December 28, 1988, Governor Mario M. Cuomo issued Executive Order No.118 establishing an energy planning process to be undertaken by the State Energy Office (SEO) in cooperation with the Department of Public Service and Environmental Conservation (DPSEC). On January 3, 1989, interested agencies, organizations and individuals were invited to comment on a package of materials that included a list of issues to be addressed in the plan, a draft outline of worktasks and environmental impact statement scope of work.[16] This package was provided to over 1,800 organizations and individuals, and was followed by a public comment period where all interested individuals and organizations were encouraged to offer comments on the draft plan. Over 50 persons and/or organizations representing a wide range of interest in State energy policy submitted written comments on the draft. All public comments were considered in preparation and adoption of the final plan. Local governments were also encouraged to participate in the process. After the adoption of the Final Plan,[17] the New York Public Service Commission (NYPSC) ordered electric utilities to submit plans for integrated long range DSM programs.

A review of New York State's plan is particularly interesting because the state, indeed the region, is currently facing capacity shortages. Under the most likely statewide forecast of electricity peak demand, new electricity resources will be necessary in 1992. In one forecasted scenario, the combination of stronger economic growth and lower electricity prices could lead to an average annual rate of growth of 2.8%, while a weaker economy and higher electricity prices could lead to a rate of demand of 0.6%. Generally, more efficient appliances, enhancement of the State's Construction Codes and other conservation measures are expected to reduce electricity consumption, while growth in the number of customers and appliance saturations, increasing penetration of electric space heating systems in new buildings and economic growth are expected to increase consumption.

B. PURPOSE AND SCOPE OF THE PLANNING PROCESS

The purpose of the Plan was to provide an up-to-date assessment of the State's energy future, evaluate the impacts of various options for meeting future energy needs, identify policies to guide State energy decision-making and recommend implementing actions. The overall long-range planning objective was to improve the efficiency in the use of electricity by 8-10 percent by 2000, and 15 percent by 2008. For purposes of this study exclusive focus was given to electricity objectives. Other long-range planning objectives included improved air quality and fuel diversity.

New York State's energy policy is guided by four important public policy goals as enunciated in Executive Order 118:

* assure an adequate, affordable and reliable supply of energy,
* play a central role in setting and achieving Federal and State environmental quality objectives,
* serve Federal and State energy security goals to reduce dependence upon imported petroleum, and
* assure that public health and safety goals are protected.

C. ALTERNATIVE PLANNING SCENARIOS

The State plan addresses the uncertainty of forecasting by including three alternative planning scenarios:

1. *Reference Scenario* - Unserved demand is assumed to be met through the construction of conventional coal plants with flue gas desulferization and gas turbines.

2. *Lower Cost Scenario* - Unserved demand is met by a combination of increased DSM programs, additional Quebec imports, new natural gas combined-cycle power plants and new conventional coal-fired power plants.

3. *Lower Emission Scenario* - This scenario was established by selecting resource options that will result in decreasing the air emissions associated with future electricity production. Unserved demand is met by a combination of increased DSM, additional independent power projects, natural gas combined-cycle power plants and atmospheric fluidized bed coal power plants. In addition, 1,313 megawatts of coal-fired power plants are life extended with scrubbers, and all existing oil and coal-fired power plants with a natural gas capability burn natural gas during the summer months.

Table 4 highlights the difficult tradeoffs that policymakers face. Implementation of the combination of options in the Reference Scenario would result in large increases in predicted air emissions when compared with the other scenarios primarily as a result of the large increase in the use of coal. A strategy of nearly total reliance on coal provides the benefit of a lower cost fuel source with abundant domestic supplies. However, the combustion of coal for electricity generation contributes to the future deterioration of air quality. Estimated air emissions from the combination of measures contained in the Lowest Emission Scenario (LES) are the lowest of the three scenarios due primarily to aggressive implementation of DSM programs and increased use of natural gas cogeneration. A strategy of heavy reliance on natural gas provides the benefit of improvements in air quality. However, the actions necessary to accomplish this benefit result in other environmental and economic risks, e.g., new pipeline construction and associated costs, and the future price and supply of gas.

Table 4
COMPARISON OF AIR EMISSIONS, FUEL USE AND COSTS

	1988	REFERENCE	LES	LCS
AIR EMISSIONS				
SOx	398,102	447,031	148,476	377,302
NOx	140,817	312,383	200,073	216,707
Co	264,106,179	133,201,025	92,740,499	94,039,231
FUEL USE				
Oil	51,136	42,160	30,865	37,853
Gas	161.8	226.1	619.2	522.3
Coal	11,096	35,273	17,850	20,034
COSTS				
Average Constant Dollar	NA	3.467	3.506	3.330

D. Meeting Future Energy Needs

After analyzing the tradeoffs among scenarios, the plan sets an overall direction for meeting the future energy needs of New York state through four general recommendations:

* implementation of various DSM programs to reduce coincident peak demand by an estimated total of 1,230 megawatts by 2000,

* completion and operation of various small hydro, cogeneration and resource recovery projects by Independent Power Producers and municipalities that result in a total of 1,629 megawatts of additional capacity by 1995,

* completion of electric utility life extension programs for 1,796 megawatts of existing coal capacity and 7,145 megawatts of existing oil-fired capacity by 2008,

* implementation by the New York Power Authority of two new contracts -- totalling 1,800 megawatts -- to import electricity from Hydro-Quebec.

The selection of resources illustrates the degree to which tradeoffs were made. New York State policymakers were particularly concerned about environmental issues: their ultimate goal was the provision of reliable electricity services in a manner which improves environmental quality at a reasonable cost. Accordingly, DSM programs directed toward peak shifting were evaluated for their impact on air emissions and other environmental concerns before being implemented. Of the 11,804 megawatts required to meet future needs, 4,659 or 39% of future needs are met through DSM options, while 61% of future needs are met through life extension of coal plants. There are no plans, however, for construction of new plants.

The NYPSC also ordered utilities to participate in a statewide effort to develop methods for quantifying and estimating external environmental costs for all electric supply and demand options.[18] The State's concerns with emissions is underscored by a series of specific recommendations regarding actions to be undertaken to improve environmental air quality and account for environmental externalities in reviewing electric utility bidding programs:[19]

* utilities should propose and implement PSC-approved ratemaking approaches that better align the interests of customers and shareholders and provide utilities with an incentive to achieve their DSM objectives,

* utilities should broaden their analyses of the economics of DSM programs, and place increased emphasis on energy efficiency programs and environmental concerns, and

* New York should eliminate the payment provision of Section 66-c of the Public Service Law, which requires utilities to purchase power at 6 cents/Kwh from independent power producers even though less expensive and more environmentally beneficial DSM may be available.

1. Codes and Standards For Improving the Efficiency of Energy Use

The New York State Plan also recognizes the significance of building codes and appliance efficiency standards in designing DSM programs. Several of the recommendations indirectly address potential

governmental roles, e.g., lobbying, in developing and implementing programs. This recognition is embodied in a series of recommendations that appear in Appendix 6.

V. CONCLUSIONS

Analysis of the Classic and Collaborative approaches to LCUP suggests overlap in the more technical and methodological areas of planning. Both processes begin with the establishment of goals and objectives which are determined, to a great extent, by capacity constraints, legislative guidelines and other planning requirements. Jurisdictions using either approach are still required to address the inherent uncertainty of load forecasting and must use appropriate tools and techniques to identify and evaluate cost-effective resources. Increasingly, jurisdictions will rely on both processes to develop least cost plans.

For example, the development of Commonwealth Edison's plan involved elements of both processes. It began as a Classic approach with planning guidelines established by the State of Illinois and has developed into a Collaborative by order of the ICC requiring intervening parties "*to reach agreement on a set of modifications through a cooperative process.*"[20] The ICC noted the potential advantages to such an approach: "*...freed from the restrictions of an adversarial proceeding, parties can set themselves to resolving rather than identifying problems.*"[21] However, the standards by which modifications will be evaluated have not changed fundamentally from those mandated in the classic. Additional programs selected will still be required to "*at minimum, pass both the societal and utility cost tests and be practical in terms of costs, start-up time and penetration estimates.*" [22]

Different approaches may not necessarily guarantee better least cost plans. The strength of either process is perhaps more dependent upon the quality of data and analysis than on the specific approach used. This suggests that certain methodological steps or principles must be adhered to in the planning cycle prescribed by the PSC or other entity, i.e., NARUC's eighteen steps in the LCUP process. While not all jurisdictions follow these steps exactly, all least cost plans will embrace key elements (forecasting, identification and evaluation of all resources) and apply certain screening tests (utility, societal, participant).

A. Comparing Approaches

There are, nevertheless, major differences in approaches that may potentially make a substantive difference in the quality and direction of a least cost plan.

1. The Classic Approach

The Classic is largely descriptive and highly dependent upon statutory requirements and the interpretation of planning guidelines. The plan is the focal point of all regulatory proceedings. All input, analysis,

discussion, etc., by intervening parties is directed towards either supporting, modifying or rejecting the plan. The process is adversarial in nature and is structured to accede to the "best" argument (e.g., least cost resource selection, lowest emissions, etc), as exhibited by the weight of evidence introduced by intervening parties. In this respect, the process demands expert resources to defeat adversarial positions. The advantage of following statutory guidelines is that utilities are not given "carte blanche" for their planning process but must instead conform to detailed requirements that have been carefully established by the state.

The adversarial nature of this approach potentially limits the agenda under discussion to only those issues that are addressed in a rulemaking or regulatory format rather than "real-world" issues experienced by utilities and consumers. This may result in focusing on "legal positioning," i.e., an overriding concern for complying with the exact requirements of the law. We are not suggesting, however, that meeting statutory requirements is not an important consideration. Indeed, it is the critical element of the LCUP process. We are suggesting, instead, that too narrow a focus may result in resources being devoted almost exclusively to meeting the letter of the law while potentially constricting creative thought on other issues.

As a result, too little attention may be devoted to other practical issues. For example, collection of good data, which is crucial for expanding utilities ability to develop more accurate forecasting and to better design, implement and evaluate resources, involves relatively high costs. If a utility has devoted a majority of its LCUP resources to meet the statutory requirements of the law and assure PSC approval of the plan, it may be difficult to expend resources on what may perhaps be erroneously perceived of as a less important issue. Table 5 summarizes the advantages and disadvantages of the Classic approach to least cost planning.

TABLE 5
ADVANTAGES/DISADVANTAGES TO THE CLASSIC LCUP APPROACH

Advantages

Statutory requirements provide a basis for planners to use, i.e., guidelines to be followed.

Parties enjoy legal rights before the PSC and courts. Parties are required to follow set procedures, in responding to data and information requests.

Decisions have the force of law. The PSC will assume responsibility for a plan's implementation.

Development of plans by legislative initiative creates opportunities for a broad spectrum of parties to actively involve themselves in its evolution.

Burden of proof lies with all parties, using the same methodologies and criteria, i.e., utilities must defend their plans, intervenors must defend their criticism, etc.

Disadvantages

The process is adversarial in nature: parties that develop the "best argument" and convince the Public Service Commission on the merit of their argument "win."

The process often requires parties to use expert consulting services.

A "winner take all" situation leaves little room for compromise. Compromises may have to be developed by an arbitrating party, i.e., the PSC.

Potentially discourages broad based participation because of cost of consultants and intimidation in a formal regulatory setting.

Focus on meeting legal requirements potentially distracts attention away from other relevant issues.

Potentially more difficult to resolve difficult conflicting policy objectives. The ultimate decision making body - PSC - may not want to face tough issues.

2. The Collaborative Approach

The collaborative process, in contrast, is prescriptive not descriptive. Unlike the Classic approach where the role of participants is to determine the merits of a plan, the Collaborative starts with a set of directives given to a broad group of participants. Though parties are still required to analyze and debate the merits of a plan, its focal point is to create a plan. As might be expected, the strength of the collaborative lies in the fact that it is process and consensus oriented.

The process potentially broadens the common ground of agreement and reduces the number of issues over which to do battle. If there is agreement on goals and objectives at the start, legal challenges stemming from different interpretations of legislative requirements may potentially be averted. Northeast Utilities noted that the collaborative effort resulted in a general reduction in litigation. However, the effort required to mount a successful collaborative process can be more consuming than a typical rate case and continue for a more sustained period of time. NU also noted that utility staff must balance the needs of the collaborative process for the time it takes to make informed decisions, against the needs of the utility organization for timely information required to support routine corporate functions, i.e., budgeting, sales forecasting, resource planning, goal setting, and so forth. *"The collaborative process can affect these functions and the utility staff personnel will feel significant pressure as the ongoing routine functions in the company are affected by the process through delays in obtaining needed information....Focusing collaborative discussions and negotiations regarding substantive program changes or resource allocation further into the future can avoid these*

problems and serve to reduce potential frustration for the people entrusted with delivery of the programs and the customers who participate in the programs." [23]

Reducing the number of issues also makes better use of potentially scarce resources. Resources are spent resolving issues that presumably all participants have agreed are problems or barriers. The collaborative may also facilitate parties ability and/or willingness to participate without preconceived notions that might prejudice their thoughts. It is an atmosphere conducive to open discussion and "brain storming" on difficult issues. Energy and resources are therefore spent on creating and resolving issues rather than on second guessing the utility by reexamining their work. Perhaps one of the greatest advantages of the Collaborative process is that because cooperation is essential for the project's design to be widely accepted, the results of the plan will be deemed more credible by the participants and, perhaps more importantly, by regulators. Credibility will also make it easier for recommendations to be effectively implemented.

The structure of a collaborative effort is important. The structure effectively determines the overall organization of the parties including levels of responsibility, staffing, funding,[24] budget, and time. Collaborative efforts require funding to adequately perform research tasks. As an example of structure, the Conservation Law Foundation collaborative was composed of a Committee (to review proposed work plans associated with the collaborative process), Working Group (manage the completion of work plans) and Program Design Staff (actually performed the work).

Table 6 summarizes the advantages and disadvantages of the Collaborative approach to least cost planning.

TABLE 6
ADVANTAGES AND DISADVANTAGES TO THE COLLABORATIVE LCUP APPROACH

Advantages

The process is prescriptive not descriptive. Plans are cooperatively developed by all, unlike the classic where a plan is developed by one party and reacted to by all others.

Better use of potentially scarce resources. Resources are spent resolving an issue or question that all parties agree warrants resolution. Resources are not spent on "hired guns" to challenge the opposition's viewpoints.

Cooperation is essential for the project's design to be widely accepted, results deemed credible and recommendations effectively implemented.

Broadens the common ground of agreement between parties, reducing the number of issues over which to do battle.

Creates the political context (broader consensus) within which good planning and regulation can occur.

Disadvantages

Expert resources are still needed.

Still requires policy guidance.

May require strong leadership. In the absence of definitive requirements - guidelines and statutory deadlines, there may be no great incentive to resolve matters. Thus, parties may not have the leadership necessary to push the group through difficult times.

In the absence of statutory guidance, implementation may be difficult.

3. Why Jurisdictions Use Different Planning Approaches

Jurisdictions use different approaches for various reasons. The Collaborative process appears to be more readily used in those jurisdictions with the presence of a well respected consumer intervenor organization that has been actively involved in utility matters such as rate cases and conservation program planning. The two most prominent examples of this phenomena are the Conservation Law Foundation (CLF) in the Northeast and the Natural Resources Defense Council (NRDC) in California and the Pacific Northwest.[25] (Appendix 5 lists the policy principles from the California Collaborative) Both organizations played leading roles in persuading their regulatory commissions and utilities that cooperation, rather than confrontation, was the preferred path to develop conservation programs.

It should also be noted that in these parts of the country commissions have been actively addressing difficult issues such as the quantification of environmental externalities and financial disincentives to DSM investments methodology. It appears that offered a new and innovative approach to resolving matters, the California and Massachusetts commissions were not averse to using it. We do not mean to suggest, however, that those states that used the Classic approach lacked strong consumer intervenors and/or PSC's. Indeed, the Classic approach used in New York State saw the NYPSC played a leading role in developing the strong environmentalist leaning of their plan.

Our research suggests that at the early stages of the LCUP learning curve, states will utilize a more Classic approach for several reasons. First, we have noted that regulators or legislative bodies often lead the development of LCUP through mandate or active encouragement. Therefore, they will take the first crack at LCUP by analyzing the status of the state's energy environment, e.g., the Illinois Department of

Energy and Natural Resources examined ***"in broad terms the environment of the state's electric utility system and suggests directions for state policy"***. This first step typically results in the establishment of guidelines developed on the basis of analysis performed at a broad -- state -- level.

Second, because LCUP is a relatively new phenomenon (recall that the EPRI survey noted that 33 states are in various steps of formulating LCUP strategies), utilities will seek guidance from the PSC or state energy office. Utilities will look to these bodies for direction not only for their knowledge and expertise on the subject, but for legal reasons. If a utility follows the direction of the PSC or State, the opportunities for subsequent questions of prudency are greatly reduced, e.g., the use of certain forecasting tools, analysis of technical feasibility and cost effectiveness of DSM programs.

Third, it is questionable whether utilities, left to their own devises, would expend the necessary resources to comprehensively develop least cost strategies which may not be in their short term interests. Because the Classic approach is a legally based one, utilities must therefore respond to policy and program demands that they would not otherwise be naturally inclined to make.

The fact that collaboration has been used primarily as a tool to resolve specific issues and not to develop comprehensive LCUP strategies for the states, with the exception of Michigan, suggests that this process may not be an appropriate tool to embark upon a LCUP process. However, it may be a useful, indeed critical, process for focusing energies and resources on narrow issues and questions of implementation, where the input of parties may be especially useful.

4. Which Process Works Best For Municipalities

Both processes present different strategic opportunities for municipalities to influence their servicing utility's plan. The differences in approaches embrace certain advantages and disadvantages that may influence the tactics and methods used by a municipality. The main opportunity for policymakers to influence a plan is afforded through comment on a rate or other proceeding before the regulatory commission. The collaborative process, because of its reliance on informality, give and take and outside pressures, i.e., political or market considerations, may potentially demand tactics that rely less on evaluation and analysis of a plan and more on developing optimal bargaining leverage to strengthen a municipality's position in negotiations. The Classic approach, conversely, may be more inflexible because it relies more on the weight of legal evidence, interpretation of rules, and access to costly resources (expert consultants and witnesses). Accordingly, if a municipality was involved in a classic process, its tactics would be determined to a greater extent by regulatory guidelines that require intervenors to prove their case before an administrative tribunal.

5. Making the Collaborative Work

There are key attributes that are important in fostering an environment for the collaborative process to achieve the benefits that both the utility and nonutility parties seek. These include:[26]

* shared commitment by those participating to make the process productive is manifested in the dedication of both people and financial resources,

* participants must trust, and have confidence that each consultant selected by participants to support the process is knowledgeable in their area of expertise, and therefore, that information provided by such consultants is useful for decision-making,

* participants need to remain flexible regarding the outcome of a particular collaborative effort -- some issues can be resolved easily, some take a little while longer, and still others may take a very long time, and

  participants must support the outcome of the process, which will necessarily include tradeoffs by each party in order to gain broader support for the final product, since in many cases, success of the individual programs is also linked to the level of support all parties give to program implementation.

ENDNOTES - CHAPTER THREE

1. Comments of Terry Black, Project Director MEOS; Director Office of Energy Programs, Michigan Public Service Commission. Least Cost Planning in the Midwest: A Symposium, Chicago, Illinois, February 10-12, 1987.

2. Final Report, Michigan Electric Options Study, Michigan Department of Commerce, October 1987.

3. Options were aggregated into four categories: (1) Improvements to the existing utility supply system (2) demand-side options (3) non-utility supply options and (4) traditional generating options.

4. Defined as the lowest cost to Michigan individuals and businesses under specified constraints and specific assumptions about the future.

5. From oil to coal or natural gas. Fuel conversion is a potential cost reduction option and not a new capacity producing options. Overall, natural gas ranked first as a fuel conversion option and coal gasification/combined cycle ranked last.

6. Identification of transmission bottlenecks which could limit Michigan's ability to exchange power regionally, as well as legal and regulatory impediments to the expansion of the transmission system.

7. Only strategic conservation, peak clipping and load shifting were included in this study, while other DSM objectives remain for future evaluation.

8. The total potential is projected to be approximately 177 MW in 1990 and 873 MW by 2005. Industrial cogeneration is projected to be the largest capacity contributor. However, non-utility supply options are very sensitive to economic assumptions. Small changes in economic factors such as fuel prices, capital costs and electricity prices may have a large impact on the future of non-utility options.

9. IPM contains two submodels: the Integrated Resource Planning Model and Electric Utility Financial Model.

10. Reference A Demand Assumptions were for low demand projections of 1% per year, while Reference B Demand Assumptions were for higher demand projections of 2 and 2.5% per year.

11. This scenario cannot be easily compared with the other scenarios since it assumes an acid rain program requiring major reductions in SO2 emissions.

12. A 1986 attempt to move a LCUP bill through the Michigan legislature, which included both Resource Plan Review procedures and Certificate of Need provisions, was unsuccessful. Its basic provisions were drafted as a result of the MEOS and included: mandatory, biennial and least-cost based utility Electric Resource Plan filings (forecasts and plans), with general public hearings and formal PSC review; MPSC authority to approve, modify, or reject plans and to order specific utility implementation actions; provision of utility funded resources to enable PSC staff and intervenors to participate effectively in the Resource Plan Review and Certificate of Need Procedures; risk sharing between utility shareholders and rate payers when certified investments are abandoned; timely rate recognition for planning expenses and plan implementation actions ordered by the MPSC; and Optional Certificate of Need Procedures with explicit MPSC authority to issue, modify, and revoke certificates as circumstances change and MPSC responsibilities to monitor expenses progress.

13. The Natural Resources Defense Council published a report that documented "this dramatic drop in utility expenditures for and commitment to energy efficiency." The utilities concurred substantially with the reports findings.

14. Fifteen parties were identified as stakeholders and a number of additional parties participated as observers. The Collaborative members included: A&C Enercom, Association of California Water Agencies, California Department of General Services, California Energy Coalition, California Energy Commission, California Large Energy Consumers Association, California/Nevada Community Action Association, California Public Utilities Commission, Division of Ratepayer Advocates, Independent Energy Producers Association, Natural Resources Defense Council, Pacific Gas & Electric Company, San Diego Gas & Electric Company, Southern California Edison Company, Southern California Gas Company, and Toward Utility Rate Normalization.

15. *Northwest Energy News*, Northwest Power Planning Council, May/June 1990, Volume 9. No.3.

16. It should be noted that the plan examined all energy sources, not just electricity. It examined transportation, petroleum, natural gas, coal, and nuclear issues as well. For purposes of this report, only electricity was examined.

17. New York State Energy Plan, September 1989.

18. NYSERDA's environmental externality costs research project being conducted by Pace University should provide estimates of the costs of environmental externalities developed by other states, utilities and research organizations.

19. (a) Emissions of SO_2, NO_x and CO_2 should be explicitly considered in procuring future energy supplies.

(b) An imputed cost of SO_2, NO_x and CO_2 emissions should be immediately incorporated in utility competitive bidding programs to allow environmentally "clean" projects to compete favorably with lower cost but less environmentally attractive proposals.

(c) A generally uniform methodology which measures the actual environmental impacts of a proposed facility's air emissions and gives appropriate weight to these air emission externalities should be used by all utilities.

(d) The methodology for evaluating and scoring air emission externalities should be based on the cost of mitigating (offsetting) the residual SO_2, NO_x and CO_2 emissions from energy supply options.

(e) The cost of mitigation should be added to a proposal's bid price, and the composite price should be treated as the price variable in the utility's scoring scheme. The costs of mitigating poor air quality are the costs that "good" air quality facilities avoid, and should be recognized in the price we are willing to pay for electricity from such facilities.

(f) Approximately 60 to 70 percent of the total awardable points should be for price and air emission environmental factors.

(g) An Environmental Block for scoring externalities characterized by local and regional environmental concerns (e.g., land use, water discharges, noise, biological impacts, aesthetics, etc.) should be included in utility competitive bidding programs. Individual utilities should provide guidance as to the types of environmental externalities of local and regional concern, and have latitude as to how these externalities should be evaluated and scored.

20. ICC order to adopt an electric energy plan for Commonwealth Edison, December 12, 1990.

21. Ibid

22. Ibid

23. Ibid

24. For example, the NU/CLF effort was funded at $250,000 to pay the costs of research and data-gathering by experts working for intervenors and interested parties. Likewise, the CLF/New York State Electric and Gas Corporation effort was also at $250,000.

25. It must be noted, however, that their activities did not involve the development of a LCUP per se. CLF and NRDC were not under direct legislative mandate to develop LCUPs. Rather, they were charged with development of conservation programs. The distinction between developing a LCUP or program does not materially affect the pros and cons of either approach. Developing conservation plans often involves many of the same steps and planning tools used in developing LCUPs.

26. "*Perspectives on Collaboration As Replacement for Confrontation,*" Armand Cohen and Michael W. Townsley, Public Utilities Fortnightly, March 1, 1990.

CHAPTER 4. ISSUES AND BARRIERS IN LEAST COST UTILITY PLANNING

I. INTRODUCTION

The least cost plans reviewed in this report share certain critical, yet generic, elements. While differences exist among jurisdictions in terms of the process and approach to individual issues, all jurisdictions developing least cost plans must address the same planning horizons and uncertainties associated with meeting future energy needs. This common framework makes it easier to identify and analyze the issues and barriers having the greatest effect on utility performance, as defined in terms of rates, reliability, equity, or environmental impact. As a first step in evaluating the least cost plans of their servicing utility, municipal officials may find it useful to identify these issues for evaluation as independent variables. This approach offers the advantage of facilitating review of sophisticated and highly technical documents, econometric models, policies, screening methodologies, data, and cost/benefit calculations.

The analysis in this chapter is intended to meet the first objective of this report: summarize key issues, influences, and barriers in order to provide the necessary background for municipal policymakers to evaluate the adequacy of their servicing utility's least cost plan. Analysis of individual issues also provides the basis to better understand interactions among issues. The issues common to the plans reviewed in Chapters 2 & 3 include forecasting, planning objectives, data, resource selection and program screening methodologies. Knowledge of these allows municipal officials to better discern where analytical resources should be focused. If an issue is deemed to be unimportant in terms of its overall impact, then a municipality with limited resources would benefit from the knowledge that resources expended on supporting or challenging the merit of that issue would not significantly effect its final disposition. Likewise, a municipality's resources would be better utilized addressing those issues impacting principal concerns and objectives.

II. KEY ISSUES IN LEAST COST UTILITY PLANNING

A. FORECASTING

Forecasting allows planners to quantify the amount of yearly capacity needed to meet expected levels of growth. Errors in forecasting can result in over-capacity or shortages and will ultimately impact rates charged consumers. The most difficult aspects of developing long-range forecasts are those associated with the large elements of uncertainty resulting from variables outside the direct control of the utility, including inflation, fuel prices, economic growth, demographic changes, structural and behavioral factors.

The most common method of dealing with load uncertainty is to develop a range of reasonable growth scenarios based upon a combination of econometric models and statistical analyses. Using alternative scenarios heightens the focus on load growth uncertainty and emphasizes the relative rather than absolute. *Alternative load growth scenarios also produce substantially different implications for the amount and types of resource options selected for implementation. Load forecasts determine the levels of capacity expected for each year of a plan and the resources needed to bridge the gap between expected load and capacity.* [1] All of the plans reviewed in this report contain alternative forecasts. Table 7 summarizes the forecasts used by these plans:

TABLE 7
Alternative Load Forecasts

State of Illinois	CECO	MEOS	New York State
Big Shock	Baseline 2%	High	Case I (High)
Sustained Growth	High 2.5%	Low	Case II (Base
Extreme Weather	Low Growth 1%		
Nuclear Phase In	End Use		

Table 7 illustrates how utility plans have developed a range of reasonable growth scenarios based on standard deviations -- low, medium and high -- and circumstances unique to their service territory. For example, the State of Illinois "Big Shock" scenario assumes unexpected and rapid changes in fuel costs and economic or technological conditions that would dramatically decrease or increase electricity usage. The "Extreme Weather" scenario assumes irregular growth in peak demand caused by extreme hot weather. The "Nuclear Phase In" scenario assumes special rate treatment for rate basing nuclear power plants in the state.

A high growth scenario is a utility's highest projected forecast of electricity demand, although the actual range will vary among utilities. For example, a region with sustained growth of 1% for 5 consecutive years may have a high growth scenario of 1% - 2%, while a region experiencing annual growth of 3% would have a higher demand growth of 3% to 4%. A "Base Case" scenario is a utility's most likely to occur demand forecast.

Most utilities forecast peak and base load requirements, sales and generating output by using a multitude of planning tools and techniques. Among these are programs which use uncertainty (probability) analysis and simulation to calculate the likelihood of actual demand values falling within the forecast range. For example, Commonwealth Edison (CECO) utilizes a Multiobjective Integrated Decision Analysis System (MIDAS)[2] planning tool which is designed to assess the impact of uncertainty on planning.

Municipalities should familiarize themselves with the tools and techniques used to produce the forecasts. While a thorough technical understanding of forecasting is important, it is doubtful that municipalities have in house expertise to challenge the validity of tools/techniques chosen. Nevertheless, municipal officials should be aware of certain key factors and ask questions.

* Are growth scenarios based on a reasonable combination of econometric models and statistical analyses?

* Are utility estimates for inflation, fuel prices, economic growth, demographic, structural and behavioral factors reasonable and accurate. It is not uncommon for utilities to use official municipal and other governmental derived estimates for inflation and economic growth. Municipalities also have access to municipal specific data that utilities may find useful, particularly in terms of housing, population and other demographic data?

* Does the forecast use uncertainty (probability) analysis and simulation to calculate the likelihood of actual demand value falling within the forecast range?

* Does the plan use alternative load growth scenarios (most plans use a low, medium and high forecasts)?

* What important economic factors/indicators are not included in the forecast and why?

* To what extent does the forecast rely on end use data?

B. PLANNING OBJECTIVES

Once load growth forecasts have been developed, overall objectives for meeting future needs are established. The relationship between forecasting and objective or goal setting stated by CECO: "*Demand forecasts translate assumptions regarding alternative scenarios into quantitative requirements, thus providing CECO's planners with a way to set goals in an environment characterized by uncertainty.*" Objectives differ among utilities because of differences in capacity situations, regulatory environment, corporate philosophy, planning capabilities, and place on the learning curve. Our research has shown that plans typically address the issues of equity, cost, environmental quality, safety, reliability, efficiency, and adequacy.

Establishing planning objectives in a clear straightforward manner is an obvious first step in any planning process, and will in large part, determine the overall direction and substance of a plan. Legislation provides a starting or guiding point for evaluating objectives because they must be consistent to the fullest extent possible with statutory or administrative guidelines. For example, the Illinois Public Utilities Act requires utilities to:"*provide energy services at the lowest possible cost to all Illinois energy consumers [while] utilizing to the extent practical, all economic means of conservation, non-conventional technologies relying on renewable resources, cogeneration, and improvements in energy efficiency as the initial sources of new supply.*"

Operationalization of objectives has critical ramifications. For example, CECO identified the purpose of its plan as the identification of cost-effective and reliable resources to be acquired when new resources are needed. The City of Chicago, in contrast, argued that the purpose of LCUP was to produce the lowest cost of meeting present and future energy needs by focusing on management of existing resources.[3] CECO's interpretation of this objective, along with its current capacity situation, presumably lead the company to view the period between 1990 and 1996 is *"a window of opportunity to expand its portfolio of resource options and its abilities to analyze...options."* CECO's near term planning efforts, therefore, did not focus on detailed planning, implementation and delivery of resources but rather on enhancing their *"capabilities to analyze alternative resource strategies."*

CECO's plan attempts to comply with the objectives of the PUA to the extent that resources selected, in the company's opinion, meet statutory requirements for least cost energy service provision because they minimize the company's revenue requirements. Had statutory objectives specifically required the adoption of the lowest cost methods of meeting present demand, their plan might arguably have included a wider array of cost-effective DSM options with a near-term implementation schedule. Moreover, if in support of this objective, legislative guidelines required CECO to use a specific program screening methodology, use certain cost assumptions about performance or market penetration of DSM, or incorporate environmental externality values, CECO's estimates of the cost-effectiveness of specific DSM programs and the impact on revenue requirements might have differed.

Intervening parties in the proceeding to adopt CECO's plan have, in several instances, taken issue with the company's views on the interpretation of other objectives. For example, CECO's concern with the objective of equity may have influenced their use of a "no-losers" test, a controversial program evaluation tool used to measure the individual benefits of a particular DSM program. The inclusion of this test effectively eliminated a great number of potentially cost-effective DSM programs. Had legislative guidelines limited or prohibited use of this test in favor of, for example, greater reliance on the societal benefits test, CECO's plan might have included those DSM programs which passed all but the "no-losers" test.

1. Tradeoffs Among Objectives

The attainment of one objective may also mean a diminished chance of reaching another. The importance of objective setting lies not only in the need to produce a clear and well understood least cost plan but for articulating, quantifying and evaluating such tradeoffs. Clear articulation of objectives will probably not lessen the problems of choosing between difficult choices, but may make it easier for policymakers to educate the public as to what the actual tradeoffs are and why they have to be made. This dilemma is cited

as a major conclusion by the Michigan Electricity Options Study (MEOS): "*Multiple and competing objectives exist in electric resource assessment and planning. Any planning process must recognize competing objectives explicitly and be capable of identifying and quantifying the tradeoffs among them.*"

The analysis in Table 8 highlights the tradeoffs that policymakers faced in New York State.

TABLE 8
Comparison Of Air Emissions, Fuel Use And Costs In New York State[4]

	1988	REFERENCE	LES	LCS
AIR EMISSIONS				
SOx	398,102	447,031	148,476	377,302
NOx	140,817	312,383	200,073	216,702
Co	264,106,179	133,201,025	92,740,499	94,039,231
FUEL USE				
Oil	51,136	42,160	30,865	37,853
Gas	161.8	226.1	619.2	522.3
Coal	11,096	35,273	17,850	20,034
COSTS				
Average Constant Dollar	NA	3.467	3.506	3.330

Implementation of the combination of options in the **Reference Scenario** would result in large increases in predicted air emissions when compared with the other scenarios, primarily as a result of the large increase in the use of coal. A strategy of nearly total reliance on coal provides the benefit of a lower cost fuel source with abundant domestic supplies. However, the combustion of coal for electricity generation contributes to the future deterioration of air quality. Estimated air emissions from the combination of measures contained in the **Lowest Emission Scenario** are the lowest of the three scenarios due primarily to aggressive implementation of DSM programs and increased use of natural gas cogeneration. A strategy of heavy reliance on natural gas provides the benefit of improvements in air quality, although the actions necessary to accomplish this benefit result in other environmental and economic risks, e.g., new pipeline construction and associated costs, and the future price and supply of gas.

The selection of resources to meet New York State's 11,804 MW of future needs also illustrates the degree to which tradeoffs are intrinsically involved in LCUP. With a particular concern to environmental issues, 4,659 MW or 39% of future needs are met through DSM options, while 61% of future needs are met through life extension of coal plants.

Such tradeoffs are also evident in the Michigan Electricity Options Study (MEOS) which identified the lowest cost combination of resources. The results of the analysis are shown below in Table 9.

TABLE 9

MEOS ANALYSIS

Broad Options	*Central Station Power*	*Small Diversified*	*Environmental*
Net Present Value (NPV) - $45.2 Billion	*Highest NPV - $47.1 Billion*	*NPV - $46.5 Billion*	*Highest NPV*
Capital Requirements (CR) - $14.7 Billion	*CR - $17.7 Billion*	*CR - $16.0 Billion*	-
Revenue Requirements (RR) - $4.74 Billion	*RR - $5.26 Billion*	*Mid-range to High RR*	*Mid-range RR*
Next to lowest rates through 2000 and lowest by 2005.	*Lowest rates through 2000 but moving higher thereafter compared to other scenarios.*	*Highest rates in all years although the difference decreases over time.*	-
Next to lowest NOx emissions.	*Highest NOx emissions in all years.*	*Second to highest NOx emissions.*	*Lowest NOx emissions.*
Highest SO2 emissions 1995 but next to lowest in 2000 and 2005.	*Next to lowest SO2 emissions through 1995 highest beyond 2005.*	*Second to highest SO2 emissions.*	*Lowest SO2 emissions through 1995 by a substantial margin.*

Development of a resource scenario that would permit an assumed reduction of about 25% of future sulfur dioxide emissions by the year 2000 resulted in the highest net present values for the state's utilities. The MEOS also demonstrates that midpoint accommodations are possible even when conflicting objectives are present. The broad options scenario which included most of the resources identified by working groups had the lowest net present value -- $45.2 Billion -- and the next to the lowest NOx and highest SO2 emissions in 1995 but next to lowest in the year 2000.

Municipal officials should carefully review the objectives in their servicing utility's plan to determine whether they are compatible with municipal goals and objectives. If municipal goals and objectives are not included in the plan, officials must then be prepared to lobby for their inclusion. The following questions should be asked:

* Are objectives clearly articulated?
* Are objectives consistent with the planning objectives in the legislation?
* Are objectives consistent with municipal energy policy objectives?
* Are objectives consistent with the franchise agreement?
* Are there inconsistencies among objectives?
* What are the tradeoffs among objectives?

C. DATA REQUIREMENTS

Substantial and reliable data expands utilities ability to perform more accurate forecasting and planning by reducing the level of uncertainty surrounding resource investment decisions. Data is also critical for performing integrated resource modeling (IRM) which facilitates the examination of multiple resource options and assumptions, and leads to better design and implementation of programs. A lack of data may, in certain cases, result in near term efforts that focus on enhancing planning capabilities instead of implementing potentially cost-effective DSM programs. For example, in the area of environmental externalities, CECO's least cost plan asserts that it currently does not possess the needed data to quantify environmental costs and benefits. If CECO had the data to account for environmental costs, the cost effectiveness of additional DSM programs would have potentially increased.

Utility's initial efforts at LCUP will probably start with the data and resources currently available to the company. Therefore, in the absence of "perfect" data, programs and policies selected will reflect the utility's current stock of available data and the potential for additional programs should evolve as new information is gained. As an example of one utility's evolution, CECO states its planning "*capabilities and skills are being improved by developing and/or acquiring new data, tools and techniques for DSM, supply-side and integrated resource planning.*"[5] Therefore, one of CECO's major planned activities over the next two years focus on data acquisition which will be used to assist in verifying peak load and energy forecasts.[6]

1. End Use Data

To supplement econometric modeling, utilities collect data for end-use models. In contrast to econometric models, which are based on expectations about economic and demographic variables, end-use models aggregate detailed functional information about specific electricity uses[7] and provide a detailed picture of energy use and requirements. Many utilities are investigating the possibilities of developing class load forecasts, a process which further delineates energy use by customer class. There are four basic uses for end-use data in DSM program planning:[8]

* Market segmentation -- The contribution of each major end-use to total load;
* Equipment Saturation -- The market penetration of different types of energy-using equipment. (This data is important for estimating DSM program impact.);
* Load shape estimation -- Load shape information is useful in identifying high potential peak clipping and load shifting market segments;
* Research and pilot program impact estimation -- Service-territory specific estimates, sometimes requiring on-site metering.

End-use data can be obtained from a number of sources, including: literature review, other utilities, building thermal load models, surveys, audits, and metering. However, collection is time consuming, expensive, and requires knowledge about current technologies and costs that could affect electricity demand, as well as information on the purchase and efficiency of new and replacement appliances.

A critical issue in determining the need for end-use data is the value that is obtained from additional information. Data collection techniques such as metering can be very costly. Therefore, utilities may be inclined to start their collection efforts with the least costly sources and then move to more expensive ones only as the need arises. A difference of opinion may arise, however, as to the merits of waiting to collect data until it is needed, particularly if unexpected collection difficulties prevent full scale program implementation.

The collaborative process can potentially facilitate data collection. One of the working groups in the MEOS, which was solely responsible for developing essential data and modeling capabilities, concluded *"that there are many gaps in information, and it is scattered among organizations and stakeholder groups. Broad participation by stakeholders opened the door to compiling the available information, helped identify information gaps, and facilitated collection and development of new information."*

Municipal officials should carefully review the data relied upon, and more importantly, the data gaps and needs in their servicing utility's plan. Officials should ask the following questions:

* What is the quality of the data used in the plan?
* Has the utility made a reasonable effort to needed data?
* Is the data of sufficient quality to provide reliable results?
* Are the costs of obtaining additional data worth the effort?
* Was end use data used in forecasting?
* How has the utility identified and gathered data?
* Has the utility identified gaps in data? To what extent have these gaps affected their ability to identify programs?

D. RESOURCE OPTIONS

Once planning objectives and load forecasts are established, the resources required to bridge the gap between loads and existing (generating and demand side) capacities must be identified. Statutory guidelines have increasingly mandated that utilities consider ALL -- demand and supply side -- resource options for meeting future needs. This edict is primarily a result of cost overruns for large central station generating plants, the increasing cost-effectiveness of DSM resources, the historic built-in incentives that encourage selection of supply-side resources and discourage those from the demand-side, as well as the general goal of resource diversification.

Therefore, legislatures and regulators have been particularly concerned that DSM and alternative resource options be given preference, or at least equal treatment in the selection process. The Illinois Public Utilities Act requires utilities to: "*utilize to the extent practical, all economic means of conservation, nonconventional technologies relying on renewable resources, cogeneration, and improvements in energy efficiency as the initial sources of new supply.*" Table 10 summarizes the broad categories of resource options considered by the jurisdictions evaluated in this report. CECO's plan, for example, identified 110 potential DSM and 15 supply side options, while the MEOS identified 36 DSM options.

TABLE 10
Potential Resource Options

SUPPLY-SIDE	DEMAND-SIDE
Supply-Side Bidding	End-Use Efficiency
Firm Power Purchases	Incentives
Plant Life Extension	Conservation
New Plants	Billing Discounts
Increased Plant Rating	Efficiency Standards
Transmission Upgrades	
Fuel Switching	
Small Power Production	
Rate Structure	
Alternative Generating	
Hydro	
Cogeneration	
Resource Recovery	

The scope of projected utility DSM efforts is now expanding rapidly, with utilities planning to implement programs that are larger by several orders of magnitude than those of a few years ago. Table 11 summarizes the total DSM budgets and energy impacts of select utilities for 1990.

TABLE 11[9]
Utility DSM Budgets

Utility	Total DSM Budget (Million $)	DSM Budget Percentage of Revenues	Projected Energy Impact (GWh)	Projected Peak Impact (MW)
Bonneville Power Administration	108	6.0	3330	35
Boston Edison	26	2.4	30	5
Central Maine Power	26	3.7	130	30
Consolidated Edison	40	1.0	100	92
Florida Power	40	2.5	35	650*
Long Island Lighting Company	38	2.1	172	158
New England Electric System	65	4.0	130	160
New York State Electric & Gas	16	1.5	6	15
Niagara Mohawk	31	1.5	130	150
Northeast Utilities	45	1.8	140	35
Pacific Gas & Electric	138	2.6	370	120
Portland General Electric	1	1.0	1	1
Puget Sound Power & Light	24	2.7	70	0
Southern California Edison	90	1.6	900	200
Texas Utilities	15	0.3	40	50
Wisconsin Electric	42	3.5	200	50

The selection of resources will be a critical factor in determining a utility's rate level and structure. Thus, municipal officials should ask the following questions:

* Have ALL resources - supply and demand side - been considered?
* How many resources have been identified?
* Which resources have not been identified? Why have they not been included in the utility's evaluation?
* Are resources consistent with the utility's planning objectives?

E. EVALUATING AND SCREENING RESOURCE OPTIONS

The next, and more critical step, involves analysis to screen and select the most promising options for fashioning a least cost plan. Table 12 below illustrates, in a generic manner, the various steps involved in screening resources.

TABLE 12
Resource Screening Process

STEP #1: Initial Screen - Eliminates Technologies Whose Development Appears Uncertain or Whose Economics Are Unfavorable.

STEP #2: Preliminary Analysis to Determine Whether Technologies Are Consistent With Utilities' DSM Objectives.

STEP #3: Determination of Programs Potential Societal Impact - Cost/Benefit Analysis Using Total Resource Test or Societal Test Incorporating Environmental Externality Values.

STEP #4: Additional Screening
- Participant Test
- Utility Revenue Requirements Test
- Rate Impact Test

1. STEP #1. INITIAL SCREEN

Screening resources at the outset reduces the number of options that must be evaluated in subsequent steps. The screening process facilitates rank ordering the alternative courses of action. Doing so, however, may result in elimination of resources that full evaluation would indicate should receive further consideration. CECO, for example, conducted a preliminary screening to eliminate technologies whose development appeared uncertain or whose economics are clearly unfavorable. The technological risk associated with the application of new, unproven technologies is accounted for by excluding such technologies from the set of resource types that were considered. On the supply-side, nuclear plants, coal gasification systems, fuel cells and large scale solar generation technologies were rejected because of high capital costs, long lead time, data deficiencies, and technical risk. Compressed Air Energy Storage (CAES) was, however, selected as a potential resource option because it could effectively complement CECO's existing nuclear and coal units, drawing power during off-peak periods at the low base variable costs, and returning the power to the system when it is needed during peak periods.

2. STEP #2. PRELIMINARY ANALYSIS

DSMRank -- EPRI's DSM ***technology*** screening model -- was used to screen and eliminate from further consideration technologies that are **"clearly unsuitable for meeting CECO's DSM objectives."** Two primary inputs were required in order to rank technologies in DSMRank -- the relative importance of CECO's DSM objectives and the ability of candidate technologies to meet objectives. Major reasons for eliminating DSM options included low market potential and/or penetration, obvious lack of economic benefits in the foreseeable future, and forthcoming national appliance efficiency standards that make comparable utility-

sponsored programs unnecessary. The inherent uncertainty of any long-term planning process also dictates that resource options selected as part of a resource plan have certain characteristics, e.g., short lead time, small size and discrete implementation steps.

3. STEP #3. DETERMINE POTENTIAL IMPACT

CECO's primary evaluation criteria for selecting resource options is reduction in the Present Value of Revenue Requirements (PVRR) of new owned capacity.

4. STEP #4. ADDITIONAL SCREENING

Utilities generally use two other tests to screen resource options. The ***participant test*** compares utility bill savings against out-of-pocket participation costs. The ***total resource cost*** test compares avoided supply costs to the sum of both utility and DSM program participants. The ***nonparticipant perspective or no losers test,*** which has been applied primarily to DSM options, is one of the more controversial tests in use. Under the terms of this test, if the costs to those who do not participate in a given program exceed the benefits they obtain, the option fails. It results in a heavy weight being applied to the losses suffered by a specific, often small group (nonparticipant). If the nonparticipant suffers even small loses, an option may be rejected despite large gains made by the participant. This argument is illustrated in Tables 15-18. The use of all three tests for screening DSM options may be overly restrictive. Various jurisdictions have repudiated the nonparticipant test for conservation investment.[10] Individuals have argued that the nonparticipant test should not be used to screen individual DSM programs because: "*Analysis of the effect on nonparticipant of each individual DSM program is analogous to analyzing the impact of each supply related investment on non-participants. If a distribution line or power plant is needed to provide reliable and cost-effective service to a fast-growing area, the fact that the addition may increase rates to slow-growing areas is not considered a valid objection to construction of the facilities. Similarly, utilities routinely add plant that raises rates to one temporal group of customers (e.g., customers in 1990) in order to lower costs to another group (e.g., customers in 2010), so long as the aggregate effect is beneficial.*"[11]

The example in Table 13 below illustrates the point that even if DSM resources are free, they will be rejected under the no-losers test, even though they reduce total revenue requirements and average bills by 15%.

Table 13[12]
Resource Misallocation Caused by the No-Losers Test
(Even When Demand-Side Resources Are Free)

Assumptions		
Current revenue requirements	$1,600,000 /yr	
Current energy sales		20,000,000
Current customers	1000	
Average consumption		20,000 kWh/customer/yr
Average revenue requirements	$0.08 /kWh	
		$1,160 /customer/yr
Demand Growth		
Incremental energy requirements		4,000,000 kWh/yr
New customers	200	
Average consumption		20,000 kWh/customer/yr
Supply-Side Resource (favored by no-losers test)		
Marginal cost per kWh acquired	$0.07 /kWh	
Acquisition cost of supply-side resource	$280,000 /yr	
Total revenue requirement	$1,880,000 /yr	
Total energy sale	24,000,000 /yr	
Total customers	1200	
Average consumption		20,000 kWh/customer/yr
Average revenue requirement	$0.0783 /kWh	
	$1,567 /customer/yr	
Demand-Side Resource (precluded by no-losers test)		
Marginal cost per kWh acquired	$0.0	
Acquisition cost of demand-side resource		$0 /yr
Total revenue requirements	$1,600,000	
Total energy sales	20,000,000	
Total customers	1200	
Average consumption		16,667 kWh/customer/yr
Average revenue requirement	$0.08 kWh	
	$1,333 /customer/yr	

Municipal officials must be knowledgeable about the specific methodology used by the utility. Review can start with very fundamental questions:

* Does the screening process eliminate resources that full evaluation would indicate should receive further consideration?

* How does the initial screen eliminate resource options, e.g., consistency with objectives, application and knowledge of technology?

* How is impact evaluated, e.g., societal, revenue requirements, revenue requirements/KwH, customer bills?

* Are there additional screening criteria, e.g., participants and nonparticipant test?

* Are environmental externality costs included in the evaluation and screening process?

a. **Inclusion of Environmental Externality Costs in The Evaluation Process.**

DSM resources are advocated as the most effective way to reduce or avoid the environmental impacts of electric power generation. Electric utilities are estimated to currently account for 20 percent of U.S. acid rain emissions, 70 percent of the sulfur dioxide (SO_2) emissions, 30 percent of the nitrous oxides (NO_X), and 50 percent of all nuclear waste. The potential impacts of efficiency improvements are substantial. Replacing a single 75 watt incandescent light bulb with a high-efficiency compact fluorescent fixture will displace the need to burn more than a barrel of oil or more than 750 pounds of coal during the bulb's 10 year-lifetime, consequently eliminating as much as 1,500 pounds of carbon dioxide (CO_2) and SO_2 that would otherwise have been released into the atmosphere. In recent years, regulators have been increasing efforts to understand and account for the costs and burdens of environmental damage externalities associated with the production of electricity. Appendix 7[13] summarizes the current status of approaches for incorporating environmental externalities.

The cost-effectiveness of DSM options, as compared to supply options, can also be underestimated by not including environmental externality costs in the analysis. Inclusion of environmental benefits in the cost-effectiveness analysis would make cost-effective many additional DSM options which were marginal losers on a utility revenue requirements basis. The cumulative effect of ignoring relevant factors when comparing DSM options to supply-side resources could result in substantial underestimation of the potential of DSM.

Several states have incorporated externalities in the rate-making process by providing a higher rate of return for DSM investments. None of these regulatory mandates has yet gone beyond the direct impacts of power generation, such as emissions, to include indirect externalities in other parts of the fuel cycle, such as fuel extraction, refining, transportation, transmission, waste disposal, and decommissioning. For example,

* The California Public Utilities Commission requires utilities to consider the air quality costs and benefits of generation supply alternatives. The Commission adopted values to assign the residual emissions of generation.

* Massachusetts Department of Public Utilities provides that "*evaluation of the cost-effectiveness of conservation and load management programs and other resource options should include, to the fullest extent practical and quantifiable, costs and benefits external to the transaction, most notably environment externalities.*"

* Wisconsin Public Service Commission credits DSM resources for its environmental benefits by adopting a 15% non-combustion credit reflecting the substantial costs which are associated with acid deposition, global climate change, and human health.

* Oregon Public Utilities Commission requires utilities to include in the cost of a resource all the costs that will or may be internalized, i.e., those costs of pollution control and wildlife mitigation, which will be charged to the utility and its customers.

* Washington Utilities and Transportation Commission require utilities to include the associated environmental costs in the evaluation of each resource.

* New York State Public Service Commission staff determined that environmental costs of electrical generation, net of mitigation equipment, total up to 24% of the avoided cost of electrical generation for Orange and Rockland Utilities, with air quality impacts accounting for about 2/3 of that amount. Staff developed a formula for ensuring that these externalities are addressed fully in the utility's bidding programs for new power supply.

Quantification of these costs, however, is not without difficulty: "*the substantive and analytic questions continue to be mired in a very complex and often very spirited debate.*"[14] The ambiguity and difficulties in defining and measuring so-called externalities are only one aspect of the problem. Equally, if not more formidable, are the obstacles in evaluating and quantifying the damages for the purposes of direct cost comparison among resource alternatives.

Environmental effects are reflected in resource planning in three ways. First, for effects that will be mitigated, utilities can include reasonable estimates of the cost of mitigation. The costs of the resource would include the incremental costs of all emissions-control and effluent-reduction equipment measures, the costs of additional fuel consumed due to an increase in plant heat rate, and all other incremental costs of complying with existing and new environmental regulations, including the Clean Air Act Amendments of 1990. Second, for residual effects that will be internalized through taxes, fees, emission caps or any other method, utilities can include a forecast of these costs, just as they consider future fuel prices in their cost analyses. Third, for the residual effects that remain after mitigation efforts that will not be internalized, utilities can monetize, or include estimates of the social cost of these effects.

There are three primary steps to expressing externality values in terms of cents/kWh. The first step is to count the important environmental effects of each resource, e.g., pounds of pollutants per kWh generated. The second step is to determine the value of each externality in units of cost per pound of an air emission. This step is termed "valuation" or "monetization" of the externality. The final step is to estimate an externality cost per kWh ($/kWh) for each resource, by multiplying the quantity of the externality (units/kWh) by its value ($/unit).

III. UTILITY BARRIERS

Unresolved issues and outside influences constitute barriers to LCUP because they potentially inhibit full consideration of all resource options. Their existence must be recognized and strategies for removing or lessening them must be designed. The major barriers identified in the plans reviewed in this report include cost recovery, technical potential vs market potential, and inequities. Acid rain legislation and competitive bidding were also mentioned as barriers by CECO.

A. TECHNICAL POTENTIAL VS. MARKET POTENTIAL

There is considerable disagreement about the ultimate achievable penetration levels of various DSM measures and about the best ways to measure actual program results. Perhaps the most hotly debated issue is separating the impact of utility sponsored DSM programs from the impact of market driven, naturally occurring improvements: *"Who, that is, would have made efficiency investments without the utility incentives (termed "free riders" by the industry) and how much is a utility's program simply accelerating what would have naturally occurred? These have become major bones of contention between utilities and DSM advocates, and account for many of the apparent discrepancies having to do with the practical, as distinct from the theoretical, cost-effectiveness of DSM programs."*[15]

The technically difficult problem of measuring actual program impacts is a planning barrier that must be resolved so the energy savings from DSM can be accurately measured. The measurement issue gains added significance because the costs per unit of energy saved appear to vary widely among utilities. The actual results of many utility DSM programs show surprisingly little correlation with capital investment. To some extent, this may reflect variations in the productivity of direct expenditures on DSM measures. CERA notes: *"In assessing the implications of utility experience with DSM programs, it is worth pausing to recall some of the lessons learned from the industry's experience with nuclear power. There, too, company-specific technical and administrative capabilities have been a major detriment of a particular utility's ability to translate apparently attractive theoretical economics into actual performance."*[16]

In assessing market potential, analysts have argued that utilities, with greater market power and greater possibilities for capturing economies of scale, are in a much stronger position to purchase and manage efficiency services and equipment at much lower costs than individual consumers.

B. COST RECOVERY

One barrier that negatively impacts utilities' willingness or ability to acquire DSM resources is the inherent disincentive created by regulatory systems which encourage the production and sale of as much electricity as possible. Least-cost strategies typically have a significant conservation element that results in reduced sales

and profits. Lost revenues from reduced sales of kilowatt hours potentially overwhelms any return that the utility is permitted to earn on the investment. The Maine Public Utilities Commission has explained the problem as follows: *"Under the cost conditions faced by most U.S. electric utilities today, the incremental sales revenue lost when a kilowatt-hour of electricity is conserved exceeds the incremental cost, primarily fuel, of supplying that kilowatt-hour...Conversely, the revenue gained when an extra kilowatt-hour of electricity is produced and sold exceeds the added production cost incurred by the same margin, thus increasing short-run profit. Thus, the immediate incentives are against any least-cost plan which includes significant demand-side options, even when the inclusion of such options would lower the overall cost of meeting customer requirements."*

Existing incentive mechanisms provide no relief to the short term tendency of energy conservation to penalize a regulated utility. In many circumstances, energy conservation will result in a short-term reduction in the profits of a regulated utility. Retail rates are set to cover both the variable costs and the fixed costs of the utility. Conservation reduces the utility's variable costs, but the utility's fixed costs are no longer covered. The utility's stockholders bear the fixed costs in the short run, until regulators adjust rates for the effect of conservation.[17] Even when incentives are used, the additional profits are a long-term incentive to conservation, but the utility receives no reward until the conclusion of its next general rate case. In the months or years before a rate case is concluded, the utility's losses from conservation can easily exceed the long-term reward of extra profits. Incentives may potentially help a utility achieve a least-cost resource plan if they help balance utility incentives for generation projects.

As yet there is no consensus on precisely how to meet the regulatory objective of ensuring that the least cost investment is also the most attractive one from a utility's perspective. The results of a survey conducted by the Electric Power Research Institute (EPRI) and Edison Electric Institute (EEI) showed that 60% of the utilities and 70% of the regulators queried were "very interested" in receiving or providing DSM regulatory incentives. One-third of the respondents considered DSM incentives "absolutely essential" to the growth of DSM, while one-half said they are "helpful but not essential." Utility and regulatory representatives also generally agreed on the reasons for creating DSM incentives: to compensate for lost profits, to create a regulatory "level playing field," to provide a bonus to stimulate DSM, to get utility management to focus on DSM, and to overcome the lost revenue problems.[18]

The basic elements of a solution are clear, however. California regulators have already decoupled utility net revenues from their sales volumes, through an Electric Revenue Adjustment Mechanism (ERAM). Through use of ERAM, rates are adjusted up or down to compensate for conservation-induced revenue shortfalls. ERAM ensures that net earnings authorized by a utility's regulators will not be affected by unexpected changes in energy use. Also, utilities that succeed in meeting or exceeding efficiency goals could

be granted a higher overall profit margin. Conversely, utilities that fail to meet or exceed the state's efficiency goals can lose some of their granted profit margin. Use of a collaborative approach was especially useful for exploring this issue. With the encouragement of the California Public Utility Commission, a group of parties representing many different DSM perspectives met for six months and issued a report recommending the innovative approaches to financing DSM. Subsequently, the state's major utilities filed applications based on recommendations of the group. Table 14 shows the incentive mechanisms used in other states.

TABLE 14
Regulatory Incentive Structures For DSM Investments

State	Rate-Basing	Increased Rate of Return	ERAM	Shared Savings	Bounty
California	x	x	x	x	x
Connecticut	x	x	x		
Idaho	x	x			
Iowa	x	x		x	
Maine	x				
Massachusetts	x			x	
Montana	x	x			
New York		x	x	x	
Oklahoma	x				
Oregon	x			x	
Rhode Island					
Texas	x	x			
Vermont	x	x	x		
Washington		x			
Wisconsin		x		x	x

The table demonstrates that a majority of states allow utilities to either rate-base or earn an increased rate of return on DSM investments. The ERAM method is used by only a few states. The State of Wisconsin, for example, has established performance criteria for determining the profitability of utilities' conservation investments, which allow companies that provide large blocks of savings at low cost to earn bonuses for shareholders. The State of Connecticut allows up to an extra 3 percent rate of return for DSM results.[19] The Bounty approach refers to additional bonuses received for capturing certain kinds of conservation opportunites, e.g., market sectors that are historically difficult to capture.

C. INEQUITIES

1. DSM Inequities

Critics of DSM have argued that inequity problems inhere in DSM resources. Those ratepayers who do not participate -- the nonparticipant -- in a conservation program, for whatever reason (e.g., luck of the draw or because their premises and equipment are already efficient) may pay higher electricity bills. If a conservation resource is cost effective and, as is typical in utility-sponsored programs, given away free or subsidized by the utility, customer rates MAY become higher than they would be without the added expense

to the utility. This phenomena is illustrated in Tables 15, 16, and 17 which scrutinize the effects of resource options on a typical household consuming 12,000 KwH.[20]

Table 15 examines a house that was selected by the utility for weatherization, a participating house. If a generation strategy to meet demand is selected by the utility, the household's annual bill will go up by 1.8 percent from $600 to $610.80. If, however, the conservation strategy is selected and conservation is given away free (DSM Strategy I), the participating household is way ahead. While its rates will increase by 6 percent, its consumption of electricity will decrease by 16.7 percent. Therefore, their annual bill drops from $600 to $530. Even if the household is charged for conservation at the average rate of electricity, i.e., 5 cents/kWh (DSM Strategy II), the participating house is still a winner. Its rates will drop by 3.6 percent, and its annual bill from $600 to $578.40.

TABLE - 15
CONSERVATION PRICING EXAMPLE - MICRO PERSPECTIVE
(Typical Electrically Heated Household)

PARTICIPATING HOUSE

		Today	Tomorrow		
			Generation Strategy	DSM Strategy	
				I	II
1.	Annual Conventional Load (kWh)	12,000	12,000	10,000	10,000
2.	Annual Conservation Saving (kWhs)	-	-	2,000	2,000
3.	Total Annual Energy Services (kWh)	12,000	12,000	10,000	10,000
4.	Average Rate (cents/kWh)	5.00	5.09	5.30	4.82
5.	Annual Bill Derivation: Row 4 times row	$600.00	$610.80	$530.00	$578.40

Table 16, in contrast, examines a house which was not selected for weatherization, the nonparticipant. If a generation strategy is selected, the nonparticipating household's annual bill will rise from $600 to $610.80 (the same as in Table 15). If the conservation strategy is selected and conservation is given away free, the nonparticipating household's annual bill will increase by 6 percent or from $600 to $636. This is because the household is paying the higher rate, and more importantly, consuming 2,000 kWh more than the participating household. This household would thus be better off with higher cost generation than with lower cost conservation. However, if all the households are charged for conservation at the average rate of electricity (5 cents/kWh), the nonparticipating household's annual bill will drop from $600 to $578.40, or precisely that of the participating household in Table 15.

TABLE - 16
CONSERVATION PRICING EXAMPLE - MICRO PERSPECTIVE
(Typical Electrically Heated Household)

NONPARTICIPATING HOUSE

		Today	Tomorrow		
			Generation Strategy	DSM Strategy	
			I	II	
1.	Annual Conventional Load (kWh)	12,000	12,000	10,000	10,000
2.	Annual Conservation Saving (kWhs)	-	-	-	-
3.	Total Annual Energy Services (kWh)	12,000	12,000	12,000	12,000
4.	Average Rate (cents/kWh)	5.00	5.09	5.30	4.82
5.	Annual Bill Derivation: Row 4 times row	$600.00	$610.80	$636.00	$578.40

Table 17 examines a household that had been previously weatherized at their own expense. Instead of consuming 12,000 KwH, it now consumes only 10,000 KwH. Its annual electricity bill is down to $500. If the higher cost generation strategy is selected, its annual bill goes up from $500 to $509. If conservation is selected and given away free, its bill goes up to $530. This is due to the fact that the rate being paid for conservation (5.30 cents) is higher than the rate that would be paid for the generation strategy (5.09 cents). This household is being penalized for effectively subsidizing the DSM costs of participating households. If, however, all other households are charged for conservation at the average rate of electricity, the annual bill for this previously weatherized house will drop still further from $500 to $482.

TABLE - 17
CONSERVATION PRICING EXAMPLE - MICRO PERSPECTIVE
(Typical Electrically Heated Household)

NONPARTICIPATING HOUSE

(Previously Weatherized)

		Today	Tomorrow		
			Generation Strategy	DSM Strategy	
				I	II
1.	Annual Conventional Load (kWh)	10,000	10,000	10,000	10,000
2.	Annual Conservation Saving (kWhs)	2,000	2,000	2,000	2,000
3.	Total Annual Energy Services (kWh)	10,000	10,000	10,000	10,000
4.	Average Rate (cents/kWh)	5.00	5.09	5.30	4.82
5.	Annual Bill Derivation: Row 4 times row	$500.00	$509.00	$530.00	$482.00

Tables 15-17 illustrate one possible impact scenario to consumers. It should be noted that the intent of DSM screening is to identify the most cost-effective options, while eliminating those that are not cost-effective. Proper resource evaluation and screening compares the NET life cycle costs of DSM options to the long run societal avoided costs of new supply resources. Among competing DSM options that are cheaper than the societal avoided cost of new supply, those which maximize NET societal benefits should be selected.

It is because of concerns with societal impact that the "nonparticipants" test is a controversial screening tool. Stated differently, the term "participant" gives the erroneous impression that DSM programs produce benefits at the expense of the "nonparticipating" customer. On the contrary, DSM programs, like supply side resources, are intended to meet the cumulative projected demand of ALL customers. DSM programs thus produce utility-system-wide benefits, as do supply side resources, which are least-cost, even though some customers will not need or benefit from new capacity. An examination of a DSM program in isolation is not an accurate indicator of system-wide level impacts. The societal cost test should thus be the primary screening criterion.

Where negative impact on non-participants is indicated, utilities can take mitigative strategies to eliminate or reduce those impacts. The most productive means of mitigating non-participants impact is through program design: offering a utility-wide package of programs which offer all customer classes and market segments the opportunity to participate in meaningful programs which will improve the efficiency of their electric usage. Utilities can also select rate design options that limit or reduce negative consumer impact.

2. Supply Side Inequities

Supply side and demand side resources are often evaluated against each other with respect to the impact on all ratepayers.[21] It has been argued that supply side options do not raise the same issues of inequity as do DSM resources. The argument is made that supply side options are inherently more fair because they result in an overall change in rate levels to all participants, whereas DSM programs have different rate impact depending upon a customer's participation or non-participation. In evaluating DSM programs, the program may be considered a failure if non-participants subsidize participants. This does not hold true for evaluating supply side choices. In contrast to DSM program options where only participating customers benefit, all customers benefit from supply side options through increased reliability and higher service level provided by the investment being recovered.

Critics of this argument, however, have commented that supply side options do in fact raise inequity issues. Specifically, critics argue that the energy produced from the construction of new supply side resources is only needed and used by new customers, not existing utility customers whose energy consumption remains fixed. As an example, demand for electricity in Chicago remained flat, and even decreased slightly, for the period 1977 through 1986, while demand in the remaining service territory grew at a substantially higher level during this same period.[22] From an energy demand perspective, consumers in Chicago did not need and benefit from the energy produced from Commonwealth Edison's nuclear generating construction program. Chicago consumers, who represent roughly one-third of the Commonwealth Edison service territory, the critics argue, effectively subsidized the cost of these plants for the remaining service territory.

Utilities argue that from a rate design perspective, it is difficult, if not impossible, to track which customers have benefited from a newly constructed generating plant. Utilities also note that it is not feasible for a utility to spread the costs of a new generating plant on future customers or those customers using more power. Doing so would cause tremendous rate disparity and would effectively limit demand growth.

D. ACID RAIN LEGISLATION

On November 15, 1990, President Bush signed into law legislation designed to improve the nation's air quality. The comprehensive measure will affect every industry in America and is estimated to cost more than $25 billion per year to implement. Title I addresses the attainment and maintenance of national ambient air quality standards, and contains specific requirements for areas not in attainment for ozone, carbon monoxide and fine particle pollution. Under the Act, each state must develop a State Implementation Plan to attain and maintain the standards. Title IV is intended to reduce emissions of sulfur dioxide (SO_2) from electric utility and other boilers by 10 million tons from 1980 levels. Beginning in the year 2000, every utility unit is required to hold an allowance for each ton of SO_2 it emits. Not all entities that generate electricity fall under the jurisdiction of the Title, only "utility units" must comply with the allowance requirements. For example, a cogeneration facility is only considered a "utility unit" if it supplies more than one-third of its potential electric output capacity and more than 25 MWs of electricity output to any utility/power distribution system. There is also a specific exemption of PURPA Qualifying Facilities and new independent power production facilities that meet one of the applicable criteria as of the date of enactment.

CECO argued that acid rain legislation could become a potential barrier had legislators forced CECO and its customers to help pay other utilities compliance costs under the Clean Air Act's Cost Sharing proposal. Cost sharing would represent a barrier to LCUP because it limits the ability of individual utilities to develop their own least cost resource mix. The increased costs of compliance will also increase the cost of resources evaluated in a least cost plan.

E. COMPETITIVE BIDDING

There has been considerable discussion about the desirability of creating an open market to allow electrical efficiency technologies to compete on their own merits with electricity generation, rather than having utilities plan for and implement increased energy efficiency investments on behalf of their customers. In an effort to encourage such competition, several states including Maine, New York, New Jersey, and Washington have developed ***All Source Bidding*** programs: a competitive process in which energy service companies bid, head-to-head, against non-utility generators to supply new capacity. Actual experience with All-Source Bidding is still limited, but the process has resulted in some DSM bids that appear highly competitive with the cheapest proposed new generating technology. Several of the top ranked DSM bids were submitted by very large companies, electric utility affiliates, and experienced power plant architect/engineering firms.

There is growing evidence, however, that many winning bids are based in substantial part on "cream skimming" in which the easiest measures are installed (e.g., retrofitting more efficient lamps and ballasts in commercial lighting) to the exclusion of other measures with higher costs but greater long-term overall savings (e.g., installation of state of the art lighting systems and controls). Problems with cream skimming, as well as other difficulties such as those related to performance contracting and guarantees of long-term operation and maintenance obligations, may discourage implementation of arm's length, contractor-provided DSM programs.

Our research suggests that most utilities support the concept of competitive bidding. CECO, for example, supports it as a means of expanding the pool of potential DSM and supply-side resources while increasing flexibility and reducing risk. Bidding also offers "***the potential to transfer some risks -- such as those associated with capital costs, operating performance, and non fuel O&M costs -- away from utility customers to those who bid new supply.***"[23] Overall, "***the desirability of competitive bidding from CECO's perspective hinges on the extent to which its customers and shareholders can be protected from risks imposed by reliance on outside suppliers.***"[24]

Competitive bidding, does, however, present problems that if unresolved, could potentially create a barrier. CECO asserts "***measuring the effectiveness of demand-side programs and accounting for free riders are both problems that must be resolved for DSM bidding to be practicable.***" Utilities, including CECO, also argue that they should be given an adequate opportunity to propose potential new resources before the field is opened to competitive bidding. Alternatively, utilities may be able to bid. CECO sees competitive bidding

as a supplement to their own DSM efforts, not a replacement for them. CERA notes that: "*It is increasingly clear that utilities must internalize the planning, implementation, and management of appropriate DSM programs...This general conclusion is strongly supported by recent evidence. The most successful utility-based DSM programs are characterized by substantial up-front investments in building staffs and the necessary institutional capabilities to deal internally with all aspects of DSM program planning and implementation. At the top of the list are up-front investments in building technically competent professional staffs and related institutional capabilities. Also crucial is overt commitment by top management to the importance of DSM to the utility...*"

Barriers potentially inhibit full consideration of all resource options. Municipalities should have several concerns about the barriers identified by their servicing utility. The questions to ask include:

* Are barriers identified in the plan?
* Are barriers real?
* What is their specific impact?
* Has the utility identified strategies for ameliorating barriers?
* Has the utility identified specific strategies that certain parties may take to assist the utility overcome such barriers?

IV. CONCLUSIONS

As a first step in ensuring that least cost plans address locally unique energy concerns, conditions and objectives, municipal officials must have knowledge of key planning variables. This chapter attempted to demonstrate the intricacies of specific issues as well as the interactions that take place among them. The intent, however, was not to exhaustively analyze these issues. The analysis may not answer all questions, but will provide an overview of what other utilities and jurisdictions are doing. Similarly, identification of issues provides a check list of questions to begin analyzing a plan.

Potential barriers were also not exhaustively analyzed. The intent was simply to identify key barriers commonly sighted in jurisdictions that have had experience doing LCUP. Knowledge of potential barriers is important for better understanding the difficulties faced by a utility. This may be an important first step in finding common ground and working towards resolving specific issues.

ENDNOTES - CHAPTER 4

1. CECO Least Cost Plan - Main Report.

2. MIDAS uses a decision tree analytical framework with forks in a tree representing either decisions faced by the utility or chance events with given probabilities.

3. A Hearing Examiner Order rejected the City's argument. The Order has been appealed by the City and at the time of publication is awaiting resolution in the courts. This disparity in definitions is cited as an example of how disagreement on planning objectives can fundamentally alter resource selection.

4. The Reference Scenario assumes construction of conventional coal plants with flue gas desulfurization & gas turbines. The LES (Lowest Emission Scenario) assumes that future power needs would be met through a combination of increased DSM programs, additional Quebec imports, new natural gas combined-cycle power plants and new conventional coal-fired plants. The LCS (Low Cost Scenario) assumes that future energy needs are met through increased DSM, additional independent power production, combined cycle, and coal plant life extension.

5. CECO Least Cost Plan - Main Report.

6. The planned activities of CECO include: consolidating all existing customer-oriented information in its Market Research Department; changing customer classification system so that customers are classified by industry group, building type and/or demographic class; studying customer preferences in order to determine the key needs of individual market segments; investigating the need for additional end-use data -- both through internal efforts and workshops; and entering these data into the Marketing Information Decision Support System (MIDSS) that is currently being developed as a centralized database containing data needed to select, design and evaluate DSM programs.

7. The first step is to identify the most important energy using devices in various sectors. The second step is to determine the number and energy consumption characteristics of each end-use, which involves defining these attributes for the existing stock, and making projections into the future. Replacing existing devices with more efficient ones could cut U.S. electricity consumption over time by 31%, according to the Electric Power Research Institute (EPRI).

8. CECO Least Cost Plan. Page IV-15.

9. Source: Cambridge Energy Research Associates, Lightening the Load: Electric Utilities and DSM.

10. Massachusetts Department of Public Utilities, DPU 86-36 (Nov 30, 1988). Idaho Public Utilities Commission and District of Columbia also reject the no-losers test.

11. Mr. Paul Chernick, Consultant and CEO, Spectrum Consulting. Consultant to the City of Chicago on the Commonwealth Edison least-cost plan. Testimony to the Illinois Commerce Commission, October 3, 1990.

12. Submission by John Plunkett, MSB Energy Associates, to the National Association of State Utility Consumer Advocates, Mid-Year Meeting, Washington, D.C. (June 18-20, 1987).

13. Reprinted with permission from Cambridge Energy Research Associates. "*Lightening the Load: Electric Utilities and Demand Side Management,*" 1990.

14.Ibid

15. Ibid

16. Ibid

17. See Staff Report, *Energy and Utilities Committee, Washington State Senate, Conservation Incentives: Evaluating the "Other" Conservation Act* (December 1988), at 1,7.

18. Survey conducted during a June 1990 EPRI-EEI Workshop on DSM incentive regulation held in Washington, DC, 36 representatives of utilities and state regulatory agencies responded to a survey assessing perspective on regulatory incentives for utility DSM programs.

19. See, for example, Minnesota Public Utilities Commission, Docket No. E-999/CI-89-212, requiring utilities and intervening parties to file proposals that remove disincentives and/or provide incentives to promote the adoption of cost-effective demand-side management resource options. Similar proceedings have been initiated by the Massachusetts, Idaho, Wisconsin and Oregon Public Utilities Commission.

20. This analysis was taken from remarks made by Myron B. Katz, Chairman of the Oregon Public Utility Commission. Presented at The Symposium on the Future of Electric Utility Regulation, University of Chicago, December 6 & 7, 1990.

21. Direct Testimony submitted by Arlene Jurasek, Director of Rates for the Commonwealth Edison Company before the Illinois Commerce Commission. Proceeding to adopt the Company's Least Cost Plan.

22. See Electric Supply Options Study performed for the City of Chicago, prepared by R.W. Beck and Associates, September 1987. Commonwealth Edison Company Historical Sales 1977-1986 and Estimated Electrical Demand and Energy Requirements 1987-2006 which projects growth rate of 1% within the City of Chicago versus 2.4% outside of Chicago.

23. CECO Least Cost Plan, Main Report.

24. Ibid

CHAPTER 5. THE MUNICIPAL ROLE IN LEAST COST PLANNING

I. INTRODUCTION

The objective of providing a starting point for evaluating least cost plans was realized by providing a generic overview of the key issues, influences and barriers to Least Cost Utility Planning (LCUP) and by determining the role of municipalities in the process. Chapters 1-3 demonstrated how least cost plans address the issues of forecasting, planning objectives, data requirements, selection of resources, evaluation and screening methodologies, as well as the barriers of technical vs. market potential, cost recovery, inequity, acid rain legislation and competitive bidding.

Chapter 5 examines the role of municipalities in LCUP. Planning for urban energy management is increasingly focused on attempts to incorporate energy concerns into the standard operating procedures of the jurisdiction. As an example, energy efficient building and design measures are becoming standard elements in building codes and development review processes, rather than separate activities. Municipalities have also incorporated energy management practices directly into specific program development activities, procedures, guidelines and expertise.

Through previous and ongoing research, the City of Chicago has identified a gamut of powers, authorities and activities that may be exercised to establish municipal energy policy, ameliorate barriers to implementation of programs, influence disposition of plans, or otherwise support LCUP. Recognition of these authorities is important since municipalities do not have a decisive legal say in promulgation of least cost plans and to ensure that plans address locally unique concerns and objectives. Municipalities have taken an increasingly aggressive position in utilizing these actions and authorities. In part, this has been caused by the proliferation of franchise expirations and renewals[1] throughout the U.S. that have lead municipalities to thoroughly evaluate the pricing and service levels of their servicing utility. The rising cost of energy and an increasing awareness of the potential environmental degradation caused by electric generating plants have also contributed to this new outlook.

The chapter examines four distinct pressure points -- generic actions available to municipalities -- that can be taken to influence LCUP. These include:

Intervention & Litigation in regulatory proceedings before the Public Service Commission to review, approve, modify or reject least cost plans.

Public Advocacy and Lobbying activities outside the scope of a formal regulatory proceeding to support the LCUP process.

Exercise of Police Powers such as the power to franchise for utility service and the use of taxing powers to leverage utility investments.

Participation in Collaborative or Partnerships with utilities.

II. MUNICIPAL ROLES IN LEAST COST PLANNING

A. INTERVENTION AND LITIGATION

State regulatory commissions regulate all investor-owned utilities and exercise jurisdictional authority over rates, rate and capital structures, construction and expansions, and standards of service. Commissions also enjoy jurisdictional authority to establish planning guidelines, and approve, modify, or reject the least cost plans of utilities. In a few states, as in the case of Illinois, a separate department (Department of Energy & Natural Resources) assumes responsibility for issuing planning guidelines and, though their input on modification of plans is great, do not have final jurisdictional authority to approve utility plans.

Municipalities have historically intervened in regulatory proceedings involving rates, certifications for construction, public safety, conservation planning, and other issues of municipal interest. Intervention is a legally available option to affect the LCUP process and is the principal and most direct approach available to municipalities. Municipalities enjoy all the statutory rights of intervenors in a formal regulatory setting, including examination of documents and testimony, cross examination of expert witnesses, and submission of independent analysis.

Understanding the issues, influences and barriers in the LCUP process is an important first step in preparing to intervene. The regulatory process relies on the weight of legal evidence and interpretation of rules to support positions. Most LCUP proceedings will focus on whether plans meet filing requirements set forth in legislatively mandated planning guidelines: does selection of resource options satisfy legal standards and/or public policy objectives of least cost, fairness, environmental quality, etc. Chapter 4 provides examples of questions that municipalities may want to address for each key planning variable. This is not an exhaustive list of possible questions since individual plans and related concerns of intervenors will vary among jurisdictions. However, the list does provide a basis for stimulating thought on the issues and for developing a framework for analysis.

The City of Chicago's intervention in the proceedings to adopt an electric least cost plan for Commonwealth Edison (CECO) provides a good example of what can be achieved in a regulatory setting. The City, along with several intervenors, successfully argued for and realized certain objectives. First, CECO was ordered to enter into a collaborative arrangement to resolve outstanding issues relating to DSM program design and selection. Second, CECO was directed to reexamine those programs which pass both the societal and utility tests. Third, the Commission ruled that CECO did not comply with State Recommendation XIII regarding lost opportunities, and directed CECO to refocus attention in this area as part of its capability building efforts. Fourth, CECO was ordered to undertake analyses to identify additional cost effective programs. Successful achievement of these points, strengthened, in the opinion of the City, CECO's plan and implementation details.

Though intervention is a legally available and arguably the most important avenue to affect LCUP, there are limitations inherent in this process. First, municipalities do not have a decisive legal say in promulgation of plans. Regulators may not agree with a municipality's arguments, potentially leaving it less than satisfied with decisions on the content and direction of a plan. For example, while the City of Chicago won several key points, the ICC rejected the City's argument that a single cost effectiveness test (societal) be used for screening purposes and that the non-participant test was prejudicial to the selection of resources because the test was not applied to supply side resources.

Second, intervention requires substantial resources. Since intervention relies on the weight of legal evidence and interpretation of rules, a municipality must have full understanding of the complexities of LCUP and/or the resources to hire the experts required to evaluate least cost plans. If it has neither, municipalities may be at a disadvantage in evaluating and challenging least cost plans. It is doubtful that the ICC would have agreed to as many of the City of Chicago's contentions had it not expended considerable resources for expert witnesses and consultants.

An informal survey[2] conducted by the Chicago Planning Department provides insight into how large municipalities utilize the process of intervention. The survey found that intervention in a least cost regulatory proceeding is not a commonly practiced option. Several municipalities stated that because they are engaged in extensive litigation before the PSC in contested rate cases, the level and degree of discourse on LCUP issues is significantly diminished. The City of Albuquerque has not intervened in an LCUP docket, but has been active in rate revenue and rate design cases, spending approximately $400,000 during 1990 to hire professional and expert witnesses to provide testimony. Other municipalities, Boston and San Francisco,

have not adopted an adversarial posture toward its utility, or appeared before the State PSC in LCUP matters.

As a result of these potential limitations, it is necessary to identify municipal actions outside of the regulatory arena that can be used to challenge or support the LCUP activities of utilities. Municipalities have unique institutional capabilities beyond its regulatory functions that could greatly improve the prospects for influencing the least cost programs and policies of their servicing utilities. The strategies of utilizing public advocacy, police powers and participating in collaborative partnerships are actions external to the system of public utility regulation and represent indirect or alternative paths that may be taken to influence the LCUP process. Unlike intervention, these actions typically do not have the force of law and often require utility cooperation or changes in public policy and acceptance, and should not, therefore, be viewed as alternatives to intervention, but as supportive or complimentary actions.

B. PARTICIPATION IN COLLABORATIVE AND OTHER PARTNERSHIP PLANNING EFFORTS

Chapter 3 noted examples of collaborative planning in Michigan, California and Massachusetts. While these and other efforts have been initiated at the state level by regulators and consumer interest organizations with statewide or regional constituencies, municipalities have also begun to take a greater interest in such processes. Initiating or participating in collaborative or partnership processes represents one primary example of how municipalities can effect the content and direction of LCUP while at the same time increasing their knowledge of the subject. Collaborative processes are particularly important if municipalities continue to not intervene in LCUP proceedings. The transition from intervention to collaboration is, fortunately occurring. The City of San Francisco, which has expressed the view that more can be accomplished by avoiding adversarial situations, did assume an important lobbying role in initiating the establishment of the California Collaborative planning process.

1. The Northern Illinois Alliance To Support Least Cost Planning

One prime example of a municipality initiating a collaborative planning effort is the City of Chicago's involvement in the Northern Illinois Alliance to Support Least Cost Utility Planning (hereinafter Alliance).[3] Arguably, the unofficial start of LCUP in Northern Illinois began with the creation of the Alliance, a pilot project devised for the purpose of determining the extent to which an independent organization functioning outside normal regulatory circles could support the emerging LCUP process in the State of Illinois. The Alliance was conceived of as a *process* whereby planning objectives could be more clearly defined and expeditiously accomplished in a non-confrontational environment, rather than an adversarial Illinois Commerce Commission (ICC) hearing process.

The Alliance addressed two primary barriers to LCUP: a lack of a cooperative planning forum and the lack of a common set of informational resources. By seeking consensus, the Alliance sought to avoid nonproductive conflicts over energy issues and encourage cooperative planning to reduce the number of issues and decisions requiring formal regulatory treatment. The Alliance clarified, narrowed, and focused choices where genuine disagreement on values or the interpretation of data required formal regulatory review. In summary, the Alliance supported the LCUP process by:

* involving people who had not participated in the LCUP process before,
* facilitating discussions among adversarial parties outside the hearing room,
* providing workshops and seminars for the purpose of educating Alliance members and Commission staff about relevant LCUP issues,
* collecting LCUP resource materials and making them available to Alliance members through a catalogued lending library,
* establishing and maintaining a data repository of end use utility data produced by utility-run programs, and
* investigating issues and technologies that it felt were essential to furthering the understanding of energy consumers in Illinois.[4]

a. Lessons Learned From The Alliance Process

The Alliance was conceived to address the lack of a cooperative planning forum and common set of data to expedite LCUP objectives in a non-confrontational environment outside the regulatory process. Were these objectives met? Did the Alliance - a collaborative process - expedite or otherwise facilitate the LCUP process in Illinois? Before evaluating the effectiveness of the Alliance in materially affecting the statewide plan, several issues pertaining to this question must be mentioned.

First, the Alliance was not mandated to develop the statewide plan. It was created to facilitate research and aid in developing it. Therefore, parties were not under a legal edict to compromise their individual positions. Nevertheless, several general conclusions can be made. The work of the Alliance did not appear to have a material affect on the least cost plan adopted for the State of Illinois. This can be attributed to several reasons. First among them was that key players (most of whom had been engaged in highly litigious regulatory proceedings for the better part of a decade) were extremely reluctant to have the Alliance deal directly with the substance of a plan that would effectively set long term electricity policy in Illinois. Parties were also unwilling to relax any exclusive control over their work products and prerogatives.

For example, key utilities insisted upon decision-making only by consensus on hiring of consultants, guidelines and recommendations, rather than by majority rule. Prominent intervenors, when it became apparent that "one man one vote" was not the decision rule, ceased to participate. As a result of this and other pressures to avoid issues of controversy to major parts of the plan, much of the substance which would have been of interest was supplementary to core issues in the State plan. The result of these dynamics meant that the products of the Alliance were the "icing on the cake", and the delays in the promulgation of the statewide plan rendered them "icing on a cake" that was not yet baked.

The Alliance also encountered one major scheduling problem related to the development of the Illinois Statewide Electricity Plan. A key purpose of the Alliance was to facilitate the planning process by cooperatively reviewing and critiquing the Statewide plan and by reaching agreement on technical issues. The Statewide plan, however, became available one year later than anticipated. Because information about the plan's content was not available to the Alliance, no direct role could be played by the Alliance in formulating it. Because of this problem, it is difficult to judge the extent to which the Alliance directly or indirectly influenced the plan. The Alliance could have served better as a vehicle for consensus-building had the actual dates of the State's planning process corresponded more closely with the Alliance activities and workshops.

In spite of scheduling problems, much was learned from the formation and operation of the Alliance, including:

* meetings and workshops are an excellent way to stimulate discussion, educate, and develop consensus around important issues, when scheduled so they are concurrent with the activities they are designed to address,[5]

* LCUP participants are in great need of carefully selected information and data, and will support a clearinghouse that serves this need,

* developing a research agenda by consensus was an important first step for the Alliance,

* consensus was reached on specific technical issues and research needs, including the:

    * critical need for resolving the issue of transferability
    * promising application of the electric van for the commercial/industrial sector
    * enormous potential for lighting retrofits in northern Illinois office buildings
    * limited potential of cogeneration opportunities
    * need to consider carefully rate structures and billing practices
    * potential for electric peak-shaving and load-shifting technologies

2. San Jose, San Francisco and Boston

The formally structured California Collaborative process was inclusive of all state investor owned utilities, non-profit consumer groups and representatives from major California cities. For example, San Francisco and San Jose politically supported and encouraged the process at the early stages of planning. Once the collaborative began working on its stated tasks, the city's involvement was reduced to that of observer. City staff would attend meetings, provide input where necessary, review documents, but did not play an active and substantive role in developing actual work products.

Both cities however, have initiated smaller scale collaborative efforts with their servicing utility, Pacific Gas & Electric (PG&E), that have been supportive of least cost planning activities. In San Francisco, there exists an informal, but effective, collaborative relationship dedicated to developing and implementing DSM programs. For example, their *Retrofit Workshop* was a partnership conceived and implemented for the purpose of introducing residential energy conservation measures to various communities. This effort works with the leaders and organizations within each community to facilitate program delivery.

Similarly, San Jose worked in partnership with PG&E to deliver energy conservation. In partnership with PG&E, San Jose performed the community outreach functions (initial surveys of residential consumers) for a residential conservation program. PG&E would then take the information gathered and deliver requested services. San Jose and PG&E are also working on defining methods to improve efficiency in new commercial, industrial and mixed use development. Their efforts will build on the technical information developed by the City's *Innovative Design & Energy Analysis Services* (IDEAS). The IDEAS program, through educational and limited energy analysis service, will be the basis of technical information provided by the City to support energy conservation for new commercial and industrial building projects.

The City of Boston's involvement was limited to an observer role: attending meetings, and helping define a municipal agenda in the collaborative in order to assure that municipal needs were addressed. However, the City essentially deferred to the expertise of CLF in technical and legal matters. As in San Francisco and San Jose, Boston has also been involved in a partnership effort with Boston Edison (BE) and Commonwealth Electric (CE), and MassSave, a non-profit energy conservation organization. Together, these parties performed audits and weatherization programs for commercial and residential boiler systems. The City of Boston and BE have formed a partnership to develop a model energy efficiency outreach program for servicing residents of Boston and customers of BE. The program will utilize the existing neighborhood networks of city outreach specialists to target, prepare, and educate customers on the innovative energy efficiency and weatherization program BE will be delivering to Boston's neighborhood.

3. New York City

New York City's participation in the development of the State of New York's least cost plan was limited to identification of experts who would review the plan and provide testimony on its content, and evaluate programs that were suggested by experts. NYC did, however, enjoy considerable autonomy in reviewing and approving DSM programs that were unique to the City such as programs targeted at the large high rise commercial office sector. NYC also participated in smaller scale collaborative efforts. In conjunction with local private electric and gas utilities, the New York City (NYC) Department of Telecommunications and Energy (DTE) implemented a number of programs to encourage targeted businesses to relocate or expand in the city's outer boroughs by developing new linkages - partnerships - between State funded programs and Consolidated Edison's Conservation Plan activities.[6] NYC proposed to reduce energy (primarily electricity) costs through a multi-faceted energy conservation initiative. In regards to natural gas reductions, NYC and Brooklyn Union Gas worked cooperatively to introduce certain high-efficiency gas equipment through coordinated joint marketing strategies to secure program participants. This involved (a) energy bill discounts reimbursed through credits on the City's Utility Gross Receipts Tax and a 4% Sales Tax Credit or refund on electricity used by manufacturers in the production process. Because of time constraints, owners preferred programs which offered lower energy rates over programs which offered conservation assistance which meant additional work for themselves and additional "hassle." The conservation strategy included:

- improved energy efficiency through expanded lighting and space-heating retrofit programs,
- creation of a city-wide conservation loan fund,
- establishment of a new energy technical assistance services,
- development of City programs and policies to encourage energy-efficient new construction,
- distribution of low-cost hydropower to manufacturers through the New York City Public Utility Service, and
- expansion of Consolidated Edison's Project *Appleseed* program which offers discounts of up to 25% for businesses who relocate into specifically designated areas, qualify for City tax incentives or meet other economic development and energy use criteria.

Cooperation in implementing this strategy was facilitated by the formation of a project advisory work group consisting of utility, state and city agency conservation representatives. An example of collaboration was an analysis by Consolidated Edison of the market penetration of conservation measures recommended in previously conducted City and State energy audits. The activity[7] was approved by the PSC at a $100,000 funding level and satisfied both parties interests. Consolidated Edison would obtain additional information on the effectiveness of energy audits as a demand-side management tool to compare to their

existing pilot audit and information programs. The City would obtain information on conservation market penetration, the energy needs of industrial firms and potential obstacles to future program development.

NYC's program efforts teach several important lessons about collaborative or partnership efforts:

* developing joint conservation programs with private utilities requires a thorough understanding of utility corporate and load shape objectives,

* programs can be attractive by matching public policy goals with utility goals by emphasizing business retention goals, enhanced opportunities for improving customer relations and increasing the market penetration of certain energy-efficient technologies, and

* creation of project advisory work groups and use of a matrix management approach[8] are useful tools in developing City government/utility projects to encourage cooperation and collaboration in the design and implementation of specific programs where there are shared goals.

C. PUBLIC ADVOCACY AND LOBBYING

Municipalities have various public advocacy options available that can directly and indirectly influence key factors that effect utility rates, policies, operations, programs and selection of resource options. These include: the ability to establish community-wide energy conservation goals; education of local residents and businesses of available programs; advocacy, development and implementation of policies and programs; and establishment and/or lobbying for passage of efficiency standards. Lobbying activities before the commission or state legislature to reform or modify certain issues is a common practice among municipalities.

As a broad policy objective, Portland encourages energy efficiency in existing residences, helps develop and promote public/private partnerships with utility, local, State and Federal programs by enforcing the energy savings standards in the State building code. A Task Force was set up to develop the City's energy policy and objectives defined criteria for evaluating energy supplies. These included: Long-term economic feasibility, technical feasibility, and environmental acceptability. The Buildings Task Force identified and evaluated technologies that offer the best opportunities for conservation within buildings and recommend policies and programs that are appropriate for the City to initiate or foster. The City has taken the following actions for meeting its energy goals:

* facilitating the weatherization of 8,000 low-income, multifamily units through the City's Multi-Family Weatherization Program by 1992,

* actively promoting utility-sponsored energy efficiency programs for Portland homeowners,

* promoting energy efficient new construction by actively supporting the inclusion of cost-effective residential energy saving measures for all home heating fuels in the State Building Code,

* investigating requiring energy audits for any residential structure receiving financing from the Portland Development Commission,

* avoiding lost conservation opportunities by encouraging property owners to install all cost-effective weatherization measures when weatherizing their rental properties, and

* identifying ways to encourage lenders to promote energy-efficient homes by counting future energy savings as income when determining the size of a home loan.

Using several of the planning issues addressed in Chapter 4 as examples, lobbying activities could be used to affect the following:

1. **Market Disincentives**

As currently structured, our market system is laden with obstacles to energy conservation and invitations to wasteful energy use. For example, when people and businesses invest in energy efficiency, they usually demand a very high rate of return on their money. Studies from Illinois indicate that investors typically expect long-lived efficiency improvements to repay their full costs in three years or less, a return of more than 35% per year: many residential customers insist on one-year payback or less).[9] Moreover, efficiency decisions often are made by people who will not be paying the energy bills, such as commercial and residential developers. In addition, energy efficiency decisions are often made under extreme time pressure with minimal information.

To ameliorate the perverse incentive to increase sales, municipalities are free to negotiate accords on responsible marketing practices with their energy provider. The accord could include the following elements: Any marketing initiative that might reinforce barriers to long-lived conservation with "lost opportunity" characteristics should be balanced by utility-financed programs designed to ensure that such measures are installed wherever feasible and cost-effective. If a marketing initiative would increase uncertainty about future energy needs by introducing substantial amounts of highly price-sensitive consumption, other customers will be shielded from any future utility-incurred costs associated with that uncertainty; to the extent that rate discounts figure in marketing programs, energy providers will offer efficiency incentives of comparable magnitude as an alternative way of retaining the same customers' business.

2. Cost Recovery

Chapter 4 noted the inherent incentive to encourage the production and sale of as much electricity as possible. Municipalities could negotiate a mutually acceptable formula with its energy providers and join them in petitioning for its adoption by the PSC. The City of Chicago and other parties in the proceeding to adopt Commonwealth Edison's (CECO) least cost plan supported the concept of cost recovery for expenses incurred by CECO for implementation of the three pilot programs. Municipalities are well positioned to mobilize independent support for the agreement from a broad spectrum of organizations and political leaders.

3. Appliance and Efficiency Standards

Appliance standards offer compelling advantages in delivering inexpensive and assured savings to consumers. Appliance purchases offer some of the most dramatic illustrations of the "payback gap" described earlier. Municipalities may choose to participate in the ongoing federal regulatory process to upgrade U.S. Department of Energy's national efficiency standards, or lobby for statewide energy efficiency standards.

4. Residential and Commercial Building Designs

Municipalities have performed applied research on innovative technologies and management practices that have proven capabilities to reduce energy costs in a variety of public, residential, commercial and industrial buildings. Their suggestions and solutions for energy management can help define realistic performance standards and construction guidelines, reduce energy consumption, decrease energy usage and costs during "peak" times, and apply innovative procedures to manage and finance energy improvements in local government buildings and facilities.

Energy efficiency standards typically cover building shells, lighting, heating, ventilation and air conditioning equipment.[10] "Beefed-Up" residential and commercial building efficiency standards could offer dramatic gains in energy savings. If real estate developers protest that their buildings would become more expensive, and thereby reduce the number of buyers who could qualify for credit, utilities could defray part of the increased cost associated with the new efficiency measure. Utilities could also underwrite training costs for builders.

Increasingly, local governments have begun to adopt stringent building standards. New England's "Design 2000" program applies this concept to commercial, industrial and institutional buildings. Portland, Oregon continues to promote the inclusion and enforcement of cost-effective energy saving standards in the State building code. It also requires certification of commissioning of air balancing and HVAC equipment in commercial buildings in excess of 10,000 square feet prior to occupancy.

Montgomery County, Maryland has developed technical guidelines based on life cycle costs of proven, state of the art conservation technologies. Their staff assessed the effectiveness of guidelines currently used to implement energy efficient designs for all new constructions and major renovations of County facilities.[11] Montgomery County's guidelines have helped save 40 to 50 percent of the energy used in buildings designed now compared to buildings designed before the program.

The City of San Jose, California has evaluated advanced energy efficient design options for inclusion in plans for new commercial construction. Based on an assessment of the cost-effectiveness of advanced energy design technology, staff intends to develop guidelines that encourage energy efficient standards in all new construction. These guidelines will be integrated into an energy design master plan that will complement the City's newly established Energy Master Planning process and its policies to support sustainable development.[12] On an individual technology basis, the City of Phoenix demonstrated methods for replacement of existing central chillers with a more efficient and better sized central chiller.

Portland encourages energy efficiency in existing commercial buildings and institutions by facilitating utility, local, State and Federal financial and technical assistance. Specific actions include:

- supporting utility programs for commercial and industrial energy efficiency,
- supporting Business Energy Tax Credit program to offer up-front energy efficiency tax credits for business,
- continuing to promote the inclusion of cost-effective commercial energy saving measures in the State building code,
- providing information to developers, architects, builders, and others interested in improving energy efficiency in new construction,
- helping schools, hospitals, and other public and non-profit groups participate in energy efficiency programs,
- requiring certification of commissioning of air balancing, controls, and HVAC equipment in commercial buildings in excess of 10,000 square feet prior to occupancy, and
- providing better enforcement of the commercial building code, especially for lighting.

5. Alternative Energy Systems

All of the least cost plans evaluated in previous chapters included a detailed assessment of alternative energy systems. Municipalities have implemented and undertaken research on alternative energy systems. Los Angeles has developed a decision process for the retrofit of municipal buildings with solar energy systems.[13]

Detroit has evaluated the potential for use of felled, city-owned trees as supplemental fuel. This project used chipped wood waste in varying proportions as fuel for a school building's boiler.[14] The City of Albuquerque examined the costs, benefits and feasible options for the use of fuel cells in municipal applications as on-site power generators.[15] Municipalities have also undertaken measures in the residential sector. The City of Philadelphia assessed add-on condensing heat exchanger technology by installing heat extractors in low income rental houses.[16] Albuquerque examined the economics and potential air quality impacts of using wood, coal and other types of similar fuels burned in individual residential stoves.[17] Kansas City, Missouri demonstrated the technical and economic feasibility of superinsulation and other advanced residential insulation technologies in new construction and rehabilitation.

The City of Portland has explored opportunities for promoting solar energy use and daylighting in commercial buildings, and has worked with industry to identify opportunities for improving energy efficiency in process applications. The City also supports environmentally acceptable, sustainable energy sources, including cogeneration and district heating and cooling. Portland has also investigated and advocated opportunities for competitive bidding to "sell" conservation to utilities or the Bonneville Power Administration (BPA). These savings could then be purchased by utilities, the BPA, and other agencies, companies or organizations. Portland also recognizes the critical nature of research and development, and the need to continue to keep up with new energy technologies, policies, and programs. The City also compiles and updates basic energy data on the sources and uses of energy within the City. The date includes: (i) a review of energy sources and uses by economic sector and (ii) a "thermal energy atlas" that identifies heating and cooling demand and supply, thus creating opportunities to share heat sources with nearby business.

6. Residential Energy Efficiency

Municipalities have been especially active in the area of residential energy efficiency. Focusing on needs for energy conservation in multi-family public housing, the city of San Francisco developed an innovative three part financing approach that combined an existing energy utility subsidy with the encouragement of more individualized "micro-utility" and energy management company concepts.[18] Hennepin County, Minnesota applied a shared savings approach to finance residential energy efficiency improvements.[19] The city of Portland, through the City Energy Office, plays a significant role in meeting these needs. To achieve and maintain leadership in energy supply policy development, the City acts as a catalyst to ensure that Portland is on the leading edge of energy supply policy and retains a competitive energy position in relation to other municipalities and regions.[20]

The City's role in increasing energy efficiency stems from policy advocacy, where, e.g., the city can educate local residents and businesses, provide and facilitate energy efficiency services, promote and develop energy resources, and advocate the development and implementation of energy policies and programs by utilities and other local, state and Federal governments. In order to accomplish its goals, several key policies and related objectives were adopted as the Energy Policy of the City of Portland:

* compile and update basic data on the sources, uses and costs of energy within the City,
* work with neighborhoods to include energy policies as a part of revitalization efforts, in neighborhood plans, and in the Neighborhood Needs process,
* compile information on new energy technologies, policies, and programs that may prove helpful to Portland's economy and environment,
* participate in the utilities' least-cost planning process,
* advocate the role of cities in the development and delivery of conservation and renewable resources,
* support Public Utility Commission regulatory changes to encourage more utility investments in energy efficiency,
* support stricter Federal energy efficiency appliance standards,
* actively solicit funding for energy efficiency projects to leverage city dollars and efforts.
* support efforts to develop a Northwest energy research institute to provide technical and policy research for the energy industry located in Portland, and
* investigate opportunities for supporting energy programs through utility franchise agreements.

7. Forecasting and End Use Data

The New York City Energy Office presented an analytical process to forecast energy needs by energy type in the city's commercial sector. Issues identified as a result of this process were used in support of policies to frame a public/private financial assistance program to reduce commercial energy costs.[21]

D. EXERCISE OF MUNICIPAL POWERS

It has been noted that states regulate most aspects of investor-owned "public utilities." A study by the City of Chicago,[22] examined the prevailing system of mixed regulation which clearly recognizes the supremacy of state authority, but allows municipalities to exercise appropriate powers in specific, albeit narrow areas. Through exercise of police powers, local governments are typically authorized to regulate those aspects of

utility service dealing primarily with local control. The exercise of police powers affects a broad range of issues not under state or federal jurisdiction, including enforcement of public safety and environmental quality matters, and zoning involving the placement, construction and removal of potentially dangerous electrical equipment. Table 18 below summarizes energy related areas subject to the influence of local government.

TABLE 18[23]

ENERGY RELATED AREAS SUBJECT TO THE INFLUENCE OF LOCAL GOVERNMENTS

AREA
Energy Use In Buildings
TOOLS
- Local building codes or additions to state codes
- Property tax advantages for energy-related home improvements
- Financial assistance for energy-related home improvements
- On-Site audits of industrial facilities, businesses and residences
- Restrictions on outdoor signs and decorative lighting

AREA
Energy Production and Distribution
TOOLS
- Direct production by local governments - Landfill, methane, resource recovery, solar application
- Municipal utility policy
- Removal of barriers and active encouragement of solar technologies, district heating, cogeneration, [independent power production]
- Granting of needed permits, including variances and waivers, as necessary
- Regulation and mitigation of impacts from increased production and environmental hazards
- Land use controls affecting distribution systems such as electrical transmission wires and [steam and] liquid pipelines

AREA
Consumption By Citizens
TOOLS
- Building Codes
- Sales, income, and property tax policies on energy conserving home improvements
- Detailed on-site audits
- Other Public Education Programs

AREA
Consumption By Local Government
TOOLS
- Vehicle fleet policy
- Energy conserving improvement of public facilities and street lights

One such exercise is franchising authority. Franchises are agreements granted to a privately held utility company governing the use of public property (streets, bridges, alleys) used for placing electrical transmission and distribution equipment. In a number of states, however, municipalities either have no role in franchising electric utilities or the exercise of franchising authority is severely constrained by statute. In other states, however, franchise agreements address issues that are commonly the province of state regulators such as alternative energy systems, wheeling, and long term planning.

The City of Portland, through exercise of police powers, regulates and plans for energy use through the amendment and periodic review of the City's comprehensive energy plan and implementing land use regulations and policies, enforcement of the energy standards of the building code, and locating new industry and high density housing close to major transit corridors. In terms of Portland's franchise relationships, their franchise with Portland General Electric Company and Pacific Power & Light does not specifically state the utility must engage in LCUP. However, arguably vague language would seem to allow encouragement and promotion of energy conservation programs.

III. CONCLUSIONS

In many respects, the role of municipalities may be defined in two words: Get Involved. Regrettably, our research has shown that municipalities, for reasons ranging from a lack of resources to satisfaction with the utility's plan, have been slow to intervene in regulatory proceedings. We hope that this report has made municipal officials aware of the importance of LCUP, and that identification and analysis of key planning issues will facilitate the role of intervention and, if necessary, litigation. The role of municipalities can potentially be more complex and less confrontational. The increasing popularity of collaborative processes, for example, provides ample opportunity for municipalities to address important issues. Also, municipalities have the ability to be supportive of utility policies and programs. This is especially evident in the development of building codes and standards. More importantly, municipalities can take actions independent of utilities to directly effect energy use and planning.

END NOTES - CHAPTER FIVE

1. See *The Electric Utility Franchise Expiration and Renewal Process*, which documents hundreds of franchise expirations between the years 1980 and 2000.

2. Telephone survey conducted by Department of Planning staff. Cities included Albuquerque, Boston, Houston, New York, Philadelphia, San Jose, San Francisco, and Seattle.

3. The Northern Illinois Alliance to Support Least-Cost Utility Planning, Final Report October 1989. Prepared by Nancy E. Collins, Project Manager, N. Marcia Jimenez, Assistant Project Manager. Submitted to The U.S. Department of Energy Office of Buildings and Community Systems. Membership was open to all parties with an interest in the purpose and objectives of the Alliance and included staff representatives from utility companies, consumer and industrial groups, research organizations, manufacturers of energy-related products, suburban municipalities, local and state government agencies, universities, and interested individuals. During the life of this project, a total of 153 individuals presenting 72 companies and organizations were active members.

4. Transferability - Results of programs and policies conducted elsewhere may not be always be used to predict program success for northern Illinois; Market penetration - This research examined market opinions, appliance saturation, attitudes towards utility conservation services and level of energy conservation activities; Market barriers in the small commercial/industrial sector; Technologies appropriate for northern Illinois, conservation, small power production, fuel switching and time-of-day and time-of-year mismatches between demand and supply; and Data needs for determining end-use loads.

5. Ibid. p. 49. The Alliance could have served better as a vehicle for consensus-building around LCUP issues had the actual dates of the State's planning process corresponded more closely with the Alliance grant, activities, and workshops.

6. This effort was funded as a two-year effort under the Urban Consortium's Year Seven (86-87) and Year Eight (87-88) programs.

7. *"Effectiveness of Commercial and Industrial Audits in Achieving Conservation."*

8. This approach would have defined the roles and responsibilities of the various organizational units in completing certain project tasks and allow for corrective actions to take place at key decision points in the project.

9. Luczak & J.Katrakis, Market-Perceived Barriers and Assessed Opportunities for Least-Cost Energy for Northeastern Illinois Businesses; Illinois Department of Energy and Natural Resources, II Illinois Statewide Electric Utility Plan, at 87-89 (January 1989).

10. The best model in the nation is the standard adopted for federal buildings by the U.S. Department of Energy in January of 1989. That enactment includes the following features: Minimum insulation levels and passive solar design requirements; Heating, ventilation and air-conditioning (HVAC) systems that minimize simultaneous heating and cooling of buildings' interiors; and Compulsory use of outside air "economizers", which allow outside air to supply part of a building's air conditioning when outside temperatures are between 55 and 75 degrees, and all of the cooling when temperatures drop below 55 degrees. Federal Register, Volume 54, No. 18.

11. *Guidelines for Energy Efficient Building Construction.* (1990) DG/88-303

12. *Energy Master Pla ing: IDEAS for New Commercial Construction.* DG/88-304

13. *A Decision Process for the Retrofit of Municipal Buildings with Solar Energy Systems.* (1980) DG/80-309

14. *Utilization of Felled Trees as Supplemental Boiler Fuel: A Technical Report.* (1983) DG/82-320

15. *On-Site Municipal Fuel Cell Power Plant: Feasibility and Applications Guide.* (1987) DG/86-301

16. *High Efficiency Gas Furnace Modification for Low-Income Housing.* (1987) DG/86-311

17. *Residential Space Heating with Wood: Efficiency and Environmental Performance.* (1986) DG/85-308

18. *Public Housing Energy Efficiency through Private Financing: A project Report.* (1982) DG/82-302

19. *Shared Savings and Low Income Homeowners: Results of a Demonstration Project.* (1986) DG/85-312

20. Ordinance No. 162975 was adopted on January 13, 1988. The ordinance also states that the city can help solve regional and global environmental and natural resource problems through local energy policies and programs. For example, the City has already enacted policies to reduce the use of foam products made with chlorofluorcarbons that contribute to ozone depletion.

21. *Matching End Use Energy Needs to Source Possibilities: Commercial Sector Conservation Programs.* (1982) DG/81-328

22. See *The Electric Utility Franchise Expiration and Renewal Process,* a report prepared for Funding Year VIII of the Energy Task Force of the Urban Consortium.

23. Lee, Henry, Energy and Environmental Policy Center, Harvard University.

CHAPTER 6.CONCLUSIONS AND RECOMMENDATIONS

I. INTRODUCTION AND LESSONS LEARNED

As states increasingly mandate Least Cost Utility Planning (LCUP) as the planning process to evaluate and select resources to meet energy needs, municipalities, if they are to effect utility decisions, must get involved either directly or indirectly in regulatory or collaborative proceedings where plans will be promulgated. Municipalities must, therefore, become increasingly knowledgeable about LCUP to critically review and, if necessary, challenge the merits of a plan. In order to maximize the effectiveness of a municipality's involvement, the report attempted to provide a basic understanding of LCUP processes and issues, and barriers to implementation. The report also documented the four distinct roles available to influence the LCUP process or otherwise control certain elements of utility performance. Given the diversity in both content and direction of least cost plans resulting from, for example, differences in capacity situations and legislative guidelines, recommendations made are general and applicable only in a generic sense. This caveat notwithstanding, there are several important "lessons learned" from this report

LESSON #1. LCUP IS A COMPLEX AND TECHNICAL PLANNING PROCESS THAT REQUIRES KNOWLEDGE OF VARIOUS DISCIPLINES

Because of the complexity of least cost plans, a comprehensive and competent review of a utility or state least-cost plan will necessarily involve the expertise of several disciplines: (1) **Legal** counsel will be necessary to assure that plans comply with state law and legislatively mandated planning guidelines and requirements. Dissatisfaction with plans and regulatory decisions will typically result in legal challenges before regulatory bodies or courts of appeals that must follow certain procedural steps. (2) **Economic** expertise will be required to evaluate the screening process and econometric models used to select resources. (3) **Technical** expertise will be necessary to review the underlying assumptions for resources selected, as well as their implementation plan. (4) **Policy expertise** will be required to determine the overall direction of the plan and its impact on municipal objectives.

As an example, the City of Chicago expended considerable talent and resources in evaluating the Illinois Statewide and Commonwealth Edison's least cost plans. In addition to staff resources from the Departments of Law and Planning, expert witnesses were retained to develop environmental externality values, challenge resource screening methodology and CECO's interpretation of state law, and review pilot program implementation plan.

LESSON #2. MUNICIPALITIES ARE ONLY ONE OF MANY PLAYERS IN A REGULATORY AND COLLABORATIVE PROCESSES

Based on the review of least cost plans included in this report, as well as municipal energy activity, a majority of cities do not actively or aggressively intervene in regulatory or collaborative proceedings to adopt a plan. The aggressive intervention of the City of Chicago in least cost proceedings is atypical. The major parties in least cost proceedings are the utilities and the public service commission, or depending on organizational structure, a state energy office or other body that has promulgated planning guidelines. Collaboratives have increasingly involved multiple parties.

LESSON #3. THERE IS INCREASING ACCEPTANCE AND RELIANCE BY REGULATORY COMMISSIONS ON THE COLLABORATIVE APPROACHES TO LEAST COST PLANNING

Municipalities should become aware of the increasing use of collaborative approach, its advantages and disadvantages, and their potential role in influencing the outcome of such a process. Municipalities must recognize, however, that the collaborative approach will, in all likelihood, require the same technical planning skills and resources as the classic approach. The decision to propose or participate in a collaborative should include an analysis of unique factors, e.g., political, that municipalities can use to influence the outcome of the process.

LESSON #4. MUNICIPALITIES MUST BE AWARE OF THE VARIOUS ROLES IT CAN PLAY TO INFLUENCE DISPOSITION OF A PLAN

Municipalities can play four distinct roles in evaluating least cost plans:

(1) **Intervention:** Municipalities have the legal recourse to intervene before the regulatory commission to challenge the merits of a plan.

(2) **Participation in Collaborative & Other Partnership Efforts:** Municipalities must be aware of the option of participating in a collaborative or partnership arrangement.

(3) **Public Advocacy:** Municipalities should recognize the options available for indirectly influencing selection of resource options. This includes strategies to ameliorate market disincentives, cost recovery appliance and efficiency standards residential/commercial building design and residential energy efficiency.

(4) **Exercise of Police Power**: Municipalities should be aware of the potential relationship between franchise agreements, land use regulations, and policies to implement energy standards in building codes and least cost planning.

LESSON #5. THERE ARE KEY LEAST COST PLANNING ISSUES AND VARIABLES THAT WILL IMPACT CONSUMERS DIRECTLY

In various least cost plans, municipalities must recognize which issues and variables are the most important. It is important to focus attention on key variables having the greatest impact on municipal concerns, e.g., utility bills. The following list summarizes factors to examine when reviewing plans:

(1) **Forecasting**: Forecasts should be based upon a reasonable combination of econometric models and statistical analyses. Utility estimates for inflation, fuel prices, economic growth, demographic, structural and behavioral factors should be reasonable and accurate. The forecast should use uncertainty (probability) analysis and simulation to calculate the likelihood of actual demand value falling within the forecast range, i.e., plans should use alternative load growth scenarios (low, medium and high forecasts). The forecast should, to the extent possible, rely on end use data.

(2) **Planning Objectives**: Objectives must be clearly articulated and consistent with legislative and municipal energy policy. Inconsistencies among objectives should be identified and avoided and tradeoffs should be noted.

(3) **Data Requirements**: The data used in the plan should be of high quality to provide reliable results. The utility should identify gaps in data;

(4) **Resource Options**: Least cost plans must consider both supply and demand side resources. The list of resources identified and reviewed by the utility should be exhaustive and the utility should explain why certain resources have not been identified.

(5) **Evaluation and Screening**: The screening process should not eliminate resources that full evaluation would indicate should receive further consideration. If the screening process does eliminate options, the utility should explain why this was done. The utility should explicitly explain how the initial screen eliminates resource options, e.g., consistency with objectives? application and knowledge of technology, etc? The utility should explain additional criteria used to screen resource options, e.g., participants and nonparticipant test and should include environmental externality costs in the evaluation and screening process.

LESSON #6. THERE ARE BARRIERS TO DEVELOPMENT AND IMPLEMENTATION OF LEAST COST PLANS

Analysis of least cost plans reviewed indicates the existence of a common set of concerns that might be viewed as barriers to the development of least cost plans. These include:

(1) **Technical Potential vs. Market Potential:** Utilities should address and include analysis demonstrating the technical and market potential of specific DSM and supply side options. Utilities should address the issue of free riders, market saturation assumptions and participation rates.

(2) **Cost Recovery:** Utilities should specify the mechanism they plan to use to recover costs and lost revenues. Does the utility "borrow" a mechanism used in other jurisdictions?

(3) **Inequities:** To what extent does the plan address issues of inequity. If inequity issues are present, utilities should propose solutions for ameliorating them. For example, the utility could specify a strategy for eliminating free-riders or design rate structures that reduce negative impact.

(4) **Acid Rain Legislation:** Least cost plan should be consistent with acid rain legislation.

(5) **Competitive Bidding:** Utility bids should account for free-riders, measure the effectiveness of the programs, and should not impede a utilities internal capability building efforts.

APPENDICES

APPENDIX 1

GLOSSARY OF TERMS

1. **AVOIDED COSTS** - The incremental costs to the electric utility of electric energy or capacity or both which, but for the purchase from a third party or a reduction in usage, the utility would generate itself or purchase from another source.

2. **BASE LOAD CAPACITY** - The amount of generating capacity dispatched on the basis of economics, unit availability and system/unit operating characteristics to remain continuously on-line to meet the load which persists 24 hours a day. The generating units that typically fulfill this operating strategy are the lowest operating cost units on a utility system. However, depending on forced outages and scheduled maintenance, many different combinations of units can satisfy the baseload operating requirements.

3. **BYPASS** - Bypass occurs when an electricity end-user produces or acquires electricity, either directly or by means of a third party, in competition with the electric utility. Bypass is considered economic if the customer's marginal cost to produce or acquire the bypass energy is lower than the utility's marginal cost to produce or acquire that same amount of energy.

4. **COMPARABLE TERMS AND METHODS** - A term referring to the imposition of the same screening tests/criteria for both supply and demand side resources. This has the practical effect of skewing the comparative cost and benefits of supply and demand side resources.

5. **COST EFFECTIVENESS** - Resources are considered economically cost-effective if total program costs do not exceed utilities avoided marginal generation costs.

6. **COST RECOVERY** - Refers to utility regulatory recovery of investment costs incurred in development and implementation of demand and supply side resources. Costs are recovered through a variety of mechanisms such as rate basing and one-time expensing.

7. **CREAM SKIMMING** - An economic concept that refers to acquisition and implementation of only the most cost-effective resources.

8. **DEMAND SIDE MANAGEMENT (DSM)** - The planning and implementation of those utility activities designed to influence customer use of electricity in ways that will produce desired changes in the utility's load shapes - i.e., changes in the time pattern and magnitude of a utility's load.

9. **DERATING RECOVERY** - Refers to recovery of generating capacity through design changes such as investments in coal handling, processing and/or feeding capability to compensate for the lower heat content of fuel.

10. **END USE MODELS** - Planning models, which in contrast to econometric models, aggregate detailed functional information about specific electrical end uses.

11. **ENVIRONMENTAL EXTERNALITIES** - Refers to the external environmental impacts, i.e., polluting emissions, of generating electricity.

12. **ELECTRIC REVENUE ADJUSTMENT MECHANISM (ERAM)** - A financial accounting mechanism to account for the loss of revenues resulting from demand side management.

13. FIRM POWER PURCHASE - The reservation of off-system capacity which when requested by the purchasing utility must be provided on demand by the selling entity. This capacity is usually reserved for several months or years at a time.

14. LEAST COST UTILITY PLANNING (LCUP) - A planning process to provide electric service at the lowest cost while striking a balance among traditional regulatory goals of efficiency, reliability, equity and environmental safety.

15. LOAD GROWTH - Refers to the increase in electricity consumption, usually measured in terms of annual peak growth.

16. LOST OPPORTUNITY RESOURCE - Resources that would lose their cost-effectiveness if not developed today. Examples of this include, window treatments, insulation, and other building shell measures.

17. MOTHBALLING - The process of placing an existing generating unit into a protective, non-operational state for an extended periods of time with the intent of eventually returning it to service at a later date. No specific duration is implied, but it generally would be for more than a year. Components are typically drained and/or filled with inert gas to prevent corrosion while the unit is idle.

18. NON PARTICIPANTS TEST - A program screening test used by utilities to determine if the costs to those customers who do not participate in a given program exceed the benefits they obtain.

19. PARTICIPANTS TEST - A program screening test that compares utility bill savings against out-of-pocket participation costs.

20. PEAK DEMAND - A utilities highest seasonal demand.

21. PILOT PROGRAM - A reference to a testing phase used by utilities before programs/resources are fully implemented.

22. PRESENT VALUE OF REVENUE REQUIREMENTS (PVRR) - The present value level of revenues (collected through customer rates) required by a utility to maintain system operations.

23. PROGRAM SCREENING - Refers to the process used by utilities to determine resource cost-effectiveness and consistency with utility planning objectives. Typically, resources must pass a variety of screens or tests before they are selected and implementation.

24. QUALIFYING FACILITY (QF) - Refers to a cogenerating or alternative generating source that qualifies under Federal PURPA laws to sell excess generated power back to their local utility. Such sales are usually made at the local utility's avoided cost.

25. REPOWERING - The process of refurbishing and restoring to operation previously retired generating units. In the case of steam units, this typically requires the addition of a new steam source, such as a fluidized-bed boiler or a waste heat boiler powered by the exhaust of one or more combustion turbines.

26. SUPPLY SIDE RESOURCES - Resources that can, when operable, supply electrical power to a utility on demand (resource commitment and dispatch). Most typical are generating units of any fuel type. Also included would be firm power purchase from others. Supply-side resources that cannot be dispatched at the discretion of the receiving utility are less desirable since a production cost penalty may be incurred if energy from such a source displaces less costly available energy at times.

APPENDIX 2

LEGISLATIVE LEAST COST PLANNING INITIATIVES

California - The California Energy Commission (CEC) is required by law to prepare and submit to the governor and legislature a biennial report assessing current and future energy trends in California and a state energy policy with recommendations for its implementation. In 1989/1990, the California Public Service Commission was instrumental in pursuing a collaborative process with interested parties that resulted in ***A Blueprint For California*** which will serve as the basis for California DSM policies and programs.

Florida - The 1980 Florida Energy Efficiency and Conservation Act requires "...increasing the efficiency of the electric system...and the end uses of energy." However, Florida's statutes and regulations cannot be construed as establishing an integrated least-cost planning process. No least-cost plan is required.

New York - The 1976 State Energy Law establishes a state energy office to work with other state agencies in the development and coordination of an overall state energy program. The state energy office prepares a report of the long-range electrical demand and supply requirements in the state. A recent commission decision has established a major new energy conservation policy requiring each of the state's electric utilities to place energy conservation on equal footing with power plant construction and alternate forms of electric generation.

Ohio - 1983 legislation requires every major electric utility to submit to the Office of Planning and Forecasts a long-range forecast and general description of planned resources. The Office is required to determine the accuracy of forecasts and whether alternatives to meet demand were considered. The public service commission's role in the process is not defined in the statutes or regulations. The Ohio process does not represent an integrated approach. No implementation process, specification of methodology or models, or power of enforcement is specifically mandated by law.

Wisconsin - The 1975 Wisconsin Power Plant Siting Law and implementing regulations of the Wisconsin Public Service Commission require each electric utility to file an "advance plan" for construction of facilities. The biennial filing must include long-range demand forecast, plans for the construction of proposed generating and transmission facilities, and analysis of alternatives to the proposed generation and transmission facilities.

Texas - In 1983, amendments to the Public Utility Commission required the Texas Public Utility Commission to develop a long-term statewide electrical energy forecast. The forecast must include an assessment of how alternative energy sources, conservation, and load management will meet the state's electricity needs. Substantively, the statute does not specify that utilities or the Commission derive a "least cost resource plan." Procedurally, at the time of utility application for plant certification, the utility must set out alternative methods considered, including the extent to which achievements through energy efficiency have offset the need for new generation.

Oklahoma - Oklahoma's resource planning strategy focuses on a new innovative rate design policy which varies services and prices in ways that are designed to meet specific needs of the individual customer. By "cost basing" rates, the program will hopefully promote conservation and energy efficiency as a means of lowering future generating capacity requirements.

Nevada - The Utility Resource Planning Act, approved by the Nevada legislative council bureau on June 29, 1984, requires utilities to submit to the PSC long-range plans for review and evaluation of resource options. Prior to passage of the act, utilities were required to provide information when they applied for a permit to construct or rate base a new generating facility. Such reviews were, however, too often cursory and inadequate. The act requires utilities to submit a plans that give "...adequate consideration of...conservation, load management, pooling of power, power purchases, [and alternative generating facilities and cogeneration]." There must also be substantive integration of forecasted future demand and a comprehensive analysis of demand and supply side options to meet or alter demand.

APPENDIX 3

STEPS IN THE LEAST COST UTILITY PLANNING PROCESS

STEP 1: Identify the objectives of the plan. Typically, reliable service, minimal or lowered environmental effects, low cost environmental controls, reducing or meeting peak demand, and reasonable prices for consumers.

STEP 2: Develop one or more load growth forecasts - Forecasting determines the future needs that must be met and is a critical factor in LCUP. Any error in forecasting will have serious effects on plans, i.e., errors will lead to over building or underestimating capacity needs.

STEP 3: Determine the levels of capacity expected for each year of the plan. This step is a logical extension of forecasting. Effectively, this step requires quantification of the amount of yearly capacity a utility needs to meet expected levels of load growth.

STEP 4: Identify resources needed to bridge the gap between expected loads and capacities - For example, generating capacity, distribution capability, a manageable load shape, and perhaps periodic decreased demand.

STEP 5: Evaluate all resources in a consistent fashion. This step requires identification of ALL potentially available resources. The resource analysis must use comparable terms and methods in the evaluation of both supply and demand side resources.

STEP 6: Select the most promising options for fashioning an effective, flexible, and responsive plan.

STEP 7: Integrate methods of supplying needed power with methods for controlling and moderating demand.

STEP 8: Construct scenarios, pitting the selected mixes of options against possible economic, environmental, and social circumstances.

STEP 9: Evaluate the economic and technical success of each mix of options under the circumstances of various scenarios. For example, low, moderate and high load growth scenarios.

STEP 10: Analyze the uncertainties associated with each possible plan of action.

STEP 11: Screen the alternatives to eliminate those that are not suitable. Not all options will be useful in all cases. Therefore, they should be screened to eliminate those that are not consistent with the utility's objectives. Screening at the outset reduces the number of options that must be evaluated in subsequent steps. Doing so, however, may result in elimination of resources that a full evaluation would indicate should stay in, and vice versa.

STEP 12: Rank order the alternative courses of action. Typically, ranking will be done according to several criteria, e.g., technology acceptance and market acceptance.

STEP 13: Test each alternative for cost effectiveness from a variety of viewpoints.

The utility perspective is represented by the revenue requirements test. This test computes the net present value of the revenue requirements for a given resource option, calculated over the life cycle of the option.

The **nonparticipant perspective** or **no-losers test** is one of the more controversial tests in use. Under the terms of this test, if the costs to those who do not participate in a given program exceed the benefits they obtain, the option fails. The nonparticipant test has been applied primarily to demand-side options. It results in a heavy weight being assigned to the losses suffered by a specific group (nonparticipant). If the nonparticipant suffer even small losses, an option may be rejected despite large gains made by the participants. A number of jurisdictions such as the District of Columbia and Massachusetts, do not permit the use of this test for screening purposes.

The **participant test** compares utility bill savings against out-of-pocket participation costs. The **total-resource test** compares avoided supply costs to the cost to all ratepayers of participation in demand-side programs.

STEP 14: Reevaluate the alternatives considering economic, environmental, and societal factors. Such a reevaluation prevents the rejection of options that may have high costs in one set of factors, e.g., economics, but strong countervailing benefits in others, such as environmental impacts. Among the factors that require evaluation are the option's effects on reliability, rates for all customers, financial stability of the utility, and the

environment. The integration of options can be accomplished through the use of various commercially available models.

STEP 15: Select a plan for implementation, one that most nearly satisfies all the objectives of the plan.

STEP 16: Develop a plan of action. The available means of implementing least-cost planning are all the traditional regulatory methods, such as rate proceedings, internal investigations, generic proceedings, and rule making.

STEP 17: Implement the plan of action to bring about the least cost provision of electric power. The major means of implementing a least cost plan are pilot programs, market-based programs, and utility incentives. Public Service Commissions wishing to implement least cost plans have often found it helpful to adopt regulatory mechanisms that provide financial incentives to utilities that use the process.

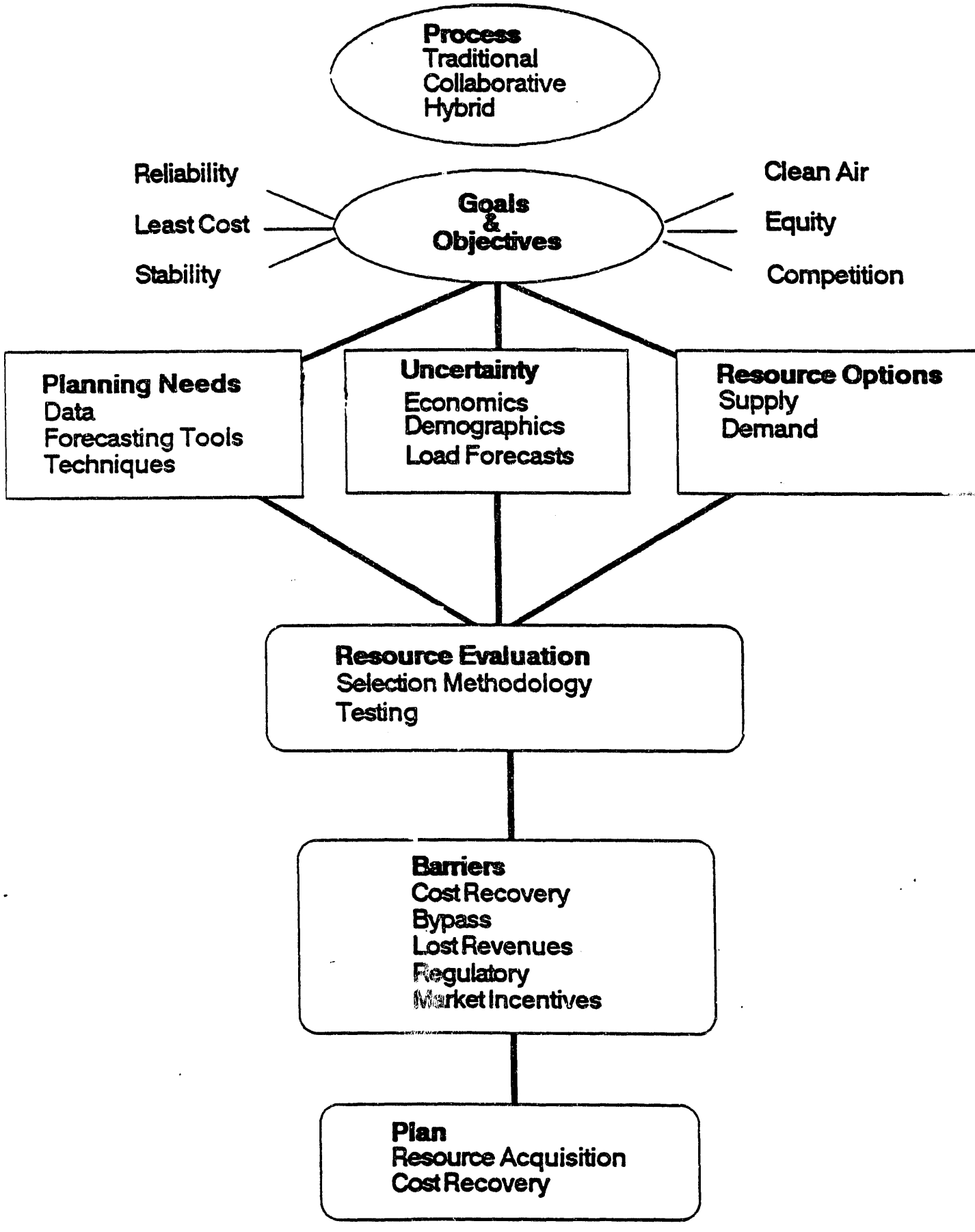
Expensing is the most common regulatory treatment of conservation investment. Utilities are allowed to consider investments in demand-side resources. as operating expenses to be deducted from current revenues.

Rate basing permits utilities to earn a return on their DSM investments.

Balancing accounts are a hybrid between expensing and rate basing. Under this treatment, efficiency investments are accumulated in a balancing or escrow account.

STEP 18: Monitor and evaluate the operation of the utility under the plan and revising the plan as necessary.

THE LEAST – COST UTILITY PLANNING PROCESS



APPENDIX 4
POLICY PRINCIPLES FROM THE CALIFORNIA COLLABORATIVE

I. DSM COST EFFECTIVENESS AND FUNDING LEVELS

Principle #1: Conformance with Standard Practice Manual
Cost-effectiveness procedures should conform to the procedures established jointly by the California Public Utilities Commission and California Energy Commission.

Principle #2: Shareholder Incentives and DSM Analysis
All DSM programs' costs, including shareholder incentive costs, should be included in the economic evaluation of DSM options.

Principle #3: The Goal of Utility Resource Planning
The goal of utilities' resource planning and investment is to minimize the cost to customers of reliable energy services.

Principle #4: Defining Cost Effectiveness for Demand-Side Resource Options
DSM program cost effectiveness is defined by the Total Resource Cost test

Principle #5: Additional Factors in Establishing Funding Levels for Demand-Side Resource Options
Different types of programs should be evaluated differently because different programs have different purposes. Alternatives should recognize a number of other considerations as appropriate adjuncts to determining DSM funding levels.

Alternative A - Program cost-effectiveness shall be determined on the net effect of (1) the marginal or avoided cost of the energy supply system and (2) total costs incurred, including costs incurred by the participant, of installing and operating the efficiency improvements induced by the utility incentive.

Alternative B - Utilities must account for important environmental, customer service, equity, and shareholder dimensions factors in considering alternative investments in DSM. This balanced level of DSM should be the basis for determining the amount of investment in DSM resources.

Principle #6: Indirect Cost and Benefits
Utilities should account for three factors in DSM cost-effectiveness analysis: (1) customer's time and effort spent in identifying, choosing, installing, and maintaining a DSM option; (2) level of investment risk and (3) changes in the quality of energy services produced.

II. QUANTIFYING ENVIRONMENTAL COSTS

Principle #7: Quantifying Environmental Costs
The environmental benefits of efficiency improvements should be included in cost-effectiveness assessments. Interim estimates of 10 to 25% of generation costs appear to be reasonable.

III. STATEWIDE INVENTORY OF DSM RESOURCES

Principle #8: Need for Statewide Inventory of Efficiency and Load Management Resources

California should promptly develop and regularly update a full inventory of currently and potentially cost-effective opportunities to improve efficiencies and manage loads in all sectors, including estimates of the overall magnitude of these resources, load shapes, and the projected costs associated with delivering the various types of energy savings that are identified in the inventory.

IV. EFFICIENCY STANDARDS

Principle #9: Relationship of CEC Building Standards and Utility New Construction Programs

The state's utilities and the CEC should work closely together to develop the next generation of building standards. In particular, utilities should cooperate in the administration and funding of demonstration projects for new efficiency measures and developing programs that reward customers and builders for going beyond the standards.

Principle #10: Relationship of CEC Appliance Standards and Utility DSM Programs

Utility conservation programs should play a supporting, partnership role in the development and success of appliance efficiency standards. For example, provide incentives to manufacturers to develop super-efficient appliances, foster markets for efficient appliances by promoting their acceptance among builders and customers.

V. LOW-INCOME POLICY

Principle #11: Guidance for Direct Assistance Programs

Direct assistance should be provided in the form of installation of conservation materials, at little or no cost to low-income participants.

VI. DSM BIDDING

Principle #12: Development of DSM Bidding Programs

Any decision to implement bidding should be preceded by testing and evaluation through pilot programs.

VII. REGULATORY COORDINATION ISSUES

Principle #13: Integrating DSM Funding Decisions

Current regulatory procedures for establishing DSM funding levels need to be reexamined. The CPUC's funding approval process is not adequately coordinated with resource planning processes.

Principle #14: Coordination of Regulatory Forums

Discussion of DSM funding levels should be adequately coordinated at all regulatory forums.

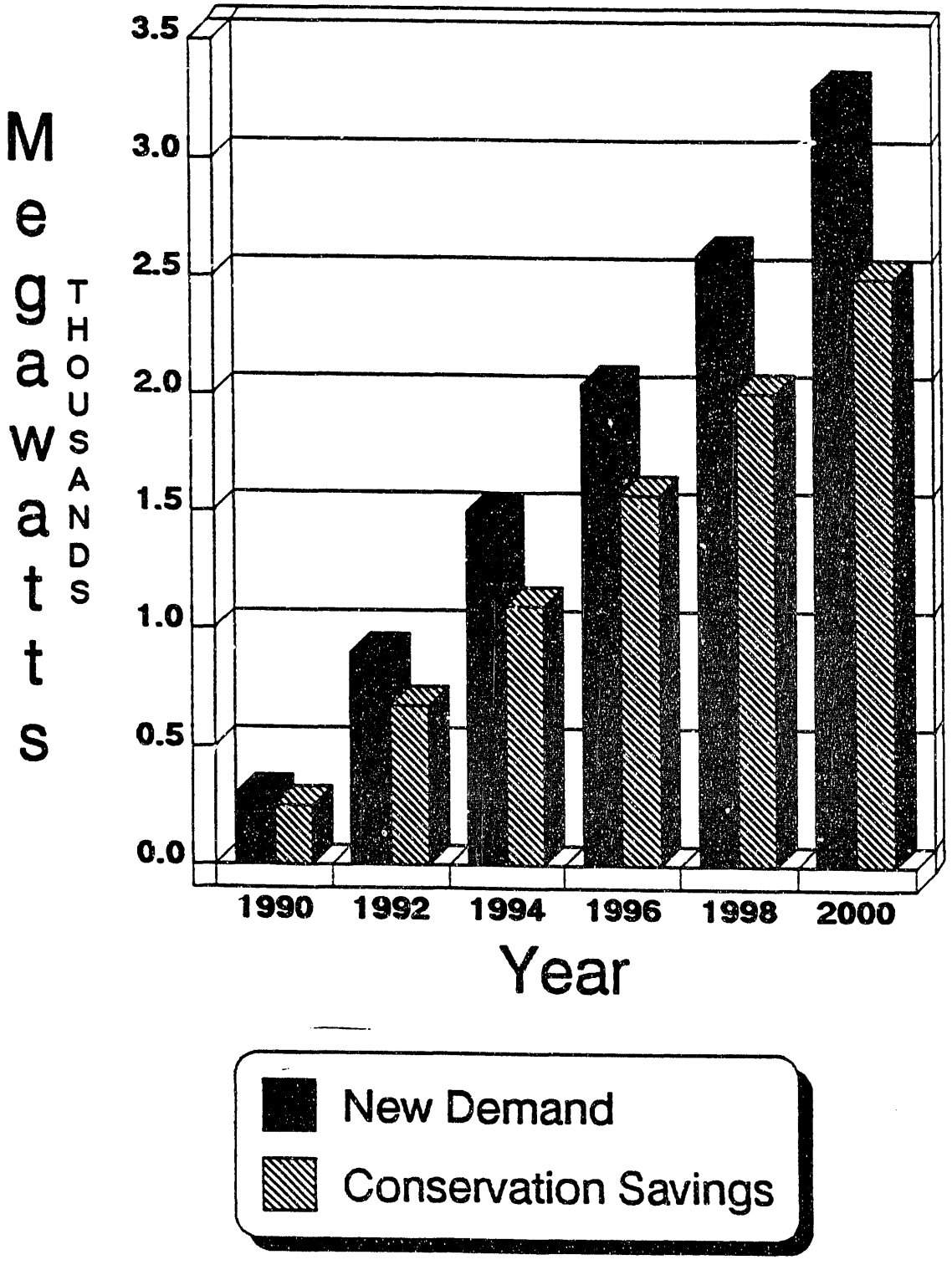
VIII. MEASURING UTILITY PRODUCTIVITY

Principle #15: DSM Impacts on the Measurement of Utility Productivity

The CPUC should be alert to the possibility that the methods it uses to measure utility productivity may need to be modified.

APPENDIX FIVE

PACIFIC GAS & ELECTRIC PROJECTED DSM SAVINGS



CHAPTER I. GENERAL BACKGROUND AND DESCRIPTIONS

I. PURPOSE OF THE STUDY

The City of Chicago's study of the Least Cost Utility Planning (LCUP) process is part of a federal research program funded by the U.S. Department of Energy for Project Year 1989 of the Energy Task Force of the Urban Consortium.[1] The City's primary interest in performing this study is to enhance understanding of LCUP and to determine the most effective municipal roles in the process. As states increasingly mandate LCUP, Chicago's research will be of increasing value to municipalities. Depending upon exact statutory language, least cost plans will significantly influence resource selection and will determine the costs that consumers pay for electricity. Municipal governments may intervene in regulatory proceedings to review and influence adoption of plans. While intervention is a key opportunity for input, municipalities do not have a statutory, and thus decisive, say in development and promulgation of the plan.

Large urban governments, because they represent a significant portion of the market of their servicing utility, are uniquely capable of influencing the content and process used to develop a least cost plan. Indeed, the hypothesis of this study is that municipalities can be a positive influence in the LCUP process. While plans may indeed benefit local government, municipalities must ensure that plans address locally unique energy concerns, conditions and objectives. Cities with an older industrial base and low income populations, for example, may have unique needs for special industrial and residential low-income programs that target these groups. Likewise, cities experiencing rapid growth in particular market sectors might find programs designed to reduce demand to more manageable levels desirable. This is especially true in service territories where growth outside the city is more rapid and where expansion to serve these needs may impose higher costs on city customers.

II. STUDY OBJECTIVES

This report does not presume to provide answers to all questions or to address all permutations of LCUP which may arise. It seeks, rather, to provide municipalities a starting point for evaluating their servicing utilities or states' least cost plans through a basic understanding of LCUP. Accordingly, this report has two major objectives:

First, serve as a "*municipal guidebook*" to LCUP by providing an overview of key issues, influences and barriers. To facilitate comprehension of terms, a glossary of terms is provided in Appendix 1.

Second, analyze the role of municipalities in LCUP. In order to maximize the effectiveness of local input, the report identifies and analyzes four distinct roles available to influence the LCUP process or otherwise control certain elements of utility performance:

* Intervention & Litigation;
* Public Advocacy & Lobbying;
* Exercise of Police Powers; and
* Negotiations as Collaborative Partners.

A. REPORT OVERVIEW

The report is organized into five chapters.

Chapter 1 provides background information on the LCUP process.

Chapter 2 seeks to explain the LCUP process by illustrating the relationship between planning guidelines established at the state level and one utility's response to statutory requirements.

Chapter 3 compares and examines the Classic and Collaborative approaches to LCUP.

Chapter 4 provides an overview of key issues and barriers.

Chapter 5 examines the role of municipalities in LCUP by analyzing those actions available to effect the process.

Chapter 6 provides conclusions and recommendations.

III. WHAT IS LEAST COST UTILITY PLANNING?

Traditional electric utility resource planning entails development of energy demand forecasts and selection of resource options to meet energy needs, while satisfying policy objectives such as reliability and efficiency, with the minimum revenue requirements. The recent track record of "traditional" planning has not been good. There are numerous examples of incorrect forecasts that resulted in over-building of generating capacity. Conversely, underestimating growth in other parts of the country resulted in utilities having to cut demand and scramble to find purchased power to avoid outages.

APPENDIX 6

NEW YORK STATE RECOMMENDATIONS

Governmental Lobbying

Sustain and increase Federal funding to continue innovative state and local assistance programs.

Increase Federal funding for the weatherization of older, less efficient homes occupied by low-income families.

In cooperation with national laboratories and universities, pursue development of cost-effective energy efficiency technologies and facilitate the transfer of such technologies to the state and local levels where they will be implemented.

Prioritize receipt of weatherization assistance.

Promote the development of district heating and cooling systems in the State's urban areas as a means of providing space heating and cooling, and reducing the source of emissions of many individual heating and cooling plants.

Promote the development of programs by utilities to increase low income participation in energy efficiency programs.

Use State Government facilities and operations to demonstrate new energy efficiency techniques and equipment and the use of renewable resources, especially photovoltaic.

Expand the amount of funding available for the multi-family housing component of the Energy Investment Loan Program.

Extend the utility-operated Home Insulation and Energy Conservation Act Saving Power Program which provides for free audits and lower interest utility loans for energy efficiency improvements in low-income census traits.

In the area of right-of-way, request the Federal Department of Transportation to remove arbitrary restrictions on the construction of transmission lines along federal highway, particularly where traffic considerations do not predominate.

The New York Power Authority should initiate, in cooperation with the SEO's multi-family housing programs, energy efficiency and technical assistance programs for public housing authorities which receive NYPA power.

Appliance Efficiency Standards

Increase the national minimum appliance efficiency standards for refrigerators/freezers above the minimum level established in the National Appliance Energy Conservation Act of 1987.

Establish national standards for fluorescent and incandescent lamps for both the residential and commercial sectors.

Establish national efficiency standards for certain sizes of electrical motors.

Adopt state standards for certain commercial air conditioners and heat pumps.

Building Codes

Establish a model Federal building Efficiency Code and require its adoption in all jurisdictions throughout the nation where such standards do not exist currently.

Amend the State Energy Conservation Code to incorporate the most cost-effective, energy efficient design and construction techniques for commercial buildings.

Review Energy Conservation Construction Code enforcement effectiveness.

Develop an energy rating system for new and existing residential housing in combination with Truth-in-Heat Law (Home Energy Fair Practices Act) based on the Energy Conservation Construction Code thermal rating system.

Develop insulation standards for industrial process piping and other industrial processes, if necessary, which are currently not covered under the State's Conservation Construction Code.

Expand technical assistance and training for multi-family building operation and maintenance staff to ensure that building energy systems are properly maintained and efficiently operated.

Marketing and Financial Incentives

Provide utility or state financial and marketing incentives for builders to construct residential and commercial buildings which exceed the State's Energy Conservation Construction Code.

Develop a long-term revolving loan fund to ensure that cost-effective energy efficiency programs are expanded and continued.

Review current cost-benefit analysis methods used to establish thresholds for energy efficiency standards and financial assistance program- reflect the true cost of environmental emissions.

Recommendations for Incorporating Environmental Externalities

Emissions of SO_2, NO_x and CO_2 should be explicitly considered in procuring future energy supplies.

An imputed cost of SO_2, NO_x and CO_2 emissions should be immediately incorporated in utility competitive bidding programs to allow environmentally "clean" projects to compete favorably with lower cost but less environmentally attractive proposals.

A generally uniform methodology which measures the actual environmental impacts of a proposed facility's air emissions and gives appropriate weight to these air emission externalities should be used by all utilities.

The methodology for evaluating and scoring air emission externalities should be based on the cost of mitigating (offsetting) the residual SO_2, NO_x and CO_2 emissions from energy supply options.

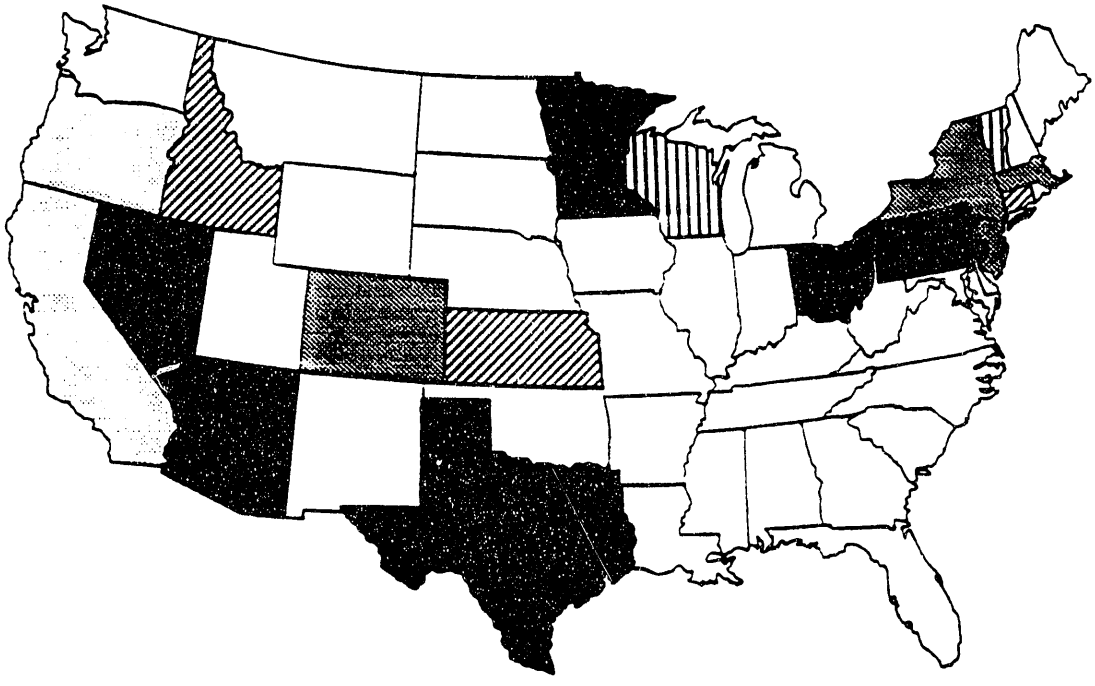
The cost of mitigation should be added to a proposal's bid price, and the composite price should be treated as the price variable in the utility's scoring scheme. The costs of mitigating poor air quality are the costs that "good" air quality facilities avoid, and should be recognized in the price we are willing to pay for electricity from such facilities.

Approximately 60 to 70 percent of the total awardable points should be for price and air emission environmental factors.

An Environmental Block for scoring externalities characterized by local and regional environmental concerns (e.g., land use, water discharges, noise, biological impacts, aesthetics, etc.) should be included in utility competitive bidding programs. Individual utilities should provide guidance as to the types of environmental externalities of local and regional concern, and have latitude as to how these externalities should be evaluated and scored.

APPENDIX 7

STATE PUC APPROACHES FOR INCORPORATING ENVIRONMENTAL EXTERNALITIES



- Qualitative treatment during the resource planning process
- Quantitative weights applied in resource planning process
- Quantitative weights applied in competitive bid evaluation
- Percentage adder and/or subtractor
- Increased rate of return

Source: Cambridge Energy Research Associates.

REPORT AND INFORMATION SOURCES

Additional copies of the report, "A Municipal Guide To Least Cost Utility Planning" are available from:

Publications and Distribution
Public Technology, Incorporated
1301 Pennsylvania Avenue, N.W.
Washington, D.C. 20004

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