Time and Flexibility in Energy Demand
Some ideas to provoke and inspire 1,000 to 2,000 word contributions from workshop participants:

There are different reasons why issues of time and flexibility matter in relation to energy demand. Systems sized to meet extremes of peak load are 'over-sized' for the rest of the year/day. More flexible matching of supply and demand in real time is increasingly important to accommodate and make best use of more intermittent supplies of renewable energy. Different responses, including forms of storage and of deferring or increasing consumption are proposed as means of managing daily and sometimes also seasonal fluctuations in the supply-demand relation. Meanwhile, the detail with which 'energy' is known is becoming more precise: prices vary over very short time spans, and seconds count. At the other extreme, large infrastructures and networked systems of provision (including buildings as well as power grids and gas supplies) endure for decades. These are timescales over which technologies and practices – from the internet through to EVs, along with patterns of commuting or of eating and sleeping – emerge and change: sometimes 'fast' and sometimes 'slow'. Whether they are aware of it or not, proponents of 'demand side' solutions, and members of CREDS, are intervening in the many temporalities that define energy systems and daily lives.

These few notes are intended to prompt participants from across CREDS to think again about their projects and themes, and to do so with a view to these and other aspects of timing and flexibility.

Rather than organising this discussion around headings like buildings, transport, heat or the digital, we want to explore the ways in which research goals and ambitions within CREDS projects/themes play out with respect to different time scales (seconds, points in time, seasons, decades) and how these relate to cross-cutting processes and relations (synchronisation, sequencing, pace). Although this event is designed and run by the Flexibility team, our aim is to address all aspects of time and timing.

If you want to join this discussion (and come to the September workshop), you will need to write a short 'essay' in which you link your current work to two or more of the following topics – broadly interpreted. The notes that follow are just for inspiration: they should not restrict you, but are there to help give the event some form and make sure it is tied to the CREDS programme.

Seasonality

There are major swings through the year in terms of the energy used for heating, cooling and lighting: also in the mix of gas and electricity. The seasons are also critical for the timing of renewable energy supply. There are various energy-related connections with health, including fuel poverty, cold and ill-health during the winter as well as of over-heating in the summer, linked to growing demand for air-conditioning. Not all energy-related forms of seasonality are weather-related: transport patterns change during school holidays; Christmas is a peak period for online delivery and for other kinds of travel. Infrastructures – including buildings – are designed and optimised for certain conditions: often for averages or for winter. Some parts of buildings are flexible (shutters, curtains) but others are not. Seasons call for constant adaptation - autumn and spring are often described as periods of 'transition' – but what of the detail, how do practices shift (if at all) during these months. The lack of seasonal variation is just as important, including the energy costs of ensuring that certain activities can persist through the year. Responses to seasonal variations take different forms: storage is one (including long traditions of harvesting and storing food/energy for winter), but ways of life also adapt as the hours of daylight extend or as the nights draw in.

These are a few observations from which to start thinking and writing about this topic. How do seasons figure in CREDS research/your project? Is there a bias towards the winter? For which themes or topics are seasons simply irrelevant, and why?

Decades

A lot of conventional energy-related infrastructure is pretty durable: often lasting for decades, and sometimes centuries. How are 'new' technologies patched into durable, even 'obdurate' systems, networks and buildings? Looking forward, for how long might present networks and material arrangements persist? This is not just a matter of being rugged, or regularly repaired. The durability of infrastructures also depends on the durability of the 'needs' and demands they enable and shape. From this point of view the Victorian housing stock is part of the energy problem, but also part of the solution. Ideas about connectivity, the indoor climate and comfort develop over generations and it is instructive to reflect on the long timescales of 'demand': how do conventions evolve? Where do present standards and expectations come from? CREDS research is about 'energy demand solutions' – but over what time scale, and how far into the future? The problem of energy demand is not fixed, so how might the challenge itself evolve over the next century or more? And what part might CREDS research play (wittingly or not) in these developments?

Take this topic of 'decades' as an invitation to think long term – backwards or forwards, and to see your research as part of an ongoing history and an also ongoing future: you can think about this practically, methodologically, theoretically or politically, or all of the above.

Peaks and troughs in energy demand

We are all familiar with daily electricity load profiles, and we know about seasonal variations in demand as well. But what lies behind these peaks and troughs, how do they form and change, and what holds them in place? Some 'peaks', like those in the evening, relate to patterns of societal synchronisation, notably around the evening meal. Although this is associated with a spike in demand, other synchronised activities (like sleeping) result in a trough or dip in energy use. We also know that some peaks – for instance in travel demand on Saturday mornings – are consequences of lots of people doing lots of different, but energy demanding activities. Peaks and troughs are not only about what people do: they also relate to the sorts of appliances involved, their energy intensity and the frequency, duration and periodicity of their use. Often methods of 'demand side management' target the peak: suggesting people shift activities to off peak times, or 'secretly' switching things off without anyone noticing the difference. Are projects in CREDS expecting the time and timing of activity to change, or are they imagining forms of intervention that make 'no difference' to what people do? How much energy does society 'need' and how does this relate to societal rhythms? Even the most 'technical' projects are working with assumptions about these topics and this is a chance to articulate them.

Engaging with this topic is an invitation to think about how peaks and troughs in demand are constituted, and about the relation between them. Also feel free to address issues of aggregation and scale: what counts as a 'peak' in a small system is not at all the same as a peak which reflects the combined activities of millions of people. Finally, there are economic aspects to consider as well. Some people put a price on flexibility – that is on the means to ramp supply up or down at specific times of day. How does the time at which energy is used figure in your work? There is a lot to work with here,

including the relevance (or not) of real time pricing; the cost of 'extra' infrastructure required to meet peaks, and methods of valuing the time at which energy is used.

9am

We could have picked another moment, but in selecting 9am, we want to encourage participants to think about what makes specific times significant. Not everyone starts work at 9am, but a lot of people do. So many that this is a defining feature that has an impact way beyond this particular moment – in many parts of the country the so-called rush hour is now much longer than an hour. The timing of who leaves home when is often negotiated within families as people figure out how to reach different destinations (work, school) at the same time. Although 9am is an orchestrating force in the working week, it is useful to think about how the significance of this time has developed over generations, and also in relation to the seasons. For example, was 9am experienced in the same way in the 1960s, did it leave the same 'traces' in energy and transport demand profiles, and what has happened since? Equally, might we anticipate the systematic erosion of this and other moments of coordination? Seasonal workers, shift workers and home workers have different rhythms, but what they do, and when, is nonetheless structured by a still fixed pattern of opening and closing times.

For CREDS, there are important questions about how institutional arrangements and policies (working hours, employment policies) define both the timing and the extent of energy demand.

Seconds

Seconds add up to minutes, hours, days and decades, but there is something intriguing about how energy demand is conceptualised at this time scale. What are the units or time scales of 'real time' pricing and when and where does the fine grain of the second (or millisecond) matter? In some contexts, this scale is important in trading and in making markets, also in the precision of automatic controls, frequency responses or methods of detecting faults and problems, but what about the timing of demand? Which activities are accomplished in a second, and how do they relate to others that take longer to do? How do very short periods of attention/doing combine, and how do they slot into other longer sequences and into hourly or daily schedules? Simply thinking about time and flexibility at the level of the 'second' makes us think again about the 'work' that other categories of time do, and the terms in which seemingly meaningful blocks of time influence the ways in which debates are conducted and how problems are shaped and formed.

As well as being an invitation to switch time scales and to therefore 'see' problems in a different light, this theme invites reflection on issues of measurement and aggregation, and on the tools and categories through which time and timing are managed and made 'real' in energy research and policy.

Fast and slow

One of the defining features of the CREDS centre is the commitment to move 'faster' – and to speed up the rate of research and policy intervention with respect to carbon reduction and energy demand. This ambition introduces issues of pace. There are, again, different ways of approaching this topic. CREDS invokes a sense of urgency as opposed to complacency and delay – but what is the imagined speed of policy and of effective action?

Alternatively, we might think about fast and slow with reference to escalating rates of consumption and demand. Since the industrial revolution, the rate at which energy consumption has increased is 'faster' than in the many centuries that came before.

Another option is to focus on how energy is itself implicated in the 'speeding up' of society. Many forms of energy demand relate to the use of technologies and appliances that take the place of (slower) forms of human or animal labour. Accordingly, slowing down is sometimes represented as a form of (energy) demand reduction. Something of the kind lies behind the 'slow' food movement, and there are other demand reduction strategies that imply lower speeds (e.g. in driving, in using trains not planes, etc.).

We want to avoid generalised laments about the political process, and we need to move beyond familiar refrains about the time it takes to introduce technological innovations, or to make 'transitions'. Instead, we are keen to encourage more considered discussion of what constitutes 'fast' and 'slow' – whether in terms of the pace of change in demand, or in the part that different forms of energy play in enabling 'speed' of one kind or another.

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Draft Programme

16th September 2019

12.00 Lunch in **Meeting Room 2/3 FASS building**, Lancaster University

13.00 Time to start: introduction

13.15 Block 1: Seasons

14.45 Interlude: introducing the weather related web server (Kris de Decker)

15.00 Block 2: Decades

15.30 Reading and talking time

16.30 Time to run around: Floorball

17.30 Interlude: Mike Fell – the sound of the grid

17.35 Block 3: Synchronisation and simultaneous practices

18.45 End

20.00 Dinner at the Borough – followed by comedy sketches with split second timing!

17th September 2019

Different venue: Forrest hills, a short walk from campus

09.00 Block 4: 9am

10.00 Interlude: DEMAND films: why practices matter and the one on time and energy demand

Coffee

10.30 Reading and talking time

11.30 Block 5: Seconds

12.15 Lunch time

13.15 Block 6 – time for walking and writing

14.45 Interlude and break

15.00 Integrating ideas

16.00 Block 7: Fast and Slow

17.00 Time to go home