



**Harvard Kennedy School Energy Policy Seminar Series, Spring 2014**

## **Rethinking Electricity Distribution Regulation**

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**By Louisa Lund, Program Director, Consortium for Energy Policy Research**

“The next revolution in power systems is probably coming in distribution,” speaker Ignacio Pérez-Arriaga said in this week’s energy policy seminar.

For a long time, Pérez-Arriaga noted, changes in the electricity system seemed to occur primarily in the areas of large-scale generation and transmission, with local distribution being a matter of maintaining wires to support simple one-way flows of electricity to customers. However, this picture is changing with the growing importance of distributed energy generation (like rooftop photovoltaics), energy storage, and the use of demand response.

With these changes in mind, Pérez-Arriaga is investigating whether there is the potential to develop “Distributed Energy Systems” that would use information and communication technologies to enhance the value of individual distributed energy resources (for example, by aggregating individual intermittent resources to provide a service to the power system with economic value, as operating reserves).

A focus of Pérez-Arriaga’s talk was the regulatory changes that might be necessary in a world of Distributed Energy Systems. From a regulatory point of view, there are a number of problems with the current system that would need to be addressed, he explained. One well-known problem is with current tariff design, which Pérez-Arriaga described as “totally inadequate” for future network users. For example, the currently common “net metering” approach used in billing customers with PV generation, when combined with volumetric tariffs and conventional meters, results in these customers paying a much smaller share of the costs of maintaining the distribution network than other customers. This problem will only be exacerbated to the extent that distributed energy requires additional investments in the distribution infrastructure. A significant growth in distributed PV energy, for example, is likely to require distribution line upgrades, to handle the increased amount energy flowing along the distribution lines. Other investment needs may include devices like smart meters and protective equipment for lines with multiple power sources.



In order to accommodate these new demands, Pérez-Arriaga suggested a system in which charges are based on actual costs associated with how individual users interact with the system and their individual profiles withdrawing and injecting power to the grid. Other changes that may be needed are changes to incentivize distribution utilities to pursue innovation and to enable them to interact in a more sophisticated bi-directional way with independent system operators and wholesale energy markets.

Pérez-Arriaga spoke as part of the Kennedy School’s Energy Policy Seminar Series, which is jointly sponsored by the Energy Technology Innovation Policy research group of the Belfer Center on Science and International Affairs and by the Consortium for Energy Policy Research of the Mossavar-Rahmani Center on Business and Government.