Points of inflection loom ahead for demand response and distributed generation

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DR – yesterday and today

The original impetus came from a desire to clip peaks

The focus was on load curtailment programs that targeted large commercial and industrial customers whose demand reductions were bid into wholesale capacity markets

But sales growth has not returned to its pre-recession levels in much of the country, six years after the recession ended

Many utilities don’t see a need for new capacity for several years
DR in the future

The focus will shift to retail markets, regardless of what happens to FERC Order 745

Residential customers will draw more attention

Price-responsive demand will become more visible

The objective will be to improve load factor and not just to curtail peak loads
“Organic” consumers will be amenable to changing their load shapes

They are passionate about controlling their energy use not only to save money but also to lower greenhouse gas emissions and create a greener planet

They are likely to embrace dynamic pricing and help overcome regulatory apprehensions about a customer backlash

Change is already underway

- Canada has deployed default time-varying rates to 4 million Ontarians
- The Massachusetts DPU has issued a straw proposal for default time-varying rates
- The NY Commission just convened a major conference on time-variant pricing
There is plenty of evidence that consumers respond to price.

Furthermore, that enabling technologies boost price responsiveness.
Aggressive renewable energy standards will create a new application for DR

The share of renewable energy resources in their generation mix continues to rise for most utilities.

The “duck curve” of net loads looms in the distance, not just in California, but in many parts of the country.

“Fast” DR, which combines pricing with enabling technology, can be used to integrate renewables into the grid.

In the early 1980s, the concept was propounded by MIT’s Fred Schwepppe as “homeostatic control” and by EPRI’s Clark Gellings as “flexible load shaping”
Fast DR will facilitate Dynamic Pricing 2.0

Simple time-of-use (TOU) rates with fixed periods and rates that are fixed in advance will not suffice. We will need RTP coupled with enabling technology that would allow customers to respond rapidly to changing prices.

- Even without enabling technology, about 25,000 residential customers in Illinois are on real-time pricing today.

OGE has about 20% of its customers on variable peak pricing, an advanced form of critical peak pricing (CPP) where the peak period price varies by day.

- To facilitate customer response, customers are provided a smart thermostat and load response is quite robust.
Dynamic Pricing 2.0 (concluded)

In the house of the future, enabling technology will be commonplace:

- Smart thermostats, smart appliances, smart light bulbs and smart plug loads. In other words, home energy management systems will be pervasive
- These will allow these households to manage their loads dynamically in real time

If prices fall in the middle of the day, as solar kicks in, or in the middle of the night as wind kicks in, customer loads will rise automatically

As prices rise later in the evening, loads will fall automatically
Some organic consumers are “prosumers” who engage in DG

Solar PV prices continue to decline

The leasing model has made the solar PV option affordable, even without subsidies and tax credits which are being phased out

Net energy metering, combined with volumetric rates, some of which incline steeply as in California, has made DG an attractive proposition
But rate design could change, slowing down DG growth

Today, a very large portion of utility costs are fixed but a very small portion of utility revenues are fixed

- Most utilities use a two-part rate design with a monthly fixed charge and a volumetric energy charge
- Typically, the fixed charge is very small (in some cases, it is zero) and does not come close to recovering even half of the utility’s fixed costs

As sales growth slows down, this two-part rate design will not recover the utility’s required revenues, forcing utilities to raise rates for all customers, creating an inequity

To remedy this, utilities are moving to add demand charges to residential tariffs, creating unique opportunities for DR
The emergence of a residential three-part rate is inevitable

The concept is not new

- Three-part rates have been widely deployed to commercial and industrial customers for the better part of the past century, backed up by a storied academic tradition that hearkens back to Hopkinson and Wright

Lack of metering and a concern that residential customers won’t understand demand charges have prevented its application to residential customers

Already, three-part rates are being considered for DG customers today, and the key question is whether they should be opt-in, default or mandatory. Later, we may see them being offered to all customers.
Conclusions

Both DR and DG are nearing points of inflection

DR will continue to grow but the focus will shift to retail markets, residential applications, and price-responsive demand

DG will continue to grow because of falling solar panel prices and net energy metering conventions but its growth will be tempered by likely changes in residential rate design
References


http://policyintegrity.org/documents/Faruqui_03.31_.2015_.pdf


References (concluded)


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