Climate change and the dynamics of energy demand: why it matters what energy is for

Professor Gordon Walker Lancaster University

National Chengchi University Taiwan, November 2014

斜 筑 毻 Ministry of Science and Technology









Climate change and the dynamics of energy demand

The DEMAND Centre and research agenda

Three reasons 'why it matters what energy is for'



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Man-made warming to blame for storms, suggests Met Office



UK • Weather • Flooding









http://www.carbonbrief.org/blog/2014/01/the-pitfalls-of-analysing-mediacoverage-of-climate-change,-in-three-graphs/













"Warming of the climate system is unequivocal"

"Continued emission of greenhouse gases will cause further warming and long-lasting changes in all components of the climate system, increasing the likelihood of **severe**, **pervasive and irreversible** impacts for people and ecosystems"

"Mitigation options are available in every major sector. Mitigation can be more cost-effective if using an integrated approach that combines measures to reduce energy use and the greenhouse gas intensity of end-use sectors, decarbonize energy supply, reduce net emissions and enhance carbon sinks in land-based sectors"



Climate change is already happening

Its impacts and consequences will worsen and be unequally experienced – a matter of climate justice



Energy is most directly implicated in both the creation and the potential for mitigation of climate change

What energy is used for, across the world, is both cause and (potential, partial) solution to climate

DYNAMICS OF ENERGY, MOBILITY AND DEMAND



Primary energy world consumption by fuel type in MTOE - World

For detailed notes please refer to the BP Statistical Review of World Energy 2011 PDF or Excel workbook.





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DEALS OF ENERGY, MOBILITY AND DEMAND



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5 years funding 2013 - 2018

Collaboration with EDF R&D European Centre and Labs for Energy Efficiency Research. Further partners Transport for London and the International Energy Agency

15 co-investigators from 11 Universities:

Multidisciplinary research team sociology, geography, transport engineering, energy and transport economics, history, construction, information technology, social statistics

15 Postdoctoral researchers, 12 PhDs







why it matters what energy is for

Why it matters what energy is for: No 1

Because the historic growth in the demand for energy (and supply of that demand through fossil fuels) has generated most of the emissions that are forcing global warming and producing climatic change

Growing demand due to:

- Economic change?
- Population change?
- Technological change?
- Cultural change?

Or changes in shared 'social practices' – ways of living, working, moving around, of doing things everyday, that directly or indirectly involve technologies that use energy



NUMBER OF LIGHTS IN AVERAGE HOME DOUBLES IN A DECADE

A survey by retailer Homebase has revealed the amount of lights in the average British home has doubled in the last decade, despite homes now being smaller than ever, *writes lighting.co.uk*.

The number of lights in the home has leapt from just 15 light sources in 2004 to more than 30 today as people add more spotlights, wall lights, pendants and lamps to their homes.

http://www.contentcoms.co.uk/number-oflights-in-average-home-doubles-in-a-decade/



Some key **DEMAND** ideas ...



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 is used as part of the accomplishment of social practices .



Aggregate energy consumption is therefore an outcome of the **multitude of ways in which energy is useful** for everyday life, much of which is shared, 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 (2014) 'What is energy for?: social practice and energy demand', *Theory, Culture and Society;* Walker (2014) '*Dynamics of Energy Demand: Change, Rhythm and Synchronicity'*, Energy Research and Social Science

The growth of air conditioning - in the UK

1 Contain

... 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.



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NDITIONING



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

www.sprg.ac.uk

Why it matters what energy is for: No 2

Because ... future trajectories of energy demand depend on changes in how energy is used, what it is for

Ongoing social change may increase demand in some respects, reduce it in others; and also change the patterning of where and when demand is happening

Policy interventions may seek to influence social change in ways that can limit increases in energy demand, or support trajectories of demand reduction and demand shifting

Ongoing debate about EU energy demand reduction target; 40% or 27% reduction by 2030?



Trajectories of change



understanding more holidaying abroad



http://blog.gowalkabout.co.uk/2012/05 /boom-in-over-50slooking-for-cheapbackpacking-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.

The peak load problem: when energy is used

Peak periods of demand for electricity are a problem for supply infrastructure – investment needs, costs and carbon

The 'peak load problem' is produced by (i) multiple patterns of social synchronization – people doing things at the same time; and (ii) an infrastructure that simultaneously tries to service all that activity



Graph 7a: HES average 24-hour electricity use profile for owner-occupied homes, England 2010-11

What makes up the peak?

How fixed in time are different energy using activities?

How flexible are they, could they be moved in time, to reduce peak load?

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)



Time use patterns in the evening in France – for people that are cooking, and those that are not (Anderson and Durand-Daubin forthcoming)

In the 'smart grid 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



Why it matters what energy is for: No 3

Because ... energy provides what are seen as necessary and essential services that underpin well being and a socially 'acceptable' quality of life

Notions of fuel or energy poverty as a problem but what energy uses really matter, and on what grounds ... and therefore should be made achievable or affordable by the government, as a right?

In the UK warmth is most important – Public Health England recommends living rooms should be kept at 18oC minimum, particularly crucial for older people and others that are vulnerable. In Taiwan, cooling? THE INDEPENDENT MONDAY 17 NOVEMBER 2014



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Fuel poverty crisis leave one in three pensioners in turmoil





6 November 2014 at 6:03am

Tonight: Fuel poverty and its effect on our health



CHRIS CHOI CONSUMER EDITOR



Elderly person dies every SEVEN minutes due to fuel poverty 'scandal'

EXPRESS

MILLIONS of pensioners are worried they will not be able to stay warm this winter as latest figures show an elderly person dies every seven minutes from the effects of cold.



It matters what energy is for because ...

the growth in the demand for energy, and supply of that demand through fossil fuels, has generated most of the emissions that are producing climatic change

future trajectories of energy demand depend on changes in how energy is being used as part of many interrelated social practices

energy provides what are seen as necessary and essential services that underpin well being and a socially 'acceptable' quality of life

... find out more at <u>www.demand.ac.uk</u>

