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## Regulating the “known unknowns”

### PLANNING FOR UNCERTAINTY IN THE ENERGY SECTOR

*“As we know, there are known knowns; there are things we know we know. We also know there are known unknowns; that is to say we know there are some things we do not know. But there are also unknown unknowns - the ones we don't know we don't know” (Donald Rumsfeld Feb 2, 2002, Department of Defense news briefing). This bulletin describes the challenges that regulators face in planning for the “known unknowns” in the energy sector.*

The former US Defense Secretary might seem a pretty unlikely source of guidance on a forward-looking approach to energy regulation. But his famous categorisation of future challenges makes a useful starting-point for thinking about the changes faced by the energy sector.

Let's start with the “known knowns”. The most obvious is change itself, and the certainty that it will be massive. We also know where some of the change will come from.

- More electricity will be generated from renewable sources, like wind, which are intermittent and which may be connected to local distribution networks



rather than national transmission networks. These changes will make the energy flows on distribution networks more complex and less predictable.

- Low carbon electricity will increasingly be used for transport and heating, adding to total demand but providing a source of flexible and controllable demand that could be exploited via smart technology.

There are also, clearly, some “known unknowns”. For example:

- Will electric vehicles take off and become widely available? Where will people charge them?
- How many people will switch from gas to electricity to heat their homes?
- How flexible will customers be about when their vehicle or heating uses power and what should energy companies do to encourage that flexibility?
- How much local and micro-generation will be encouraged by policies like the new “feed-in” tariffs offering guaranteed prices?

And then there are the “unknown unknowns”...

Taken together, these changes could lead to major shifts in the way networks are planned, moving on from today’s approach, which could fairly be described as “fit and forget”. Today, electricity flows are relatively predictable and stable, flowing from generation on the transmission system towards customers whose behaviour is predicted from well-established statistical models. As a result, network owners can invest so that the network is, outside exceptional circumstances, able to carry all customer demand.

In the future, network flows may become increasingly complex as more generation is connected to local grids. New technology will provide the option to control demand more effectively and some uses, like electric vehicles, may turn households into temporary sources of power back to the grid when wind-based generation drops. So the models of historic load growth, and their implications for new investment, look likely to break down.

These changes should result in more options for network companies actively to manage supply and demand than are available today – for example, by controlling flexible demand sources – rather than always relying on investment to meet peak demand. But uncertainty over the size and speed of these changes also creates problems for utility managers and regulators, because it increases the risk that long-term investments that appear useful today turn out to be a waste of money.

## REGULATORS’ PUZZLES

The regulatory challenge is to incentivise energy companies to make efficient choices between network investment and active management options. Not easy, when the future is so uncertain. What is more, the stakes are high. Electric vehicle use alone could easily double both the total and peak electricity demand of a domestic customer. Investing to meet all possible new load would be massively expensive.

## Regulating the “known unknowns”

Ofgem, the UK energy sector regulator, recognises this challenge and has taken it on board as part of its RPI-X@20 project.<sup>1</sup> As part of this wide-ranging review, the regulator has been thinking about the impact industry developments should have on regulation. The conclusion that seems to be emerging is that today's regulatory framework may create a bias towards investment. The root of the problem lies in the additional risk network companies may think they face, if they substitute active management (via customer contracts) for network investment.

First, contracting offers less certainty, and more commercial risk. No individual contract will last as long as a network investment, so there is almost certainly more price risk. Further, the network companies will find themselves having to justify the cost of these contracts in each price review, so there is increased regulatory risk. In contrast, once they have justified an investment under the current framework, they may reasonably expect it to be remunerated in full.

Second, the nature of the trade-offs between contracting for generation or load, and network investment, may be very local in nature, much more so than today. If electric vehicles become widely used, these trade-offs may come at the individual street level. This then creates the risk that any parties offering very localised active management options might gain a degree of market power, since few parties will be able to compete at that level.

Third, there may also be problems in contracting for interruption of load. Suppliers (rather than distribution companies) manage the customer relationship, and customers can change supplier with 28 days' notice. Although suppliers may be sufficiently certain of retaining customer density over large geographic areas that they can offer contracts for demand-side response, they may be less certain about offering long-term contracts at a very local level in case their customers switch away. A further complication is that suppliers may favour national pricing strategies that do not provide the option to reflect local distribution conditions, particularly following Ofgem's introduction of the non-discrimination clause into the supply licence.

### SEARCHING FOR SOLUTIONS

The – potentially expensive – bias to investment created by these factors is not easy to correct, and the potential solutions are far from straightforward. For example, network companies could be allowed to own distributed generation or energy storage, to avoid the risk of being held to ransom by those offering localised active management solutions. This would in some ways be analogous to gas network companies owning gasholders. But networks to date have been deliberately prevented from owning assets that would more properly be part of a competitive market.

Another potential solution would be to allow the network companies to contract directly with small customers, to avoid the issues identified above associated with their changes of supplier. However, customers move house almost as often as they change supplier, so there would still be plenty of churn. And this change would risk customer confusion and increase billing costs, since network companies would also have to develop a billing function, separate from a customer's normal bill.

Alternatively, new suppliers could be required to take on the contractual commitments made to old suppliers in respect of demand side response. However, this would risk further complicating the change of supplier process.

From the point of view of Ofgem's RPI-X@20 project, perhaps the most important issue to look at is how to equalise incentives over time. There are two broad approaches that could be used:

- an ex ante approach, based on evaluating whether an investment appears appropriate at the moment at which it is made; or
- an ex post approach, based on remunerating asset owners according to the actual use that is made of investments in future.

The current approach is largely ex ante: once an investment has been allowed into the regulated asset base, asset owners do not expect that investment to be removed during its lifetime. This approach could be refined by requiring Ofgem to satisfy itself that the individual investments are appropriate. However, since distribution investments tend to be small in scale, and numerous, it might be impractical for Ofgem to review them all.

But it would only be appropriate to move to an ex post approach if network owners were well-placed to manage the risks associated with predicting where assets are likely to be used and useful in future. Making them bear risks that they are not best placed to manage would raise the cost of capital, without bringing customer benefits.

Network companies cannot be expected to have much control over the pace of development. This will be driven by technology and policy. But they will have the best information about the steps that can be taken now to build networks that would be robust to a range of development scenarios. So the regulatory focus should be on ensuring network operators plan appropriately for future uncertainty, rather than moving to a system that rewards or penalises them according to outcomes that they are not well placed to predict.

Ofgem has some time to think about all of this, as the options evolve. And the RPI-X@20 project is an ideal vehicle for these considerations. However, as we face increasing uncertainty around the planning of long-term investments, it seems likely that distribution companies will have to bear at least some of the risk. And they just might turn to sources other than Donald Rumsfeld for lessons on how to manage it...

## NOTES

- <sup>1</sup> "The role of future energy networks: a report prepared for Ofgem", *Frontier Economics* (September 2009)

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