Energy Industry: Innovation, Reliability, Quality

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Thank you for that very nice introduction. As was indicated, I currently chair the New York State Smart Grid Consortium, a membership organization consisting of utilities, colleges & universities, technology corporations and government entities that are participating in the process of modernizing the energy delivery system.

I also chair the AERTC, or Advanced Energy Research and Technology Center, located in the Research and Development Park at Stony Brook University. The AERTC is a world class, platinum leed-certified energy research facility, designated as a "Center of Excellence in Energy" by New York State, and designed to develop new energy technologies, which improve our environment and can be commercialized to create businesses and jobs.

The Energy Center, a true partnership of academic institutions, research institutions, energy providers and industrial corporation, focuses on research in all phases of energy, including renewable energy and battery storage, with a primary focus on the production and distribution of clean energy – efficiency, conservation, renewable energy and nanotechnology.

Prior to that, I spent 50 years in the energy utility business, starting out as a Junior Engineer in the meter repair shop at Brooklyn Union Gas, affectionately referred to as BUG. Over the course of 30+ years I progressed through the ranks, to become Chairman and CEO of KeySpan Corporation, *formerly* Brooklyn Union Gas, which through acquisitions became one of the largest energy companies in the Northeast.

In 2007 National Grid, a global energy company acquired KeySpan. At that time, we were the second largest utility in the United States serving 8 million customers, with a $7 billion market cap and 18,000 employees.
I was appointed the U.S. Chairman of National Grid and Vice Chairman of National Grid PLC, a position I held for two years, until I retired . . . but that's a whole other story.

I'd like to describe to you today the current state of the energy utility business and the role of innovation, reliability, and quality.

I always start with the fact that we've been very fortunate in this country to have an energy delivery system of gas and electric that has worked for many years. It has provided perhaps the best level of reliability of any country in the world.
Through that, we have been able to have a great quality of life in this country. We have a lot to be thankful for, and a proud history to look back on.

But you've got to look forward. You've got to look to the future. The challenge now is to make the energy delivery grid more efficient, so we can deliver energy to the consumer at the most efficient reasonable cost, without sacrificing reliability.

We also need to reduce our carbon footprint by incorporating more renewables into the system. Further, we need to be going to more distributed generation, so the customers have more control over their energy supply and can do it in a more efficient manner. But all of that adds a great deal of complexity to the energy delivery system.

When I talk about the energy delivery system, I mean both gas and electricity because I think they're very closely connected.

The challenges are many but they're certainly achievable. We can achieve them if we manage the process in the correct fashion. What do I mean by the challenges?

I'll start with the incorporation of renewables into the grid. The grid was designed to be supplied by large central generating plants. They distributed the energy out into the local distribution system through transmission and then through local distribution.

That was the basic model, and primarily all the electric distribution systems were built to do that. We're now talking about changing that model. We're talking about incorporating renewables, which are not perhaps as reliable as traditional older generating plants.

What I mean by reliability is, most renewables will be coming from either solar or wind. We know the sun doesn't shine all the time and the wind doesn't blow all the time. The wind really does blow all the time, but maybe not at the same velocity.

You must be able to provide backup power when those sources are not available. That means you must have some type of utility-size storage, which is being developed, and that's the good news. Or you need some conventional generation to back up renewables when they're not available.

That's one of the challenges, which I think is being addressed through storage and also through some more distributed generation.

There are certainly a lot of constraints and complexity. The complexity comes about because the utility now has to be able to manage all of the various sources of energy being delivered to the grid. Renewables are a big part of this, but also the utility has to be able to incorporate more distributed generation into the system.

That's different from the traditional utility model. You're going to have customers that may have solar. They may have combined heat and power. They may have co-generation, or they may have fuel cells providing their energy from off the grid and in some cases delivering energy to the grid.

It presents some challenges because the electric utility has to figure out how to incorporate all of these variables into their overall load management. They also have to provide opportunities that make these sources of generation available if there are disruptions in the utility grid. It takes a great deal of coordination, to do all of this and maintain a reliable electric grid.

It's doable, but we're going to have to have new technologies developed to be able to manage that complexity. Utilities will have to become a lot more knowledgeable about data management and operations to be able to manage what is a much more complex grid.

The N.Y. State government has set a goal to have fifty percent of its power from renewables by 2030, while also reducing the carbon footprint. You have to start with goals, and then you have to figure out how to achieve those goals.

How do you make all that work in the marketplace? What is the regulatory model that can work? For people to make investments, at least initially, you'll probably have to provide some incentives. You also have to make it worthwhile for the utility to participate in this new model.

It's important to think about the role of the utility going forward. Should utilities be able to invest in renewables and distributed generation? I think so.

But that presents some challenges from other competitors to the utilities. You have to start with the big picture and establish your goals. Then you need to think about which regulatory models need to be put in place that will make it all work.

I grew up in the gas industry. I think there's a very important role for natural gas to play in our energy future.

If you're talking about distributed generation, combined heat and power, and fuel cells, natural gas is the ideal fuel to provide energy to those types of distributed generation, and for the most part, at least on the local level, the gas distribution network is in place.

You don't need a lot of expansion, except in the areas perhaps in Eastern Long Island where there isn't a gas infrastructure. But in most cases the existing system is in place. And the good news is that it's a very different supply situation from years ago, when we thought we were running out of natural gas, particularly in the U.S.

We now know we have vastly more natural gas than we thought in the lower forty-eight. We may have more than any other country in the world. The U.S. is becoming an exporter of gas, unlike when I went to Canada thirty years ago to import gas to the U.S.

True that natural gas is a fossil fuel. It's the cleanest burning of the fossil fuels, so I think it should play an important role in the mix going forward.

There is an issue on the production side that needs to be addressed. I am a believer that fracking for natural gas can be done safely if it's done properly. I emphasize the word properly. Wells should not be drilled in environmentally sensitive areas.

The well construction needs to be so that you're not going to have any leakage. You also must deal with the water disposal problem. I'm an engineer, so I'm a problem-solving guy, but I think those kinds of problems can be solved. So, I'm a big proponent of natural gas playing a stronger role in our future and I think it's going to be necessary for it to do so to reach our environmental goals.

I'm not sure my crystal ball can see the next ten years, but I have to use an overly used phrase. I'm cautiously optimistic. That's because while there are these challenges out there, I see new technologies being developed that I believe can deal with those challenges.

I believe it's going to take a period of time. I don't think it's going to take five years. It may take ten years, or maybe longer, where we'll see a completely different energy delivery system.

We'll see more renewables incorporated with the system. We'll see more distributed generation, and I think we'll get to the point where we'll also see the customers having a lot more control over their energy usage than we have had in the past.

So, I'm optimistic. I think it might be my grandchildren who will really see the benefits of what's going to be a much more environmentally sensitive, efficient, energy delivery grid that will continue to provide reliable power to keep the lights on.

As I mentioned earlier, I currently chair the Advanced Energy Research and Technology Center at Stony Brook University.

The Advanced Energy Research and Technology Center is the Center of Excellence in energy. Its primary role is to do energy research and develop new technologies which can be commercialized.

The benefit of being at Stony Brook University is that we have students both at the graduate and undergraduate level working with our researchers and incubator companies.

So, the researchers have the advantage of having students working with them, and the students get a tremendous education on the research aspect of energy. The energy center is closely connected to the engineering school at Stony Brook University.

The person I collaborated with to get this center built was Dr. Yacov Shamash, who was the dean of the engineering school. We were the two guys that decided that building an energy center at Stony Brook would be a good fit for New York State.

What really goes on at the center is energy research in every facet of what I call the energy value chain. We're starting at the production end, looking at producing energy from biofuels and renewables like wind and solar that feed into the distribution system. We are also doing research into new technologies that are going to make our energy delivery system more efficient.

Our research includes battery storage, and technologies at the customer end. We're looking at developing new technologies, which are going to allow the customer to manage their energy use more efficiently and more economically.

The advances in new technology come from research. These advances in technology have provided us with many great things, whether it be in the scientific world, the medical world, or the engineering world.

Research is important. That's where technological advances come from. But it's a long-term plan that needs continued investment.

When we had the vision of the energy center, we had the vision that we would be doing some basic research. That is what professors do. They write papers, which get published, and provide a basis for future research.

But we wanted to do more applied research.

At the energy center, that means developing technologies that could be commercialized and could eventually produce companies and jobs. In addition to the research facility, we have a number of incubator companies that are commercializing these new technologies.

Hopefully they will be commercialized, and these companies will become growing businesses. The research end is where it begins, and then hopefully the technology of commercialization follows.

Continued funding of the research is critical in my opinion, to fuel the process, and it must be a long-term investment to be successful.

An example is the critical research done at our national laboratories. Stony Brook has a very important relationship with Brookhaven National Laboratory. Brookhaven Lab is one of the ten Department of Energy laboratories in the country. It is one of the larger ones.

Brookhaven, because of its high-powered facilities, can do very basic research.

There's a very close collaboration between Stony Brook and Brookhaven, and many employees are actually co-employees at Brookhaven and Stony Brook. It is essential that this continue to be funded.

One of the areas where I think we will see some real breakthroughs is in the battery storage area, which I mentioned earlier will be necessary to incorporate renewable into the energy production mix.

It's happening already and obviously, from our standpoint, we want to see batteries get to grid-level size. So, they can really be there as backup for renewables, and can enhance the reliability to the grid. I think that's one area where we're going to see some major breakthroughs.

The other area where we're going to see some major breakthroughs is in the technology of managing the energy delivery grid. I think we're talking about developing new types of sensors which give us the ability to analyze the flows in the grid.

This will give us the ability to be much more effective when we have interruptions, whether it be through storms or other incidents. This information will become available to the utilities, in times of interruption, to more quickly restore the grid. I think those technologies will all be developed in the near future.

We have an entity that works in close collaboration with the energy center called the New York State Smart Grid Consortium. I'm the chair. We are looking at the new technologies that are going to be necessary to make the grid more effective and more efficient.

I act as a bridge between Stony Brook and Brookhaven. Since I'm not smart enough to make the decisions on what kinds of research we should be doing, my role is really to connect the researchers with industry. I'm trying to get more industry participation.

While I mentioned basic research is important, I think it's also important for the researchers to understand the needs of industry, and what things cost, which is my area of expertise.

I chair the energy center advisory board, which is a collaboration of people from colleges to universities, industry and utilities. The board members role is, in my opinion, one of the most important roles, because it is designed to help mix researchers with industry representative. This is how we can really develop technologies that can be commercialized.

We are very fortunate at the energy center, because we have been able to get significant funding through grants. Most of it has come from the Department of Energy.

I play a role in working with the researchers, the PI's as they call them, in drafting proposals to get funding for grants. I bring an industry perspective to the table. I'm certainly not a researcher by trade. But I have had many years of experience in the energy industry.

The utilities are the backbone of the energy delivery system. Gas distribution and electric distribution are primarily the world of utilities.

In order for utilities to continue to provide effective, reliable, economical power or gas to the customers, they need to be more innovative in doing it. We can't do it the way we did it for the last one hundred years, even though it worked.

In order for it to be effective in the future, utility thinking has to change. They have to be thinking about the future. What are the customers' needs going to be in the future? That takes innovative thinking.

I'm not knocking the old utility industry, because I was part of it for many years. I think we did a pretty good job. But as we look to the future, the utilities have to be able to think differently.

The system's going to be designed differently, and it's going to operate differently. It really is all about innovation and technology. I think the utilities are bringing people in who really can provide that new perspective.

It's not your grandfather's utility anymore. It might be my grandchildren's utilities in the future. But, I think innovation is critical to make the utility even more relevant, and also to be able to provide economic, reliable service to the customer.

I think what's fun and rewarding to me is the fact that I can bring my many years of business perspective, and interact with the people that are really developing our future. Also, I can assist in developing the technologies that are going to empower our energy future.

I get a lot of satisfaction dealing with the young people (the students, graduate and undergraduate), hearing their thoughts, and being able to bring my perspective to the table as well. That gives me a lot of satisfaction.

Thank you for your attention and for letting me share my energy industry insights with you today.