Radical innovation in the electricity sector

Written by: Chris Pike, OECD Directorate for Financial and Enterprise Affairs

Last update: 23 January 2018

© Shutterstock

With new business models on the horizon, competition in the electricity sector may be beginning to stir.

The rise of the digital economy, like the industrial economy before it, has led numerous markets to experience radical innovation in business models that have shaken incumbent firms and benefited consumers. This evolution in business model has often left markets unrecognisable from those that preceded them.

The revolution in electricity generation has of course been under way for some time, and this has given us green and distributed generators that pose existential threats to traditional generation businesses. However, the distribution and retail of electricity has so far remained remarkably unchanged. This now seems set to change, and a variety of new business models are competing to lead that change. There is much need for innovation in a sector of systemic importance, with low productivity, but with a huge role in delivering the Paris climate agreement, and in combatting fuel poverty. Indeed, in the search for inclusive and sustainable growth it may be fundamental.

There are three competitive challenges to traditional business models. The first challenge to traditional business models comes from the sharing economy. This offers the prospect of peer-to-peer (P2P) energy trading between 'pro-sumers' (producer-consumers). It differs from the uber model in two important ways.

Firstly, it does actually involve the sharing of spare capacity (à la Airbnb), and therefore unleashes a significant capacity expansion at zero marginal cost (in contrast to the smaller increase in supply that occurs when restrictive regulations are challenged). Secondly, if, as appears possible, P2P electricity models adopt blockchain technology, it may represent an evolutionary step in the 'sharing' business model . This is because the blockchain, with its ability to provide accurate and certified records of activity, provides a role akin to reviews on digital platforms and allows trust to develop between the buyer and the generator in both the transaction and the origins of the electricity. Once the blockchain is functioning (and there are already numerous open-source blockchains), the role of the digital platform becomes passive (if it is required at all), which has the added advantage of reducing or even eliminating intermediation costs. This therefore has the potential to both lower electricity prices and increase the incentives of generators to enter the market.

if, as appears possible, P2P electricity models adopt blockchain technology, it may represent an evolutionary step in the 'sharing' business model

Consumers that use the P2P electricity market who choose to purchase from local generators may rarely, if ever, need the transmission grid, and so may argue that they should not be required to cross-subsidise it. However, contributing to the funding of the distribution grid will still be necessary since there remains a need for a local distribution grid onto which each household generator would need to be able to transfer its spare capacity in order to sell it locally. There is also a question of how buyers of local energy resolve the problem of intermittency in local renewable generation. Battery storage, where capacity continues to increase, may be one answer, but this may also be challenged by 'super-grids' that create the ability to quickly transport renewable energy across continents when local renewable capacity is short.

A second challenge to traditional business models comes from demand aggregators. Some governments have looked at whether they can reduce energy costs by encouraging consumers to form buying groups that use their collective purchasing power to obtain discounts. Thus far, this has involved supporting the set-up of buyer groups to which consumers must choose to opt-in, which typically involve small numbers of already price-sensitive customers. While the formation of opt-out buying groups holds more promise, the real business model innovation comes from those firms that go a step further and contract with customers that are prepared to have their usage curbed when the grid operator is experiencing high demand. At such times, which become more frequent as the grid relies on intermittent local renewable energy sources, the grid operator would otherwise 'turn on' high cost, typically non-renewable, generators. Given this cost, the grid operator may prefer instead to reduce demand by triggering a demand-side response from contracted demand aggregators. The value of such a capability can

then be reflected in discounts on those contracts, which make them attractive to customers and profitable for the aggregator.

A third challenge is from firms seeking to de-commoditise electricity and sell it as a service (for example, lighting) rather than by the kWh. These Electricity Service Companies (ESCOs) charge for the service and seek to make energy consumption more efficient in order to reduce costs and increase margins. They install sensors and use algorithms to turn off or turn down lighting when it's not needed, or to manage heat production and retention. This model has been a growing part of the supply of electricity to large business for some time, but the arrival of the 'internet of things' creates the opportunity to retail it to households and small businesses. There is also the potential for these firms to bundle electricity in with other utilities in contracts for 'household services'.

In the midst of this competitive upheaval, competition agencies and regulators have a delicate role to play. They need to advocate that regulation keep pace with the changes; they should call for regulations that become obsolete or that distort competition or protect incumbents to be removed or revised; they may also identify the need for new rules given the different risks posed by the new business models. They need to facilitate innovation by giving firms the freedom to innovate, without picking winners. They also need to distinguish between pro- and anticompetitive responses from incumbents who might look to exclude innovative rivals, but might also look to innovate and price or contract more competitively.

For competition authorities, regulators and policymakers questions therefore abound. Will these innovations result in anticompetitive bundling of energy services? Incumbents engaging in predatory pricing? Grid operators refusing to supply? Anti-competitive acquisition of innovative entrants? How should access to, and use of, the distribution and transmission grids be priced? What rights do consumers have to obtain two-way connection to the grid? Is there a case for vertical separation of distribution grid operators? Will capacity reward mechanisms for non-renewable power stations help or hinder innovation? What protections would purchasers with demand-response contracts require? Can multiple ESCOs have access to the meter? Will this increase consumer engagement, lead to dynamic pricing, or help facilitate the transition to green power sources?

In the end, the disruption caused by new business models and technological innovation is competition in action, and it inevitably threatens existing business models, but it also provides an opportunity for competition agencies to use their enforcement and advocacy powers to promote greater competition and maximise consumer welfare.

Visit www.oecd.org/daf/competition/radical-innovation-inthe-electricity-sector.htm

References

Diane Cardwell (2017), "Solar Experiment Lets Neighbors Trade Energy Among Themselves", The New York Times, 13 March 2017 https://www.nytimes.com/2017/03/13/business/energy-environment/brooklyn-solar-grid-energy-trading.html

Matthew Crosby (2014), "Will There Ever Be an Airbnb or Uber for the Electricity Grid?" Green Tech Media, 8 September 2014 https://www.greentechmedia.com/articles/read/an-airbnb-or-uber-for-the-electricity-grid#gs.Vfx98Sc