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Electricity Overloads and the 'Last-mile' Transformation

Isabel Shaw & Ritsuko Ozaki
Imperial College London
Energy & Society Conference
Krakow, 4-6 June 2014

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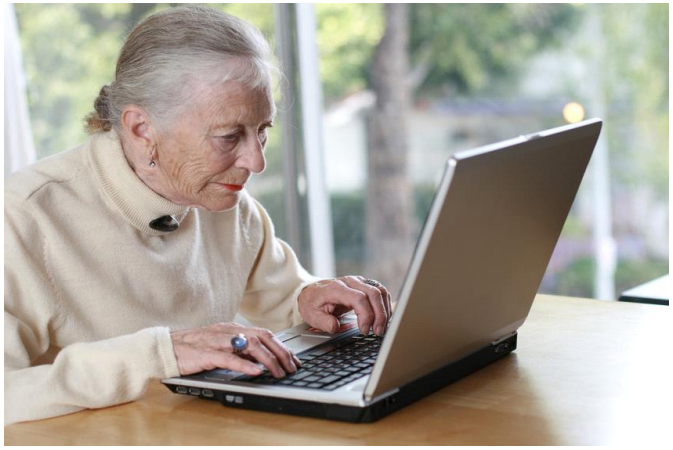
“Last-mile”




2011


START
STOP
NISSAN

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230V +10% ~ -6%

- Cables in the ‘last-mile’ tend not to ‘overload’ thermally; rather, they ‘overload’ by voltage dropping outside the range
- ‘Legacy’ cables
- Could a **relaxation** of the voltage quality definitions avoid a large and disruption cable replacement programme?
  - e.g. A laptop can operate across 90V to 250V.

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Our Research

Engineers' conception of and approaches to voltage relaxation as a solution to electricity overloads [and carbon emissions]

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Objectives

- [How do engineers conceive of the problem of electricity overloads and carbon emissions?]
- How do they assume socio-technological provision and usage of electricity?

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Theory

Standardisation (e.g. Timmermans and Berg 1997)

- Local actors possess **flexibility** as to how they **interpret** a standard with potentially diverse/conflicting outcomes
- Interpretive flexibility **at the receiving end**
- Local universality
  - Localised universality emerges from **localised processes** of negotiations and pre-existing institutional, infrastructural and material relations

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Methodology

- Semi-structured interviews
  - Half an hour to an hour by telephone
  - Project engineers
  - 10 (/15)
  - To be resumed in October 2014
- Thematic analysis with open coding

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Findings

- Two contrasting ideas identified
  - Static view – purely technical
    - Users: part of demand model
  - Dynamic view – performativity of technology

The construct of *Top* and *Tail* ("Energy Networks Top and Tail Transformation"):

- **Top**
  - 'Long-distance transmission to integrate energy over wide areas' (SF)
  - 'The transmission system' (MJ)
  - 'A black box with network of cables and switchgear or transformers' (SR)
  - 'Generators and a transmission system' (RS)

- **Tail – Networks connect to consumers**
  - ‘The last-mile of distribution from sub-station to houses’ (MT)
  - ‘The last section… the structure of the grid… a block of distribution networks’ (SF)
  - ‘Where the consumer is connected to low voltage networks’ (MJ)

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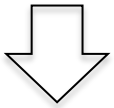
Tail:

LV energy networks

- ‘The sub-station transformer [connects] to cabling and protection devices that might be incorporated to protect and manage the network. Low voltage network includes all of the equipment based at the sub-station and **between the station and the consumer**’ (MJ)



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Users and socio-technological usage – Who 'behaves'?

- Disconnecting "the social"
  - As 'a **purely technical** study'
- Users seen as a universal (or irrelevant) concept:
  - '**Generalisable input** to demand models' (NK)
  - '**Invisible**' (MJ)

- [A] ‘building **behaves**… temp flows, **physical behaviour of the building**, rather than the behaviour of the occupants’ (NK)
- ‘When you understand demand, then you model the network and the power flow through it… For example, lighting, air conditioning, and computer. We feed back to understand network, how they will **behave** to deliver electricity’ (MT)
- ‘To do these, they [we] **generalise users as demand models**’ (NK)

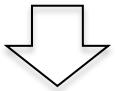
Cables (which are part of the network) – Passive, but also performative

- [The] ‘reason for considering sub-stations is that existing technology is **passive** and has no mechanism for regulation at all, so you can’t change the voltage level’ (MJ)
- [We] ‘think of cables as **passive** things, but have [having] **highest value** as part of the network. [It is a] **challenge to reuse the cables**’ (SR)

- ‘Cables have two properties, which matter in [the] low voltage network. One is resistance, voltage feeding one end of street… different at other end. So, **cabling is affecting what is going on in network**. In a street the cabling may be different at one end than the other. These sorts of things are **fixed** because the cables are buried, so [we] have to work within those constraints’ (SR)

Tentative concluding remarks:

- Literature – Empiricist vs. contingent repertoire
- Engineers views of solutions to energy/environmental problems
  - Technology – dynamic; performativity
  - Users – static; bracketed off



- Our agenda: How to make this into a sociologically insightful study?