

# Points of inflection loom ahead for demand response and distributed generation

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# **DR – yesterday and today**

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**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

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**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

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**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**

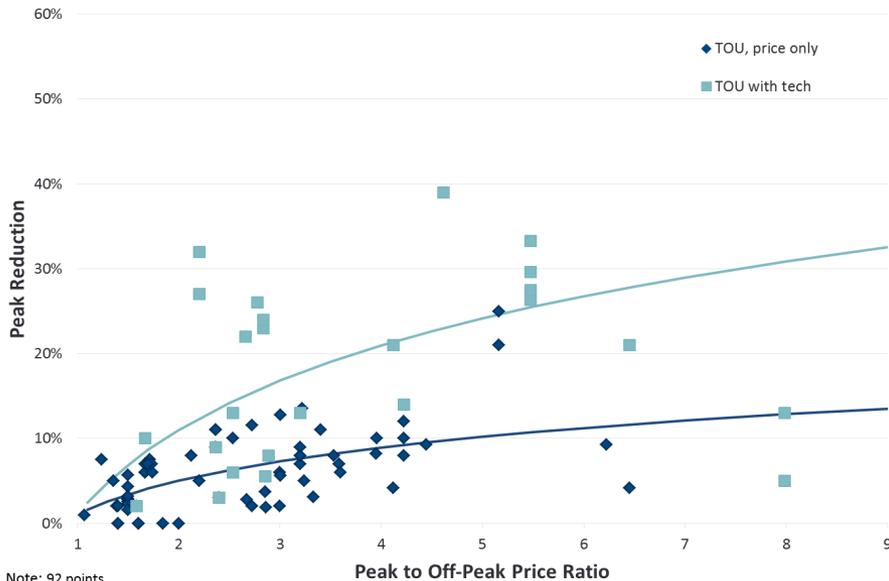
## **Change is already underway**

- 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

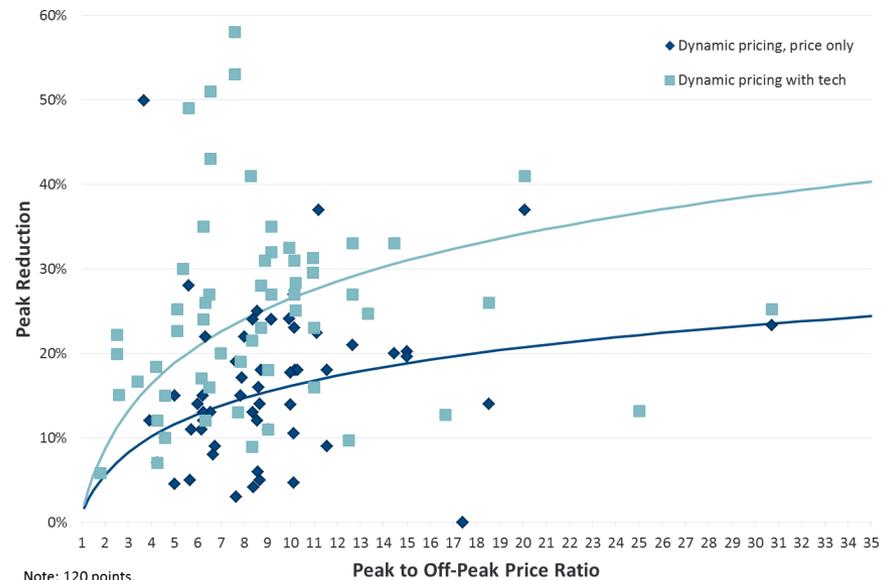
Furthermore, that enabling technologies boost price responsiveness

## TOU Impacts



Source: Faruqi, Ahmad. "Arcturus." The Brattle Group.

## Dynamic Pricing Impacts



Source: Faruqi, Ahmad. "Arcturus." The Brattle Group.

# Aggressive renewable energy standards will create a new application for DR

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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 Schweppe as “homeostatic control” and by EPRI’s Clark Gellings as “flexible load shaping”

# Fast DR will facilitate Dynamic Pricing 2.0

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**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)

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**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

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**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

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**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

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## 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 harkens 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

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**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**

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Ahmad Faruqui, a principal with The Brattle Group, leads the firm's practice in understanding the changing needs of energy consumers. This work encompasses rate design, distributed generation, energy efficiency, demand response, demand forecasting and cost-benefit analysis of emerging technologies. During his career, he has worked for more than 125 clients, including utilities, system operators, and regulatory commissions, in the US and in Australia, Canada, Egypt, Hong Kong, Jamaica, Philippines, Saudi Arabia and Thailand. He has filed testimony or appeared before state commissions, government agencies, or legislative bodies in Alberta (Canada), Arizona, Arkansas, California, District of Columbia, Illinois, Indiana, Kansas, Maryland, Michigan and Ontario (Canada). He has spoken at conferences in Australia, Bahrain, Brazil, Egypt, France, Germany, Ireland, Jamaica, and the United Kingdom. His work has been cited in publications such as *The Economist*, *The New York Times*, *USA Today*, *The Wall Street Journal* and *the Washington Post*. He has appeared on Fox News and National Public Radio. The author, co-author or editor of four books and more than 150 articles dealing with energy issues, he holds bachelor's and master's degrees from the University of Karachi and masters and doctoral degrees from the University of California, Davis.

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