In 1964 the Federal Power Commission released one of the more significant documents in its nearly half-century of existence—the National Power Survey. There, for the first time in comprehensive terms, was compiled a detailed inventory of this Nation's electric power capacity, demand, and capability data. Most significantly, the survey undertook to project future demand and requirement trends through the year 1980.

Starting from a 1960 experience base point, the Survey forecast a requirement of 2.8 trillion kilowatt-hours of electric power for the Continental United States by 1980—an increase of 200 percent over the three-quarters of a trillion kilowatt-hours consumed in 1960. More significant for our purposes here, the 1980 need for peak demand generating capacity was estimated at 250 percent over the 1960 base for the electric utility industry, exclusive of industrial in-plant generation. In short, the 138 million kilowatts of peak demand capability would have to expand over three and a half times, to more than 493 million kilowatts, to meet our energy demands a short decade from right now.

Everyone here can attest to the fact that we have been living, and are living, in a period of tremendous economic growth. The very existence of your organization and the occasion for this annual conference will attest to the dynamics of our age. As national output creeps inexorably toward that magic level of a trillion-dollar GNP, it is clear beyond doubt that severe dislocations will occur if one of the contributing ingredients falls short of the expectations placed upon it. Our economy has expanded because of its almost limitless capability to harness energy, and the most convenient, flexible and fundamental form of energy upon which we rely is electricity.

Sharply increased demand for electric power is, of course, not new to our experience in this country. Practically from its establishment around 1880, the electric power industry has approximately doubled its output every decade. As is the case in every situation where growth follows a geometric progression curve, there comes a time when the base figure constitutes a challenge to imagination and creativity. That is where we are in the American energy industry.

Recognizing that we are caught up in the crosswinds of change and because electric energy is so critical to the material aspirations of our society, the Commission determined several months ago that the patterns of growth needed measurement according to a yardstick of the present. The result will be a current updating of the National Power Survey to adjust the projections made five years ago and carry them forward another decade, to 1990.
Much hard work needs to be done on this project, especially on regional differences, fuel requirements and forecasts, etc. But certain preliminary conclusions may be drawn from summary data and overall projections which have been compiled.

There was concern in 1964 about how we could meet growth needs of the magnitude then indicated. I can only tell you that there is no solace in the revised trend data. On the contrary, the road looks only longer and rougher. The growth curve not only continues upward through 1990, but its angle is more acute for both the short and long terms. Power requirements for 1970--starting just a month hence--are now predicted to be 2-1/2 percent higher than forecast just five years ago, and the earlier projections for 1980 appear to have been underestimated by a full 10 percent as to both energy consumption and peak demand requirements.

Reverting again to the hardware terms that will have direct relevance to this conference, it is now foreseen that total plant capacity, including reasonable reserve, must reach a level of nearly 344 million kilowatts in 1970, then nearly double in the next decade, and reach a total requirement of over a billion and a quarter kilowatts in 1990.

What this means in net terms is that we must add to our electric power generating plant a total of nearly 900 million kilowatts of installed capacity--or nearly three times the existing electric utility plant, exclusive of replacement requirements for existing plant as it becomes obsolete--and over the past 10 years we have retired steam generating plants at an average rate in excess of 600,000 kilowatts per year.

To give this figure added perspective, what we are asked to provide in the next 20 years is equivalent to 450 times the largest steam electric plant currently in operation in the United States. It would take the output of 670 Hoover Dams to meet the predicted capacity increase--or 1125 Hanford nuclear plants.

Historically, the rising demand for economical electrical energy has been met through development of the hydroelectric potential of our great river systems and through private investment in steam generating plants. But even the National Power Survey of 1964 saw the limitations on these standbys of the past. Good hydroelectric power sites still exist, but in proportion to the need they offer a relatively small area of opportunity. Moreover, hydroelectric development requires a long lead time and high capital investment cost per unit of energy capacity. A relatively recent concept of water power development, pumped storage, is available to supplement traditional hydro methods. But it suffers from some of the same cost problems and is limited to areas where water resources are relatively abundant.

In theory at least there are no such limitations on the expansion of fossil fuel-fired steam plants. As a Nation we are liberally
endowed with coal resources and as the size of thermal plants has increased into the range of 2 million kilowatts, a high degree of efficiency and low unit cost has been achieved. But other forces are at work: despite improvements in mining technology, coal production remains labor intensive and is experiencing upward pressures on its pricing structure. The most valuable types of coal for electric generation are also in demand for coking and other industrial purposes where a higher price is available.

But most of all, coal (and to some extent its fossil substitute, residual fuel oil) is encountering a new form of objection. Its environmental byproducts, smoke and gas emissions, have made it an unwelcome neighbor to an increasingly vocal segment of the public. This reawakening to the erosion of environmental values is being translated into legal controls at all levels of government. In particular, air quality standards have been adopted in some metropolitan areas which effectively preclude the use of fossil fuels of a quality level which has been traditional for the power industry.

To meet this challenge and still perform their proper function, electric utilities have turned increasingly to an attractive alternative energy form--natural gas. But here competition is even more fierce than for the other prime mover fuels, and demand has increased so rapidly as to raise serious question concerning the adequacy of national reserves. Already one-sixth of all the natural gas produced in the United States is used for power generation. At a time when we are seeking incentives for increased exploration and production, when increased imports from Canada and transport in liquid form are being planned and when research on conversion of coal to gas is being accelerated, it would seem foolhardy in the extreme to count it heavily in our inventory of potential electric power sources.

In its 1964 projection of future generating capacity, the National Power Survey recognized or anticipated some of these pressures by forecasting that over 20 percent of the capacity increase required by 1980 would use nuclear energy as its prime mover. This boldly optimistic forecast was substantially higher than that proposed by the Commission's technical advisory committee on generating stations. It may stand as a monument to the sales ability of your industry if the cost trends and other technological developments relied upon by the Commission staff do not produce the anticipated results.

If so, we shall not be alone. For, as you may recall, the electric utility industry reached a similar conclusion. By 1966, a landmark event had occurred. Although still classified as developmental, rather than commercial, for AEC licensing purposes, nuclear power plants in that year accounted for more than 50 percent of the new generating capacity than on order or announced for future construction.

As we look forward another 10 years in our current updating
effort, the staff has tentatively concluded that the targets set for 1980 must be set even higher, to a total of 150.7 million kilowatts of installed nuclear capacity or about 43 percent of the growth foreseen for the next decade. By 1990, the nuclear share of installed capacity must rise to over a half billion kilowatts.

Thirty years ago we could not have foreseen the nuclear alternative as even a possible solution to the rising demand for energy. Conceivably by century's end our technological horn of plenty will again produce a newer, more efficient, cheaper and more flexible answer to our insatiable demand for the energy of convenience, commerce, and comfort. But even M-H-D, the most advanced of these promised advances, offers little promise before 1990, and practically none in the nearer terms.

Given the vast demand that must be satisfied and recognizing the physical limitations on conventional solutions, I for one am convinced that we are committed to the nuclear solution for the period of present planning capability. Your conference this week is devoted to the problems that stand in the way of early realization—technological, economic and ecological. Never has it seemed so important to get on with solutions, so that the promise that we have relied upon can be an industrial reality in our time, a time that grows short.

Growing national concern for the air and water and the landscape that make up the matrix of our national environment is perhaps the most significant development in public affairs over the past decade. Speaking as a citizen and a public official charged with protection of the total public interest, I must also say that it is a most necessary and welcome development. But therein lie some of the major problems we must overcome in meeting the tremendous expansion in electric energy already outlined.

The unfortunate aspect of this increased public concern for the quality of natural surroundings is that we lack an institutional context to meet and resolve its challenge. The issues are therefore posed in the format of confrontation—or polarization, to use the current dialectic. The result is delay in meeting the visible needs of our economy and the society it supports.

This confrontation is taking place in the courts, and increasingly before regulatory agencies whose jurisdiction is less than crystal clear. To date, the emphasis has been on stopping unpopular projects—whether hydro development of the Colorado or Snake Rivers, pumped storage on the Scenic Hudson Palisades or any one of half a dozen nuclear proposals on Long Island Sound, the Chesapeake Bay or Cayuga Lake. Nor does public concern stop at the generating plant; transmission lines planned without regard to natural values or community development are being subjected to similar questioning.

The situation in which we find ourselves is not without some inherent ironies. When further harnessing of the Lower Colorado
was under attack in the middle 1960's, one of the most forceful arguments advanced was that hydro development was outmoded and inefficient. Nuclear energy was cheaper and less destructive of the total resource base. Now, however, nuclear development is opposed by some of the same people, because of radiation hazards and adverse thermal effect on water resources. With equal vehemence, generating plants are opposed in urban areas. But when the producing facility is planned and sited away from metropolitan concentration, a major problem is encountered in attempting to locate transmission lines across the intervening expanse of suburbia.

A mental rundown of a few of these confrontational situations across the country reveals a pattern. In most of the cases, the utility company is the beleaguered defendant, the opposition, the enemy--the stag at bay to put it in an attractive metaphor. Occasionally, as in New York City last fall, a utility executive is able to mount a counter-offensive, and show the public the connection between the frustration of needed expansion and power shortage and brown-outs. But overall, these struggles are characteristically marked by a "go-it-alone" doggedness.

When the United States Government moves in the direction of lending a hand it is news. It would not be unfair to say that governmental concerns and actions in the past two decades have been in the general direction of stretching out the lead-time for expansion by the addition of new procedural and substantive requirements in the public interest. Now we see a shift in emphasis.

For example, former Chairman White in his last press conference at the FPC said that his biggest disappointment was "the inability to persuade the electric power industry and the Congress that we are rushing, I am afraid almost headlong, into a situation where we may not have enough electric energy in this country to go around." (July 29, 1969)

The message of Chairman Seaborg's stark language before the Joint Committee on Atomic Energy about a month ago made national news:

"In the years ahead today's outrages about the environment will be nothing compared to cries of angry citizens who find that power failures due to a lack of sufficient generating capacity to meet peak loads have plunged them into prolonged blackouts--not mere minutes of inconvenience, but hours--perhaps days--when their health and well-being and that of their families, may be seriously endangered. The environment of a city whose life's energy has been cut--whose transportation and communications are dead, in which medical and police help cannot be had, and where food spoils and people stifle or shiver while imprisoned in stalled subways or darkened skyscrapers--all this also represents a dangerous environment that we must anticipate and work to avoid." (Oct. 29, 1969)
My reaction upon reading Dr. Seaborg's testimony, and the accompanying strong testimony of Commissioners Ramey and Thomson, was that they were very brave, and seemed somewhat lonely and exposed. After all, they must withstand attacks, however unfair, based upon the developmental responsibilities given that Commission by the Atomic Energy Act.

As it happens, our own Chairman, John Nassikas, had testified before the Joint Committee the preceding day, presenting strongly worded evidence about the magnitude of the task and its national significance. He, too, emphasized that there is a rising tide of public opposition toward the environmental acceptability of new electric facilities.

In this high-stake game we cannot afford the luxury of "winners" -- not in the sense of a utility ultimately prevailing in getting a particular plant built, or in the sense of one or the other segment of the bureaucracy emerging dominant, or in the sense of putting a conservation or citizen or university group to rout in court, legislature, or opinion polls.

The job we face is not the public relations one of "selling" a point of view as between fossil and nuclear plants, but the vital one of persuading the American people that a crisis exists, right now. For the next three decades we will be in a race for our lives to meet our energy needs.

In that job of persuasion we are starting at rock bottom. Looking back over the years that I have been in resource administrative work for the U. S. Government, I cannot recall a single decision which could be termed a breakthrough into new high ground of public rapport with the problems the utility industry--public, private and cooperative--of this country faces.

We've had great technological advances, in generation and transmission. We've had stirring improvements in a national consciousness about environment, very much to the good. We've had legal and procedural revolutions, infinitely widening the horizons for public participation in the decisional processes at local and national governmental levels and even into the corporate board rooms. We have achieved an affluence which seemingly makes possible whatever level of tastefulness we choose in the design of facilities, including transmission facilities.

But have the American people comprehended the gigantic facilities which must be built to maintain our national growth? On balance, I would say that we are not better off than when the great battles were between public and private power, or when the Insull empire's collapse gave the entire industry a black eye.

Perhaps starting at rock bottom is an advantage. No one wants the whole responsibility, and no one can claim to know all the answers. The FPC can help the AEC; they and the Interior Department can work in better coordination than they have in the past;
the cooperation among the public and private segments is better than it has been in years, but it can still be improved. Suspi-
cion of motives no longer should mark the reading of every FPC or other governmental proposal. Most of all, the great national consciousness of conservation and environmental values should be seen as an asset, not a threat.

Nobody can go it alone. The national interest and the continuance of our material progress demands a new order of industrial, governmental, and conservation statesmanship. The dialogue between idealism for natural values and the energy needs that will permit the luxury of comprehensive environmental protection must be elevated.