Teaming for Success

James J. Markowsky
Executive Vice President, American Electric Power Company

Thank you for that kind introduction.

I'm delighted to be here this morning — for many reasons. For one thing, we are near the AEP System and our 16 power plants located in Ohio, Indiana, Kentucky, Virginia, and West Virginia where we consumed 52 million tons of coal last year while achieving the second lowest fossil heat rate in the nation. Perhaps more importantly, AEP has wholesale electricity customers in Pennsylvania with ambitions to enter the retail market here in the very near future.

How appropriate, too, for me to be talking about coal in this particular setting. This city of Pittsburgh is located in one of the top coal producing states in the U.S. We are also less than 50 miles from Brilliant, Ohio, where AEP, in cooperation with the Department of Energy and the Ohio Coal Development Office, built and operated the very successful 70-MWe Tidd PFBC Demonstration Plant — the first utility-scale PFBC Plant in the United States.

Tidd is a fine example of what is possible when capable partners team up for success. Teaming For Success is, of course, essential for the continued advancement of clean coal technologies.

Introduction

Although our gathering represents both environmental and generation technologies, my main mission today is to put coal into perspective as a key energy choice that deserves more attention.

In funding coal research, in prioritizing coal technology projects, and in our communications about coal, we need more teamwork, more focus, more effort. I'm not saying that simply because of my company's involvement in coal or out of my personal involvement over many years in the advancement of coal technologies in ways that improve our environmental performance. I'm saying that because I truly believe we need to put coal back into perspective as a strategic energy choice for the future. It seems to me that this involves a lot of communication by all of us. My mission, as far as communication goes, is to promote a better understanding of energy choices and to put coal-powered electricity into that context.

Our energy choices are wide and varied, but they are not unlimited. In fact, looking at price constraints, environmental constraints, financial constraints, and technological constraints, we might be tempted to say we are faced today with the incredible shrinking energy menu. That is, we find fewer competitive and environmentally acceptable energy choices all the time.

But experience teaches us that a variety of choices are needed. We can't depend exclusively on foreign oil. We can't assume that nuclear power will be the cure-all for future energy needs. No single fuel, no single generating technology, has a lock on the future of world energy needs.

So, it becomes our task — at gatherings such as this one — to remind ourselves of our role and our contribution. And, where we find the public less aware of the role of coal and its contribution to meeting energy needs, our need to communicate effectively about coal is even more critical. And, where we find critics of coal determined to minimize its role as a source of electric power, we must ask what fuel, what new technology, what overall energy strategy can fill the gap? That is our overall responsibility because we are always dealing with finite resources and our potential for affecting the environment. And, more than ever, this is a public process in which our success depends on broad understanding of energy choices — and their consequences.

During my remarks this morning, I want to reiterate the pressures I see continuing to mount on the use of coal.

Why Coal Is Important

Let me begin by redefining coal as a strategic resource for the United States: the fuel behind most of America's electricity production is coal. Eighty percent of the coal consumed in this country goes to generating electricity.

- Coal currently provides the fuel to generate about 54 percent of our electric power.
- Nuclear provides 23 percent.
- Natural gas contributes 10 percent.
- Hydro and other renewable generation is 11 percent.
- And oil contributes only 2 percent.

Overall, approximately 800 million tons of coal are consumed annually for the purpose of generating electricity. The industrial/retail sector accounts for some 9 percent of our domestic coal consumption. It is the heat and power for foundries, iron and steel making, cement plants, and other industrial and manufacturing facilities. In addition, the coal industry pumps nearly $167 billion into the U.S. economy every year.

Growth/New Generation

There are those who believe that the restructuring currently underway in the electric utility industry will ultimately cause the demand for electric energy to decline. But, the experience over the last 20 years shows that electricity seems to displace other energy forms and maintains its growth rate, despite declines in the rate of growth of other energy sources.

To those who say that electric energy demand will decline, I say: if you really believe that, take a look around you at our crowded airports today. Compare the volume of air traffic to that prior to airline deregulation. Or perhaps they could answer this question: has long-distance phone usage increased or decreased since 1984, when AT&T was required to divest itself of the Baby Bells and enter the competitive world?

No, I do not think that reduced demand for electricity is realistic. Nor will that kind of thinking do anything to resolve the issues to be discussed here today. According to the Energy Information Agency's December 1996 report, electricity consumption is expected to grow at a rate that is slightly below 1.8 percent annually over the next 20 years. So between 1995 and 2015, electrical load will grow from 2,900 billion KWh to about 4,100 billion KWh. That's a 40-percent increase.

The question is where will that electricity come from?

Existing Capacity

Some of that demand will be met by improving the performance of existing generating assets. Overall, the capacity factor for coal-fired generation in the U.S. is approximately 60 percent. Now I'm not suggesting that after all is said and done, we'll be running at a 100-percent capacity factor. I would say to you that a significant portion of that growth could be satisfied from the current fleet, before the next generation of base-load capacity will be needed or built.

But, there are limitations on what existing coal-fired plants can do and our obligation is to deal with those limits in a proactive fashion. For one thing, approximately 50,000 MWe of existing coal-fired capacity will be 50 years old or older by 2005. That tells me that new base-load generation capacity will be needed sometime during the first decade of the 21st century.

The only real question, then, is what primary fuel will be used for this new base-load capacity addition? I would like to share my thoughts on some of the available energy choices — and some choices that may not be quite up to the task.

Nuclear? Nuclear generation? The United States has not started up any new nuclear plants since 1996 (TVAs Watts Barr), and that was nearly 22 years after construction began. Prior to that, Comanche Peak was the last plant to come on line and it began operation back in 1993. Without significant regulatory help to deal with high level radioactive waste issues and radical changes in public perception of nuclear power in general, it is unlikely that new nuclear plants will be able to be brought on line.

At the same time, many older nuclear plants will be retired as their licenses expire, or as economic conditions dictate. Earlier this year, Commonwealth Edison announced it is considering shutting down its 26-year-old Zion Plant by 2000. If they do, it will happen 10 years before its license expires. Similar decisions are being contemplated by others, and the list is growing at an alarming rate as competition approaches.

To give you a more in-depth perspective, the operating licenses for approximately 40 percent of the current U.S. nuclear capacity will expire on or before the year 2015. That's about 33,000 MWe or about 260 billion kWh of production.

Assume for a moment that a third of that capacity prematurely drops out of the picture because the risks of relicensing and operating a nuclear plant in a competitive market may not match the financial rewards. That means 11,000 MWe or about 90 billion kWh of generation may not be available — at least, not without regulatory help.

Add this to the anticipated growth of consumption and some retirements of existing fossil units and I'll ask again, where will it come from?

Oil? Oil? The market price of electricity will continue to preclude oil as a major fuel for additional power generation. In fact, current oil-fired generation, (about 2 percent of the U.S. total), may need to be replaced with alternatives.

Renewables? Renewables? Currently, renewables account for less than 11 percent of the total electricity production in the United States. Of that, about 90 percent is conventional hydro. That means non-hydroelectric renewable energy sources account for a little more than 1 percent of the total U.S. electricity production. According to EIA, hydro is expected to shrink — not grow — over the next 20 years.

In contrast, electricity generation from solar technology is expected to grow at an annual rate of nearly 30 percent. Even so, by these projections, solar generation will contribute less than two hundredths of 1 percent of this country's total electricity needs. Similar arguments can be made for generation derived from geothermal, biomass, and municipal-waste technologies.

The reality is that renewables, while very important, have physical and technical constraints that limit how much renewable generation can be added. Even if these projections are understated by a factor of 10, renewables are not a contender for satisfying a significant portion of this country's demand for electricity.

Natural Gas? Let's talk about natural gas for a moment. I doubt it is news to anyone here that natural gas is the current fuel of choice for new generating capacity. According to the EIA data sources, from an energy production perspective, natural-gas-fired electricity generation is expected to grow at a rate of nearly seven times that of coal.

In the past 8 years, about 75 percent of new capacity additions used natural gas as the fuel (IPPs), dominated by combustion turbine and combined cycle. Given this kind of growth, natural gas-fired generation could expand from 10 percent today to 30 percent within 20 years.

What does that rapid-fire growth imply? For one thing, under these circumstances, total domestic usage of natural gas would increase on an annual basis from about 21 Tcf today to more than 36 TCF. Approximately 7 TCF of this increase would be from electric power generation; currently, about 3.3 TCF is used to generate electricity.

This projection does not take into account the U.S. EPA's newly proposed standards for ozone and PM 2.5, which would increase the demand for natural gas even more. Satisfying this increase in demand would be a struggle from an infrastructure standpoint, in spite of the current efforts underway in Canada and the northeastern United States to build a new pipeline infrastructure.

Fundamental economics tell us that natural gas will cost more as demand increases. How much more? It's difficult to say. Some would say that abundant reserves of natural gas exist and that prices will remain in the $2/MM Btu range for the foreseeable future. However, if natural gas were to become the fuel for 30 percent of the total domestic electricity production as these projections suggest, new capital investments in transmission and distribution facilities will be required, which could double the price for natural gas by 2005.

Without a viable competitive fuel like coal to provide a price ceiling, more significant price increases will likely be the reality.

Coal Is an Absolute Necessity! So, we need to return to coal and look at how to keep coal in the perspective of meeting the growth demands for electricity in the U.S. The Energy Information Administration forecasts that nuclear generation will drop from its current level of 23 percent down to 11 percent by 2015. Further, let's assume that natural gas and renewable energy production, including conventional hydro, will increase to 30 percent and 14 percent of the total domestic energy production, respectively. The 14 percent assumes a growth rate for real renewable generation that is more than three times that projected by EIA. That's pretty heroic considering the physical and technical barriers facing renewables.

Still, this means that nearly 45 percent or 1,900 billion kWh must come from coal by 2015. That is 20 percent more than is currently generated from coal. It should be crystal clear to all of us in this room that the use of coal to fuel our nation's electric infrastructure is more than just an option. It is an absolute necessity. Our economy and lifestyles depend on coal now and will continue to depend on coal well into the future.

The development and use of coal technology will be critical to retain this abundant source of fuel. And the question is how will we make this happen in the face of the obviously formidable challenges that lie ahead?

Competitive Challenge

First and foremost in the challenge category, coal technology needs to be competitive with natural gas. In the past, it was natural gas that established the price cap for coal. However, given the projected demand for natural gas, viable coal technologies are needed so that coal can provide price stability for natural gas.

I don't have a crystal ball. So, I am in no position to tell you, with certainty, what the price of electricity will be in the future. However, to be competitive with natural-gas combined-cycle technology, the capital cost of advanced coal-fired capacity needs to be in the $800/kW

range, with a heat rate approaching 7,600 Btu/kWh and a fuel cost ratio, natural gas to coal, that is greater than two on a life-cycle basis.

Now I know it's not news to anyone in this room, but we are not there yet.

Environmental Challenges

But, economics is not the only challenge for coal. In order for coal technology to be a viable option among the generation technologies of the future, we need to address the newly proposed standards for ozone and PM 2.5.

These new standards will cause significant increases in the cost of generation from existing coal-burning power plants, because they will require a combination of FGD and SCR or fuel switching to natural gas as options that will need to be evaluated for each facility. A national debate needs to take place challenging the need for such standards versus the cost to the economy.

Retrofitting existing technology is a near-term solution. However, from an economic perspective, advanced clean-coal technologies could provide a much better long-term solution.

The Role of R&D

Unfortunately, the funding available for coal R&D has been declining in recent years and does not match the need to enhance the economic competitiveness, efficiency, and environmental aspects of coal-based technologies. Quite simply, funding for coal generation technology research no longer approaches the magnitude we would expect from the source of more than half of all our electric power.

Between 1994 and 1997, the DOE's appropriations for the Fossil Energy R&D programs for coal declined by 40 percent. State funding for R&D is not faring much better, as states focus on the difficult decisions concerning where to cut their budgets. Further, many of the individual utility R&D programs for coal have been caught in the vortex of electric utility restructuring. As those utilities focus on cutting costs, reducing staff, and reducing R&D expenditures, there is less focus on the need for new base-load coal-fired generation. Industry-sponsored efforts to collaborate on advanced coal technology research have waned as well. The Electric Power Research Institute (EPRI) continues to adjust its structure and priorities and programs to adapt to the structural changes that are underway in the electric utility industry.

As a result, EPRI reported that funding for coal related R&D, as a whole, declined nearly 40 percent over the past 10 years; for advanced coal, the reduction was over 90 percent. Ignoring the use of coal in the mix of new generation technologies, in my view, is a strategic mistake for this nation, which has long-term implications for energy price stability and for the economy overall.

CURC. A new organization was formed in February, 1997 to deal with this discouraging trend line in coal R&D. It is CURC — Coal Utilization and Research Council, and its members represent many organizations with an interest in the future of coal, including coal producers, equipment manufacturers, A&E firms, and electric utilities.

The role of CURC is to promote government/industry partnerships in research and development programs that will lead to the commercialization of advanced coal technology. Organizations such as CURC must be successful first in communicating the message that coal is vitally important to this country. Next, they must be able to work with government and other groups to provide leadership in setting strategic goals that would be the road map for the development of effective R&D programs that can ultimately make those goals reality. CURC cannot change the fact that R&D funding for coal-based technologies will continue to be scarce. Instead, CURC seeks collaboration to prioritize R&D programs, and to develop a balance between short-term and long-term needs.

The goal of CURC is not only to ensure that the appropriate funding levels are established, but also that the benefits derived are as high as they can be.

Balanced R&D Portfolio. The CURC approach is a valid one, I feel, that has the potential to streamline and focus our efforts without putting all our eggs in one basket of limited technology choices. I have often heard Pat Godley, whom I regard very highly, emphasize the importance of having a balanced portfolio of long-term and short-term R&D projects. I could not agree more. We need diversity in our portfolio of energy technologies, just as many long-term investors seek a balanced portfolio as they seek ways to deal with the emotional ups and downs of the stock market. Like a well-managed investment portfolio, the coal R&D portfolio must be balanced with short-, intermediate-, and long-term plans. And it should always be ready to be adjusted as market conditions change.

It is also appropriate to rethink the way our government allocates R&D funds. Under the current federal budgeting process, most of the funds that the federal government allocates for R&D are earmarked by Congress for specific projects. Too often, heavy political pressure is placed on our legislators in Congress during the budgeting and appropriations process relative to the expenditure of the limited funds available for fossil R&D projects. We must work diligently within the political system of the Congress to ensure the decisions made by our elected officials are based on good science and engineering analysis. We need to stress the strategic importance of coal to our nation, and the need to maintain the technical, economic, and environmental viability of coal. This is not to say that politics can or should be divorced from this process. But politics is the art of the possible.

We must come to terms with the fact that it will not be possible to continue to fund numerous projects when Congress faces considerable pressure to reduce spending and trim the deficit. The limited amount of R&D funding requires that we all work together to focus on the true needs of our nation. Industry, Congress, and the executive branch must move forward as a team to ensure that the maximum possible value is derived from every dollar that is spent on R&D.

Conclusion

The 21st century is nearly here and its realities will demand a new level of teamwork on technology. We may have come to the limits of what we can accomplish without intelligent pooling of resources, technologies, and strategies to keep that balanced portfolio of energy choices alive. We have had strong reference to it in this meeting already this morning (in Rita Bajura's "Bridge to the 21st Century" remarks).

In my business, we are trying to figure out just how electric and overall energy services will be provided in the new millennium, and it's fair to say we don't have all of the answers yet. There are difficult issues to be analyzed and resolved, and many complexities to be intensely debated. But I also remember Winston Churchill once said that, "Out of intense complexities, intense simplicities emerge."

Let me suggest to you an intense simplicity to keynote your thinking as you proceed through this conference. Coal is a strategic resource and has a role in the production of electricity in this country just as nuclear, natural gas, hydro and others do, as I mentioned here this morning. We cannot afford to let coal fall behind — and moving forward requires a higher level of coordination and teamwork. Industry and government must continue to work together to ensure that advanced clean-coal technologies are competitively positioned to provide a viable choice for the next fleet of power plants as we look to the future. Our window of opportunity is about 10 years.

Our nation has already invested a lot of effort and money in the development of clean coal technologies — in excess of $7.5 billion, to date. Tremendous progress has been made. Our industry and this nation need to continue pursuing advancements in the environmental, efficiency, and economic performance of clean coal technologies. I have every confidence we can advance superior technologies if we will "Team For Success" in the context of a properly funded and well-thought-out program.

Thank you for allowing me to share my thoughts in this important forum.