

## MAKING ELECTRICITY DATA 'BIG' WHAT IS IT EXPECTED TO ACHIEVE?

### Key points

- Many claims are being made about the value of generating 'big' electricity data in businesses and large organisations.
- Installing multiple digital sub-meters pulsing data in 'real time' is promised to enable better energy management and identification of new opportunities for cutting energy consumption.
- Such data could be used in various ways but in practice is focused largely on achieving cost savings with little insight gained into more fundamental questions about the making of energy demand.

### Introduction

There are significant shifts underway in how electricity is metered. Digital meters that generate automated readings and data on electricity flow at a much bigger scale are taking the place of old style analogue meters and manual readings. So called 'smart meters' are now being fitted to all domestic and small businesses premises in the UK, but there is much more experience of digital metering in large scale private and public sector organisations. There is also a growing industry of hardware and software providers, data analysts, and energy management consultants working with a wide range of clients. We analysed marketing materials from metering and software providers, interviewed representatives from 7 of these companies and attended industry events where they and their clients came together to learn more about the value of having 'big' electricity data.

### Questions

- What changes when old style electricity metering moves to new systems of digital metering?
- What claims are made about the value of more detailed metering and the data it produces?
- What are the constraints and limitations on how data on electricity flows can be used in energy management?



### Findings

Analogue meters were read manually, often on an infrequent basis, and located only at property boundaries in order to generate an electricity bill. By contrast, digital electricity metering enables data about electricity flow to be measured at more locations and with much more temporal precision than ever before. In large organisations, 'sub meters' can be positioned relatively easily and cheaply to provide data on the electricity used by specific technologies, by different units or departments of a business, or on different floors of a building. These meters can 'pulse' their data over digital networks to a precisely specified schedule – from hourly units down to minutes and even seconds.

We found that many claims are being made about the value of producing and analysing 'big' electricity data in large organisations. The most common were that,

- New insights can be achieved about energy use, efficiency and costs from knowing precisely how electricity flow is changing during the day, across different days of the week and over longer timescales. You can only 'manage what you measure' is a recurrent refrain, with a dominant focus on managing to reduce costs.
- Consumption costs can be allocated more accurately, e.g. by installing sub-meters for each space in a multi-tenant building.
- Comparisons of trends and fluctuations in electricity flow can be made between time periods to locate technical malfunctions or spot when equipment is being left on after hours.

*I don't think energy management is all about accuracy, about precision. It is about understanding, and you get that understanding because you understand the profile, because you understand the shape, because you can see a spike where you hadn't seen a spike before.*

(CEO energy metering services provider)

*Meters are like someone going to the doctor. So once the doctor starts to observe things, they find something with the patient and that's very much the same with our observations with a building.*

(CEO smart utility metering provider)

- Groups of staff can be made much more responsible for their electricity use when it is measured in smaller units and 'real-time' feedback on their electricity consumption is provided.
- More detailed metering makes it possible for companies to participate in demand side response schemes offered by the National Grid.

We also found different perspectives and some disagreement, for example in relation to:

- When data is 'real time enough' and the value of ever greater detail about the timing of demand.
- Whether the cost savings that can be achieved are largely short term with diminishing returns over time.
- Which strategies for data analysis, feedback and visualization can achieve most impact within an organisation.
- Problems of data overload, in which large amounts of data are accumulated but little actionable knowledge follows.

## Significance

'Old style' metering provided very little data and reliable knowledge about where and when electricity was being used in large organisations. This limited energy managers' ability to carry out their work. Digital metering systems provide much more data, but questions remain about the value of this information. In principle, data could be collected and analysed in many different ways and used to ask and answer different questions. In practice, energy managers' priorities remain the same – most are concerned with cost savings to the organisation (rather than carbon savings for society more generally), promoting energy efficiency and making consumption visible to end users on the assumption that better, more responsible actions will follow. In this context, the risk is that simply knowing more about electricity flow is of relatively marginal importance, and potentially a distraction from the bigger issues at stake. Simply knowing how much energy is being used does not, in itself provide much insight into the changing practices on which demand depends.

## Implications

- While more precise measurement is promised to inform and inspire new actions to reduce or to manage demand, increasingly in 'real-time', this does not take account of how organisational structures limit the practicalities of energy management.
- Better data systems may help to track how energy use is changing in an organisation, but they cannot be expected to inspire or induce demand reduction, particularly on the scale required to meet low carbon objectives.
- 'Smart' metering is now relatively established in large organisations and operates within a familiar financial framing, as part of accepted practices of monitoring business performance. Translating this experience to domestic settings, as is happening with the smart meter rollout, will not be straightforward, given the very many differences between organisational and household settings.

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**Further reading:** [www.demand.ac.uk](http://www.demand.ac.uk); Kragh-Furbo, M and Walker, G (2018) Electricity as (Big) data: metering, spatiotemporal granularity and value, *Big Data and Society*, 1-12 [open access]

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