Core capacity
SAVE data & social science literature review

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Scottish & Southern Electricity Networks

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citizens advice

Two separate commissions

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What we will talk about

- What is core capacity and why are we looking at it?
- What us done elsewhere?
- Top-down analysis, for Citizens Advice
- Bottom-up, the social science on essential needs, for SSEN
- Implementation – gains and risks

What and why?

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Future Charging Review

Ofgem to "*explore the feasibility and desirability of defining a minimum basic level of access for small users (or a subset of small users), as well as having threshold limits for sharper charging signals*."

About incentives to manage capacity

Acknowledge difficulty of defining "*essential*" usage

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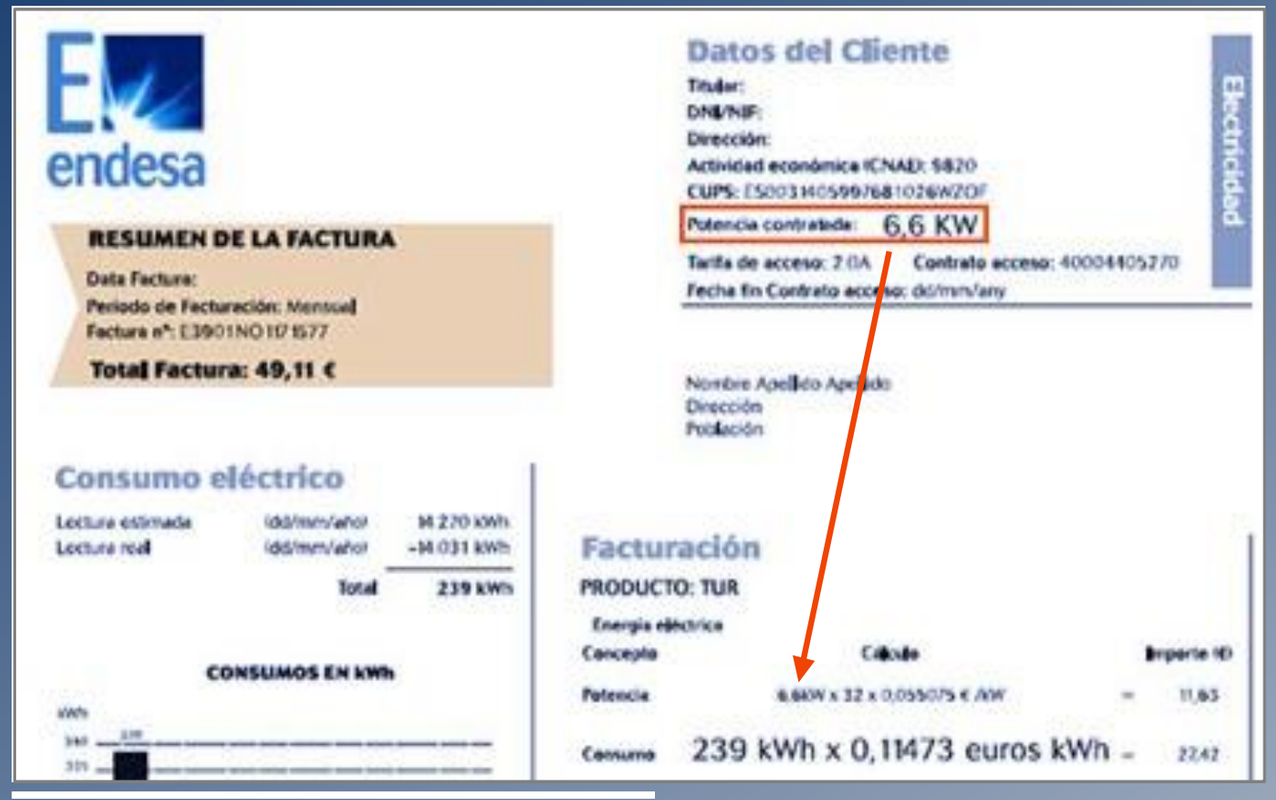
Experiences?



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Capacity limit	Household characteristics	Equivalent to
2.3kW	Studio flat without air conditioning	• 93.8% of total consumers in Spain • 109,000 kW of capacity • 64,000 GWh yearly consumption • On average paying €41 kWh per month
3.45kW	Small flat without air conditioning with small appliances	
4.6kW	Medium size flat with air conditioning in some rooms + small appliances	
5.75kW	Medium size flat with air conditioning + medium size appliances (oven, dryer)	
> 6kW	Medium and large flats with air conditioning and large appliances	

Capacity limit	Annual consumption	Description (by way of example)	Fixed amounts in total electricity bill (€/year and €/kW/year)	Yearly net bill (€/year)
3	1500	Single person household	27.5%	304
3	2200	Two-person household	21%	393
3	2700	3-4 person household	19%	457
3	3200	>4 person household	17%	521
3	900	Holiday home used few months per year	-	377
3.5	3500	Typical household which electrifies cooker and water heating	16.5%	570
3	4000	Multiple occupancy household (e.g. short-term tenancy contracts for students and workers away from home)	-	773
6	6000	High efficiency house	15%	946

Core capacity elsewhere

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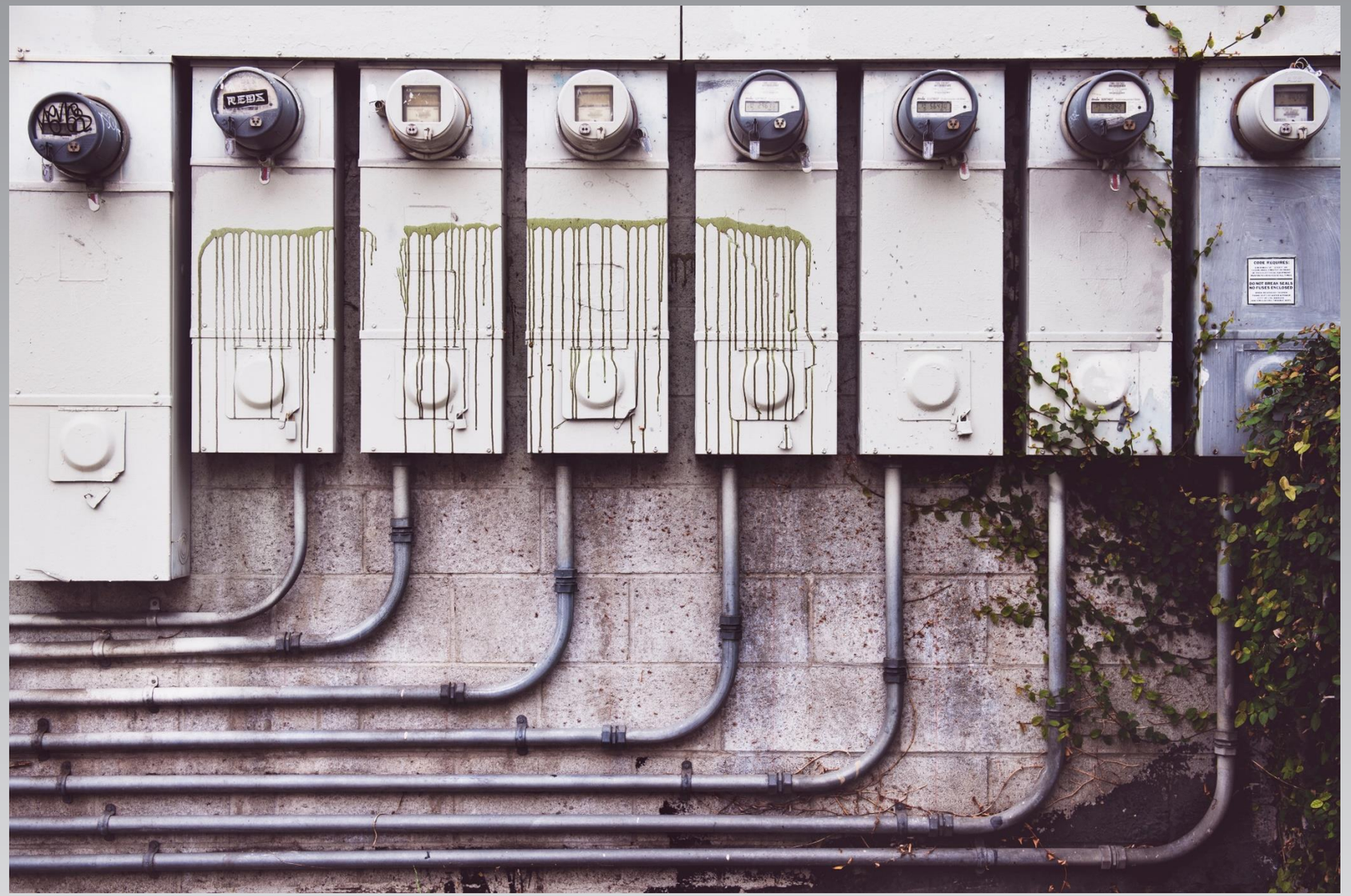

Top-down analysis - smart meter data

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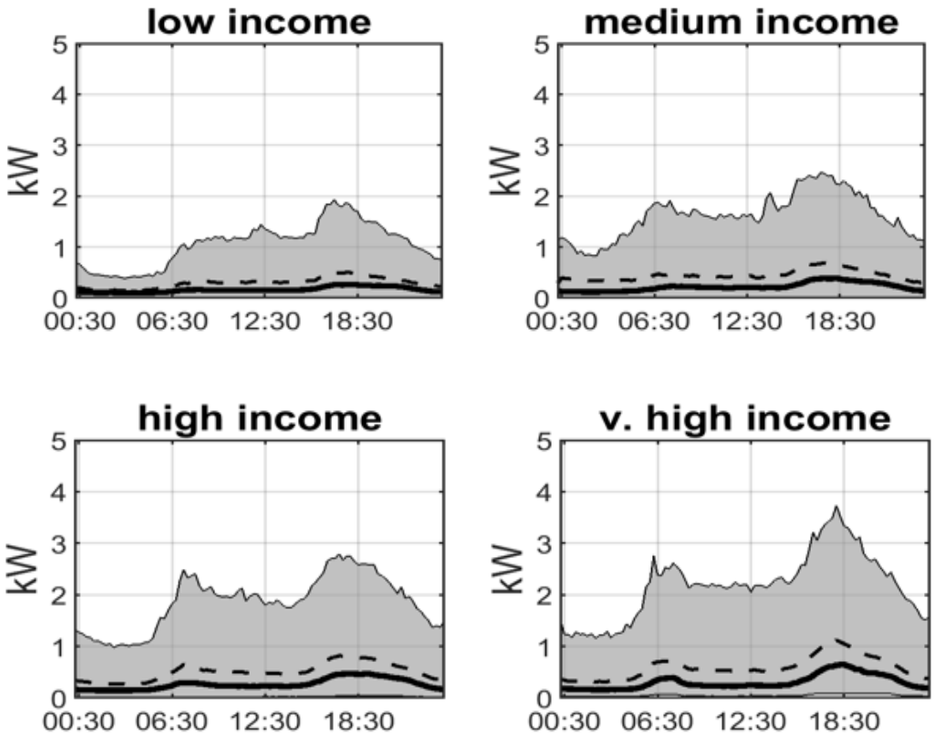
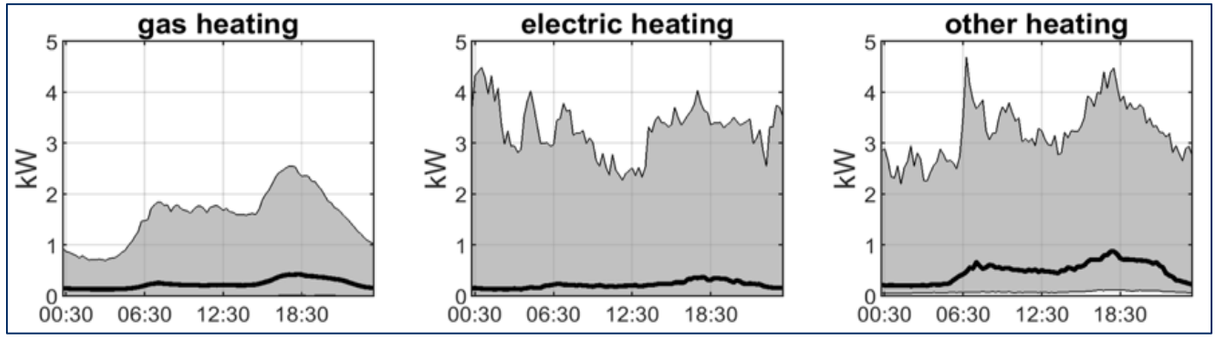
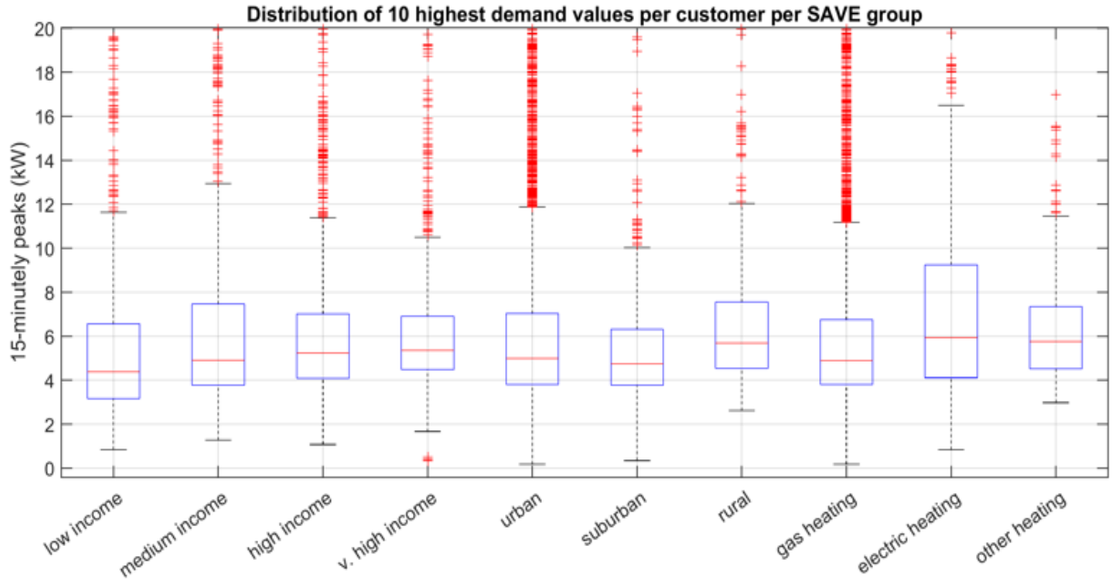
SAVE Cores







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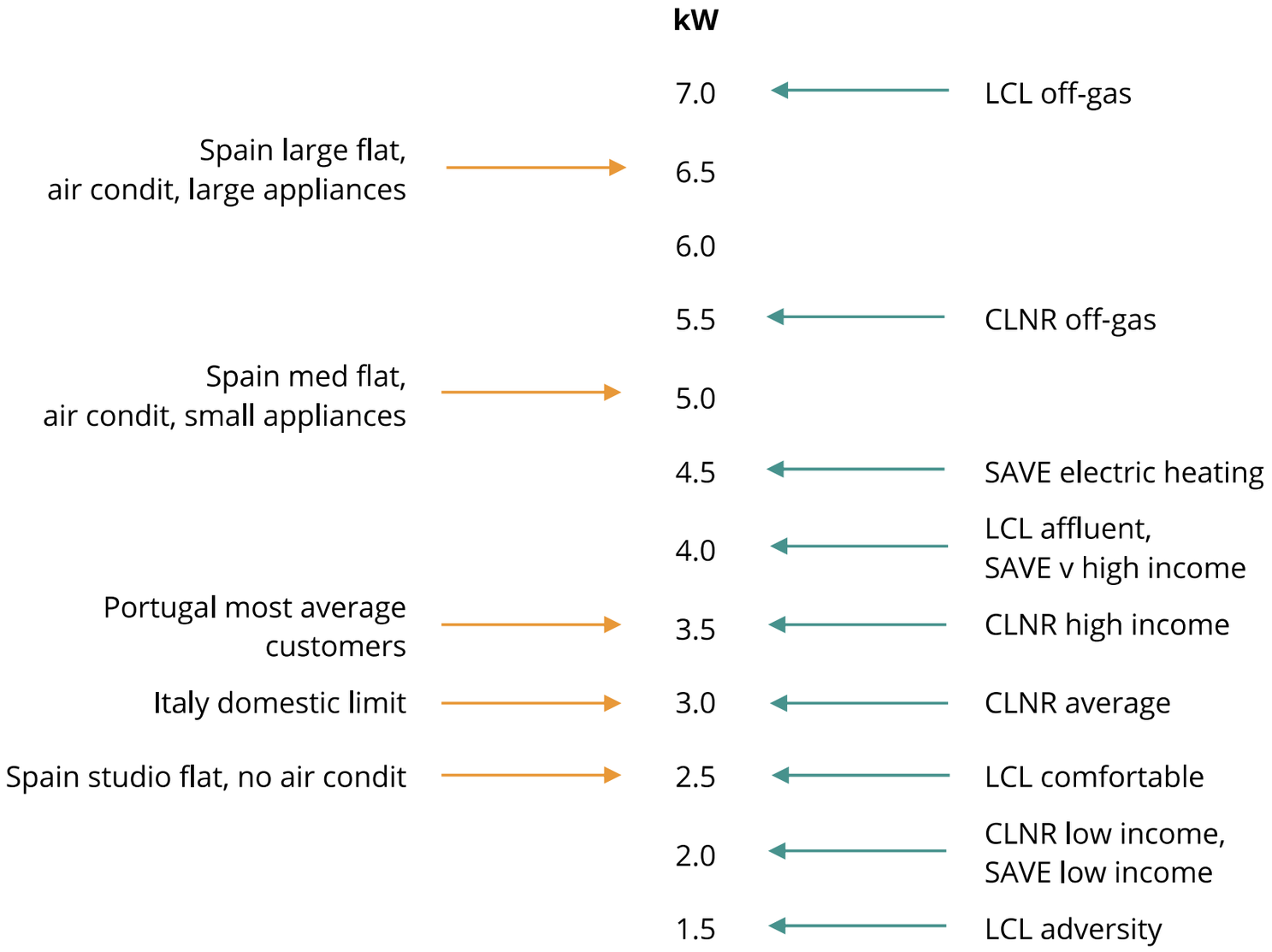

Off-gas highest to living in adversity at the lowest

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Social science of essential needs

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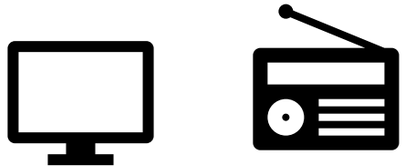
Social sciences

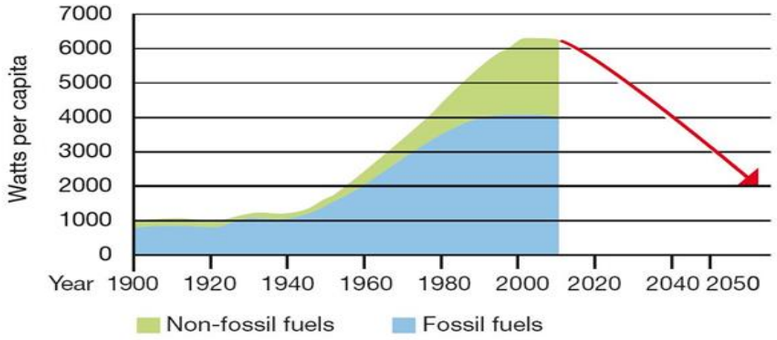
- **Services**
- **Needs**
- **Sufficiency**

Some services are time critical



Categories of basic needs

Swiss 2000 watts society



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Minimum Income standard

- Heating
- Lighting
- Home entertainment
- Computers and internet
- Communications
- Kitchen
- Cleaning and laundry
- Personal care
- Bedrooms

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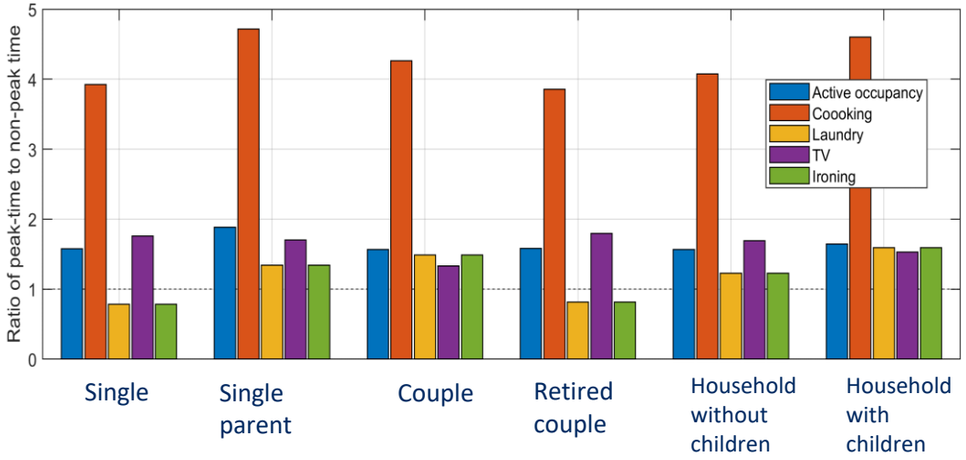
Minimum income standard and energy sufficiency

	Couple, working age	Pensioner single	Lone parent, 1 child	Couple, 4 children
Hob	√	√	√	√
Microwave	√	√	√	√
Kettle	√	√	√	√
Fridge freezer	√	√	√	√
Toaster	√	√	√	√
Central heating pump	√	√	√	√
Vacuum	√	√	√	√
Tumble dryer				√
Washing machine	√	√	√	√
Iron	√	√	√	√
Hair dryer	√			√
Vacuum cleaner	√	√	√	√
TV set with Freeview box	√	√	√	√
TV with DVD player			√	√
Radio		√		
Personal computer	√		√	√
PM4	√		√	√
Lighting	0.21	0.18	0.26	0.53
TOTAL capacity	14.86	13.19	13.51	17.78

Future proofing

Capacity limit	Percentage of total consumers with heat pumps
3 kW	5%
4.5 kW	16%
6 kW	48%
10 kW	23%
15 kW	7%
> 15 kW	1%

Services happening at peak/off-peak time



A) For a family with a capacity limit of 3 kW consuming 2,220 kWh per year with a small car (1650 kWe), purchasing an electric vehicle involves an increase in core capacity of 0.5 kW;

B) For a family with a capacity limit of 3 kW consuming 2,700 kWh per year with a medium-size car (2595 kWe), purchasing an electric vehicle involves an increase in core capacity of 0.5 kW;

C) For a family with a capacity limit of 6 kW and yearly consumption of 6,000 kWh with a large-size car (3240 kWe), the purchase of an electric vehicles does not induce and change in core capacity.

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Implementation

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How?

- Charges – already capacity and reactive power charges for small business users

- Disconnection! – smart meter function

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Equity

This is all about **Future-proofing** e.g. Air Source Heat Pumps and Electric Vehicles driving expansion of the grid.

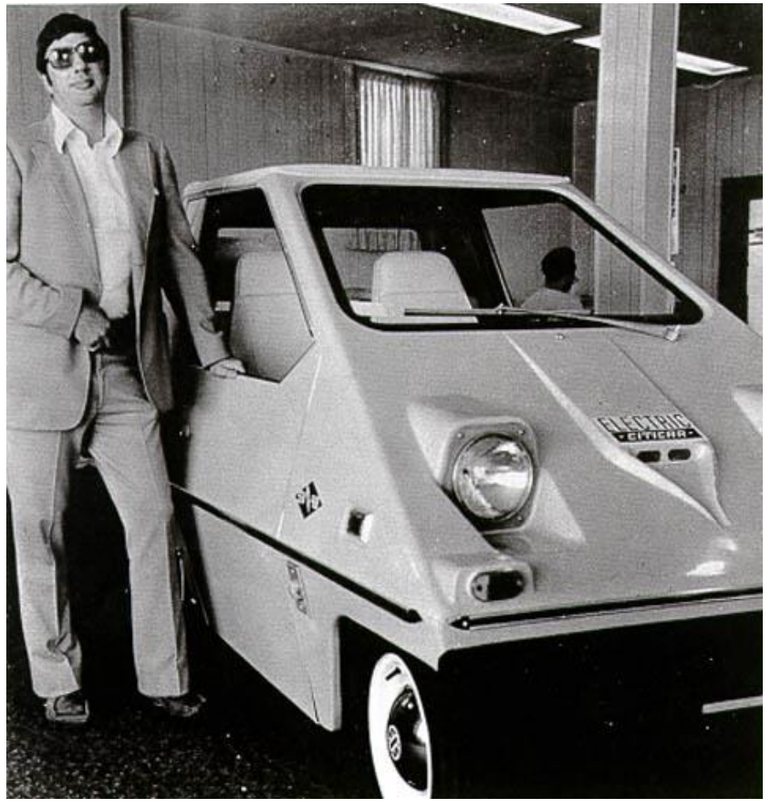
Who should pay? Who will be left behind?

A fifth of adults are digitally illiterate

Smart technology costs money. “Alexa – when is electricity cheapest.” Alexa £70. Smart appliances more expensive. Low income consumers replace appliances less often.

EV ownership

Compared to all car owners, EV owners more likely in 40-69 age group, high social grade, live in multi-car household (Department for Transport). 89% male (Hutchins et al, 2013)



Bob Beumont's groundbreaking Citicar
http://web.stanford.edu/dept/SUL/library/extra4/sloan/EVonline/profiles.htm

One man and his Tesla
https://www.theguardian.com/business/2018/jul/27/one-man-and-his-tesla-an-electric-cars-journey-to-edinburgh

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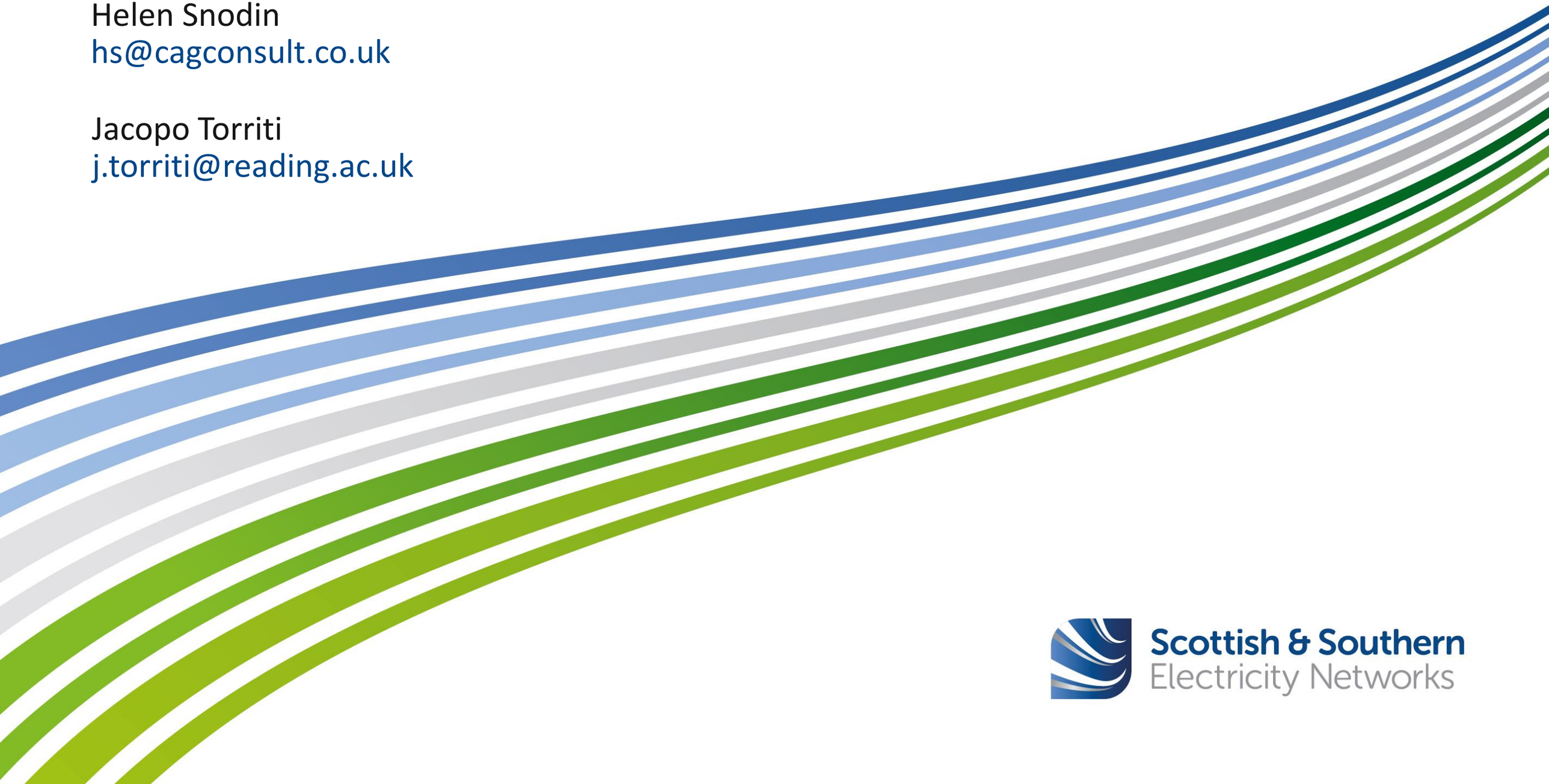

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