

The Value of the Grid

By Fereidoon P. Sioshansi

Mike Howard, the Electric Power Research Institute chief executive officer, more than a year ago promised something every regulator and policy maker is craving: a step towards a framework for evaluating the worth of being connected to the grid.

This is no longer an academic curiosity since distributed generation options allow an increasing number of customers to get an essentially free ride on the grid without paying for the valuable balancing services it offers.

Determining that value is critical because it will help regulators decide how much to charge customers to maintain and upgrade the distribution network. This is amongst the most controversial issues

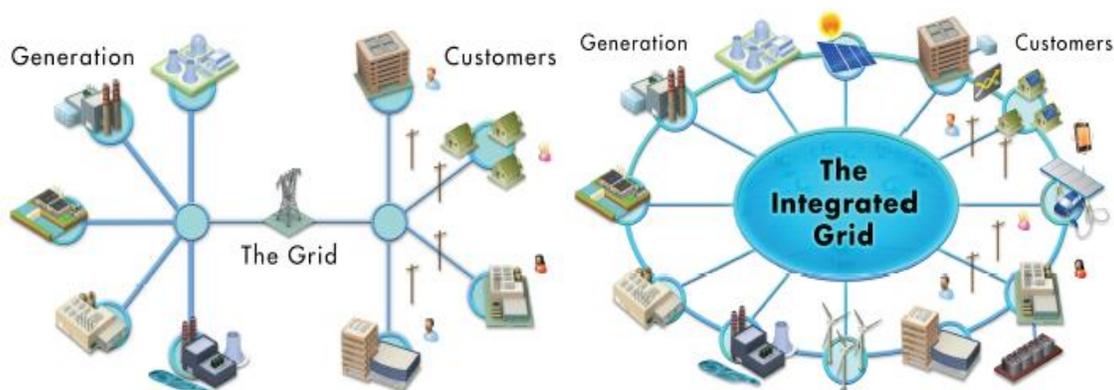


facing California and other state regulators as the debate about distributed generation, rooftop solar panels, micro-grids operating more or less independent of the grid, and exotic patterns of electricity consumers—or

prosumers—proliferate.

Central to setting *just and reasonable* tariffs—every regulator’s mantra—is deciding how much the reliability, back-up and balancing services that come from being connected to the ubiquitous grid is worth to the growing numbers of **prosumers**—consumers who self-generate virtually as many kWh as they consume, but not at the same time they consume it.

The future grid is integrated, as on the right rather than the historical utility-centric paradigm, on left.



Source: The integrated grid: Realizing the full value of central and distributed energy resources, EPRI, 2014

These prosumers increasingly rely on the grid to balance their self-generation and internal demand. And since nearly all residential consumers in the U.S. to date pay little or no fixed fees for being connected to the grid, they tend to get a *free ride* on other customers who continue to buy all their electricity from the grid. As directed by state legislation, the California Public Utilities Commission is grappling with revising residential rates to provide more equity between the solar haves and have nots, and between those in hot summer climates versus cooler regions (see page 1).

It is a pressing problem as the cost of self-generation continues to fall relative to the cost of buying from the grid in many high retail regions around the world. (This was not an issue in the past since virtually all consumers bought nearly all their kWh needs from the grid under bundled tariffs).

EPRI's promise, delivered by its CEO at last year's conference of the National Association of Regulatory Utility Commissioners, was well-timed and pitched. EPRI offered NARUC an unbiased answer from a respected research institute that is legally prohibited from lobbying.

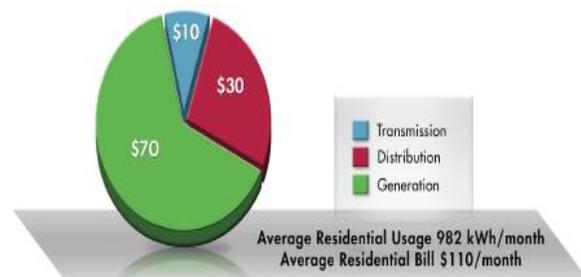
This makes a huge difference compared to a study coming from the Edison Electric Institute, whose main function is to lobby for the investor-owned utilities. Likewise, studies conducted by many other organizations are occasionally tainted because one often wonders if the source of funding for the study affects the results.

Other organizations, such as the Solar Energy Industries Association and environmental groups, are occasionally suspected of offering biased views. The same applies to many think-tanks and most consulting organizations. One always wonders where they get their funding or who pays the high billing rates, respectively.

At the February 2014 NARUC meeting, knowing what the regulators wanted to hear, Howard said, "What we want and what utilities and the public need is a consistent, repeatable and transparent way to do these (benefit-cost) scenarios based on a set of core assumptions," as he described EPRI's project titled *The Integrated Grid: A Benefit-Cost Framework*.

Cost of service for average US residential customer

Cost of Grid Service: Energy and Capacity Costs

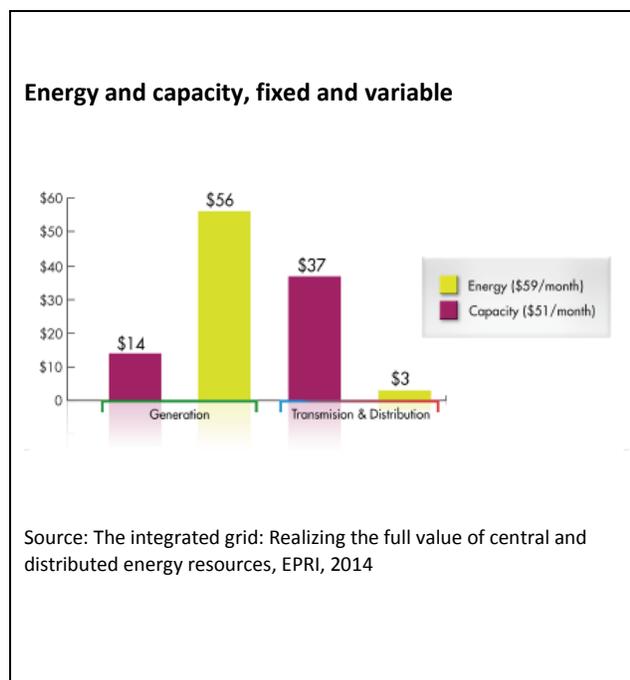


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Howard said, by applying insights from science, engineering and economics, the grid of the future will be transformed from one of interconnected parts to one that fully integrates distributed *and* central energy resources while providing safe, reliable, affordable and environmentally responsible services at a level not seen before. This, he said, would be in contrast to the historical utility-centric paradigm, which is shown on the left side of the same schematic. The traditional utility view of the world has been "us" vs. "them," with the grid as the conduit to deliver electrons as a commodity to passive consumers. This view is being challenged as consumers become prosumers.

This blueprint consisted of three steps to define and describe the integrated grid of the future, identifying questions, including how much the services offered are, or would be worth to the average consumer or prosumer, and realizing that not all consumers would want or be able to self-generate.

This is a critical issue as regulators must find a fair and equitable way to allocate the costs of maintaining the network among consumers and prosumers— since they will continue to rely on the grid.



In mid- February 2015, EPRI released a *framework* that aims to enable users to assess benefits and costs of various technologies and systems related to the integration of such distributed energy resources as solar, wind and micro-grids, into the planning and operations of the electric system.

The pilot projects, where the *framework* can be applied, have the potential to provide technical and financial insights, as well as a roadmap to support the deployment of what EPRI calls “The

Integrated Grid” —one that makes the best and fullest use of both central and distributed energy resources. EPRI, like many others, expects a future where the best elements of centralized and decentralized systems can synergistically co-exist.

The interim report, however, is a dud: a long and wordy document that does not offer many useful insights. Perhaps that is the way *frameworks* work, defining a road map for further research.

EPRI says the pilot projects will provide a better understanding of the operational values, performance issues and economic benefits of an array of grid integrated distributed energy resource deployment, including utility-scale photovoltaic projects; utility-scale solar with energy storage; distributed energy storage; micro-grids; electric vehicle charging infrastructure; and customer-side technologies.

At least the list covers the key areas of interest, offering a foundation from an unbiased source.

In the meantime, regulators are waiting for simple answers to guide them in making important decisions while in uncharted waters.

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