Market, Technology, and Policy Drivers: The Future Structure of the Electricity Industry

2000 Aspen Energy Policy Forum
John H. Gibbons and William W. Hogan, Co-Chairs

Elizabeth L. Malone, Rapporteur
John A. Riggs, Program Executive Director

For additional copies of this paper, please contact:

The Aspen Institute
Publications Office
109 Houghton Lab Lane
P.O. Box 222
Queenstown, MD 21658
Phone: (410) 820-5338
Fax: (410) 827-9174
E-mail: publications@aspeninstitute.org
Web: www.aspeninstitute.org

For all other inquiries, please contact:

The Aspen Institute
Program on Energy, the Environment, and the Economy
One Dupont Circle, NW
Suite 700
Washington, DC 20036-1193
Phone: (202) 736-5823
Fax: (202) 467-0790

The Aspen Institute
One Dupont Circle, NW
Suite 700
Washington, DC 20036-1193

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Dedication

Three major figures in the history of the Aspen Energy Policy Forum were taken from us this year. Regular Forum participants know that the lasting friendships, intellectual and personal, that are developed and enhanced at the annual meetings are as important as the topical discussions. Aspen is in many ways what this year's Co-Chair, Jack Gibbons, referred to as an "invisible college." The ties among its members extend well beyond the few days in Aspen each summer, and the loss of a colleague is deeply felt.

Al Alm served under five presidents of both parties in the White House, the Environmental Protection Agency, and the Department of Energy. Although he supplemented his government work with interludes in business and academia, he exemplified dedicated public service in support of sound environmental and energy policies and often described himself as a "government recidivist." A long-time member of the Aspen family, he has chaired the Forum, organized and chaired individual sessions, and written reports on the group's deliberations. His friendship and his intellect will be sorely missed.

Dana Orwick joined the Institute in 1970 to help direct its environmental program. When energy came to the fore in 1973-74, he helped shift the program's focus to the linkages between energy and the environment. As director of what

became the Program on Energy, the Environment, and the Economy, he shaped and nurtured the Forum, keeping its interactive style and its focus on governance. When he retired in 1995 a colleague wrote, "The culture of these forums that we have all learned to love is largely his creation." The Institute and the Forum have greatly benefited from his long and dedicated service.

John Sawhill had a distinguished career as federal energy "czar," president of New York University, creator of the energy practice at McKinsey & Company, and CEO of The Nature Conservancy. But he also played a large role in the life of the Aspen Institute. He was an organizer of the first Energy Policy Forum, with Henry Linden and Bill McCormick, and he served briefly as director of Aspen's energy and environment program. He personified the Aspen ideal of thoughtful and stimulating intellectual exchange and lasting collegiality. Shortly before his untimely death, he wrote to express his regret at missing this year's Forum and to say he hoped to attend next year. We fervently wish it could be so.

This report is dedicated to their memory. The world is a poorer place without them.

Foreword

Accelerating change is one of the few constants in today's electricity industry. Rapid developments in legislative and regulatory ground rules, the growth of e-commerce, improvements in supply and demand technologies, and the changing expectations of investors are buffeting traditional utilities and creating opportunities for those who can anticipate the direction of change.

This year the annual Aspen Energy Policy Forum sought to understand some of the key factors causing this rapid change, taking as its topic "Market, Technology, and Policy Drivers: The Future Structure of the Electricity Industry." Building on discussions in recent years that focused on fuel choice, supply, and reliability (1999); pathways to a sustainable energy system (1998); and energy industry restructuring (1997); the Forum in 2000 considered some of the most significant factors influencing the reconfiguration of electricity companies.

The annual Forum, now in its 24th year, reflects the mission of the Aspen Institute, which is to improve the conditions for human well-being by fostering enlightened, responsible leadership and by convening leaders and policy makers to address the structural challenges of the new century. Using the rigorous discipline of informed dialogue and inquiry among people of diverse viewpoints and backgrounds, the Forum raises policy questions that require crosscutting, interdisciplinary approaches. Although the partici-

pants are experts in their own businesses or disciplines, they are challenged to avoid easy or oversimplified responses that draw on a single area of expertise. They are asked to weigh different points of view, imagine the possible, see how alternative solutions may play out, determine which values should be given priority, and synthesize the knowledge of their colleagues in the dialogue. An informal atmosphere and a not-for-attribution rule nurture creative thinking, candid speaking, and mutual education.

The distinguished co-chairs of the 2000 Forum were John H. Gibbons, former Science and Technology Advisor to the President and Director of the Office of Science and Technology Policy, and William W. Hogan, Lucius N. Littaur Professor of Public Policy and Administration at Harvard University's Kennedy School of Government. Their deep experience and perceptive analysis added substantively to the dialogue while their moderating skills helped focus the diverse expertise of the participants.

The major strength of these Forums lies in the lively dialogue and the contributions from all of the participants around the table, but presentations from a few invited experts start each session, and knowledgeable session chairs guide the ensuing exchanges. This year's chairs and presenters, who are listed in the agenda, provided a wealth of information and a variety of perspectives, contributing immensely to the richness of the dialogue.

Elizabeth Malone of Pacific Northwest National Laboratory (PNNL) served as rapporteur and magnificently met the challenge of extracting and summarizing the most important points from many hours of free-wheeling discussions. The Institute and the Forum are grateful to her, and to PNNL for supporting her work.

The Aspen Institute and its Program on Energy, the Environment, and the Economy acknowledge the very important role of our sponsors. Without their generosity, support, and confidence in our work, this Forum and the other activities of the Program could not continue. Each project must be fully self-supporting, and registration fees do not fully cover our costs. Thus we gratefully recognize and thank the following, whose support during the past year has provided an affirmation of our vision and the means to achieve it.

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John A Riggs
Executive Director
Program on Energy, the Environment, and the Economy

Agenda

"Market, Technology, and Policy Drivers: The Future Structure of the Electricity Industry"

June 8-12, 2000

Forum Co-Chairs:

John H. Gibbons, Former Science and Technology Advisor to the President
William W. Hogan, Professor of Public Policy and Administration, Harvard

Session I: E-commerce

Chair: **S. I. Garnett,** Senior Advisor, Hagler Bailly Inc.

How is electronic commerce affecting the energy world, including business-to-business and business-to-customer dealings? What role are web site operators and electronic marketers playing, and where will it lead? How are e-commerce and information technologies affecting utility-customer transactions?

Speakers: **Steven A. Appelt,** Senior VP- Administration, AEP Energy Services Inc.
Brett Powell, VP- Internet, Utility.com
Charles Q. Miller, CEO, ProcureZone.com

Session II: Generation and transmission technology

Chair: **Ernest Moniz,** Under Secretary of Energy

What progress is occurring with fuel cells and other distributed power technologies, and how fast will they grow? How do buyers' needs for reliability affect their power source? What does the future hold for conventional fuels, and what advances in technology will make a difference? How can the grid be enhanced in the face of long-term uncertainties? How much gas will the electricity industry demand? How many nuclear reactors will be relicensed in the U.S.? How many will be built elsewhere?

Speakers: **Robert W. Shaw, Jr.,** President, Aretê Corp.
Mark P. Mills, President, Mills-McCarthy Associates
Andrew W. Williams, VP-Transmission and Marketing, PEPCO
Nancy Mohn, Director, Marketing Strategy, Alstom Power US

Session III: Market forces and corporate transformation

Chair: **George Schreiber,** Managing Director, Credit Suisse First Boston

What is driving the reconfiguration of energy companies? Where will it end? What is behind some of the prominent acquisitions, mergers, spinoffs, unregulated subsidiaries, and other utility efforts to restructure? What are some of the legal hurdles? What is the investment community looking for, short and long term?

Speakers: **Clifford Sikora,** Troutman Sanders
Charles E. Bayless, former CEO, Illinova Corp.
Brian Dickie, Group President, TXU Energy

Session IV: Policy Drivers

Chair: **Elizabeth A. Moler,** Senior Vice President, Unicom

How will public policy decisions change the potential value of company assets and the incentives to reconfigure, including decisions on Federal and state restructuring legislation, regulation of and access to the grid, and Clean Air Act regulations?

Speakers: **Congressman Joe Barton**, Chair, Energy and Power Subcommittee
Linda Breathitt, Commissioner, FERC
David Hawkins, Senior Attorney, NRDC

Session V: What Does It Mean?

Chair: **Philip R. Sharp,** Lecturer in Public Policy, JFK School, Harvard

Summary discussion, common or crosscutting themes, lessons learned, long-term implications of short-term trends, guidance for policy makers.

Breakout group moderators:

Merribel S. Ayres, President, Lighthouse Energy Group
Jan Mares, EOP Group, Inc.
Ellen Roy, Managing Director, I-Group

Summary

The electricity industry is being challenged on the one hand by restructuring and on the other by the potential of new technologies. Restructuring is proceeding slowly and unevenly, with uncertain national leadership, disputes over the jurisdiction of the Federal Energy Regulatory Commission (FERC), continuing and increasing environmental concerns, and a plethora of state policies and regulations (Figure 1).

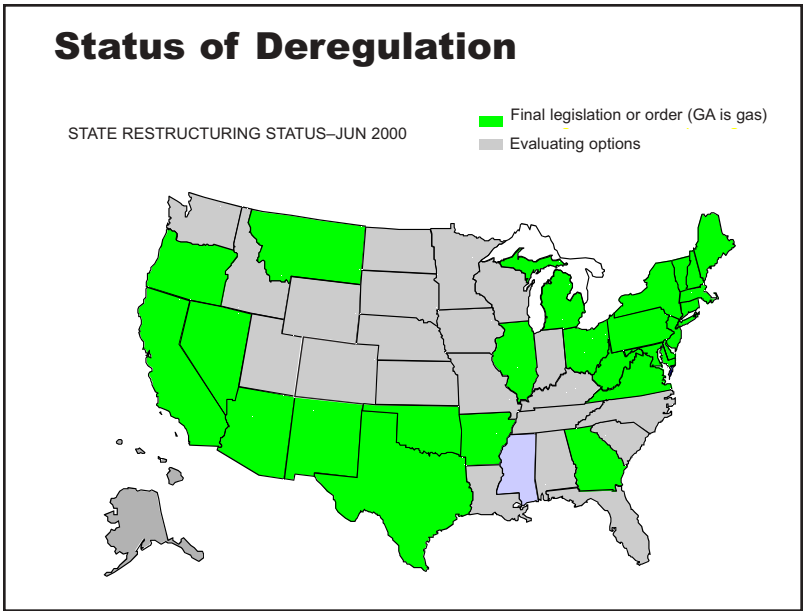
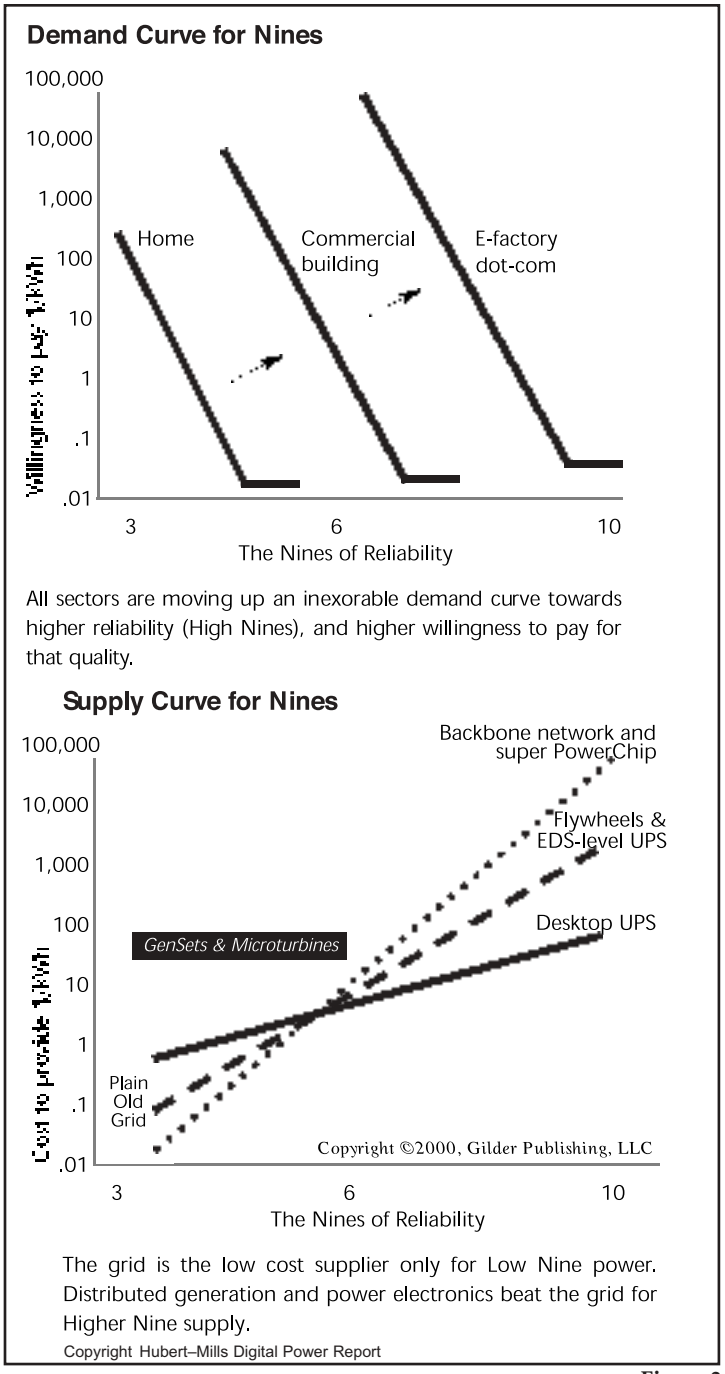


Figure 1


Demand Curve for Nines
100,000
10,000
1,000
100
10
1
.1
.01
Willingness to pay: $/kWh
Home
Commercial building
E-factory dot-com
3
6
10
The Nines of Reliability
All sectors are moving up an inexorable demand curve towards higher reliability (High Nines), and higher willingness to pay for that quality.
Supply Curve for Nines
100,000
10,000
1,000
100
10
1
.1
.01
Cost to provide 1 kWh
Backbone network and super PowerChip
Flywheels & EDS-level UPS
Desktop UPS
GenSets & Microturbines
Plain Old Grid
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3
6
10
The Nines of Reliability
The grid is the low cost supplier only for Low Nine power. Distributed generation and power electronics beat the grid for Higher Nine supply.
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Figure 2

New technologies, in contrast, are developing swiftly, especially in the areas of e-commerce, distributed generation, efficient use, systems integration, and enhanced reliability (Figure 2).

The internet is spawning new ways of doing business in an increasingly deregulated environment. Generation, transmission, distribution, customer service, and new combinations of products may be performed by separate businesses that cut costs and deliver better service using the power of the internet. These businesses may be utilities trying to attract customers to new ways of choosing and configuring their electricity services. Or utilities may conduct business-to-business transactions such as exchanges, auctions, and streamlined and data-rich procurement activities.

New technologies are being invented, improved, and implemented rapidly. Distributed generation, drawing on longstanding development efforts, encompasses fuel cells, micro-turbines, improved photovoltaic systems, and hydrogen systems. These systems offer consumer control (i.e., they have the potential to operate off-grid), reliability, and environmentally clean energy. Advances in PowerChip technology are enabling the greatly improved reliability that some internet and other companies are demanding – and making the grid less necessary for some businesses.

Incremental and institutional innovations are being made in the traditional system as well. Companies are looking for innovative ways to upgrade the national grid. Orders for units to be installed in central power stations have increased, especially below 3.5 MW and over 35 MW sizes. The emphasis is on combined cycle gas turbines. And viable nuclear power plants are increasing reliability, efficiency and prospects for relicensing.

One response to industry restructuring, uncertainty, and eroding interest of investors has been to enter into mergers and acquisitions. These actions must be carefully planned, make business sense, and be steered by expertise to deal with regulatory issues. Focusing within the value chain, emphasizing the convergence of capabilities, and beginning with analyses of customer needs are robust strategies for designing mergers that will add value.

Three major issues remain unsettled from a policy perspective. Congress has been unable to develop legislation that establishes what regulation will be set at the federal level and what will be left to states. FERC has issued Order 2000 but has not yet given clear signals about what incentives will be offered for businesses to join Regional Transmission Organizations (RTOs), invest in the grid, and create new market institutions. Finally, the extent and timing of environmental regulations covering emissions of greenhouse gases and pollutants are unknown.

In changing to a market-based industry, electricity product and service companies must navigate through older and newer regulations, often differing state by state; exploit new technologies; and restructure themselves to provide lower cost energy for consumers, enhanced reliability, improved environmental performance, and technological innovation.

These issues were discussed in five sessions at the 2000 Aspen Energy Forum. The sessions focused on e-commerce, generation and transmission technology, market forces and corporate transformation, policy drivers, and paths forward.

Session I: E-commerce

Major new initiatives and businesses are attempting to realize the potential of the internet for reducing costs, increasing efficiency and quality, and forging new and robust business networks. The contemporary marketplace is characterized by fragmentation along the value chain, for example, the separation of generation, transmission, and distribution products and services, as well as new product bundles, for example, home security with electricity. Fragmentation and the resultant new context will create opportunities to use e-commerce, and early adopters will increase their odds of being winners.

Utilities must determine what the opportunities are, establish priorities, and formulate a strategy for action (alone or in partnership). In the current environment, opportunities include websites for sharing information (business-to-business and customer-business), trading hubs, transmission regulation systems, and customer hubs (to accomplish transmission and distribution convergence).

An advantage of e-commerce is that it can provide a neutral environment for an exchange or auction site. Successful e-commerce draws in participants to this neutral environment; to do this, the enterprise must have an independent management team as well as structural flexibility within the existing businesses, perhaps groups at the corporate level and minigroups throughout the company. Much is unknown about how corporate structures will change, how and how much individual utilities will participate, how an incum-

bent can capitalize on the value of that incumbency, and what the financial effects will be.

Several immediate possibilities for e-commerce include the following:

1. An electronic exchange for wholesale trading, where either everyone trades with an incumbent or there is a neutral consortium for trading. The features of such an electronic exchange are expected to be lower cost, standardized products, real transactions, and settlement of transactions. Challenges include competing exchanges, competition from traditional brokers, development of enabling technology, and maintenance of neutrality.

2. An auction site to procure goods and services. E-commerce could save 5-15% on procurement activities and facilitate vertical as well as horizontal expansion. The initiator of the auction site must have an internal commitment to break old habits and take advantage of the new tool, and must secure an appropriate management team. The advantages to suppliers will be a share of the savings, especially in the areas of marketing and access to customers.

3. Services and products for small businesses and individual consumers. Internet energy services can include information, marketing, education, sign-up for products (bundled or unbundled), multi-utility billing, and customer services (for example, frequently asked questions). An internet business can provide one-stop shopping for energy (including off-peak discounts and green power), telecommunications, conservation, home automation, home warranties, bank services, frequent flyer miles, data on historical use, and so forth. Currently small businesses and residents face cumbersome switching rules (multiple sign-ups, required "wet" signatures) and high entry barriers (diverse state regulations and high transaction costs), which e-commerce may help to overcome.

4. Business-to-business (B2B) tools for procurement. Most tools are relatively simple translations of traditional tools, but a few companies are developing fundamentally new tools. A library of specifications can serve as boilerplate from which requests for quotations or bids can be assembled. Standard bids can be submitted in an auction format, with changes, milestones, and payment tracked electronically for a complete administrative record. Further, this record becomes a history of procurements that can be accessed worldwide for ongoing management control.

These examples are at the leading edge of e-commerce, but they do not address the question of winning strategies for customers working with millions of microchips and demanding perfect reliability. The current initiatives reflect the need to take small steps in the complex, fragmented, and uncertain environment for utilities. Since costs are not well understood, businesses are trying to minimize risks. The uncertainty is prompting some actors to advocate national-level rationalization of regulation, and there is a lurking threat of re-regulation.

Policymakers, however, are largely ignorant of the impacts of proposed policies on businesses, and there is a dearth of dialogue. Policymakers must address issues of reliability and safety but need information about technology from EPRI, manufacturers, and information technology companies. For example, instead of instituting performance standards, policymakers may need to first establish incentives to develop a data baseline from which standards can emerge.

Meanwhile, future-oriented companies are developing their own strategies for ensuring reliability, such as going off the grid completely, that suggest that brokering wholesale electrons is not the future. Today's infrastructure is sticky and will remain, but other structures will become increasingly important, for both physical and information flows. The internet now provides incremental improvements, responding to market forces in the uncertain regulatory environment. Some traditional utilities are concerned about who will control the energy business and are responding to incentives to do nothing

now. In the United States, are there too many regulators and incumbents to effect change of the sort that is sweeping other countries?

From a customer's point of view, a market approach would make it easier to choose lower cost and efficient energy services while gaining information about their own energy use that they can use to control their demand. The internet can democratize the industry; for example, with standard specifications, a community or small engineering firm can build a power plant. Energy Service Companies (ESCOs) can be democratized. The fully automated house envisioned in Fahrenheit 451 may come to be a reality.

Session II: Generation and transmission technology

Technology has enabled and perhaps driven developments in generation and transmission – but the reverse is also true; structure enables and drives technologies. One of the lessons is to keep a broad portfolio, and yet funding for energy research and development (R&D) is declining. "If the market wants it, the market will take care of it" does not apply to public goods and underserved markets; government must play a role, a role defined by vigorous public-private dialogues. One of the functions of government in supporting public goods is to emphasize longer term enabling technologies, such as terascale computation, that will facilitate intelligent management of the distribution system architecture.

In the area of micro-generation, public funding of R&D is appropriately falling off as private capital is pouring in. In January 2000 the power technology sector became "hot" in financial markets. Investment banks have formed power technology groups and started to court micro-generation technology companies, which have raised huge blocks of capital in secondary offerings. Almost as suddenly, growth in these companies slowed in the spring, but research and technology development efforts underway for decades are now giving birth to commercial products such as fuel cells, micro-turbines, improved photovoltaic systems, and hydrogen systems. Nanotechnologies can further transform micro-generation products. These technologies promise high performance and reliability,

modularity, low cost (when mass produced), minimal environmental footprint, and consumer control.

Simultaneously, the new economy is making unprecedented demands on the aging utility infrastructure for reliability, power quality, and voltage stability. Consumers, especially businesses that depend absolutely on computational infrastructures, are turning to micro-generation technologies to meet their needs. Some are leaving behind the existing utility infrastructure, which is vulnerable to weather and system faults, and has a much larger environmental footprint. Niche markets may quickly lead to mainstream applications such as micro-grids to enhance local reliability and capture load diversity. Diffusion of "disruptive micro-generation technologies" could be extremely rapid (Figure 3). The US automobile industry produces the equivalent of 750,000 MW of generating capacity each year, which equals the installed utility capacity in the United States; thus, enough generation capacity to replace the installed base could theoretically be manufactured very quickly.

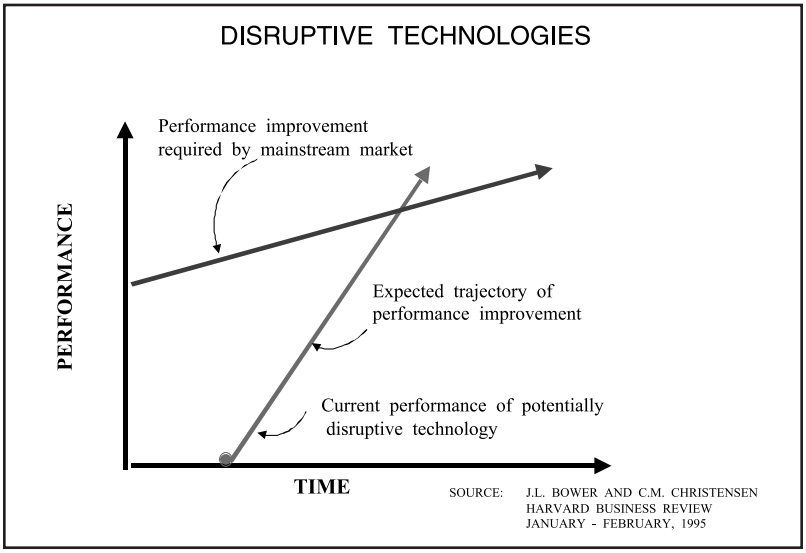

Figure 3

In today's niche markets, cost per kilowatt hour may be far less important than improved reliability to, for example, bank data centers, cyber super sites, and telecom networks. Other entry markets

include remote, non-grid-connected locations and high-cost, grid-connected places such as rural villages. As production volumes are built in these niche markets, costs will go down and the technologies will become cost-effective in larger markets.

The benefits to consumers are obvious, but utilities will benefit also. The modularity of micro-generation systems will allow faster response to load changes. Micro-generation technologies offer fuel diversity from multiple-fuel and hybrid systems, and they reduce systems losses. However, in order to realize the benefits, policymakers need to work with utilities to remove barriers such as interconnection rules and standards, charges for going on- or off-grid, "net metering," cumbersome and diverse local codes and permits, and lack of customer knowledge.

The issue of reliable electricity is nowhere so evident as on the internet, and in telecom and datacom companies. The internet is consuming increasing amounts of electricity. The traditional electric utilities have achieved 99.9% reliability, or Three Nines – but this level is no longer adequate for companies that cannot tolerate 8 hours of outage a year. Hospitals, airports, phone companies, and military bases have long had stand-by generating systems. Dot-com and telecom firms must have 99.9999% (Six Nines, or no more than approximately 30 seconds of outage per year and still enough to crash a network) reliability, and demand is growing for Nine or Ten Nines, at which point interruptions (outages) will not be network-crashing events.

However, the traditional power grid cannot provide these higher levels of reliability. Almost all of the switching on the grid is still electromechanical, so that power spikes and arcing (as well as storms and accidents) are constant threats to reliability.

Reliability at the High Nines can come from clean power systems, ride-through systems (typically battery systems that keep the system up even if the power goes out), and standalone local generators. Clean power systems switch between electrons coming off a primary power source (with its blips and dips) and electrons stored tem-

porarily in capacitors. Ride-through systems rely on batteries or other forms of short-term back-up power. Standalone generators can take a company totally off-grid to be completely self-reliant. All of these technologies present investment and market opportunities, and all present significant challenges to the grid as presently constituted.

However, there are relatively few projects to improve or increase transmission capacity and investment. Expenditures have been declining significantly in recent years, but projections for the next five years are up a modest 5%. At this time, cost recovery is highly uncertain, both from business and regulatory standpoints. Under competition, investment in transmission is risky because of long lead times, long depreciation schedules, and potentially early obsolescence. The regulatory depreciation rates (35-50 years) are far out of sync with risk, and the rate of return allowances similarly do not reflect the risk. There is strong opposition to regional rolled-in rates, and local rate recovery is highly unlikely because of retail price caps. Independent System Operators (ISOs) and transmission companies (transcos) cannot resolve the basic obstacles, at least not without cooperation from owners or builders of transmission infrastructure and regulators.

FERC's Order 2000 may lay the basis for improving the transmission systems. FERC acknowledges that current rate policies can shortchange transmission, resulting in a lack of incentives to build new infrastructure. A near-term solution may involve regional transmission owners contracting jointly to license and build all-new transmission within a region in accordance with an ISO expansion plan that garners input from all affected parties. The owners can enhance the process and eliminate delays over cost/benefit allocations. FERC would recognize the business risks by allowing reasonable return on equity or reduction of the risks by long-term rate setting or moratorium. FERC would further allow deferred recovery of new investment while under state rate caps and shortened depreciation on new investment. Within this planning and regulatory context, incentives would be introduced to ensure optimum transmission availability and reliability, thereby improving market efficiency.

In terms of new generation capacity, central station power technologies continue to take the largest share of new capacity orders, but technology options are expanding. In the United States, orders for new capacity (including repowering of existing units) have skyrocketed in the past two years, overwhelmingly for combined cycle units (Figure 4). Some of this increase results from growing demand, but competition is providing the impetus to replace "out of the money" capacity with merchant plants, retire assets that do not comply with environmental regulations, and position a generator to take advantage of transmission constraints. The dominance of orders for combined cycle technologies results from competitive operating costs (low forecasted gas prices, efficiency gains) coupled with reduced capital at risk (ease of permitting, low-cost and quick installation). Although no utility is known to be considering building new nuclear capacity, US nuclear plants that have a recent track record of improving performance have renewed their prospects for relicensing.

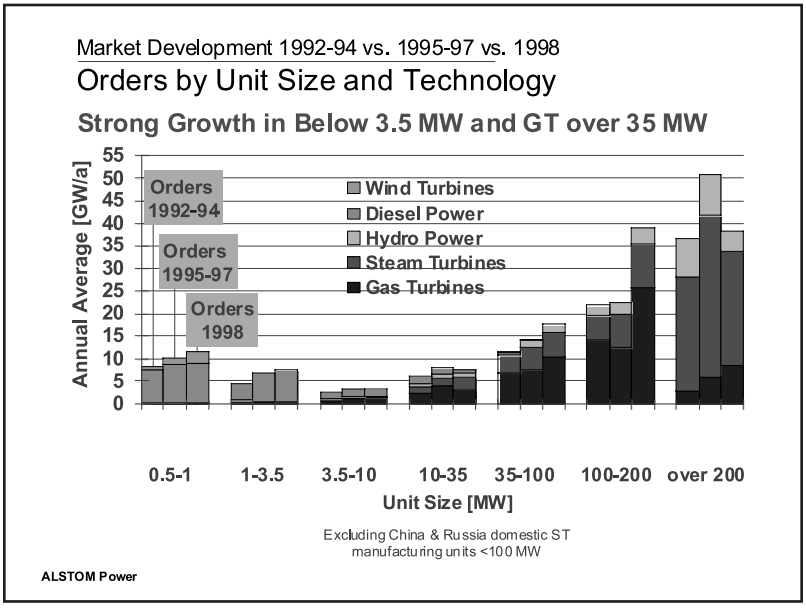

Figure 4

The constraints of the existing generation and transmission system are being addressed incrementally. Meanwhile, electricity is being produced outside the system for a nontraditional market in

which a higher cost of electricity yields an even higher benefit in High Nines reliability. And new generation technologies are making possible new configurations of equipment; for example, residential neighborhood fuel cell grids with 3-10 kilowatt units can provide rapid response to changes in load. In a truly open market, a surplus of both wires and power plants would allow substitution of the former for the latter. Direct current capability, which is inherent in most distributed sources, could once again become the preferred path – as Thomas Edison had foreseen. Thousands of datacom and telecom hotels have been built. In terms of fuels, diesel is being used for off-grid generation – or gas, in the case of California. Hydrogen and solar power are possibilities, but currently expensive. The choice of fuel raises public-good problems relevant to environmental impact.

Global markets vary from being very focused on large power plants with long lead times, to decentralized locations such as sub-Saharan Africa and Pacific islands, where there is demand for small generation units. In the twenty-first century, consumers favoring the environment may support decentralized, renewable energy backed by natural gas. However, they will remain price-conscious. When California consumers are shown the real prices, including price spikes, they may well revolt. And customers surveyed even after long outages are unwilling to pay 10% more to gain improved reliability. They will want the new, environmentally benign technologies – but only when the costs are lower.

What will happen next? In order to sort out risk and liability issues on and off the grid, policymakers need to define property rights for use of the grid that will reflect reality. However, since it may be physically impossible to improve the present grid beyond Four Nines reliability, some feel that policy and property rights may be irrelevant as the new technologies become inexpensive and invade the price-conscious market. Some believe the answer to the problems of a regulated monopoly such as the transmission system is to become as unregulated as possible and let the market work. Others point to the need for regulators to address, in addition to the necessary coordination function, dealing with stranded costs, rationalizing the national system, catalyzing initiatives such as energy consortiums, and providing the necessary tools for high-technology industries.

Session III: Market forces and corporate transformation

Equity capital markets are sending clear signals; investors are not convinced that utilities can transform themselves from regulated monopolies to knowledge-based, dynamic competitors. The S&P electric index is clearly lagging the indices of competetive industries and is even further behind high growth sectors such as the internet, technology and telecommunications. Utilities have adopted several different strategies in a business environment that is still to some extent regulated but moving towards a competitive market. Some are joining the merger and acquisition bandwagon, at least partially because size matters, with large utilities holding value better. Some are specializing in one or more sections of the value chain, for example, generation. Others are focusing their strategies on new technological systems and the delivery business.

Merger and acquisition transactions are being initiated at unprecedented levels (Figure 5), but deals take time in the United States: between 12 and 15 months versus 30 days in the United Kingdom. Legal issues abound in corporate restructuring. Formerly, in the context of a regulated monopoly, the concerns revolved around how to manage the applicable regulations. But, because the goals of restructuring today are greater efficiency, positive results for investors, and the need to achieve product and market focus, the legal concerns revolve around how to maximize value by managing differently. Major issues include state law, FERC policy, the requirements of the Public Utility Holding Company Act (PUHCA), the Department of Justice and Federal Trade Commission

scrutiny of vertical market power, tax management, nuclear issues (if applicable), union and employee benefits, and environmental regulations. Legal issue management can be characterized as finding the intersection points between shareholder value and what the regulators want. If these issues are resolved and if the merger or acquisition makes business sense, the post-merger stock price should be greater than the sum of the pre-merger individual stock prices (i.e., value creation).

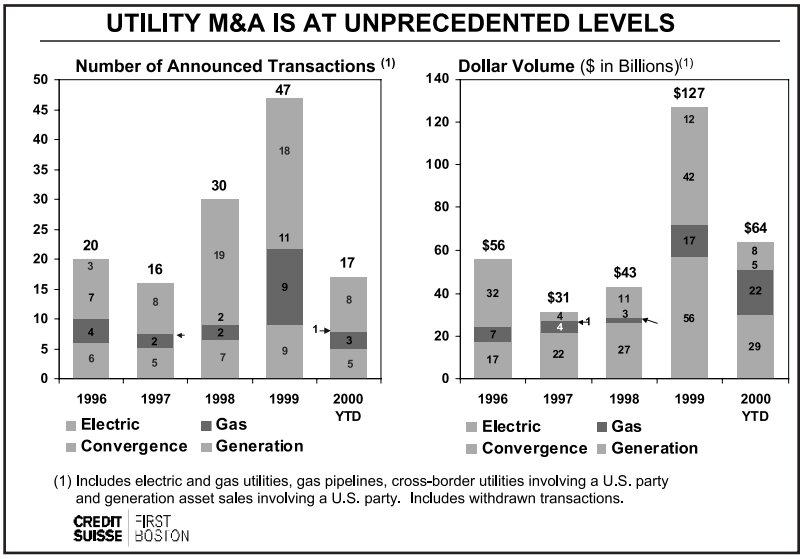

Figure 5

Consolidation seems to make sense in terms of aquisitions, not mergers of equals. The largest companies in, for example, telecommunications, oil, and airlines control a disproportionately large share of the market and yield large returns to shareholders. However, the paradox of recent consolidations, as mergers of equals, is that typically an acquiring company's stock declines more than the acquired company's stock goes up, resulting in lower net value. So a simple bigger-is-better strategy will not be successful. Of the bottom ten performers in the utility sector, seven were involved in mergers. Reasons include the length of time needed for a merger, the uncertain business environment, regulators' directing that some savings be given to customers, and mergers that don't make business sense. The latter may reflect a management desire to stay with the old ways of doing things but become marginally more efficient, for example, or utilities may feel that a simple merger will solve all their problems.

Interesting consolidations may result from focusing within the value chain. Deregulation can force the breakup of the value chain by separating generation from delivery. Some utilities have started to focus, but the trend is very lumpy. In the United Kingdom, one company put together management and maintenance functions; other companies are focusing on services. More radical restructuring will place bigger bets on a smaller set of activities.

In the gas industry, return on equity plummeted after FERC's Order 636 was issued. The mix of free market and regulation yields suboptimal situations such as having a regulated price that is above the market value. A merger allows extreme re-engineering, but the key to success in the current situation is to be nimble, planning for the relatively short term (two years) instead of initiating actions that will take 5-10 years to implement.

To meet the market-oriented goals of a merger, utilities need to think about how they are going to do business. How will the repeal of PUHCA or establishment of regulations relevant to global climate change affect the direction of the consolidated business? Where is the convergence and where can corporate areas of expertise complement each other? One partner may be skilled at arbitrage, another at managing nuclear plants. Social issues should be settled early; in particular, the partners must agree on top management and ensure support for the new company.

With or without consolidation, corporate transformations will be necessary. Many incumbent managers will be threatened by deregulation. To transform a company through a major dislocation, some believe management may need to be replaced two or three times. One strategy may be to unbundle all except the most basic activities, sell plants, and outsource performance-based management in order to redeploy private capital and transform utilities to be able to function in a free marketplace. Start-up companies often want to do only one thing, for example, billing.

Large industrial customers and residential consumers expect reliability and lower prices from deregulation, but this is not a necessary

consequence. To stay competitive, utilities must charge prices at least equal to marginal costs, and price spikes are problematic, i.e., there may be lower average prices but increased volatility, although arbitrage may smooth the spikes. Prices are not flowing through to customers, so they are not able to respond by controlling their consumption.

Starting with customer needs may be a robust way to restructure. Customer needs are changing, e.g., reliability, and putting business pieces together in the same configurations will not meet those needs. Instead, utilities can design ways to deliver the benefits of new technologies to consumers. Delivering value is the primary goal; a balanced system would deliver value to both customers and investors.

Regulations can diminish or add value. The delays attributable to regulation degrade the value of technology and promote a mindset that is too cautious. The bulk of the regulatory cost is a result of obsolete regulations that encumber management's ability to respond to market changes or that provide disincentives to pursue value-creating activities. If legislators and regulators can create a secure, rationalized regulatory structure, they could enhance the opportunities for value creation to the benefit of customers and investors. Certainly regulators have the power to ease the transition or to make it cataclysmic. Enlightened public policy can certainly create the incentive to invest in infrastructure and new technologies that will enable the new economy.

Session IV: Policy drivers

The relationships between public policy and private sector imperatives are characterized by disconnects and missing links. The goal of creating a more competitive market may conflict with the states rights that are important to some members of Congress. An aggressive business model of open competition must be tempered by the reality of existing federal and state regulations. Maximizing returns to shareholders may not be congruent with protecting electricity customers. And a free market in generation must internalize environmental costs to the disadvantage of some types of generation. Public policy must deal with these thorny issues.

Congress has had difficulty developing a consensus bill on electricity restructuring. Each member of Congress is faced with hundreds of issues, of which electricity is usually very low on the list. The sponsors of the House subcommittee-passed bill used a nonpartisan process, including investor owned utilities (IOUs), rural cooperatives, and consumers. The bill that emerged in October 1999 was endorsed by rural cooperatives and favored by municipal utilities – but disliked by many in the industry because of its states-rights orientation. The bill did not specify a date certain for restructuring, and it did not deal with transmission issues.

A significant, unsettled issue is how much regulatory authority should be retained at the federal level (i.e., FERC) and at the state level. How will the industry achieve more competition? How should

RTOs be handled – should they be mandatory or should FERC and/or the states provide incentives for companies to join RTOs? Many agree that rules about transmission would decrease uncertainty and provide investment incentives, but how and at what level should this be done? Because larger companies appear to survive better, utilities would like to operate at the national scale but currently have to learn all the different state rules. On the one hand, Congress is unwilling to appear to be telling companies to operate in more than one state. On the other hand, policymakers recognize that a state or a company should not be able to game the system by claiming priority for local customers.

FERC's Order 2000 amended the regulations of Order 888 to advance the formation of RTOs. The Commission had numerous policy objectives in mind when Order 2000 was issued. These include the need to address engineering and economic inefficiencies, to ensure reliability, to accommodate competition and improve market performance, and to reform transmission pricing.

Order 2000 will result in a significant reconfiguration of the electric industry. Utilities are being faced with important decisions about the future direction of their business. Do they want to focus on its traditional core business or do they want to be more diversified? Do they want to stay a fully integrated company or spin off assets? Order 2000 took a voluntary approach to RTO implementation. At the same time, the rule requires utilities to file their plans to join an RTO by either October or January. The FERC administrative law judge's ruling regarding rates of return on transmission assets within the recent California RTO sends a clear signal that should be addressed by the full Commission – the industry needs to know whether a utility will be rewarded for joining an RTO.

Order 2000 discussed six rate treatments that could help spur RTO formation: rate moratoriums, non-traditional depreciation techniques, incremental-cost pricing for new facilities, performance-based rates, levelized transmission rates, and rate of return approaches.

FERC will be open to new ideas on innovative rate treatments, but the use of rate of return provides certain elements that are attractive from a regulatory standpoint. These elements are simplicity, transparency, and effectiveness.

- Simplicity: Other rate treatments, such as performance-based or levelized rates, may require utilities to file more complex or controversial proposals. An approach using rate of return is relatively easy to understand and uses known formulas.

- Transparency: The effect on rates of using levelized rates or accelerated depreciation will probably not be as apparent as simply adjusting the return on equity.

- Effectiveness: A rate of return approach can set return on equity in a manner that would make it easier for utilities to join RTOs.

Any approach to RTOs should be open to sharing demonstrable benefits among consumers (through the elimination of pancaked rates) and transmission owners (through a flexible rate of return policy). This helps to ensure that everyone is better off and that incentive policies lower consumer rates.

Another part of the policy context for utility restructuring is environmental regulation. Today the electricity industry produces about two-thirds of emitted sulfur dioxide, two-fifths of carbon dioxide, one-third of oxides of nitrogen, and one-third of mercury in the US, as well as contributing fine particulates. These waste products are interactive and overlapping, contributing to climate change, urban ozone and smog, respiratory health problems, visibility impairment, and ecological damage from acid deposition. Candidate solutions include adopting integrated regulations under bipartisan legislation that would place national caps on these pollutants for the electricity sector and provide for emissions trading. The future trend for

[1]Subsequent to the Forum, a Commission decision addressed this problem.

nuclear power is more problematic; climate change concerns could prolong the life of current nuclear plants, but concerns about reprocessing and nuclear wastes remain.

Linking integrated environmental regulations to restructuring would have the advantage of providing a marketplace with internalized environmental costs (that is, the price of electricity would reflect environmental harms, for example, from emissions of sulfur dioxide). A carbon tax is an imperfect method of internalizing costs because it would not account for all costs, e.g., nuclear waste. Although achieving agreement on environmental costs could be difficult, internalizing them would reduce market distortions, provide certainty about the costs of controlling pollution, and assist the industry in assessing and reducing business risks. Environmental regulations will have a profound impact on assets. The National Academy of Public Administration (NAPA) is looking at innovations, especially the success of the acid rain program

Different stakeholders have divergent visions of the public good aspects. In a regulated industry, the clear goal was to serve customers. In this half-regulated, half-competitive environment, no clear goal has been substituted. One issue is timing. For the short term it is important that businesses stay viable and retail customers benefit. For the longer term utilities must be able to transform themselves, implement new technologies, and provide value in new products to the customer. Many potential beneficiaries may not now be able to see how they will benefit under restructuring. Perhaps distributed generation technologies will solve or ease the transmission problems, and state regulators can deal with stranded assets and other state-level issues while letting markets select the most efficient performers. Reliability issues may be the market signal that sends customers to distributed systems, thus building up the non-regulated parts of the system.

Entrepreneurs and new economy technologists are under-represented in the policy process. Because of this, policymakers could inadvertently raise barriers to implementing new technologies, as has happened in California. Even beyond eliminating barriers to

new technologies, policymakers perhaps should be structuring to encourage them. At this time technology is moving faster than policy, and perhaps policymakers should see their fundamental role as protecting the public welfare by ensuring equity, universal coverage, and reliability.

Moreover, public policymakers must carefully balance the needs of customers and utilities and consider how much regulatory authority is necessary and how to allocate that authority. The Congress, the states, and FERC have opportunities to ease the transition; create a stable set of rules, including environmental regulations; and allow the development of a competitive market and implementation of new technologies that will benefit consumers. Many of these tasks are clearly within the purview of federal legislators or regulators; state commissions, however, could settle such issues as recovering stranded costs, ensuring no mandatory divestitures where no market power exists, implementing appropriate and flexible affiliate relations standards, developing the capability to set performance-based rates, and rationalizing or reforming the retail sales tax structure so that incumbents are not penalized

Session V: What does it mean?

The electricity sector is moving unevenly toward deregulation. Some involved in the sector wish to move forward as quickly as possible; some are still questioning why the industry should be deregulated. The transition has been far from smooth. The process is not simply a matter of government withdrawal; some level of regulation will be necessary to coordinate the system, and at least the transmission part of the system will remain monopolistic at least for a time. So there is a mix of regulated and unregulated activities, with parts of the sector in historical institutions and mindsets, parts characterized by rapid innovation in products and services. The diverse experiences and experiments of states provide learning-by-doing examples, but also present a patchwork quilt of regulations that inhibit an interstate system.

In the final session of the Forum, three breakout groups were given the following charge:

> *Assume that the goals of the evolving electricity system are lower cost energy for consumers, enhanced reliability, improved environmental performance, and technological innovation. What are the five key obstacles that public policymakers must deal with to achieve these goals? Prioritize them.*

In breakout groups and a subsequent plenary session, participants agreed that the five most important policy-relevant obstacles were:

1. The electricity sector lacks a clear set of rules consistent with efficient market operation. Barriers to grid access exist as well as barriers to exit, property rights have not been well defined, and congestion pricing is incomplete and inconsistent. The result is inadequate incentives for investment and operational improvements. Markets are not good at setting consistent rules in these areas, and states set differing standards; policy is needed to set uniform transmission access, pricing, and operational rules.

2. Clear environmental rules have not been established or implemented to internalize what are now externalities. If costs were assigned to environmental "bads," the playing field for different fuels and technologies would be leveled. Although several paths to action on carbon dioxide exist, many feel that none has been chosen to address this issue, which represents a global problem on a long timescale, in contrast to shorter term and more localized pollutants.

3. Retail deregulation has not penetrated enough, i.e., consumer choice is not a reality. Consumers do not see the price signals, e.g., the pricing spikes in California, and they find it difficult to change providers (e.g., multiple sign-ups and hardcopy signatures are often required).

4. In the transition from a regulated to a deregulated energy industry, equity, public benefits, and universal service must be ensured. There is a tension between gaining the benefits of a market and assurance that these benefits (e.g., lower prices) will accrue to all customers.

5. The distribution system has incomplete standards and regulations for integrating distributed generation systems into the grid.

The participants also identified three additional obstacles to achieving an effective market-based electricity supply system:

6. Not enough funding is going into technology research and development, particularly basic research. In a deregulated market, there is inadequate funding of public goods research. Furthermore, the present regulations present barriers instead of incentives to innovation.

7. Regulators and industry leaders need to adopt a new vision and leave behind the cultural norms and traditional roles of the regulated system. Regionalism is an issue.

8. Short-term problems with the reliability of the system, particularly transmission, have raised public concern and may prevent needed action to move to a robust market system.

There was concern that the broader public may not be well represented in the dialogue about the direction of deregulation, and some of the traditional players seem to be principally concerned with collecting compensation for their stranded assets or otherwise protecting existing advantages. The challenge is to join in the continuous process of giving up some individual advantages in order to innovate together, exercising the power that knowledge brings us to create a better system

Participants

Alvin L. Alm
President
Chambers Associates

Steven A. Appelt
Senior Vice President
Administration
AEP Energy Services, Inc.

Merribel S. Ayres
President
Lighthouse Energy Group

Francisco J. Barnes
Autonomous University of
Mexico
Visiting Scholar
Pacific Northwest National
Laboratory

The Honorable Joe Barton
Chair
Energy and Power Subcommittee
House Commerce Committee

Charles Bayless
Former CEO
Illinova Corporation

Ellen Berman
President
Consumer Energy Council of
America

Larry Bickle
Partner
Haddington Ventures, LLC

Peter D. Blair
Executive Director
Sigma Xi, The Scientific
Research Society

The Honorable Linda Breathitt
Commissioner
Federal Energy Regulatory
Commission

Chester L. Cooper
Deputy Director, Environmental
Health Sciences
Battelle, Pacific Northwest
National Laboratory

Loren C. Cox
Associate Director
MIT Center for Energy & Environmental Policy Research

Etienne Deffarges
Global Managing Partner – Resources Strategy
Andersen Consulting

Brian N. Dickie
Group President
TXU Energy

Paul Dragoumis
President
Paul Dragoumis Associates, Inc.

Theodore R. Eck
Senior Economic Consultant

Patricia Eckert
Prinicipal
Patricia M. Eckert & Associates

Juan Eibenschutz
Subdirector de Produccion
Luz y Fuerza Del Centro

S. David Freeman
General Manager
Los Angeles Department of Water & Power

Larry G. Garberding
Executive Vice President and Chief Financial Officer
The Detroit Edison Company

S.I. Garnett
Senior Advisor
PHB Hagler Bailly

Jerry D. Geist
Chairman
Santa Fe Center Enterprises

John H. Gibbons
Senior Fellow
National Academy of Engineering

Patricia F. Godley, Esq.
VanNess Feldman

David Hawkins
Senior Attorney
Natural Resources Defense Council

Robert A. Hefner III
Owner and Managing Partner
The GHK Company

William W. Hogan
Lucius N. Littauer Professor of Public Policy and Administration
Harvard University

Sheila S. Hollis
Managing Partner
Duane, Morris & Heckscher, LLP

Paul Holtberg
Group Manager , Baseline Center
GRI

Toshio Inoue
Chief Economist
Cosmo Oil Co., Ltd.

Beverly Jones
Board of Directors
Consumer Energy Council of America
Adams and Reese, LLP

Melanie Kenderdine
Acting Director of Policy
U.S. Department of Energy

Wilfrid L. Kohl
Director, IEEP
Johns Hopkins University SAIS

P. Barrie Leay
Chairman
Energy Federation of New Zealand

Lynn LeMaster
Senior Vice President, Policy, Issue Management & Internal Operations
Edison Electric Institute

George Lobsenz
Editor
The Energy Daily

Amory B. Lovins
Chief Executive Officer (Research)
Rocky Mountain Institute

Edwin Lupberger
Chairman
Nesher Investments, LLC

Jan W. Mares
EOP Group, Inc.

Charles Q.Miller
Chairman and CEO
ProcureZone.Com

Mark Mills
President
Mills-McCarthy Associates

Nancy C. Mohn
Director, Marketing and Strategy
Alstom Power

Elizabeth A. Moler
Senior Vice President of Federal Government Affairs
UNICOM /Commonwealth Edison

The Honorable Ernest Moniz
Under Secretary of Energy
U.S. Department of Energy

Walker Nolan
Oldaker and Harris

D. Louis Peoples
Vice Chairman and CEO, Emeritus
Orange and Rockland Utilities, Inc.

Brett Powell
Vice President - Internet
Utility.com

James Ragland
Director, Economic Research Group
Aramco Services Co.

Ellen Roy
Managing Director
I-Group

Robert N. Schock
Senior Fellow
Center for Global Security Research
Lawrence Livermore National Laboratory

George A. Schreiber, Jr.
Managing Director
Credit Suisse First Boston

H.B.W. Schroeder
President and COO
Trans-Elect, Inc.

Phil Sharp
Lecturer in Public Policy
Harvard University

Robert W. Shaw, Jr.
President
Aretê Corporation

Clifford Sikora
Partner
Troutman Sanders

Robert Smart
President
Framatome USA, Inc.

Gerald M. Stokes
Associate Laboratory Director
Batelle

Herbert H. Tate
President
NJ Board of Public Utilities

Admiral Richard H. Truly
Director
National Renewable Energy Laboratory

Andrew W. Williams
Vice President - Transmission & Marketing
Potomac Electric Power Company

Selena Wong
Senior Economist
Texaco Inc.

Kurt E. Yeager
President and CEO
Electric Power Research Institute

Staff:

Elizabeth L. Malone,
Rapporteur
Manager, Global Change Group
Pacific Northwest National Laboratory

John A. Riggs
Executive Director
Program on Energy, the Environment, and the Economy
The Aspen Institute

Maytee Romero
Program Coordinator
Program on Energy, the Environment, and the Economy
The Aspen Institute