

The Timing of Energy Demand

The timing of energy demand is increasingly important for energy system transformation with implications for system balancing, future grid development and carbon emissions. Researchers from the DEMAND Centre have developed new methods of analysing when energy is used, focusing not on individual decisions, but on shared social practices, conventions and societal rhythms.

What are peaks made of?



On average, demand for energy peaks early in the morning and most strongly in the early evening, especially in winter. DEMAND research (Mattioli et al. 2014; Walker 2014) shows that peaks are outcomes of what people do at specific times of the day. Some peaks arise when people are engaged in the same practices at the same time. This is known as societal synchronisation, and examples include TV watching or preparing the evening meal. But not all peaks are the same.

DEMAND research (Mattioli et al. 2014) has analysed time use data to show that evening peaks in travel are outcomes of many people making different types of journeys at the same time. This is the same for the large peak in demand around noon on Saturdays, when a lot of people travel for a wide variety of reasons. The research shows that any intervention in the timing of energy or travel demand is also an intervention in the collective rhythm of daily life.

Mattioli, G, E. Shove and J. Torriti (2014) 'The timing and social synchronisation of energy demand'. DEMAND Working Paper 1 <http://www.demand.ac.uk/wp-content/uploads/2014/02/Working-paper-1.pdf>

Walker, G. (2014) 'The dynamics of energy demand: change, rhythm and synchronicity'. *Energy Research & Social Science* (March 2014): 49-55

DEMAND Research Insight #1 [WHAT MAKES PEAK ELECTRICITY DEMAND?](http://www.demand.ac.uk) DEMAND website www.demand.ac.uk

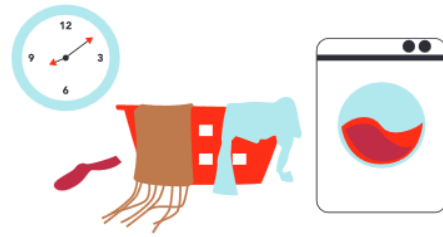
Analysing peaks in energy demand

Time-use surveys collect 5-30 minute interval data on people's activities, sometimes combined with details of geographical location (using GPS devices). In their study of peak residential electricity demand, Torriti et al. use this kind of data to analyse the extent to which activities vary throughout the day, and whether they are synchronised and shared with others. Their analysis identified differences between what men and women do during the day and during times of peak demand. Women, for example, are typically more engaged in different activities throughout the day than men, because they spend more time on domestic labour. This is different during the evening peak (5.40-7.40pm), when women tend to engage in more similar activities at the same time in comparison to men. The timing of energy demand for households with or without children is also different. Households with children tend to be more synchronised, especially during the morning peak and the early evening peak. This type of analysis is critical for understanding whether the timing of energy demand can be shifted. DEMAND research underlines the point that any such intervention whether through price, technology or control needs to take into account what different people and households do at times of peak demand.

Torriti, J., A. Druckman, B. Anderson, G. Yeboah, and R. Hanna (2015) *Peak residential electricity demand and social practices: deriving flexibility and greenhouse gas emissions from time use and locational data*. *Indoor and Built Environment* 24 (7): 891-912

Shifting the timing of energy demand?

Ideas about how the timing of demand might be shifted to lower the peak often focus on specific activities: hence suggestions about doing the laundry at night. DEMAND research (Mattioli et al. 2014) shows that practices are linked together over time, and that some more tightly 'locked together' than others. This suggests that some 'bundles' of practices are less flexible than others.



Other DEMAND research emphasises the historical dynamics of practices and the implications of longer term change for energy demand. Using previous time-use surveys to analyse the timing of laundry and cooking and eating practices, Ben Anderson and Mathieu Durand-Daubin show how key practices have changed over the last decade and what this means for energy demand (Anderson 2016; Durand-Daubin and Anderson 2017). The research found that 'doing the laundry' has moved away from its traditional mid-week morning slot towards early weekday and Sunday mornings, meaning that laundry practices are in any case happening during non-peak times. This trend is partly related to the increase in full-time female labour market participation from 1985-2005. These authors also show that the energy demand for cooking and eating practices has reduced at midday, and been pushed to later in the evening, a pattern they also attribute to changes in employment, especially amongst women. Both studies make the point that there are wider societal trends beyond energy that have consequences for peak and non-peak energy demand.

Anderson, B. (2016) Laundry, energy and time: Insights from 20 years of time-use diary data in the United Kingdom. Energy Research & Social Science 22: 125-136

Durand-Daubin, M. and B. Anderson (2017) Changing eating practices in France and Great Britain: evidence from time use data and implications for direct energy demand. In A. Hui et al. (eds.) Demanding Energy: Space, Time and Change. Palgrave Macmillan

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