

Consumers at the heart of the future energy system

#CAFutureEnergy

The logo for Citizens Advice, featuring the text "citizens advice" in a dark blue, lowercase, sans-serif font. The text is contained within a white speech bubble shape that has a small tail pointing downwards and to the left. The entire logo is set against a dark blue background.

**citizens
advice**

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#CAFutureEnergy

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A white speech bubble containing the text "citizens advice" in a dark blue, sans-serif font. The bubble has a tail pointing towards the bottom right.

**citizens
advice**

If you would like to keep in touch with our research on Future Energy Consumers then please sign up [here](#) to receive upcoming blogs and reports.

Headline speaker

#CAFutureEnergy

Martin Cave

Ofgem

Martin Cave's speech can be found on the Ofgem website [here](#).



EV smart charging
**Drivers' views on how to
make it work for them**

Victoria Pelka, Citizens Advice
Neale Kinnear and Becca Jenkins, Transport Research
Laboratory



1. Context of the research
2. Key research findings and takeaways
3. Brief Q&A
4. Group discussions

The Challenge

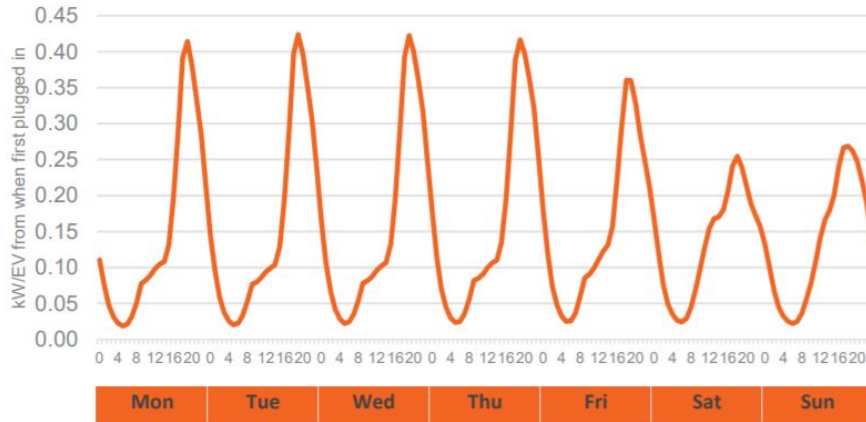


Figure 1: Residential charging for a typical week

*National Grid SO and Element Energy, "EV charging behaviour: A Network Innovation Allowance (NIA) project", April 2019
https://gallery.mailchimp.com/653aa73e3a1af04b72fa0b5ae/files/bc95eec2-e06e-4fee-8ffe-78a7ab46f604/EV_NIA_v1.0.pdf



Research gaps: what we didn't know

Appeals, concerns,
preferences, and
information needs
for different
flexibility offers

Qualitative,
immersive
research

Research with
small businesses
and people in
vulnerable
situations

Research with
future EV drivers



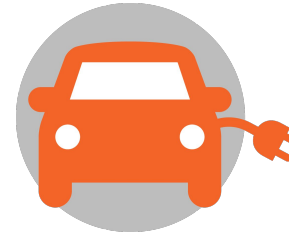
TRL

**THE FUTURE
OF TRANSPORT**

Smart charging: What do electric vehicle drivers find acceptable?

April 2019

- EV adoption will introduce **new challenges**
- Smart charging is a key means of **addressing** these challenges
- **Consumer needs** must be considered
- This research aimed to understand current and future EV drivers' and small businesses' **attitudes towards being flexible** in their energy use



1. To what extent do drivers **understand the need** for them to become 'flexible' in their energy use, and how acceptable do they find this?
2. To what extent do drivers find various smart charging options **acceptable**?
3. What are their **concerns** or perceived **barriers** to uptake regarding the options?
4. What are their **information needs** before signing up to a smart charging option and who would they prefer to provide that information to them?
5. What **provisions** would drivers like to be put in place to increase acceptability of the options?

The six smart charging options we discussed



Static time-of-use tariffs

Different price bands for electricity throughout the day



Dynamic time-of-use tariffs

Real-time or predictive prices for electricity throughout the day



Third-party charge management schemes

Allowing a third party to manage EV charging



Vehicle-to-grid (V2G) services

Enabling consumers to return energy in EV battery to the grid



Smart charging technologies

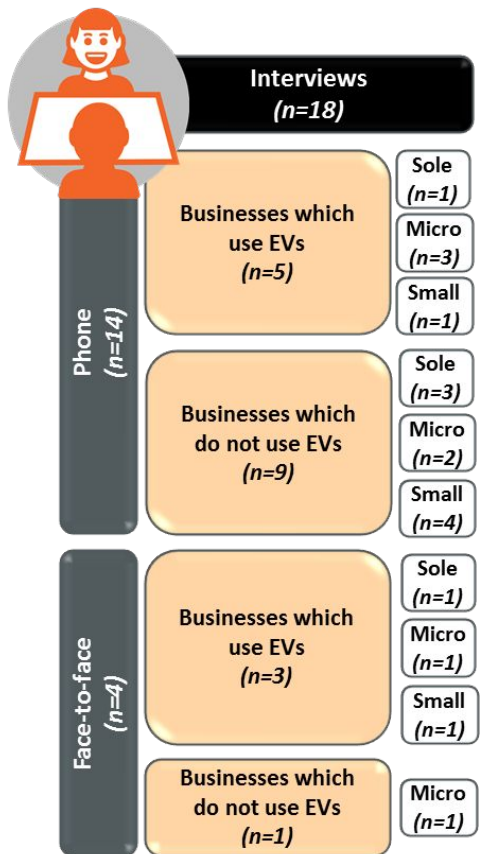
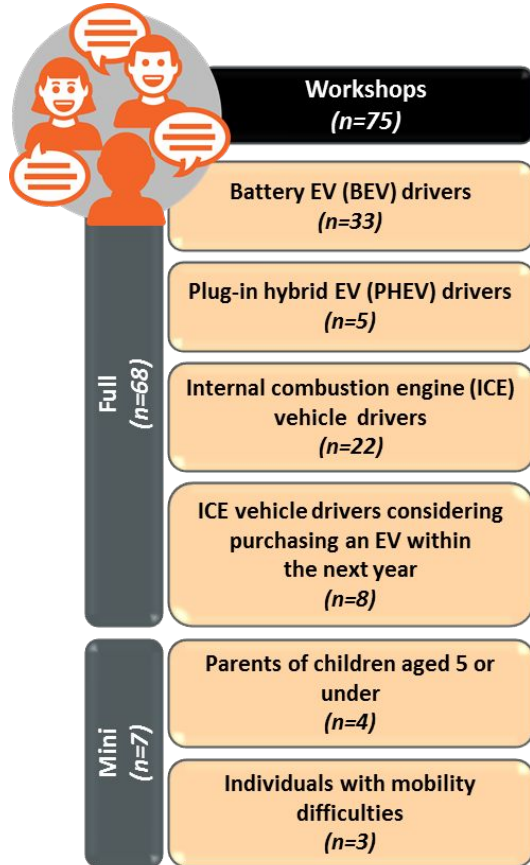
Smart chargers or scheduling function in vehicle, facilitating engagement with the above options



Mandatory managed charging

Potential curtailment of EV charging by network operator, implemented as a 'last resort' if other mechanisms fail to reduce peaks in energy demands

Method



Workshop structure

Icebreaker activity (ranking household objects and EV by annual cost)

Managing household energy use (monitoring, reducing, choosing tariffs)

EVs and uptake (PHEV vs. BEV – current uptake, future uptake)

Daily routine activity – typical vehicle use, when EV charging would happen

Energy supply and peak demand

Responsibility for balancing the grid

EV charging demo

Introduction to smart charging options including videos

Workstation activities (posters, phone apps, energy use calculator)

Group discussion

Poster activity

Closing discussion

Interview structure

Pre-interview questions

Background (business and vehicle use)

Views of EVs

Understanding of smart charging options

Opinions of smart charging options

Information needs



Households - summary

- **Good understanding** of the **need** to be flexible with future energy use
- Saving **money**, **convenience** and the **environment** were key factors for consumers
- **No one-size-fits-all solution**; some participants accepted and some rejected each option
- But, most participants felt that **at least one** option would fit with their needs
- Static time-of-use tariffs were the most popular option amongst household participants

“If the number of electric vehicles on the road grows – which we expect it to – to not have to need more generating capacity, we have got to make use of all this technology and tariff incentives to smooth the demand out”

“Energy companies need to offer pricing structures to influence/encourage”



- We held two mini workshops: one with parents of young children and one with people with mobility difficulties
- Views did not differ markedly from other household participants
- Some concerns were amplified for these groups:
 - ✓ Need the EV to be sufficiently charged for emergency use at all times
 - ✓ Must be able to override scheduled charging
 - ✓ No spare time to plan charging

“For a larger family I don’t think [flexible charging] is particularly good because of the fact that I have to have routine...for smaller families it could work”



“Where is your time best spent? Monitoring cheapest tariffs and constantly changing behaviour accordingly or on other more pressing demands of family life?”

Small businesses - summary

- Good understanding and acceptance of the **need** to be flexible with their energy use
- Cost savings are secondary to ensuring an EV is **sufficiently charged** to meet business requirements
- Keen on any smart charging option that reduces **admin** time
- **No one-size-fits-all solution**
- But, at least one option would fit in with each business
- Dynamic time-of-use tariffs were the least popular

“Your typical business spends 1-2% of its turnover on gas and electric. Compared with salaries, leasing or renting buildings, energy is insignificant”



“[Having an EV that is not charged would be a] catastrophe as cars need to be on the road making money”

1. Static time-of-use tariffs



“Easy for users – they know the rates so it’s their choice when to charge”

- The **most favoured** option amongst household participants
 - Key concerns:
 - Being **penalised** for needing to charge EV at peak times
 - Widespread uptake of the tariff would result in the ‘peak’ times being shifted
 - **Significant** cost saving required to encourage drivers to shift charging to off-peak
-

• **Some felt it would work well but not attractive to all**

- Key concerns:
 - **Being penalised** for charging EVs at times that suit operational requirements
 - **Time and effort** required to fit in with off-peak times
 - **Financial impact** if they cannot charge during off-peak



“I expect my utility provider to be providing a service, so having to do extra thinking is an inconvenience, there would need to be a big added value to take it on”

2. Dynamic time-of-use tariffs



“It would be too confusing, too complex, too unpredictable”

- Generally **unpopular** with household participants
 - Key concerns:
 - **Time consuming** and **complex**
 - **Unpredictable** and requires **effort**
 - Limited personal or financial benefit
 - Needs to have guaranteed **maximum** charges
-



“Because we’re a 9 to 5 business, we are kind of held to ransom, so we are kind of held to those working patterns. There’s an element of loss of control”

- **Not attractive** to business participants
- Key concerns:
 - Being penalised for charging at times that fit with operational requirements
 - **Complex** and requires **time** and **effort**
 - Expected to have a negative financial impact

3. Third-party managed charging



“I just can't see how having a third party managing your electricity for you could be cheaper...you've got to pay a middle man to do it for you”

- **Little support** from household participants as they are **unwilling** to relinquish control to a third party
- Key concerns:
 - **Lack of trust** in third parties
 - **Perceived lack of benefit**
 - Households would require a guarantee that third parties would **meet their charging needs**



“We're a small organisation, so less admin for me is appealing...it would be nice not to have energy management to deal with”

-
- Small business participants are open to this mechanism as it has the potential to **minimise effort** and **save money**
 - Key concern is around placing **confidence** in a third party to manage the business' energy use

4. Vehicle-to-Grid (V2G) services



“It could potentially pay for your charging, zero cost, charging cost”

- **Overall support** for the concept from household participants
 - Would like the ability to set charging preferences and to have a minimum guaranteed state-of-charge are important
 - Key concerns:
 - Financial benefits and **practical viability**
 - Potential impacts on **battery health**
-



“There’s not much that I don’t like about it, it makes a lot of sense...it could work well for meeting peak demands”

- **Largely supported** by small business participants
- Appreciate potential benefits
- Key concerns:
 - Ensuring vehicles would always have **sufficient charge** for unforeseen business-critical situations

5. Smart charging technologies



“You put in your requirements...and at the end of the month, you pay slightly less. You would be a happy customer, but it has to be reliable”

- Seen as a **positive** means of supporting flexible charging
 - Key concerns:
 - **Lack of trust** in the technology
 - Certain groups may be **less willing or able** to use apps or to plan charges around a set household routine
 - Needs good user interface and functionality
 - Must have ability to override scheduled charges
-



“Our electricity tariff is a single rate tariff, we would use smart elements if energy costs varied”

- Only perceived to be of benefit in conjunction with a time-of-use tariff
- Key concerns:
 - Must not interfere with business operations
 - Time and effort required for administration

6. Mandatory managed charging



“If there is societal give back, I could live with it, but I would need to know the reason why they did it at the time that they did it”



“If they do force EVs on me, it would probably kill it [the business] off ...to be controlled by someone else isn't fair”

- Mandatory managed charging is **largely disliked**
 - Household participants would only accept if there were **guarantees** around the level of charge and **advance warning**
 - Key concerns:
 - EV drivers would feel **unfairly targeted**
 - Would **discourage** ICE vehicle drivers from purchasing an EV
-
- **Largely disliked** by small business participants
 - Key concerns:
 - Potential for **lost revenue**
 - **Restricted freedom of movement**

Information needs

- Household participants want contractual details:
 - Length of contract
 - Early termination fees
 - Details around cost savings (tailored to their household) and other costs are also important
 - The key source of information would be the service providers' websites
-
- Small business participants need assurance of value for money
 - Also suggested energy suppliers could identify the most appropriate flexibility mechanisms for their business

“Presumably you have to sign into a contract for any of these things and what are the cancellation fees, how does it work, what are the penalties? You need know all this before”

“I think the comment about bringing benefits to the environment is very woolly...needs more data”



Guarantees and consumer-friendly design features

Decreasing importance

Having a guarantee that your vehicle's state-of-charge will never fall below a specified percentage

Having a guarantee that your vehicle will be fully charged by a specified time of day/night

Overall cost of charging

Having full control over the time of day/night that charging happens

Certainty about cost of energy per kWh

Having full control over the time of day/night at which full charge is reached

Certainty about annual energy bill

Saving money by charging your vehicle flexibly

Having a guarantee that some or all of the electricity for charging your car comes from renewable sources

Free charge point installation when purchasing a vehicle if you enter a contract to charge your vehicle flexibly

Ability for charging to be automated (so that you don't need to intervene)

Receiving money for returning energy to the grid from the vehicle's battery

Guaranteed charge

Cost of energy use

Control over charging

Other financial incentives

Environment

Group differences

Driver type



- EV drivers had greater knowledge about charging and about some of the flexibility mechanisms than ICE vehicle drivers

Location (urban/rural)



- Participants in rural areas had concerns about reliance on the internet and other networks
- Some rural participants expressed greater concern about not having sufficient charge for unexpected journeys
- Participants from rural areas were less likely to use V2G than those from urban areas

Country



- Participants in Wales were more open to using smart technologies than those in England or Scotland

- This research provides an insight into the views and attitudes of a sample of drivers and small businesses
 - Guide future research and policy
- Participants had diverse needs
 - Perceptions of the advantages of each option, and their concerns, were diverse
 - Providers of smart charging options will need to tailor their marketing to different groups of customers
- Flexible: Each participant felt able to adopt at least one of the options
- Future research should continue to explore attitudes towards and use of various options, in particular exploring the needs and attitudes of businesses in more depth
 - More in-depth qualitative research with consumer types and businesses
 - Surveys
 - Randomised control trials

I'M RUNNING OFF WITH THE FINDINGS!!



NEVER MIND THE LIMITATIONS

imgflip.com

My takeaways

Smart charging offers should:

- be tailored
- protect users
- be easy to use

Key considerations for drivers:

- control over battery level
- ease of use versus financial benefit
- business requirements
- trust in companies
- battery health
- data privacy
- environmental impact
- system impacts

Drivers may be happy to provide flexibility with their EV if provided with appropriate market offers



Guarantees and consumer-friendly design features may encourage greater involvement in providing flexibility

No one offer fits all: Motivations, circumstances, and abilities vary hugely

Small businesses have different motivations and considerations to households to engage with flexibility

Households with someone in a vulnerable situation may rely more on their vehicle than others and need particular consideration

Brief Q&A



Outstanding questions for debate

Roughly 10 minutes each per question

- A. What do the findings mean for your organisation?
- B. To what extent are the guarantees and design features the drivers in our research were asking for implementable? (see handout)
- C. How can the concerns and needs of **small businesses** be responded to effectively?

OR

- D. How can the concerns and needs of **households with someone in a vulnerable situation** be responded to effectively?

Workshop B

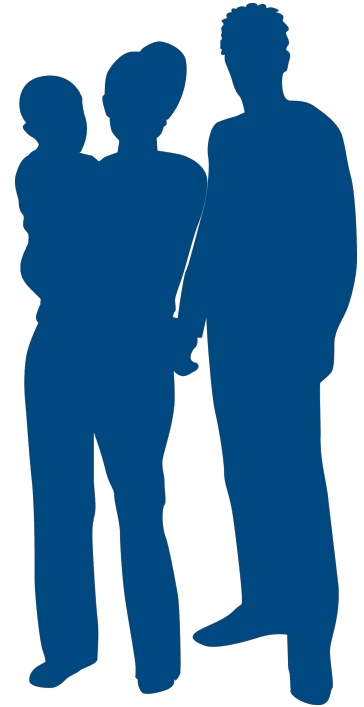
Consumer protections in smart connected homes



#CAFutureEnergy

Rajni Nair
Dr Rose Chard

Mapping the “customer
journey” for new
technologies to identify
consumer risks



How might consumers understand what they are buying?

1	Personalised pricing	Particularly relevant to heat as a service (as pricing might relate to technology and energy efficiency)
2	New concepts and terminology	Market models may be unfamiliar, what support mechanisms do consumers need to engage?
3	Bundled offers	Technology may be offered as a bundled product and service. How can consumers understand the value?
4	Comparison	If pricing is personalised, dynamic or technology is bundled into offers, how can consumer compare easily?
5	Value	Some DSR technologies could offer a 'value' to customers but value can be hard to understand upfront.

What happens if consumers think they are not getting the level of service they bought? What support should they get if something goes wrong?

1	Automation	Makes it difficult for consumers to understand what the outcomes of decisions might be
2	Multiple service providers	Can offer a confusing route to resolution if problems are not easily attributed to a particular party
3	Advice, protection and advocacy	Difficulty for regulators and consumer groups to understand problems and act on consumers' behalf
4	Alternative dispute resolution	There needs to be an independent ADR scheme with the technical knowledge to handle complaints

What if consumers do not understand the service or find it no longer works for them?

- 1 Support**
Consumers may need support in adapting to new technology/service. Risk that consumers lose out if no support is given.
- 2 Protections**
How should consumers be protected to enable them to engage in new technology/services?
- 3 Independent advice**
How might advice and support need to change as the market becomes more varied?

How might consumers understand the data they have shared and the purpose?

- 1** Amount of data collected
This could be substantial, from half hourly data to appliance level data to efficiency of that appliance.
- 2** Complex data sharing
As tech and services blur, data sharing and knowledge of ongoing interactions may become complex for consumers
- 3** Renters
Landlord owned appliances may hold tenant data. Data privacy in the PRS needs to be considered

How can we give consumers flexibility in using systems whilst adhering to safety and security requirements?

1

Consumer friendly security processes

How can we ensure easy and flexible access to technology while offering robust security for consumers?

2

Renters

Renters may need bespoke security requirements for landlord owned appliances

How might consumers feel in control?

1

Automation of tech
and services

Use of appliances based on 'rules' given.
But finding the right balance of control
and automation will be important.

How might consumers leave contracts without unreasonable barriers?

- 1 'Pay back' models
If consumers choose to purchase technology with a service, paying for the product may lock them into contracts
- 2 Technology included
If technology is included with no financial payment required, what impact does that have on minimum contract lengths?
- 3 Maintenance and service support
What are the implications of technology included models on maintenance and support? What should the T&Cs be?

How might consumers' data change the responsibilities of service providers?

1

Service provider responsibilities

Access to consumer data may identify vulnerabilities, for example cold or damp homes.

Workshop D

Clean growth - the future of heat



#CAFutureEnergy

James Kerr
Damien Morris
Dr Jeff Hardy

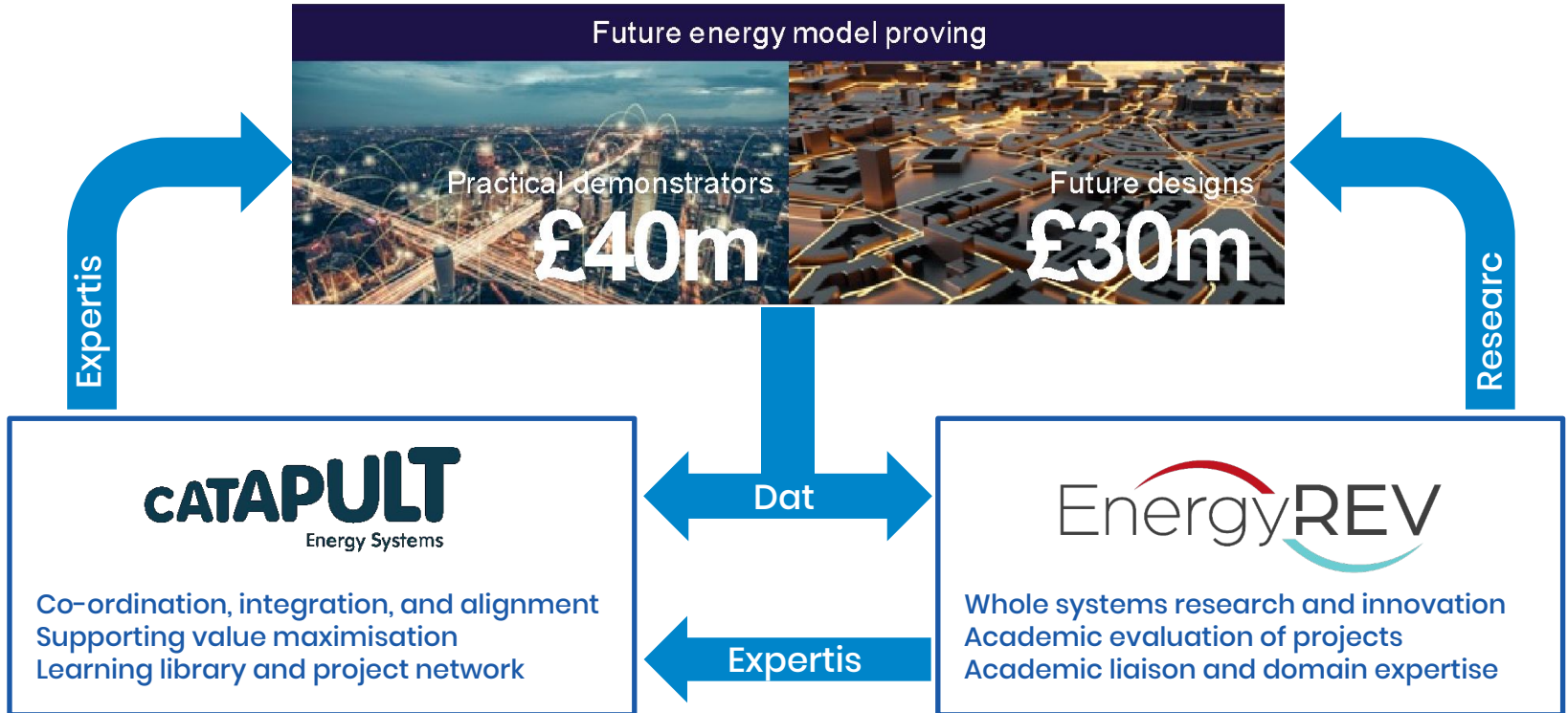
The challenge of decarbonising heat

Dr Jeff Hardy

Senior Research Fellow - Grantham Institute - Climate Change and the Environment

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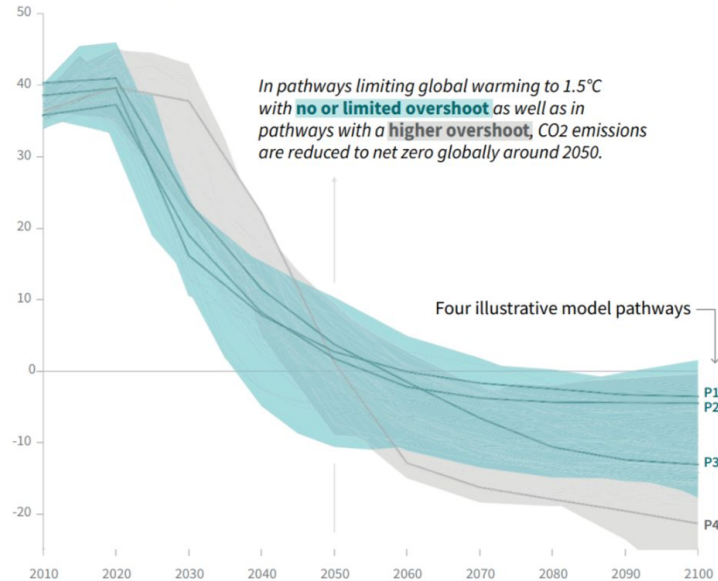
PROSPERING FROM THE ENERGY REVOLUTION



Decarbonised

Global total net CO₂ emissions

Billion tonnes of CO₂/yr



In pathways limiting global warming to 1.5°C with no or limited overshoot as well as in pathways with a higher overshoot, CO₂ emissions are reduced to net zero globally around 2050.

Four illustrative model pathways

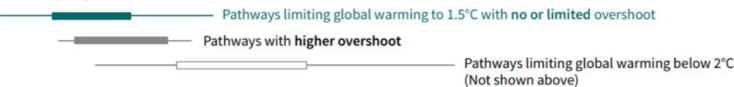
P1

P2

P3

P4

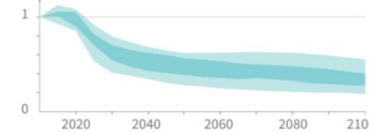
Timing of net zero CO₂
Line widths depict the 5-95th percentile and the 25-75th percentile of scenarios



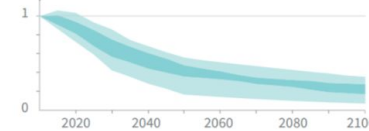
Non-CO₂ emissions relative to 2010

Emissions of non-CO₂ forcers are also reduced or limited in pathways limiting global warming to 1.5°C with **no or limited overshoot**, but they do not reach zero globally.

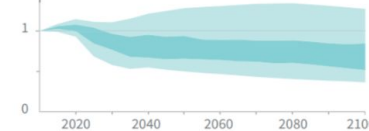
Methane emissions



Black carbon emissions



Nitrous oxide emissions

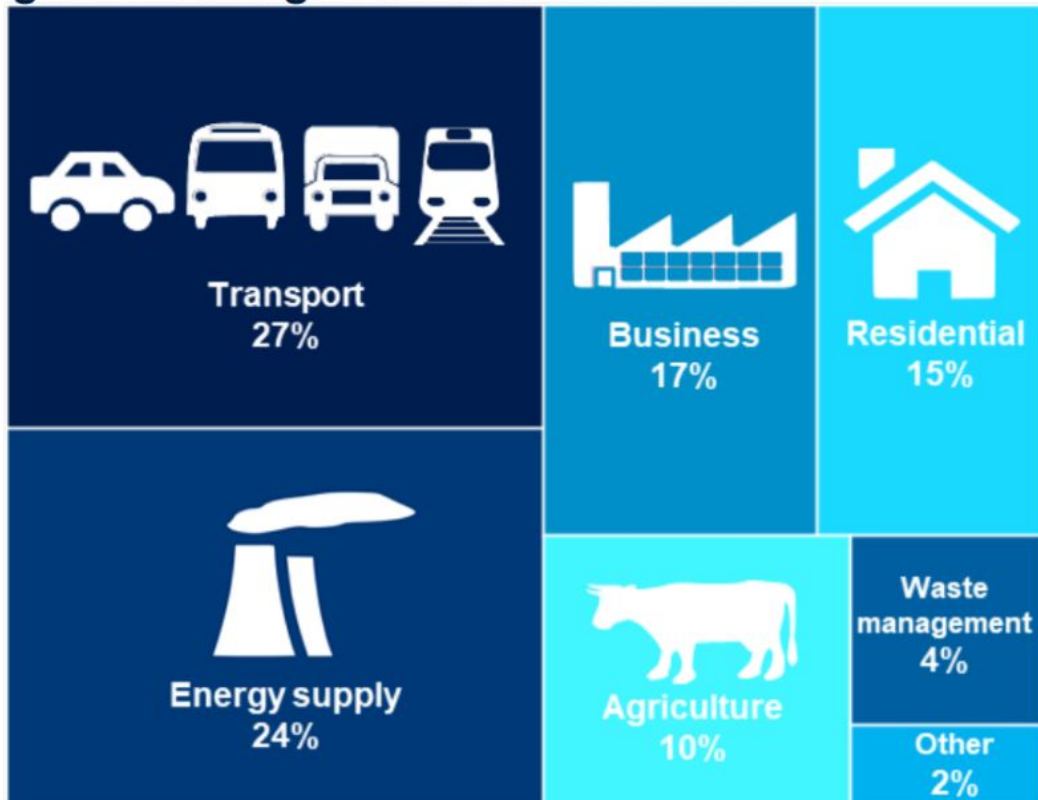


Source: https://report.ipcc.ch/sr15/pdf/sr15_spm_final.pdf

“Limiting warming to 1.5°C is possible within the laws of chemistry and physics but doing so would require unprecedented changes,” said Jim Skea, Co-Chair of IPCC Working Group III.



Transport was the largest emitting sector of UK greenhouse gas emissions in 2017



Electricity ✓

Transport 😐

Heat ✗

Other includes Public, Industrial Processes and the Land Use, Land Use Change and Forestry (LULUCF) sectors (note that LULUCF acts as a net sink of emissions). The percentages may not sum to 100% due to rounding.

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/776083/2017_Final_emissions_statistics_one_page_summary.pdf

Energy efficiency

Unlocking the First Fuel in UK homes

Investing in efficient heating, insulation, controls, lighting and appliances

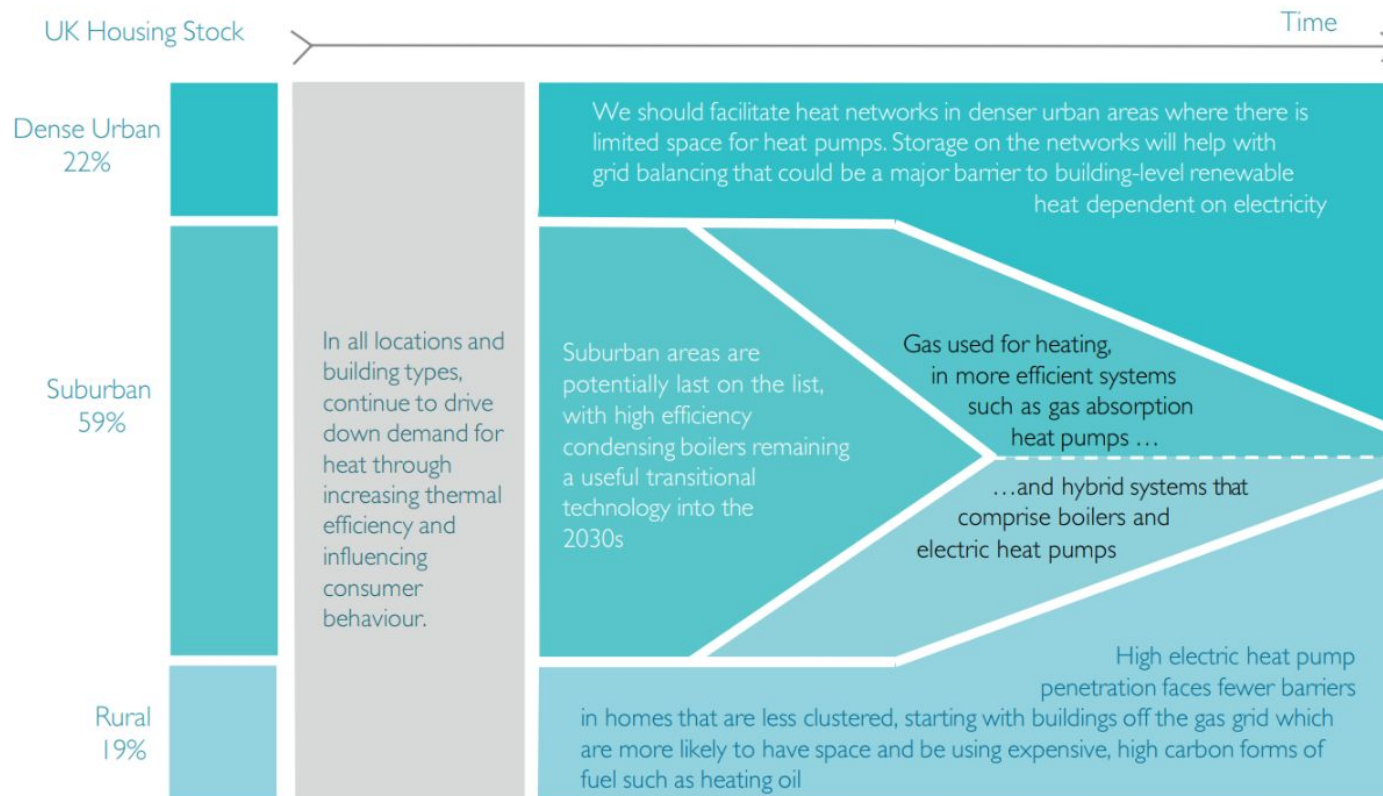


*at today's energy prices

Source: <https://www.e3g.org/library/unlocking-britains-first-fuel-the-potential-for-energy-savings-in-uk>

Strategy

Figure 7: Updated strategic framework for low carbon heat in buildings over time



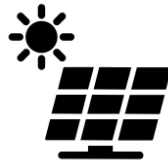
Source:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/190149/16_04-DECC-The_Future_of_Heating_Accessible-10.pdf

Smart and flexible energy system



29% 2017



65% 2050



35 million 2050



20 million 2050



(Globally) 74 billion 2025

Sources

- [FES 2018](#)
- [Connected devices](#)

“The UK could save £17-40 bn across the electricity system from now to 2050 by deploying flexibility technologies”
Smart systems and flexibility plan

“The UK is uniquely placed to lead the world in a Smart Power Revolution. If we get this right we could save consumers up to £8bn a year”
NIC Smart power report

“This research suggests that by 2050 up to £21 billion per year of new financial value is available in the UK electricity system...”
Utility 2050 project

What's the problem?

Heating and hot water are together responsible for around 20% of UK greenhouse gas emissions. According to the Committee on Climate Change, these emissions must be “reduced by over 20% by 2030, with a near complete decarbonisation by 2050” if the UK is to meet its legal obligations under the 2008 Climate Change Act.

But...

There is no strategy for the decarbonisation of heat. Without one, inefficient decisions could be taken by consumers, network companies and other actors seeking to decarbonise our source of heat.

Key discussion topics

Energy
Efficiency

Heat
Networks

Electrification
of heat

Hydrogen

Government
Strategy by
2021

Who pays?

Citizens Advice Policy Asks

1. Government must consult on a detailed Heat Decarbonisation Strategy as soon as possible, with particular consideration over who pays and when.
2. Energy efficiency is a “no regrets” policy which must be pursued with much greater commitment - and funding - from Government. This funding must be fair for consumers and policies must effectively engage consumers.
3. Homes should be made energy efficient before being transferred to low carbon heat with consumer friendly, cost-effective and efficient policies to deliver governmental strategic goals.
4. Government should pursue a number of “low regret” policies now via the right mix of incentives, coordination and regulation. Reform of the RHI to achieve this is essential as well as other incentives.
5. Heat is an essential service and should be regulated as such. Consumers should have comparable protections no matter the technology they use to heat their property.

Roundtables

4 tables:

1. Heat Networks
2. Energy Efficiency
3. Electrification of Heat
4. Decarbonising the Gas Network

Questions:

What are the issues for consumers?
Who pays?
What have we missed?
Where are our blind spots?
What have we got wrong?

20 minutes and then move to another table

Please log in to **menti.com** and use the code **78 15 92** to note your answers/comments

Wrap up and questions

Thank you

Many thanks to Dr Jeff Hardy.

James Kerr & Damien Morris (Senior Policy Researchers) and facilitators Lauren Snoxell and Zoe Guijarro

Follow us:

@CAEnergyPolicy, @james_h_kerr, @DamienMorris



Workshops - additional information and materials

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How to achieve the best outcomes in the future energy market (slides not included)

- Links to co-facilitator Rachel Bray's work on local energy markets can be found [here](#) and [here](#).
- Information about Centrica's Local Energy Market can be found [here](#), and an explanatory video can be found [here](#).

Clean growth: the future of heat

The pre-reading for delegates attending the future of heat workshop can be found [here](#).

Consumer protections for smart connected homes

- Citizens Advice recently published a report with the Energy Systems Catapult on the potential risks for consumers in a smart energy future which can be found [here](#).
- We have also published a blog on the human reality for smart home technologies which you can read [here](#).



Academic posters

#CAFutureEnergy

Homeowner and landlord preferences for investment in energy efficiency

Luciana Miu

Imperial College London

Vulnerability, Redress and Regulation

Cosmo Graham

University of Leicester

The logo for Citizens Advice, featuring the words "citizens" and "advice" stacked vertically in a dark blue, sans-serif font, enclosed within a white speech bubble shape with a tail pointing towards the bottom right.

**citizens
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Vulnerability, redress and regulation

Cosmo Graham and Maribel Canto-Lopez, Consumer and Essential Services Unit
Leicester Law School



Vulnerability

- 13 million people in poverty
- 1.5 millions people with learning disabilities
- 0.9 million people with dementia
- 2.5 million people with cancer

• 5.3 million people over 75 (12.2 million 2041)
When will new energy market mean for the vulnerable?

Ofgem vulnerability strategy; licence condition

What has the industry done?

What does good mean?

Outcomes

New Priority Service Register
DisCo stakeholder engagement



Regulation

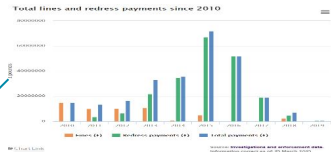
More variation in supply
More complexity
More supplier failures?

Energy transitions

Smart meters
Dynamic contracts
More small suppliers?



Redress



Energy UK
Department for Business, Energy & Industrial Strategy

Where is the Strategy statement?

Advice on lifting the price cap?

ofgem Making a positive difference for energy consumers
Tripartite group
Citizens Advice
Citizens Service
Extra Help Unit



Who uses OS:Energy?

Allocating redress payments

Stakeholder views

Strengths	Weaknesses
Money to energy consumers/voluntary sector	Unfair system for choosing recipients
Further reach: geographical/unusual	No change in company behaviour
	Unreliable income

Going forward

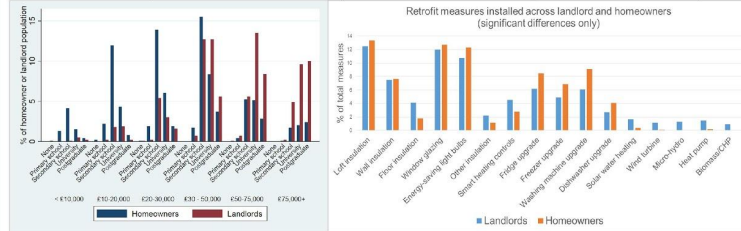
- Energy savings trust
- Support energy transition
- Lessons for other sectors

HOMEOWNER AND LANDLORD PREFERENCES FOR INVESTMENT IN ENERGY-SAVING MEASURES

Luciana Miu, Dr. Adam Hawkes, Department of Chemical Engineering, Imperial College London
L.miu16@imperial.ac.uk

A national survey of investment preferences

- 1,128 homeowners and 1,069 landlords
- Significantly different in a variety of aspects
- Most had experience with retrofit (94% of homeowners, 87% of landlords)



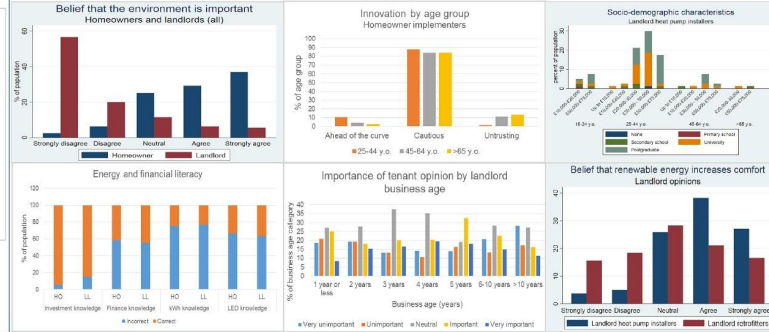
- Small samples of “planner” and “inactive” respondents
- Socio-demographics, property characteristics, retrofit experience, attitudes, norms and perceptions

Socio-demographics, technologies, social networks

Homeowners and landlords differ in attitudes, norms, consumer effectiveness

Differences also driven by respondent characteristics

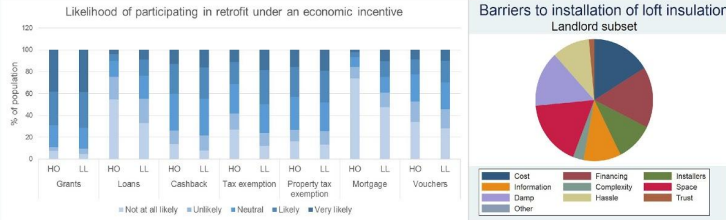
Specific differences in certain technology installers, e.g. micro-renewables



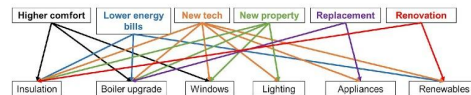
Barriers, drivers and responsiveness to incentives

There is varied responsiveness to economic incentives for retrofit

Different barriers manifest for different measures

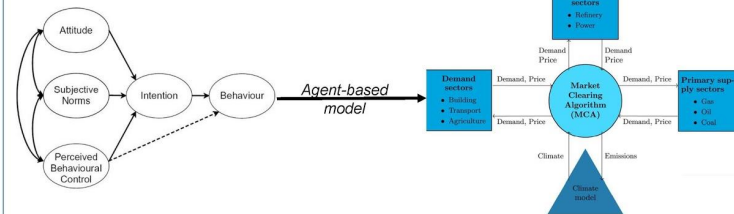


Different drivers trigger investment in different measures



Modelling applications

- Consumer segmentation based on stakeholder interests
- Empirical calibration of an agent-based model
 - Agent definitions/typologies
 - Agent objectives (cost, efficiency, emissions, comfort)
 - Investment behaviour structured on Theory of Planned Behaviour
- Outputs feed into MUSE[®] energy systems model



Theory of Planned Behaviour

MUSE[®] Residential Building Sector Module

Keynote speaker

#CAFutureEnergy

Sharon Darcy

Sustainability First

How do we get the shift that government, regulators and industry need to make to transition to a fair, smart and low carbon future energy market?

Sharon Darcy's speech can be found on the Sustainability First website [here](#).



Will Swan, Salford University

Jacopo Torriti, University of Reading

Alexandra Schneiders, UCL

Jillian Anable, University of Leeds

Mike Fell, UCL



Lightning Talks

#CAFutureEnergy

Will Swan

University of Salford



Smart Meters, Smart Homes and Smart Energy Services?

Current and Future
Will Swan
23rd April 2019

Not so very long ago.....



British Gas logo

Account number: 800000000

Check it out: [www.britishgas.com](#)

Get it done: [britishgas.com](#)

Your business electricity bill

Sample 202 Sample Street, Sample Town Sample Postcode
Invoice: 14 March 2024

Your charges (open up for details)	
Outstanding balance at 1 March 2024	£12.00
Balance from April 2023	£74.00
Your charges this bill (open up for details)	
Electricity charges	£71.00
Standing charges	£2.15
Payment charges (see 102)	£675.00
VAT	£1.24
Previous charges (see 102) for credit	£40.00
Total amount due	£61.44

Please pay this by 15 April 2024

Get it done: [www.britishgas.com](#)

But then some things started to happen



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Meanwhile in the world of IT and consumer electronics



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We started to think about the relationship of smart and control...



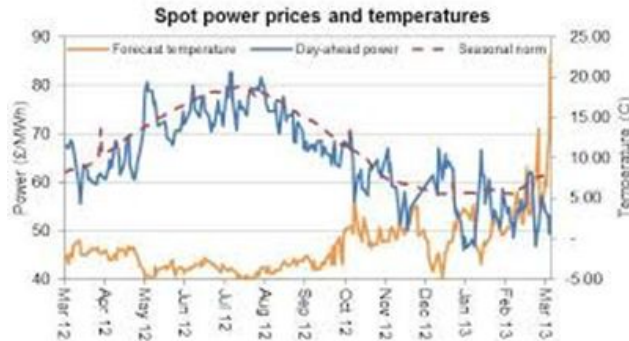
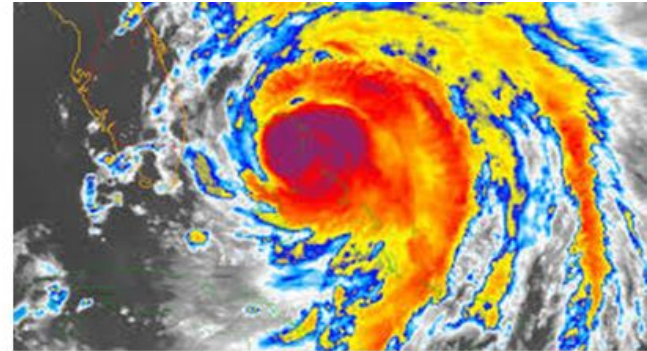
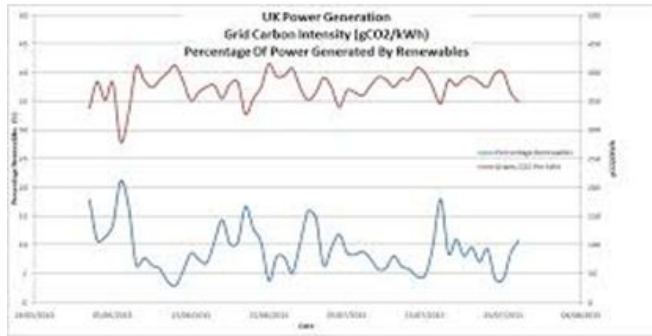
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We started to think about the relationship of smart and control...



...but how do we make a decision?



Alexa, Google, Siri.....?



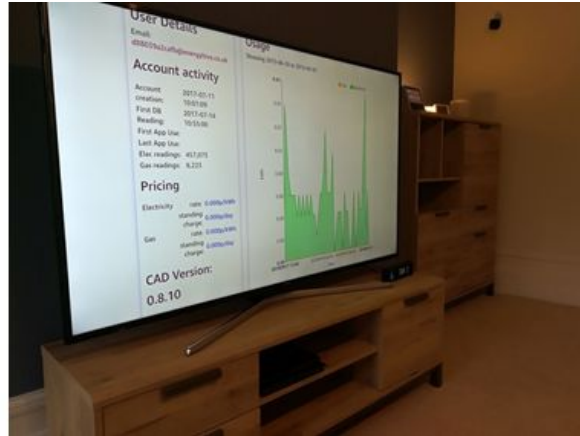
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What we are doing



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Contact



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Jacopo Torriti

University of Reading



POWER TO THE PEOPLE!

But who has the time and means for demand-side flexibility?



Prof Jacopo Torriti

London

23th April 2019

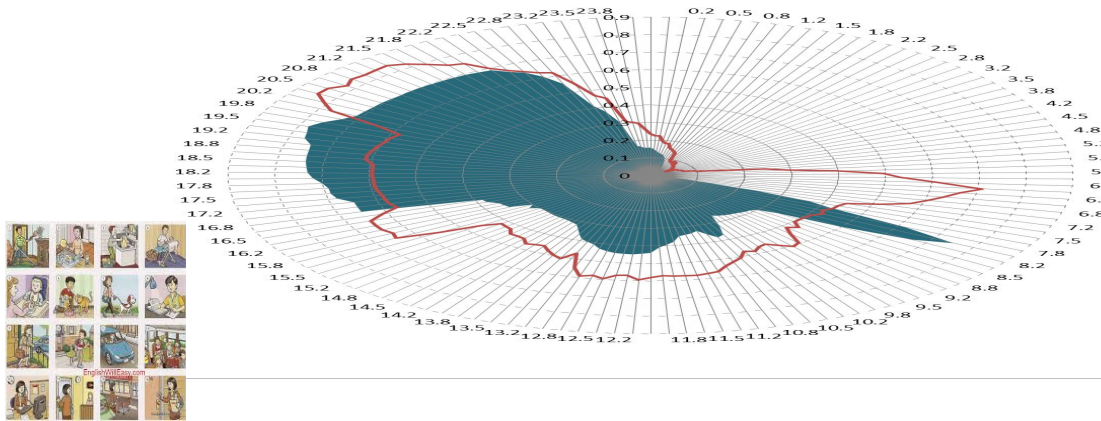
Consumers at the heart of the Future Energy System



- Weekday



- Weekend



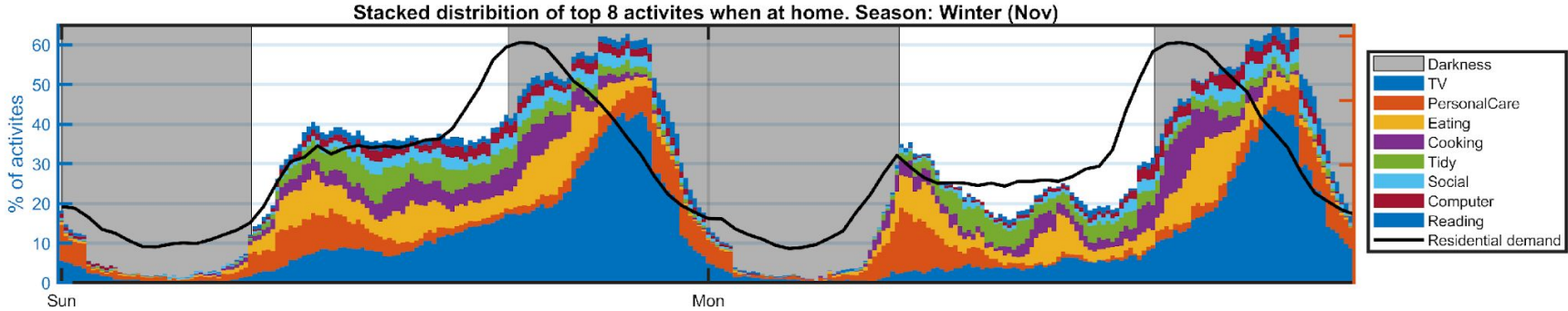
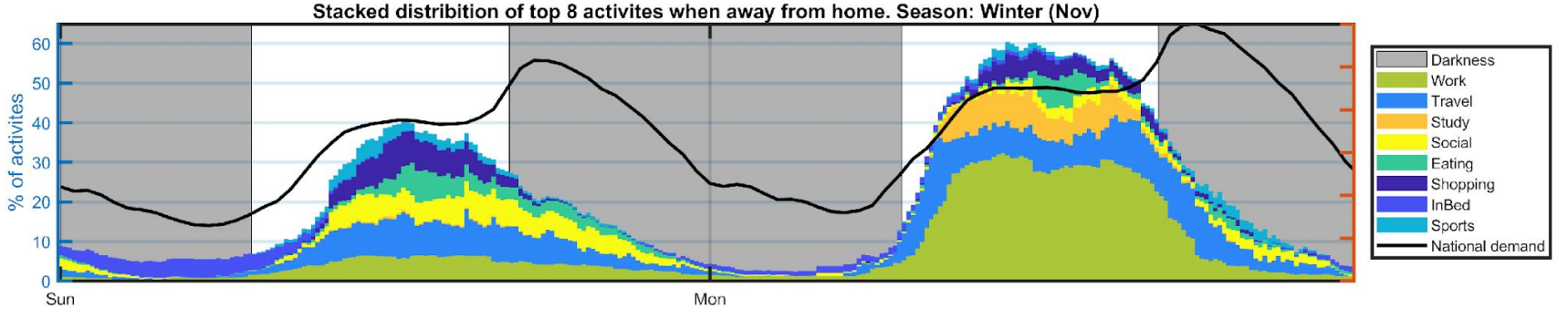
Time use data

- Self-recorded diary
- 10 minute granularity

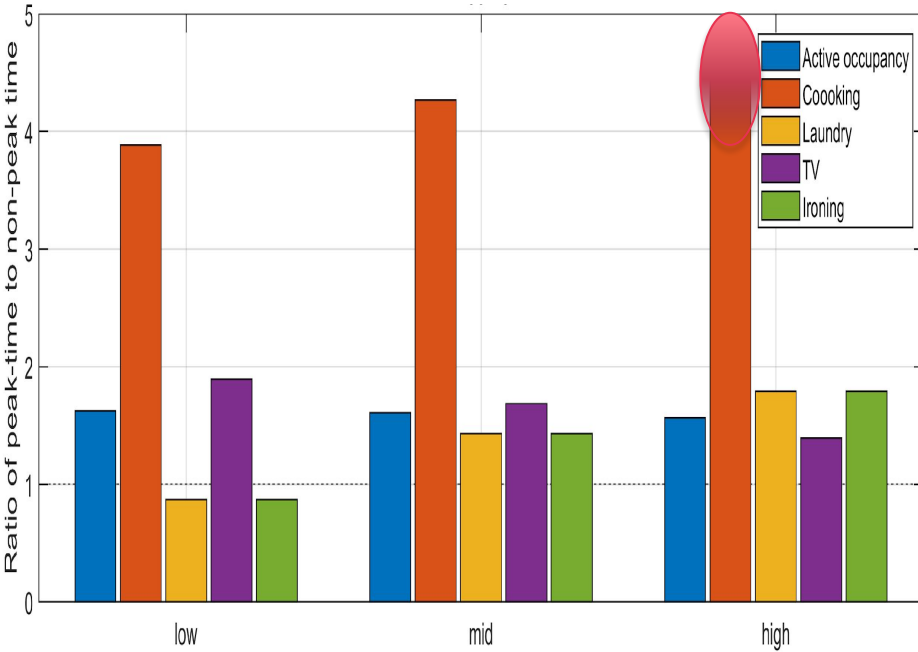
Diary/ person id	Starting Time	Ending Time	Main activity	Parallel activity	Who with:				Where/mode of transport
					Alone	Spouse	Small child	Other pers.	
AA23	04:00	07:20	Sleep						At home
AA23	07:20	07:50	Shower						At home
AA23	7:50	08:30	Had breakfast	Read newspaper			Ch		At home
AA23	08:30	08:40	Walked to bus		A				By foot
AA23	08:40	09:00	Bus to job					OP	By bus

Country	StartTime	Work and study	Travel to/from work/study	Household work	Sleep and other personal care	Eating	Freetime	TV and video	Unspecified time
Belgium	04:00	1.04	0.07	0.16	97.16	0.15	1.01	0.17	0.24
Belgium	04:10	1.09	0.09	0.28	97.14	0.18	0.85	0.14	0.23
Belgium	04:20	1.09	0.15	0.18	96.94	0.4	0.81	0.17	0.25
Belgium	04:30	1.13	0.35	0.23	96.51	0.27	1.09	0.17	0.27
Belgium	04:40	1.23	0.34	0.36	96.46	0.2	0.97	0.15	0.29
Belgium	04:50	1.26	0.35	0.44	95.81	0.49	1.16	0.18	0.31
Belgium	05:00	1.53	0.34	0.61	94.76	0.49	1.78	0.21	0.27
Belgium	05:10	1.6	0.47	0.68	94.82	0.61	1.34	0.21	0.27
Belgium	05:20	1.71	0.64	0.61	94.54	0.65	1.25	0.24	0.36
Belgium	05:30	1.83	0.95	0.7	93.31	0.77	1.84	0.22	0.37
Belgium	05:40	1.94	1.26	0.99	92.77	0.74	1.74	0.24	0.3
Belgium	05:50	2.31	1.22	1.08	91.76	0.98	2.09	0.21	0.36
Belgium	06:00	3.08	1.06	1.39	88.08	1	4.81	0.23	0.34

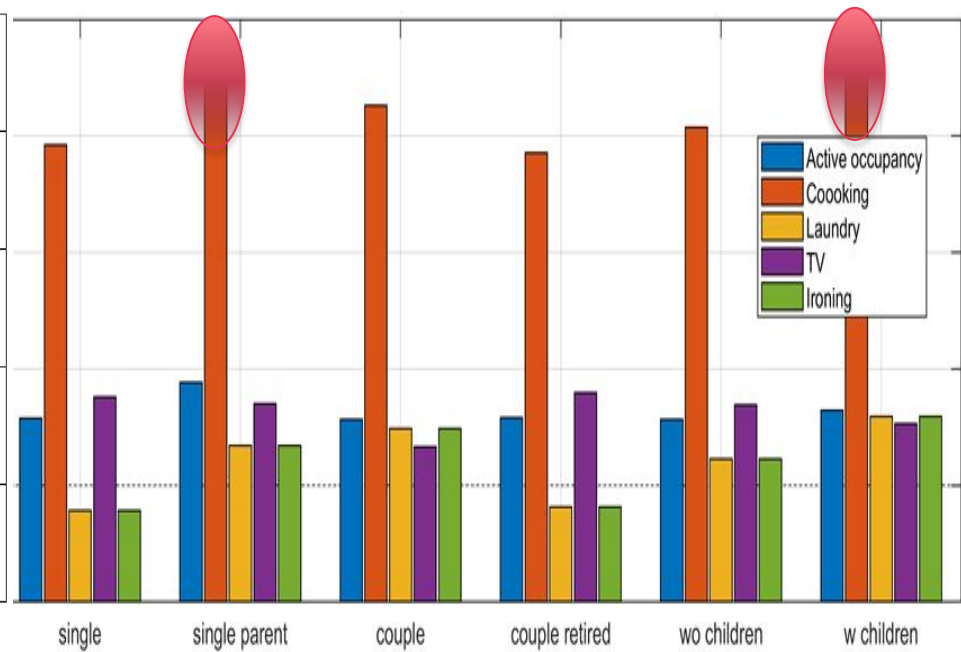
From Activities to Demand



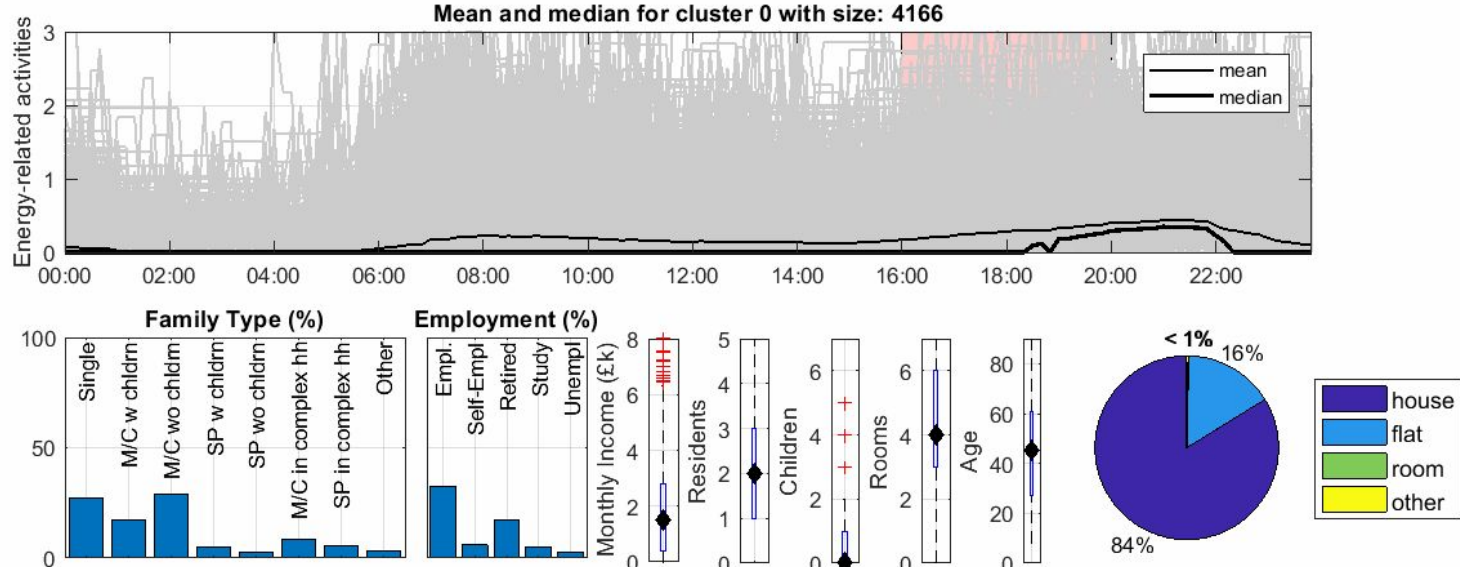
Comparison peak and off-peak activities: income



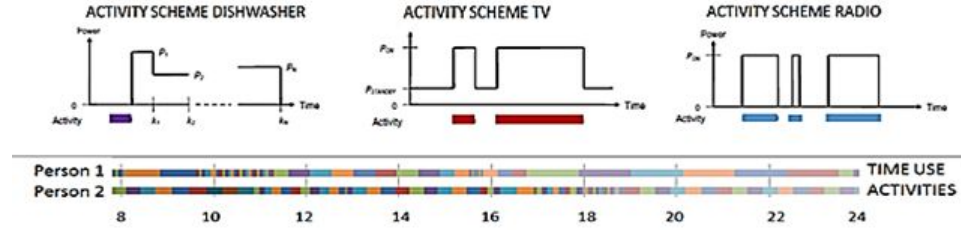
Comparison peak and off-peak activities: household composition



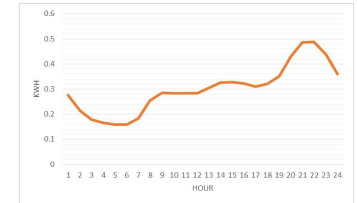
Clustering households by activity



Time use data and load profiles



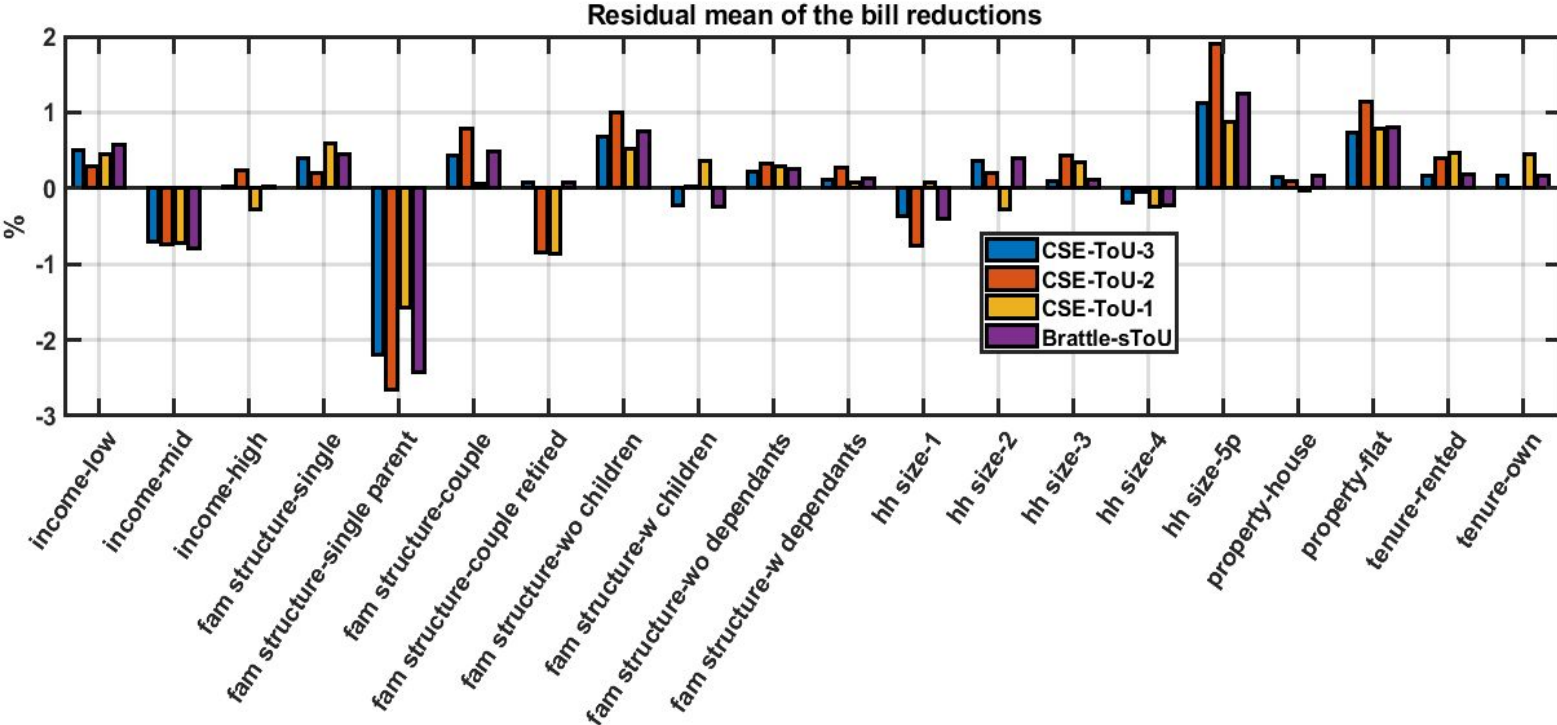
Activity schemes can enable to link time use activities with appliance and electricity use



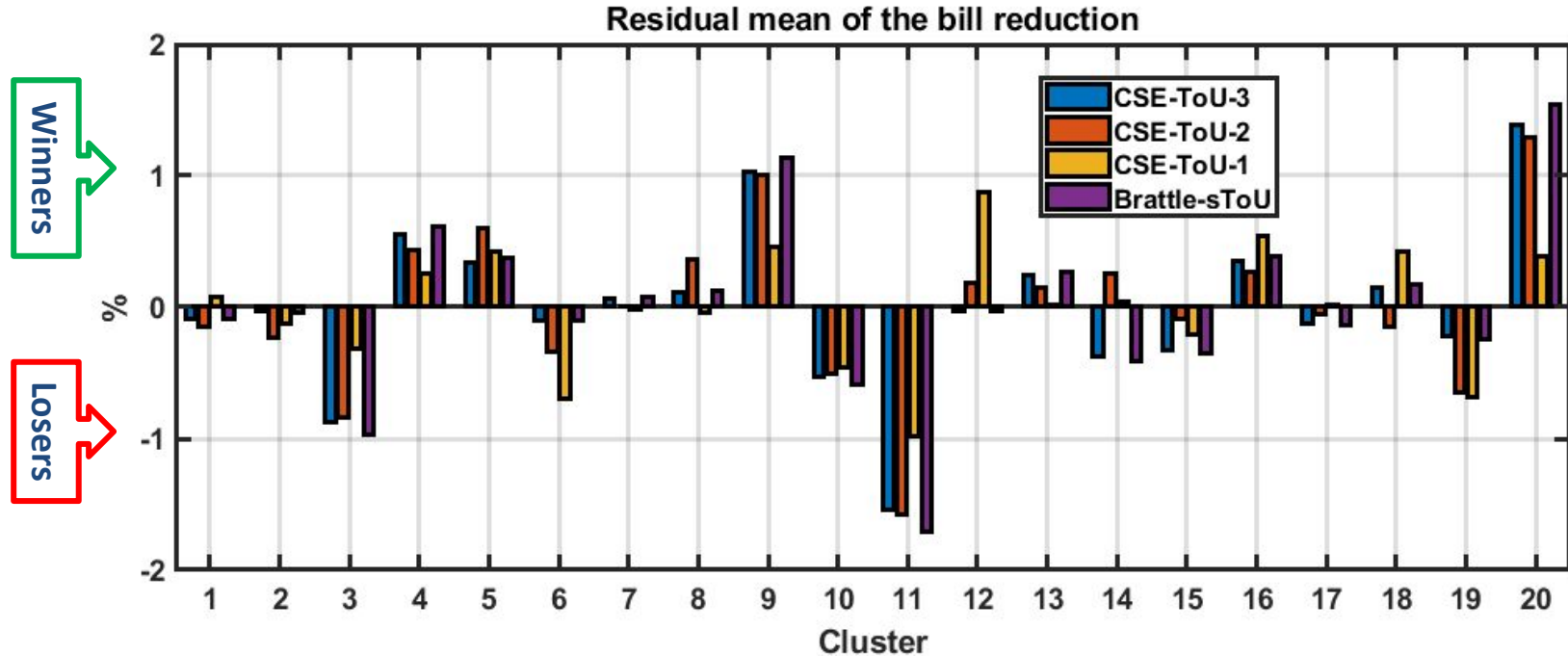
Income groups: impact of Time of Use tariffs

Winners

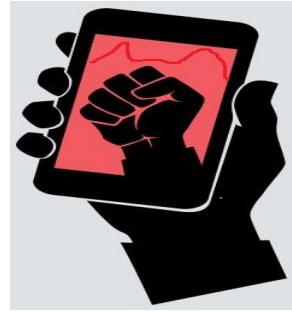
Losers



Clustering by activity: impact of Time of Use tariffs



Power to which people?
What happens to those who do not
have the time and means for
demand-side flexibility?



The single mother nurse

- Excluding her from flexibility opportunities?
- Protecting her from flexibility costs?





CENTRE FOR RESEARCH INTO
ENERGY DEMAND SOLUTIONS

Thanks



@JTorriti

<https://research.reading.ac.uk/redpeak>

www.creds.ac.uk

Alexandra Schneiders

UCL



Consumer Protection in Peer-to-Peer Energy Trading

Alexandra Schneiders
UCL Energy Institute
23 April, Citizens Advice

Introduction

- Research Associate at UCL Energy Institute since 01/18
- Focus: Peer-to-peer energy trading using DLTs, policy and legal aspects

- Law and policy background
- Previously worked in Brussels advising EU and companies

What will I talk to you about today?

- Intro: Decentralisation and peer-to-peer energy trading
- Legal challenge:
 - Consumer rights
- UK regulatory approach
- Conclusion



Introduction

- Decentralising energy system: grid management challenges
- Meet supply and demand at local level
- Peer-to-peer energy trading one of solutions
- Role of DLT technologies, e.g. blockchain



Legal challenge: Consumer rights

- **Challenge**: Domestic energy consumers producing their own energy ('prosumers') are not recognised under UK consumer law.
- **Context**: Transaction between peers profit making.
- **Issues**:
 1. Keep rights as consumers when trading energy?
 2. Unable to shoulder B2C consumer-facing obligations.



- UK Consumer Rights Act:

1. Trader is “a person acting for purposes relating to that person’s trade, business, craft or profession, whether acting personally or through another person acting in the trader’s name or on the trader’s behalf”.

2. Consumer is “an individual acting for purposes that are *wholly or mainly* outside that individual’s trade, business, craft or profession”.

- EU Renewable Energy Directive (enforced 12/18):

1. Consumers can generate, store, consume and sell electricity as consumers, provided that these activities “do not constitute their *primary commercial or professional activity*”.



UK regulatory approach

“Regulating for uncertainty requires a more flexible approach that relies on learning over time.”

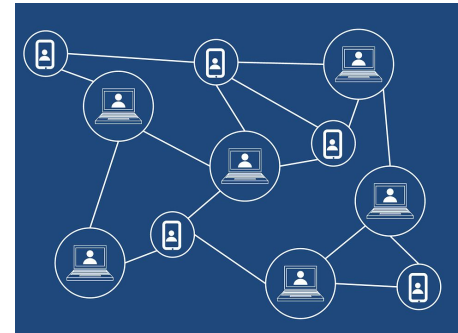
- Ofgem (UK energy regulator)



- Regulatory sandbox: testing of innovative business models in controlled ‘live’ environment
- Re-assess regulation based on trial results
- Not all consumer-relevant rules can be exempted from!

Conclusion

- Enshrine right to P2P energy trading while retaining consumer rights
- Consumer law not applicable to C2C transactions in UK
- Solution of trading within legal entity (e.g. energy cooperative)
- Re-think sandbox process



Thanks for your attention!

Any questions?



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@LexScn

Jillian Anable

University of Leeds





Electric Vehicles

Consumers at the Heart of the Energy System Conference, Citizen's Advice
23rd April 2019

Jillian Anable

Professor of Transport and Energy

Institute for Transport Studies, Leeds



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@jillian_anable

Whose responsibility is it?



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***“We expect this transition to be
industry and consumer led”***

HM Government Road to Zero Strategy, 10th July 2018 (p2)



Whose responsibility is it?



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*“Consumers are not the problem.
The problem is that they are treated
as a problem.”*

(Anable, July 2018)



Consumers are rational
... just not always
economically rational



$$TCO^* = TMI^{**}$$

- Short payback periods
- Value upfront costs higher than running costs
- And they **DO NOT DO THE MATH!**

*TCO=Total Cost of Ownership

**TMI = Too Much Information



... it is also not about the environment



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- Environmental issues have little direct effect on car purchasing decisions
- Other issues are prioritised: vehicle price, size (+practicality, comfort), reliability, brand, appearance, performance, other costs signals
- Environmental claims are not **trusted**
- **Complexity** (eg smart charging) is a barrier

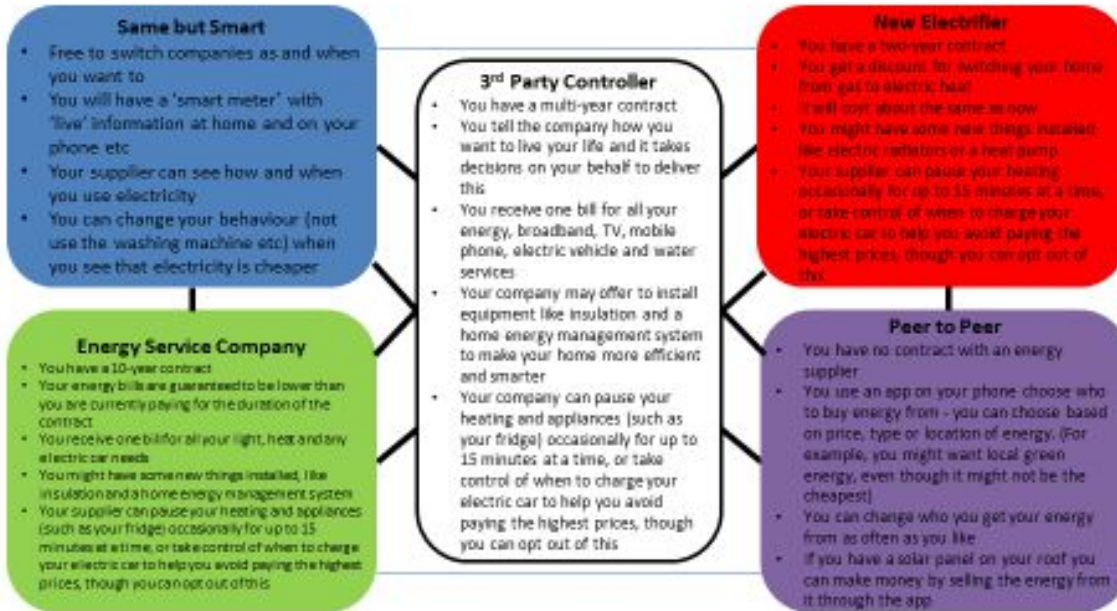




Yet the world is becoming more complex



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Paired Comparison design (=10 binary choices)

'Utility 2050' Project

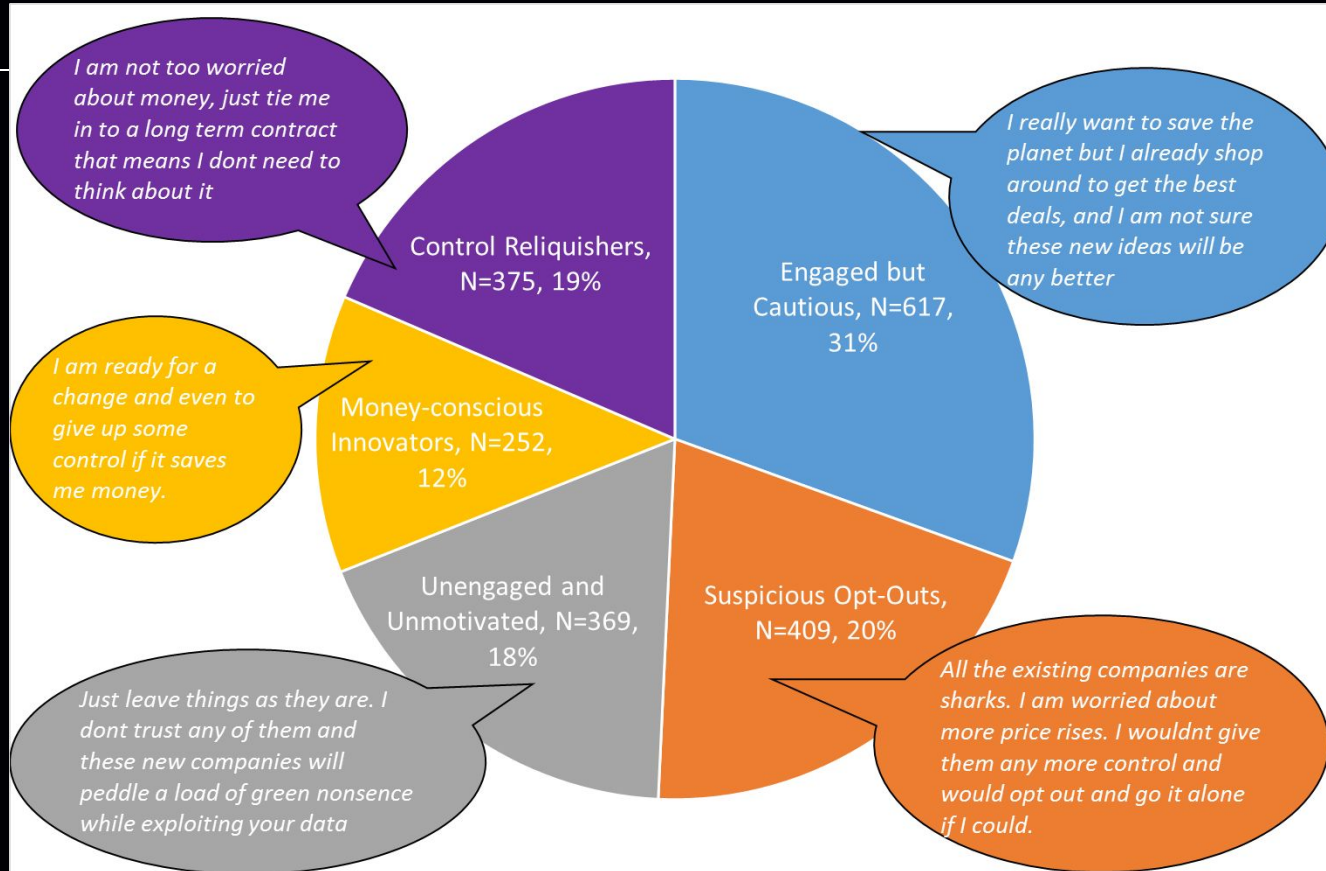
Paper submitted: Hall, S., Anable, J., Hardy, J., Mazur, C., Workman, M. and Matthews, Y.. Which consumers want the new business models the energy system can offer? *Nature Energy*

Contact: s.hall@leeds.ac.uk





Engagement and Trust are key for consumers



'Utility 2050' Project

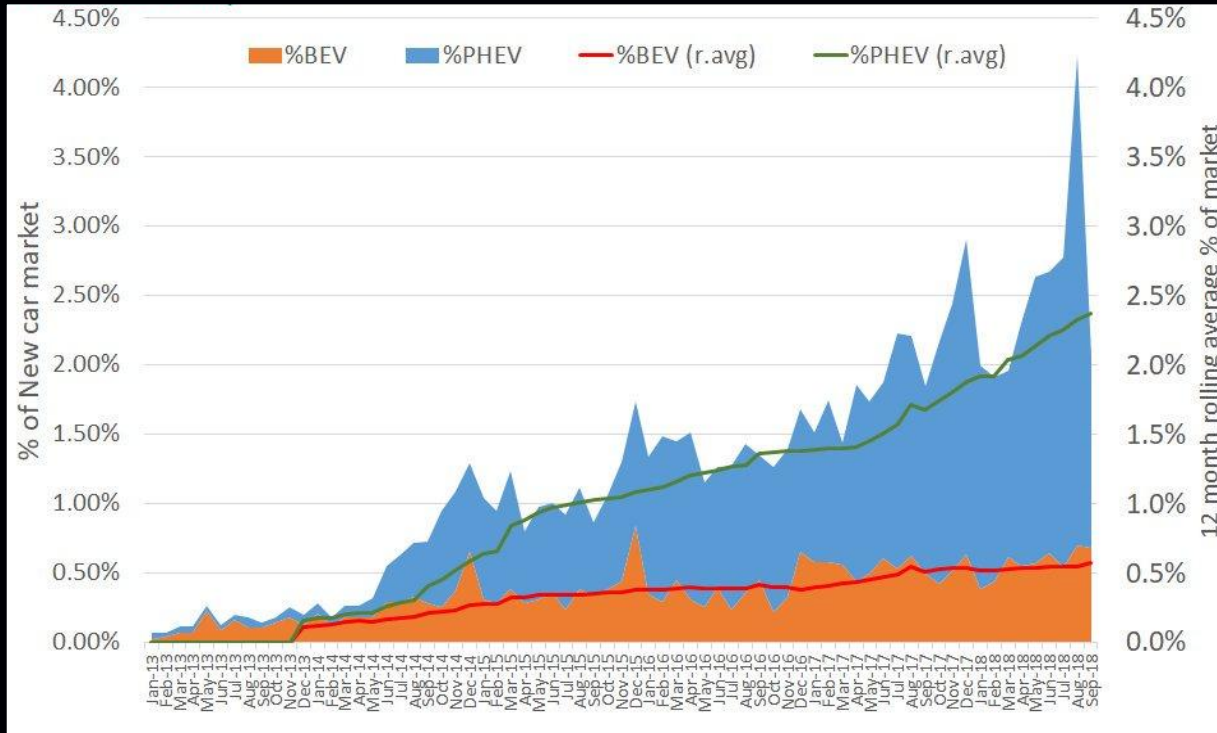
Paper submitted: Hall, S., Anable, J., Hardy, J., Mazur, C., Workman, M. and Matthews, Y.. Which consumers want the new business models the energy system can offer? *Nature Energy*

- In choice experiments:
 - PHEVs emerge consistently more popular than BEVs
 - Even where optimistic cost and range parity is tested, ICEs are preferred
- It is the combination of range and running cost that is important





Proportion of UK car sales that are 'plug-in'

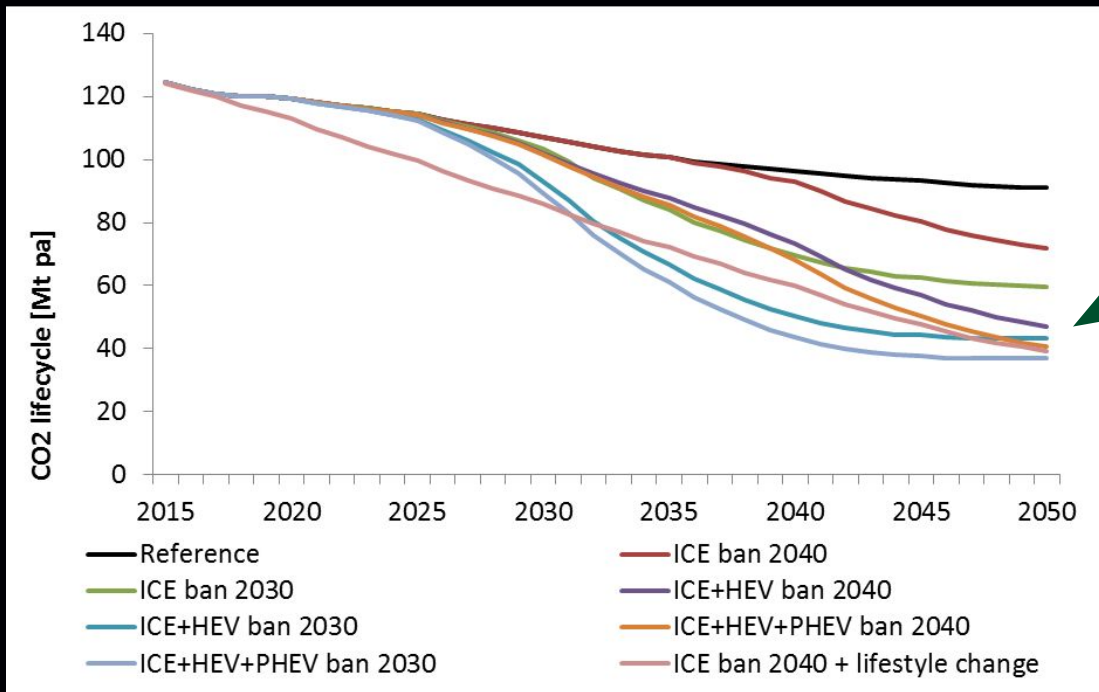


- 3 out of every 3 EVs that are sold are PHEVs
- What proportion of mileage is undertaken in electric mode??





Scenario analysis: lifecycle CO₂e from car and van manufacture, use, maintenance, end-of-life



Upstream and downstream emissions remain

Emissions from generation of electricity replace those from fossil fuel production

A revolution?



Showing results for revolution *definition*

revolution

/rɛvəˈluːʃ(ə)n/

noun

1. a forcible overthrow of a government or social order, **in favour of a new system.**
"the country has had a socialist revolution"
synonyms: rebellion, revolt, insurrection, mutiny, uprising, riot, rioting, rising, insurgency, insurgency, coup, overthrow, seizure of power, regime change, More
2. an instance of revolving.
"one revolution a second"
synonyms: single turn, turn, rotation, circle, whirl, twirl, spin, wheel roll, round, cycle, circle
"the prop shaft turns 4.7 times for one revolution of a wheel"



Translations, word origin, and more definitions

Feedback

Continuation of the automation paradigm



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Electric Cars



Autonomous Cars



Shared Cars*



So, changing patterns of demand have to be part of the solution – this is where the real challenges arise

*The 'Mobility as a Service' (MaaS) business model relies on selling more and more mobility

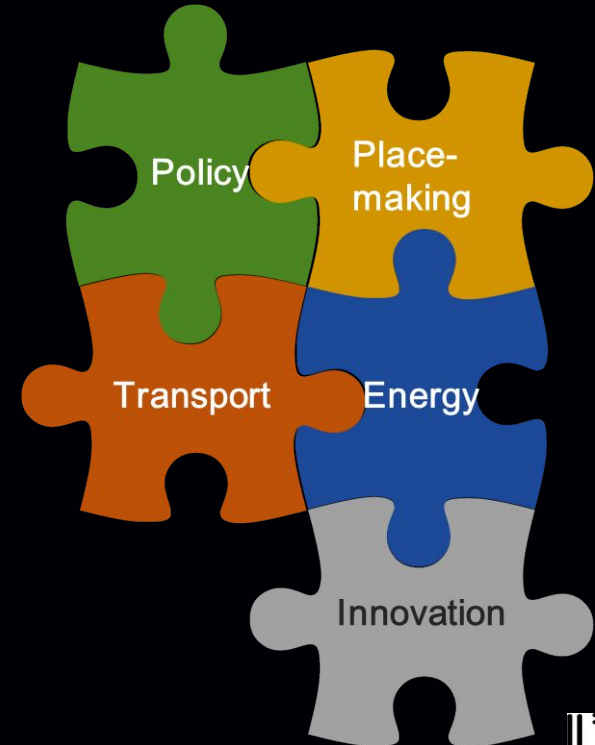


What does this all mean for the future of EVs?



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- EVs are not a solution to anything other than decarbonisation
- Decarbonisation does not mean rapid reductions in carbon; nor does it mean reductions in car use, car dependency and congestion
- Consumers & industry will act with rational bounded rationality – we need strong regulation to achieve the future we want



Lightning Talks

#CAFutureEnergy

Mike Fell

UCL

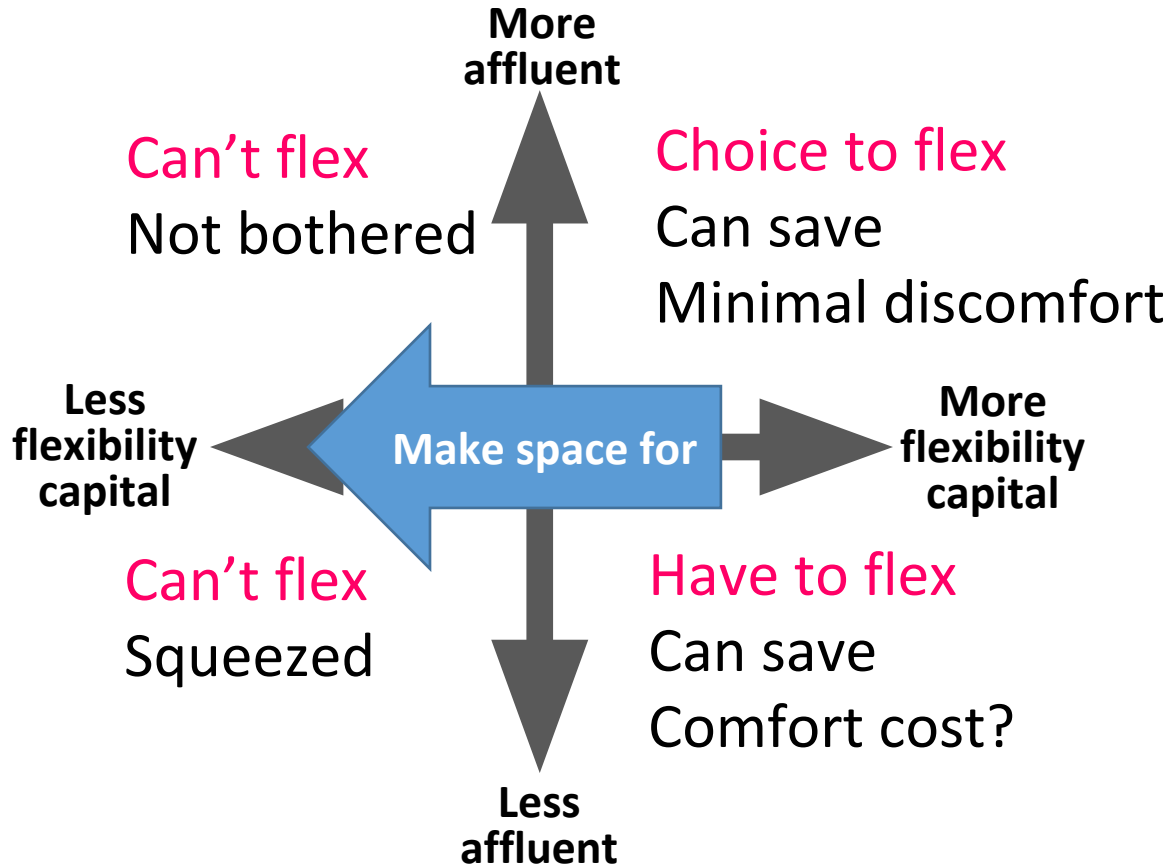


HOW FAIR IS FLEXIBILITY?

**Flexibility Capital and
Flexibility Justice**

Michael Fell

Consumers at the Heart of the Future Energy
System, Citizens Advice conference
London, 23 April 2019



**Technology
-derived**



**Socially-
derived**

Self



Other

- Ability to be flexible is a form of capital
- It is unevenly distributed
- Key concerns if you are less affluent:
 - Lacking it hits you harder
 - Economizing it may cost you in comfort
 - Economizing it may not feel fully voluntary
- Those with it 'make space' for those without
- This doesn't just apply in energy
 - see: transport, employment, etc.

Based on the paper
Flexibility Capital and
Flexibility Justice in Smart
Energy Systems
by Gareth Powells and
Michael Fell in *Energy*
Research and Social
***Science* (2019)**

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I gratefully acknowledge support from UK
Research and Innovation through the
Centre for Research into Energy Demand
Solutions, grant reference number
EP/R 035288/1

But let's be realistic



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Lightning talks - additional information and materials

#CAFutureEnergy

- You can read about the University of Salford's Smart Meter>Smart Homes Lab can be found [here](#), and further information on Will Swan's research can be found [here](#).
- Information on Jacopo Torriti's research on peaks in residential electricity demand and Demand Side Response can be found [here](#). Jacopo is also delivering a public lecture on this topic in Reading on the [15th May](#)
- Information on Alexandra Schneider's research can be found [here](#).
- Information on Jillian Anable's research can be found [here](#).
- Michael Fell's talk was based on an academic article which can be found [here](#), while further information about his research can be found [here](#).



Keep in touch with our research

If you would like to keep in touch with our research on Future Energy Consumers then please sign up [here](#) to receive upcoming blogs and reports.

#CAFutureEnergy

@CAenergypolicy

