**Keynote Speech**
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The evolution of the Smart Grid is the most important – and potentially the most beneficial – development that has occurred in the electric utility industry in New York State since I started representing the seven electric utility companies of New York State in 1973.

Implementing the Smart Grid in all of its aspects requires both a sense of urgency and of realism. The benefits are very large (1) in improving the efficiency and reducing the costs of the electric system of New York City and of the nation, (2) in improving the reliability of the system, particularly through optimization of the distribution system, (3) in reducing the environmental impact of our current electric system, (4) in creating a new culture of consumer choice and control, and (5) in setting a technological foundation for the enormous and unimagined changes that will be brought to the electric power systems of this country and of the world.

At the same time, there is a lot we do not yet know. We need to explore how the new technologies will actually operate in practice to control a utility's system. The Governor's Office, the PSC, and ConEd, NYPA and LIPA were wise to pursue demonstration projects that, in Con Ed's case, would explore almost every aspect of the Smart Grid to learn what we can from real world experience.

The revolution that took the telecommunications industry from electro-mechanical technology to digital technology almost overnight, with new innovations pouring into our lives constantly, will be mirrored by the merger of communications technologies with power technologies and the ramifications of new products and new control opportunities we cannot now imagine.

The article that appeared in the New York Times this past Sunday gave one intriguing glimpse into the evolution of electric power controls. The article was entitled "Smart

Dust? Not Quite, but We're Getting There". Its subject was the development of micro-chip equipped sensors just a few millimeters in size which are designed to monitor and measure not only motion but also temperature, chemical contamination and biological changes. Applications, the article said, include buildings that measure their own energy use, bridges that sense motion and metal fatigue to tell engineers when repairs are needed, and the like. These sensors do not need batteries but would take their power from the ambient radio power from television and WiFi networks or other such sources. A vice president at IBM was quoted as saying "You can see that sensor computing is going to be important and useful, but it is not possible to see in advance just how it will transform things."

You can easily envision such tiny sensors attached to each appliance in your house and controlled from your computer. This can evolve from the same kind of information technology and control software that is the foundation of the Smart Grid.

To me, the most critical element of the Smart Grid is that it empowers customers by giving them information and control. Consumers will automatically manage, through their computer portal, their electric power usage according to their personal consumption preferences, such as by telling the portal to turn off an electric water heater when their home is unoccupied, or by specifying a fixed amount they want to limit their bill to each month and selecting the usage options offered by the computer portal that will achieve this result, or by answering the question of whether they would like to save 85% of the annual power cost of their digital TV by instructing their computer to shut down the power outlet connecting their TV when they are not using it, and the like. Utility customers thus become, for the first time, empowered and informed consumers.

At the same time, the Smart Grid opens the door for utilities and their customers to establish two-way communication, which helps utilities save their consumers money by effectively managing peak periods. For example, during a peak period, utilities can avoid dispatching an inefficient peaking unit by adjusting customers' thermostats by only a few degrees. Customers who opted into the utility program through their online electricity portal can receive a reduction in their bill in exchange for their participation.

To illustrate the benefits of a Smart Grid, consider a single emerging technology: plug-in electric vehicles. Nissan and General Motors are among several automakers that will release plug-in vehicles beginning this year, A study by the Oak ridge national

Laboratory concluded that 160 new power plants would be required if everyone plugged in such a hybrid in the early evening, when demand is already high,. With smart grid technology, utilities could stagger charging times and offer consumers lower rates for off-peak electricity, This capability, called “smart charging”, would eliminate the need for most of these power plants.

There are also major efficiencies to be captured in transmission and distribution. Much progress has been made by leading companies such as Current and others in implementing upgrades to distribution and transmission systems that would provide visibility and control over problems in the distribution and transmission networks. Network problems would be automatically diagnosed and the new Smart Grid technology would tell a specific device to take a specific action at a specific time and place to improve the efficiency or the reliability of the distribution grid. For example, the Smart Grid technology enables minimization of line losses by automatically redistributing power flow and balancing current to maintain optimal balance between voltage, frequency, and reactive power. These initiatives have the potential to significantly increase – some experts say by up to 10% - the power delivered to customers from a fixed amount of generating capacity.

These solutions are most readily put into place in areas without the density and complexity inherent in New York City’s network, but even in New York City there is room for significant increases in distribution network efficiency, and Con Edison is putting into place a number of initiatives in four areas of Queens which will provide data on the potential visibility and efficiencies that can be achieved in this complex network.

So the benefits are clear and real and enormously important:

(1) an efficient electric system with the lowest possible cost to consumers;
(2) a highly reliable system, self-correcting or self-healing, as the jargon has it;
(3) an environmentally friendlier electric system;
(4) a system in which customers have choice and control; and
(5) a system based on a technological foundation from which it can continue to evolve and improve

Smart Grid in urban areas will evolve naturally into Smart City initiatives utilizing communication and other technologies and creativity to revolutionize the way we think about so many aspects of urban life – management and delivery of water, collection and disposal of waste, transportation of people, transport of goods into cities and waste out of cities, perhaps using the same vehicles, and so on.

Challenges to Implementation, Particularly in Major Cities

1. Wireless Communication Challenge – No simple, "one size fits all" smart grid communications solution in dense residential or office buildings. In New York City, in particular, Con Edison has noted that "[o]ne of the challenges is the terrain of the city: the buildings in New York City create canyons which make a conventional wireless communication approach difficult without significant investment."

2. Difficulty of optimizing distribution systems in underground networks although much can be done – for example, placement of sensors underground that would help identify the location of a problem and would help utilities predict feeder line outages in advance and thus repair them before the outage takes place.

3. Need for a shared vision among key stakeholders and for collaboration. Key constituencies need to come together to support demonstration projects and implementation investments that will have massive benefits in improving system efficiency, reducing system costs, reducing the need for expensive new power plants, reducing the cost of power at peak periods, increasing reliability, integrating renewable resources into grids, and reducing carbon emissions. In New York City entities like the Partnership for New York City and the NY League of Conservation Voters could play an important part in developing such a consensus and supporting such initiatives,

4. Regulatory Policies – There are two regulatory issues that bear significantly on the success of a Smart Grid initiative.

First, utilities will need confidence that they will not be penalized for making Smart Grid investments that will reduce consumer costs on a systemwide basis. The focus should be on the total customer bill, with the need to reward both the utility and the customer for conservation.

In New York, the PSC adopted a few years ago a revenue decoupling mechanism, which should make utilities agnostic on demand reduction since utility revenues would not decline with the decline in sales. Indeed, utilities should be incentivized to implement creative approaches to induce conservation, and in New York it is my understanding that utilities are incentivized to some extent by virtue of incentive mechanisms that have been put into place.

Second, there is a need for time of use pricing to enable utilities to send price signals reflecting the marginal cost of power. These price signals are needed to give incentives for customers to take action to reduce the costs incurred by the system and therefore by the utilities' customers.

The US Department of Energy's Smart Grid System Report (July 2009) reported that in 2008 slightly over 1% of all customers had a "dynamic pricing tariff", with nearly the entire amount represented by time-of-use tariffs. This statistic, indicating that only 1% of consumers in the US are receiving a price signal reflecting the true cost of the power they are purchasing, represents a great challenge to inducing consumers to conserve during on-peak hours, when the least efficient plants are being dispatched.

New York State today prohibits by legislation the mandatory imposition of time of use pricing on the typical utility customer (aside from very large industrial customers). Time of use pricing in New York is voluntary. This needs to change in order to provide incentives for a more efficient system where pricing reflects marginal cost. I believe this legislative change should be enacted in the interest of all electric customers in New York State.

I would like to touch on two additional regulatory-related issues:

1. The Cost Backlash – Despite the enormous benefits that customers will achieve in so many ways from the buildout of a smart grid network in this country, we saw in 2009 the first significant signs of a backlash against the costs imposed on utility customers to pay for a utility's rollout of smart meters, evidenced by a lawsuit by customers against PG&E. There have been other manifestations of consumer opposition in other parts of the country. The danger here is that utilities will become more reluctant to propose to regulators the implementation of smart grid capital programs and that regulators will become more cautious in approving capital expenditures by utilities. This would be a major setback since before the DOE smart grid stimulus grants were announced, utilities had been painfully slow in expending their own funds to built out their smart grid networks.

I believe that what is needed in each state, including New York, is a thoughtful and vigorous advocacy program by a coalition of business, environmental, and public entities focusing the attention of citizens, elected officials and regulators on the enormous benefits to be provided to customers and to society by a far more efficient, less costly, more reliable, less polluting electric system in this country.

2. Setting Standards – Increasingly it is becoming clear that the build-out nationally of a smart grid network requires a high level of confidence by utility companies and their regulators and standards-setting organizations of the interoperability of smart grid deployments. The winning technologies in such an environment will be those based on open-standards which can effectively operate in conjunction with both decades-old utility deployments and new offerings by the various smart grid supply competitors.