What do we *really* know about energy demand?

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What do we know about energy demand?

What do we *need* to know about demand?


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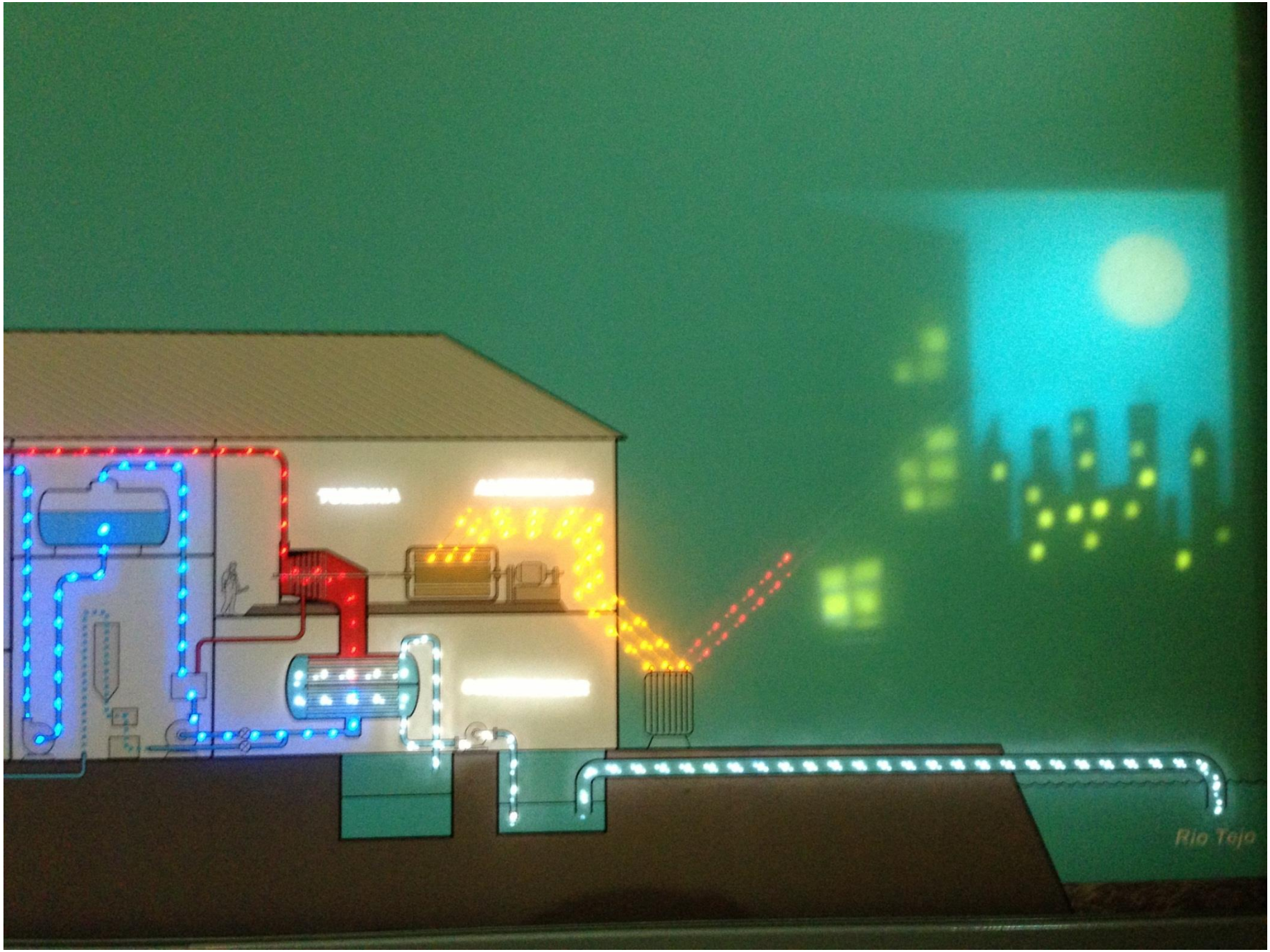
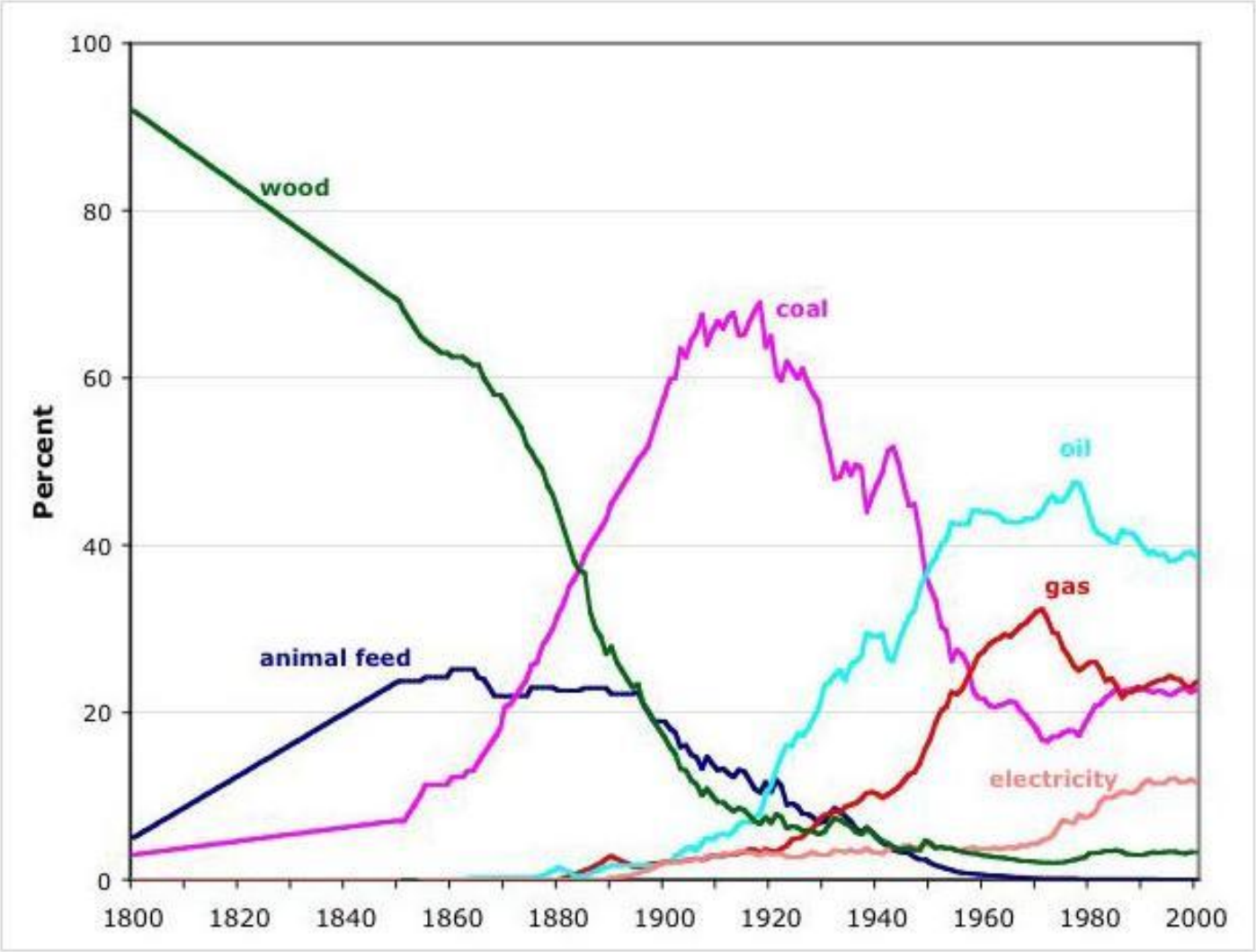

Rio Tajo

What do we know about 'demand'?

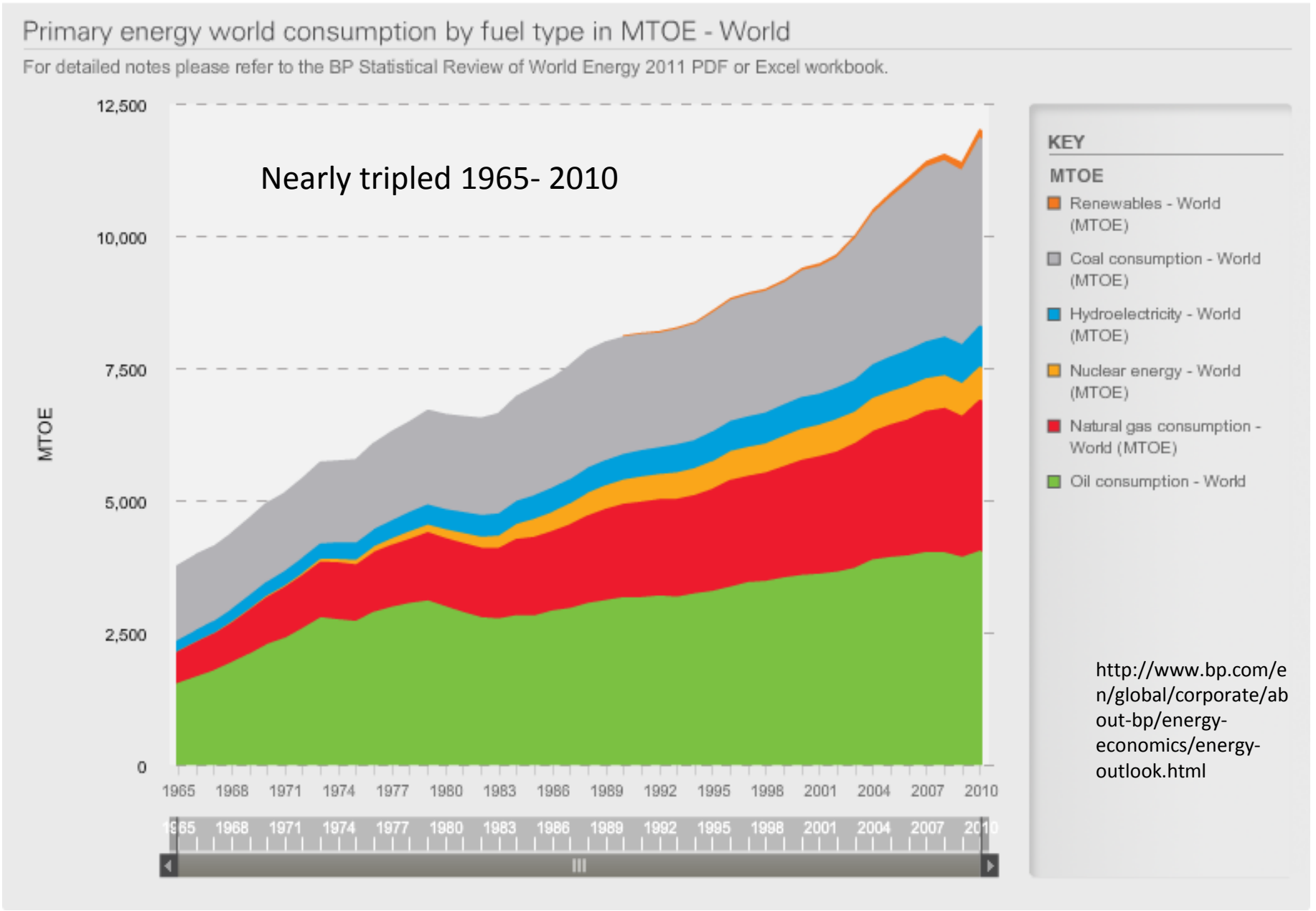
Most of the knowledge that circulates on the 'demand side' is about (aggregated) indicators of energy *consumption.* So we know about, for example:

- **how much energy of what type** is being consumed and in broad sectoral terms by whom, and **aggregate trends over time**
- **changes in energy intensity** - relationship between aggregate energy consumption and aggregate economic growth
- **changes in energy efficiency**, in terms of technology improvement, standards tightening and sales of more efficient models
- **variation in aggregate consumption over time** from season to season, day to day, hour to hour



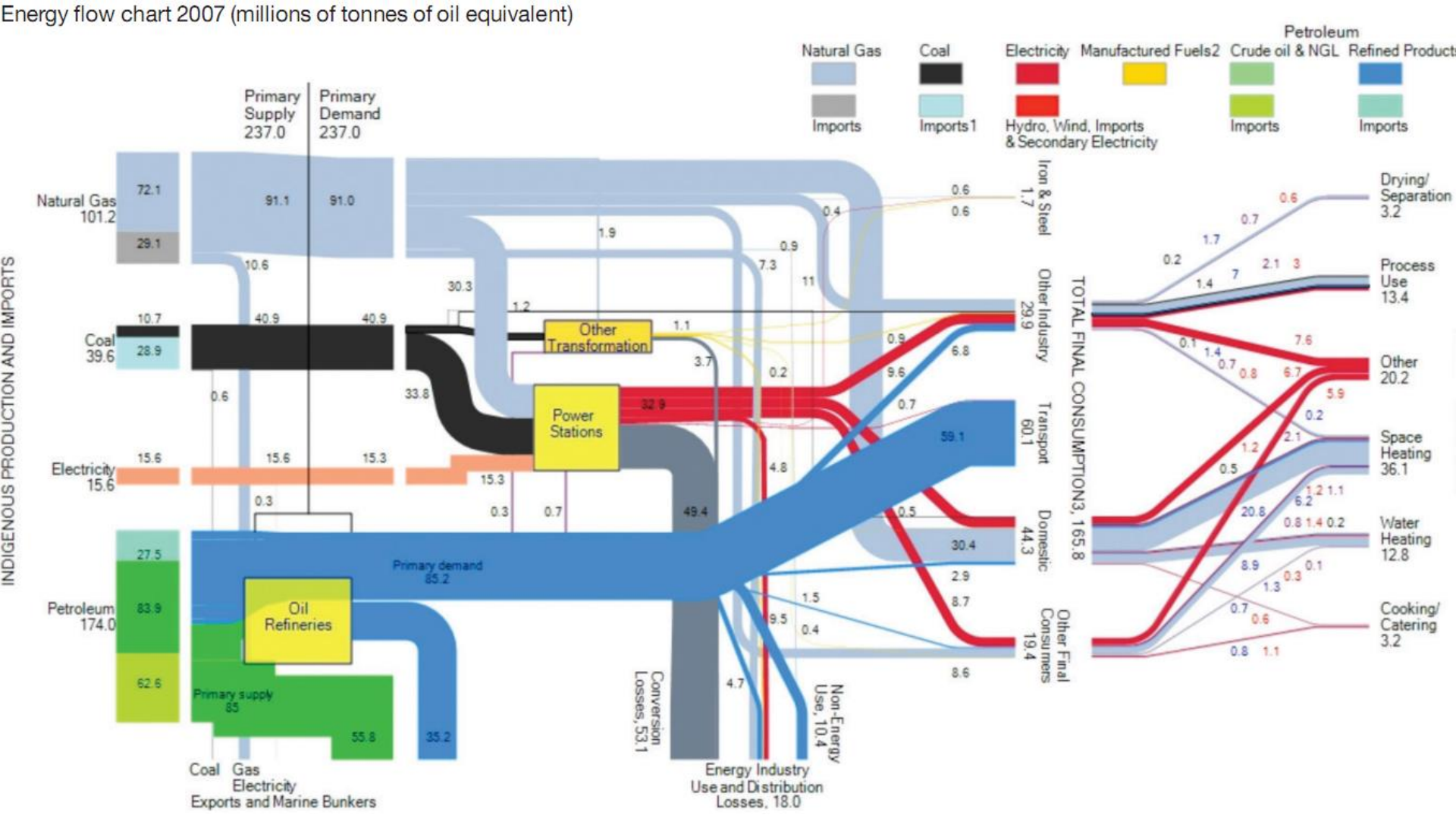
Composition of U.S. energy use.

http://www.energybulletin.net/node/33269



http://www.bp.com/en/global/corporate/about-bp/energy-economics/energy-outlook.html

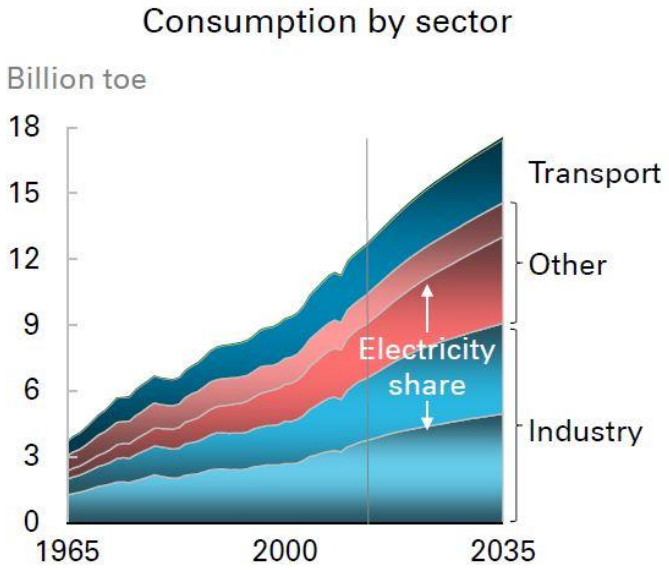
UK Energy Sankey Diagram 2007

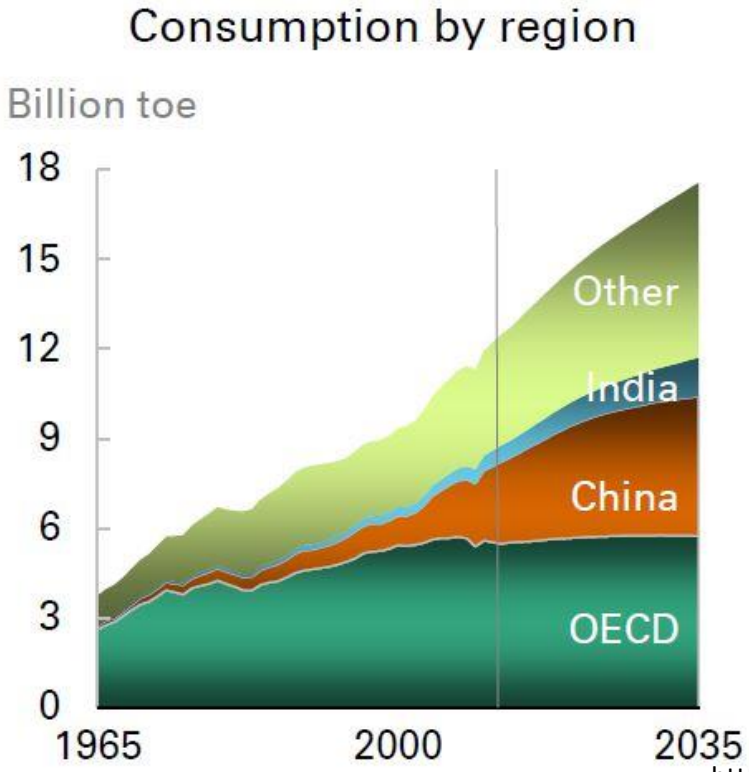


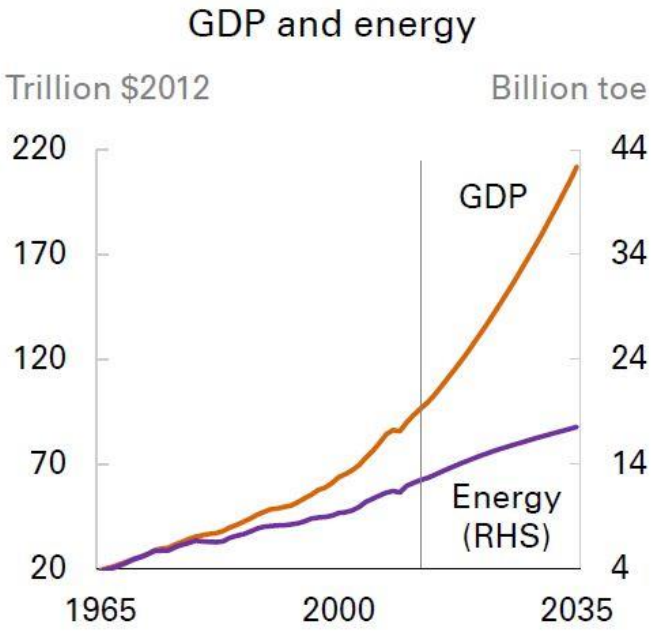
http://www.sankey-diagrams.com/

Expectations about the future are made in the same terms:

- BP Energy Outlook (2014) ‘most likely’ scenario for 2035
- global energy consumption will increase by 41%, 95% of that growth coming from emerging economies.

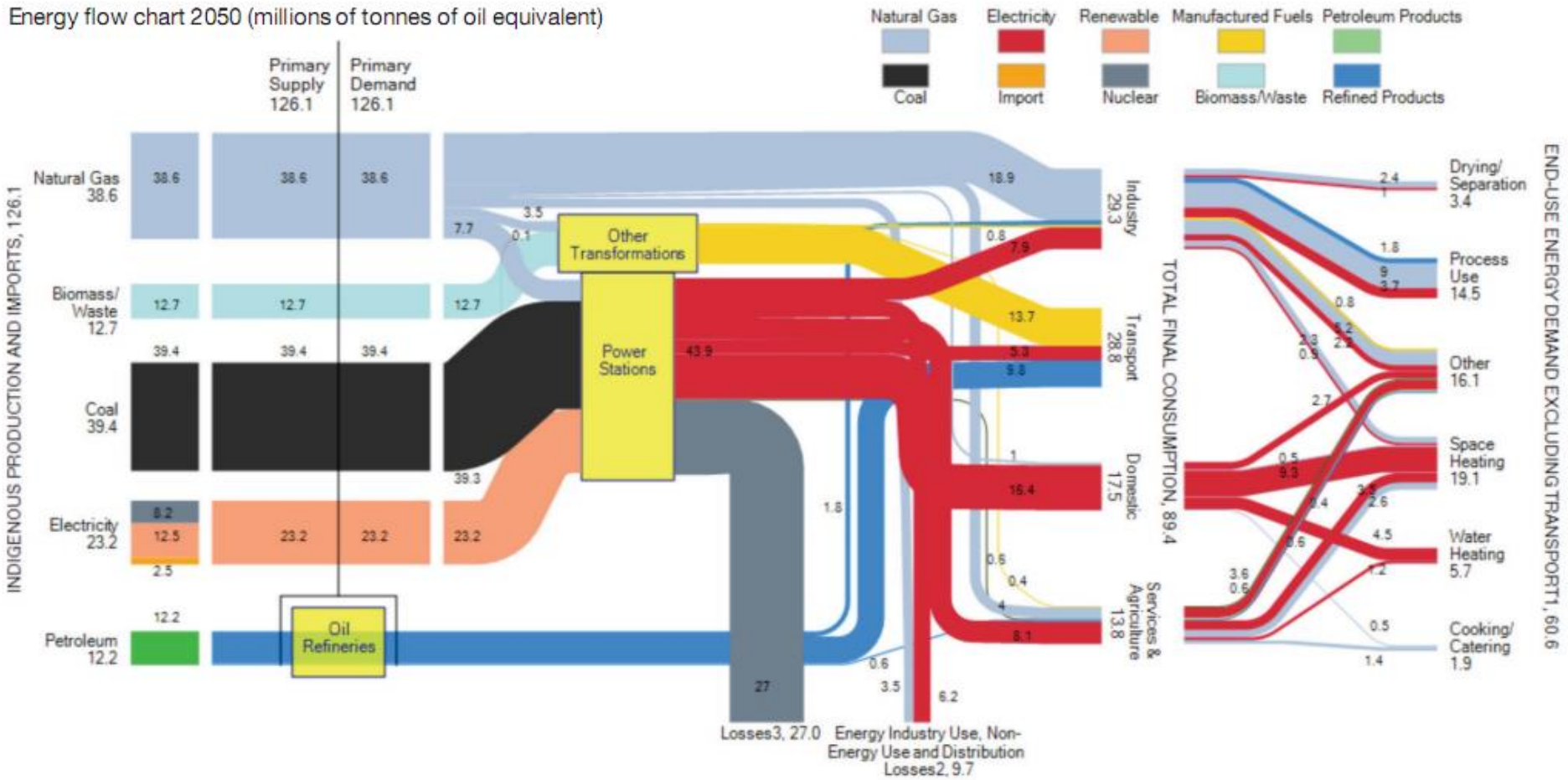






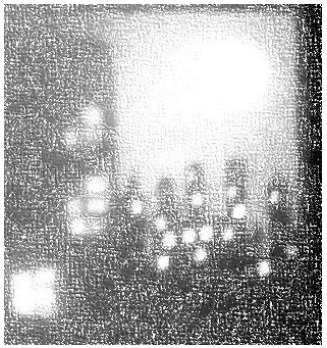
http://www.bp.com/en/global/corporate/about-bp/energy-economics/energy-outlook.html

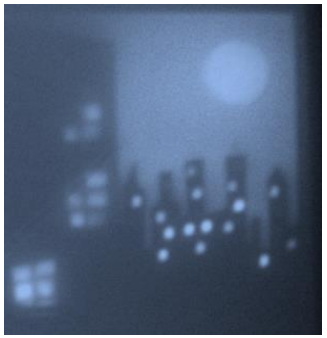
UK Energy Flow Sankey Diagram 2050



http://www.sankey-diagrams.com/

But in the context of the need to achieve deep and rapid **carbon emission reduction** whilst keeping **energy affordable and secure**
we need to know more about demand
… about different things, making use of different knowledges





We need to *really* know about demand

What demand really is about …

Energy itself is not demand*ed*. The demand is for the **services** that using energy can provide – heat, light, mobility, communication …

Those services are necessary for **social practices** (*driving* needs power for movement; *washing* needs heated water). Energy ise is therefore an outcome of the accomplishment of shared social practices .

Aggregate energy consumption is therefore an outcome of the **multitude of ways in which energy is useful and 'does work'** for everyday life, much of which is routinised, mundane and ordinary.

This is where demand lies and where it changes; and what we need to know more about …

For more see, Shove and Walker (in press) 'What is energy for?: social practice and energy demand', *Theory, Culture and Society;* Walker *'Dynamics of Energy Demand: Change, Rhythm and Synchronicity',* Energy Research and Social Science, 1(1*)*

Energy is used not for its own sake, but in the course of accomplishing social practices (what people do).

What people do obviously matters for energy demand

Technologies and infrastructures obviously matter for energy demand, and for what people do

If we are interested in DeMand we need to focus on how technologies, infrastructures and practices interact. And on the dynamics of these interactions

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Example 1: For the DEMAND Centre …

understanding past, current and future trends and changes in energy demand is a matter of understanding the dynamics of social practices; how energy using practices develop, change and evolve.

- interweaving of 'material arrangements', skills and knowledge, norms and conventions e.g. cycling

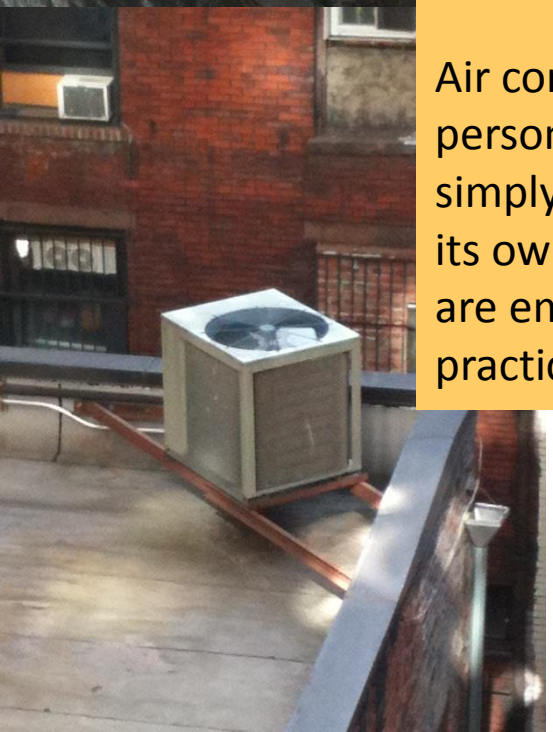
- patterns of recruitment to being a 'practitioner', and the patterning of repetition & frequency of practices being performed e.g. becoming and being a cyclist

The rise of air conditioning (in the UK)

… there is no one explanation for how and why air-conditioning is being installed in the UK. In each of the settings we studied (office, hospital, hotels) the relation between technology and practice - that is, between air conditioning and what people do - was different.

Air conditioning is not simply a matter of personal preference or human comfort, nor is it simply about cooling as if that was a practice in its own right. The dynamics of air conditioning are embedded in the dynamics of multiple social practices…

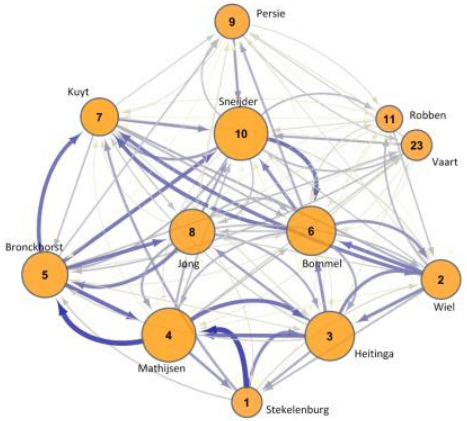
Shove E, Walker G. & Brown S., **'Transnational transitions: the diffusion and integration of mechanical cooling'** *Urban Studies, online Aug 2013.*



www.sprg.ac.uk

How 'energy using' practices change

For example: **elderly, well being and mobility**



understanding more holidaying abroad

http://blog.go-walkabout.co.uk/2012/05/boom-in-over-50s-looking-for-cheap-backpacking-insurance/

For example: **business travelling**

face to face but when, how often, as part of what practices? selling, negotiating, collaborating … how this varies and professions and occupations. How technologies of various forms are involved in shifting travel patterns.

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Example 2: For the DEMAND Centre …

analysing the scope and potential for demand response and 'load shifting' is a matter of understanding what the time profiles of consumption are made of - the social practices that create them:

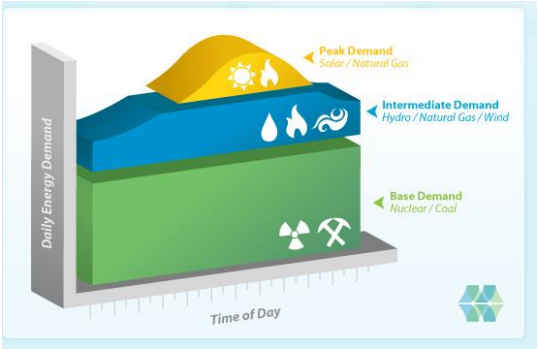
- The 'rhythms' of the everyday social world
- How much what people do is synchronized together
- How fixed or pliable the timing of different energy using practices might be

Social order is made of rhythmic conventions; '**rhythms emerge from human practices**' (Edensor 2010)

"*All social life is timed. It has a time-based order. Synchronisation and 'time structuring' are fundamental to any collective order*" (Adams 1990; 108)

The peak load problem

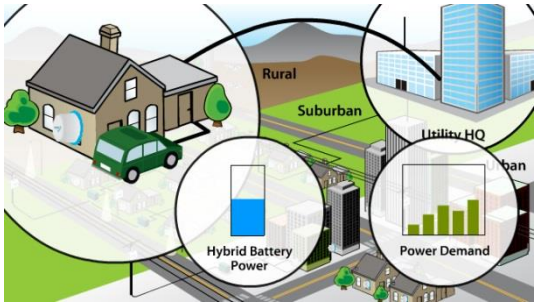
Problem for electricity grid capacity, investment, costs, carbon, future electrification (cars & heating)



Aggregated energy demand - or the load on the system/infrastructure/grid (within given spatial/network boundaries) - is generated from the **synchronization of social practices**

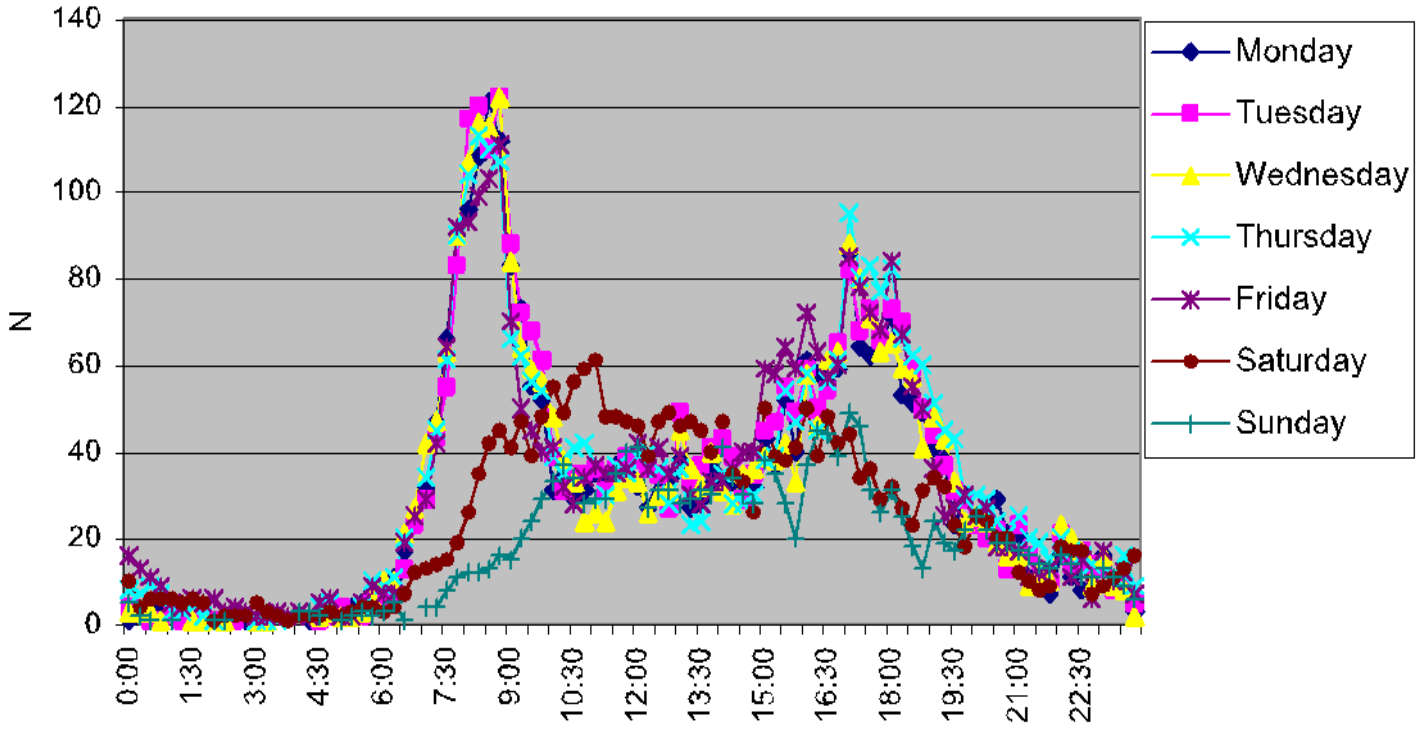
The 'peak load problem' is produced by (i) multiple patterns of social synchronization – people 'doing' together in time and space – and (ii) an infrastructure that simultaneously services those multiple doings

How do peaks and their make-up shift with changes in social practice, infrastructure, technology?



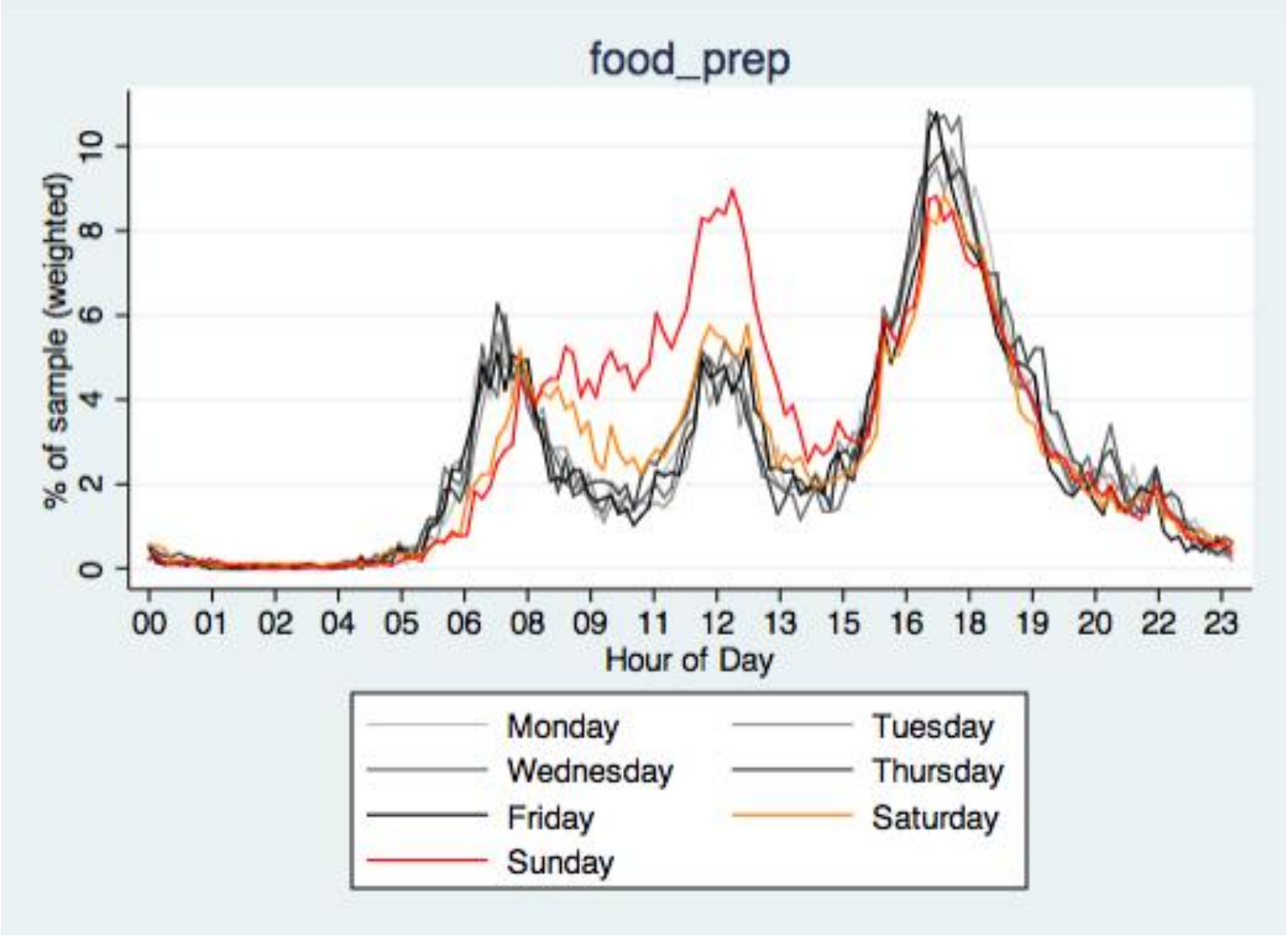
Time Use Data

‘At home and online’ UK 2000



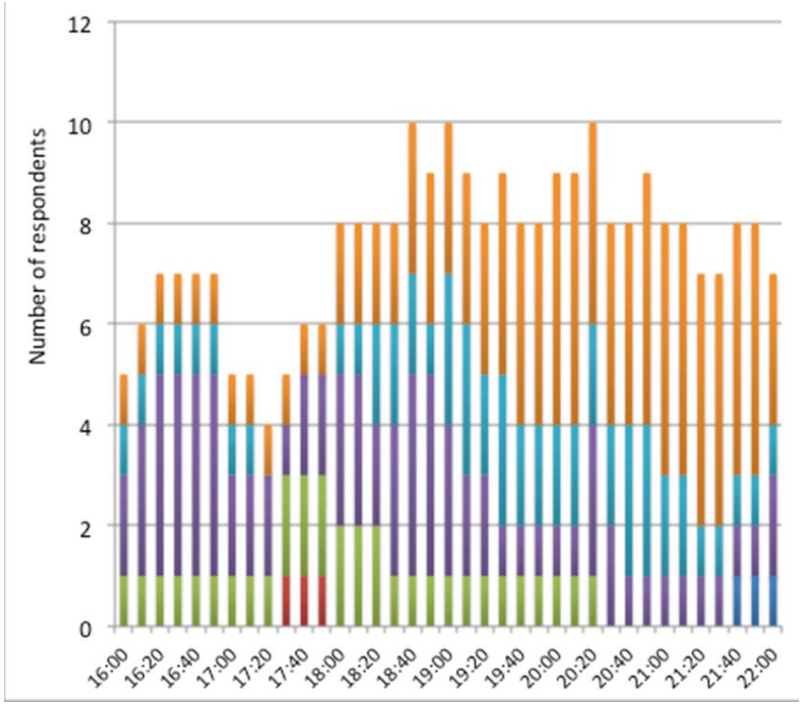
‘Home and OnLine ‘2000 Time Use Survey Data (UK) N of persons reporting (sample n = 1093)

Daily/weekly portrait of a practice: food preparation

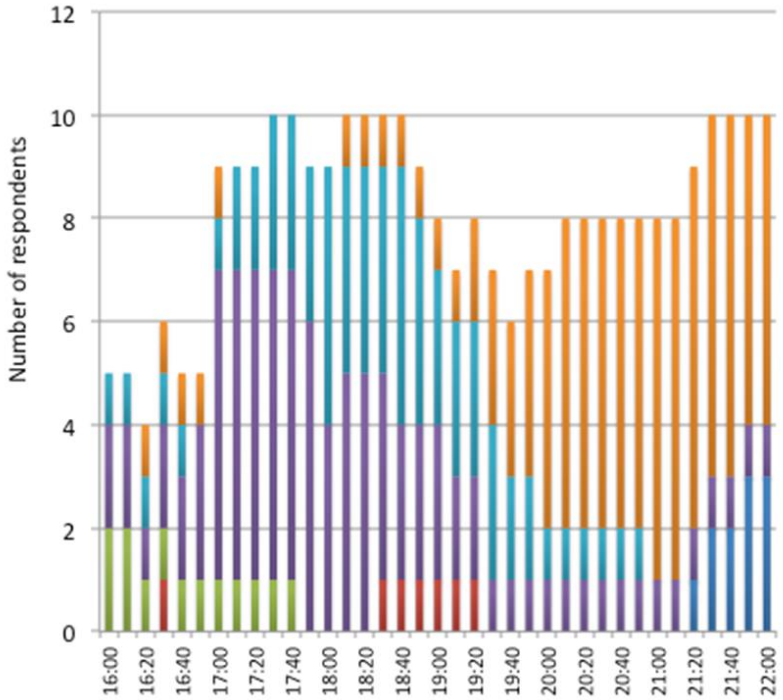


Original dataset: ONS 2000 UK Time-Use Survey (Ipsos-RSL and Office for National Statistics, United Kingdom Time Use Survey, 2000 [computer file]. 3rd Edition. Colchester, Essex: UK Data Archive [distributor], September 2003. SN: 4504, http://dx.doi.org/10.5255/UKDA-SN-4504-1)

Monday and Friday evening peaks compared



Monday



Friday

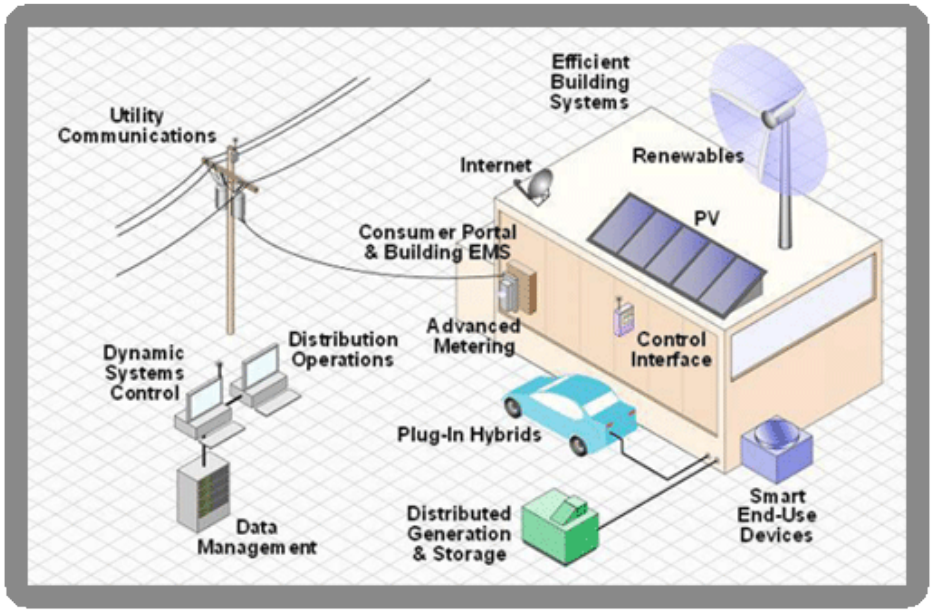
- Watching TV and videos/DVDs, listening to radio or music
- Eating or drinking/having a meal (at home/away from home)
- Preparing food and drinks, cooking, washing up
- Work for your job (includes paid and unpaid overtime, work brought home)
- Washing, dressing/undressing etc.
- Sleeping

Finish work earlier on Friday

The intermittency of renewables problem

- As energy supply becomes more dependent on natural fluxes and rhythms (wind, sun, tidal) **synchronization between supply and demand matters** - **can demand be 'made' to match with supply**?

- At different **scales** – household, business, up to system level



- In the ‘smart world’ ….. can demand be purposefully moved? Can the time patterning of practices that generate demand be shifted?

- Demand shifting taking different technological & institutional forms – price incentives, technology controlled, recurrent, exceptional etc …

↓

British Gas in the UK to trial giving customers free electricity on Saturdays

Fixed?

'*Rhythm disappears into the mist-enveloped realm of fixed things*' (Mels 2004; 23)

Social practices are interwoven, sequenced, locked into temporal patterns of the familiar/normal/necessary; therefore hard to disentangle; some practices and people may be more 'fixed' than others

Pliable?

"*there is no identical absolute repetition indefinitely … there is always something new and unforseen that introduces itself into the repetitive*" (Lefebreve 2004: 6)

The social ordering of time is full of regulation and governance – setting both the possible and the 'right' time of things (Adams 1990)

… **starts/beginnings and ends/stops; opening times, working days; timetables …**

And plenty of examples of energy demand shifting for **non- energy** reasons

Movement as a question of power and governance?

Where (if anywhere) is the power to retime the temporal ordering of practices located? Who has it, how can it be exercised, under what conditions, for what practices, to what degree, to what ends? Where do resistances lie?

- Employers can and already do shift their **working hours** to fit with commercial objectives (including energy related ones)
- The UK is planning to deregulate the timing of **school holidays**, and the school day – an act of significant societal de-synchronisation

What wider consequences and inequalities lie within time-related demand management?

What do we *really* know about energy demand?

- we know a lot about the aggregate outcomes of demand in terms of consumption; far less about demand itself and how this is changing
- means stepping back from energy and asking what energy is for
- deepening policy and practical relevance – for better scenarios &modelling; low carbon transition policies; active demand management; smart grids….

… find out more at www.demand.ac.uk

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Is based on 3 linked propositions

1 Energy is used in the course of accomplishing social practices.

2 Social practices and energy demand are shaped by infrastructures and institutions.

3 These systems reproduce interpretations of need and entitlement, and of normal and acceptable ways of life.

These propositions underpin 5 research themes.

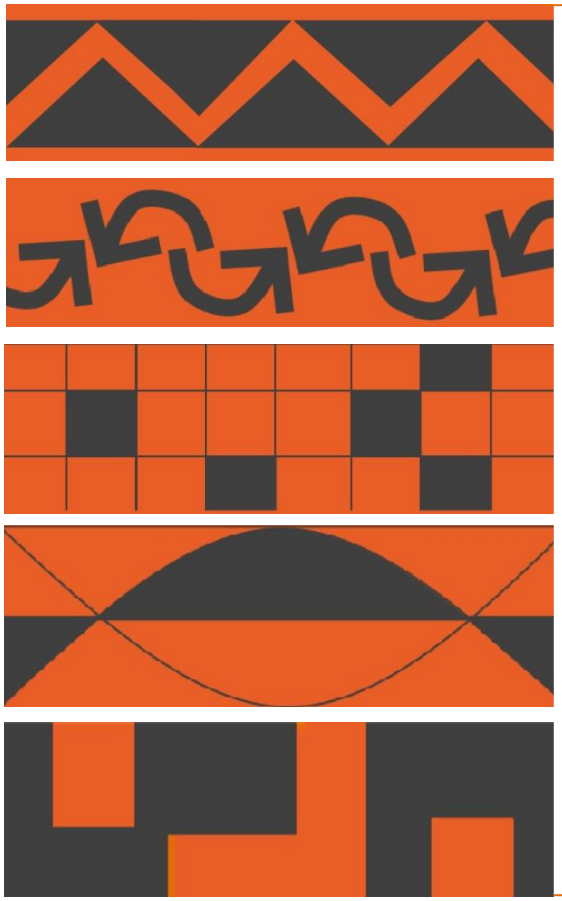
1 How and why do end use practices vary

2 How and why do end use practices change over time

3 How do infrastructures of supply and demand shape end use practices

4 What are the implications for normality, need and entitlement

5 How is energy demand, constituted, transformed and steered?



Research within these themes allows us to:

Identify and explore new opportunities for **demand** management at different scales.

Achieve a step change in how energy **demand** is understood and managed.

Confront fundamental issues of **demand:** what is energy for?