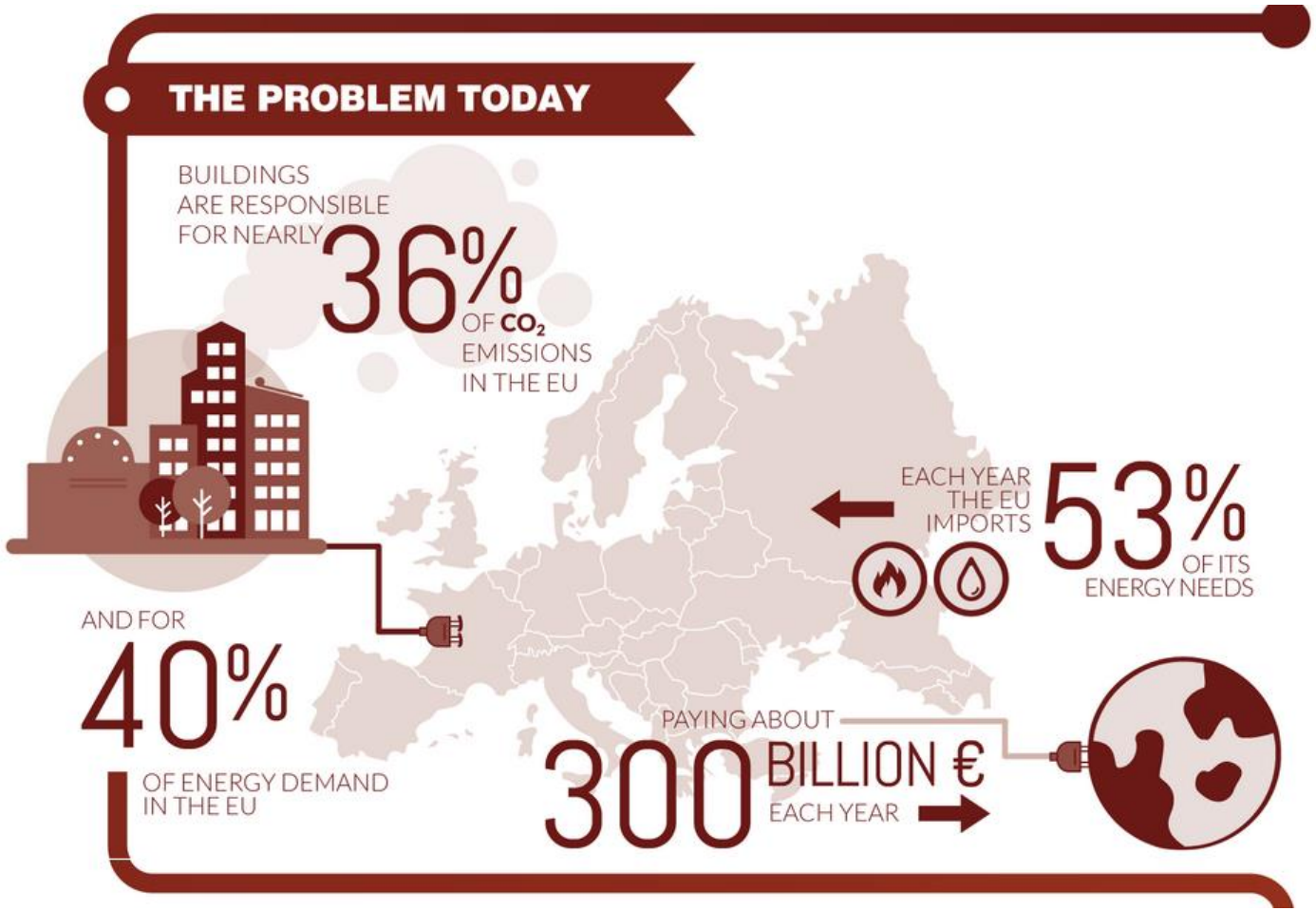
Overview of buildings energy use & policy

Tina Fawcett, Environmental Change Institute, University of Oxford

Energy use in buildings



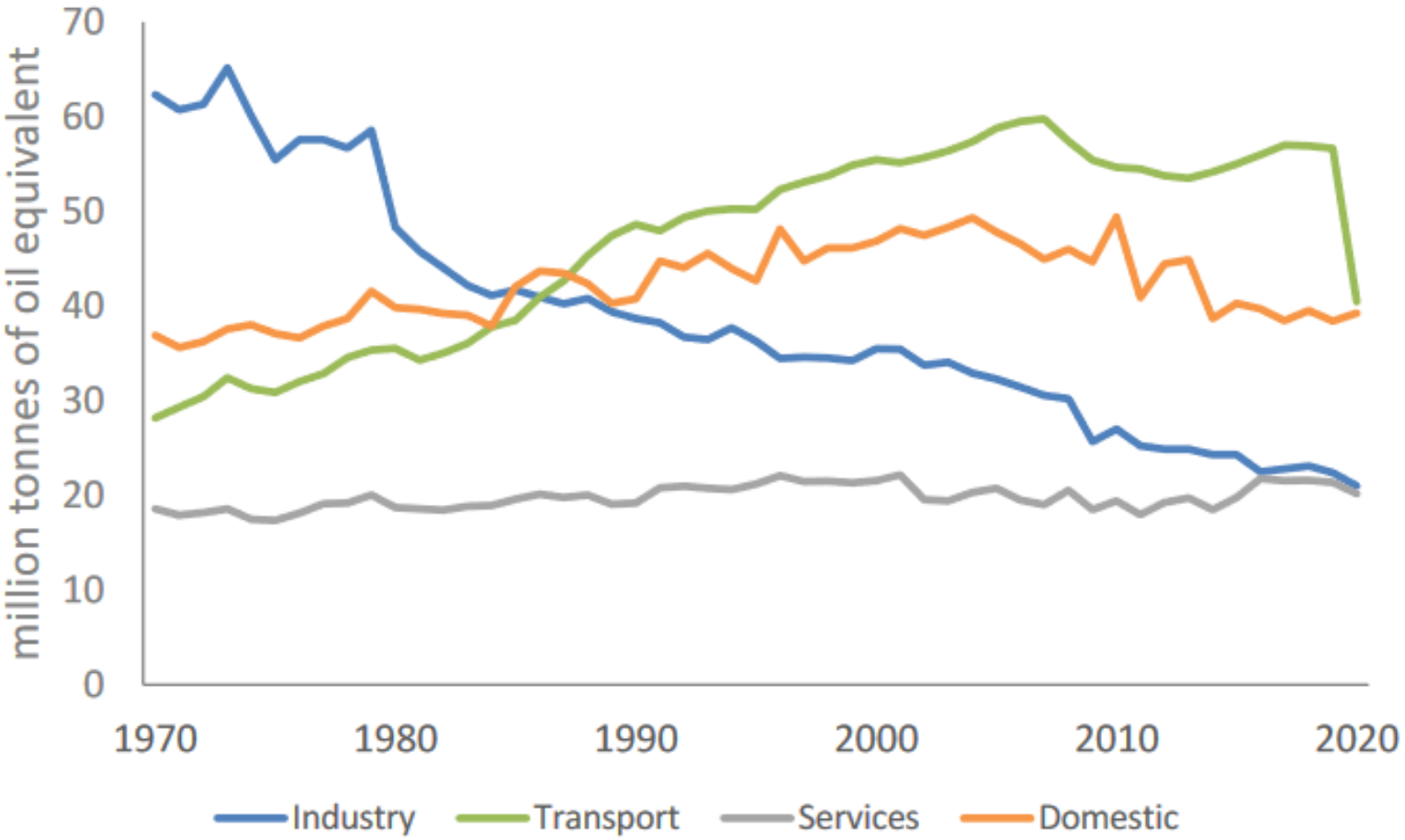
Source: www.renovate-europe.eu

UK buildings are responsible for around 30% of national greenhouse gas emissions.

The vast majority of these emissions result from heating: 79% of buildings emissions and about 23% of all UK emissions

Source: HMG, 2021

Energy use in UK buildings has been falling – but not fast enough



Source: BEIS, 2021

The socio-technical challenge

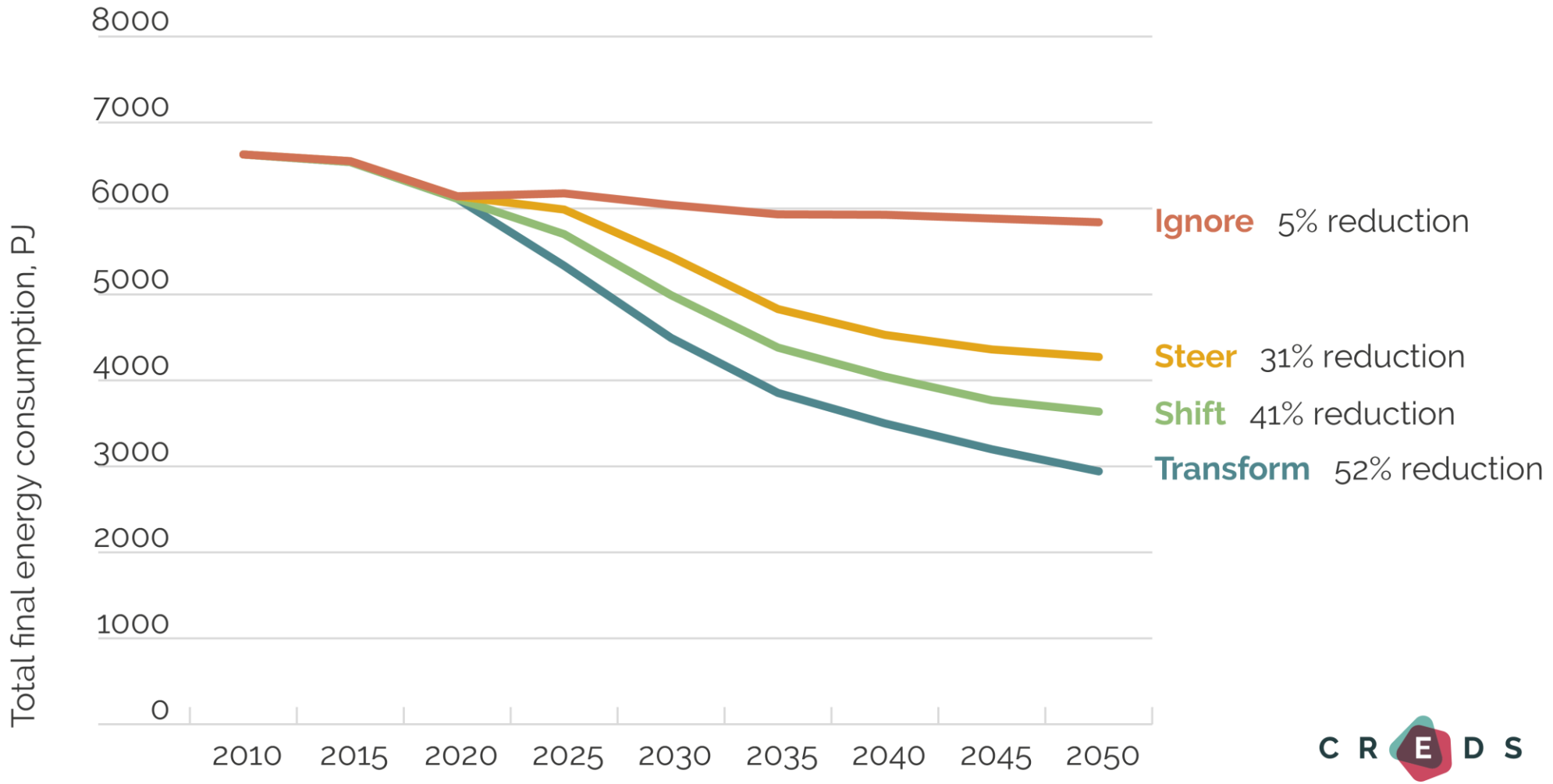
Reduce energy use in buildings & increase flexibility of time of use

- Increase energy efficiency of heating & hot water – building fabric plus heating technologies
- Increase efficiency of lights, appliances, ICT, other uses of electricity
- Usage patterns & amounts – reduce use & increase flexibility – interactions between people, organisations, social norms, systems, technologies…

Supply remaining energy use with renewable / low carbon sources

- Switch away from natural gas for heating
- Continue the shift away from fossil fuels for electricity generation

CREDS UK energy demand reduction modelling



Source: Barrett et al, 2021

Improving building efficiency & reducing energy use has many benefits

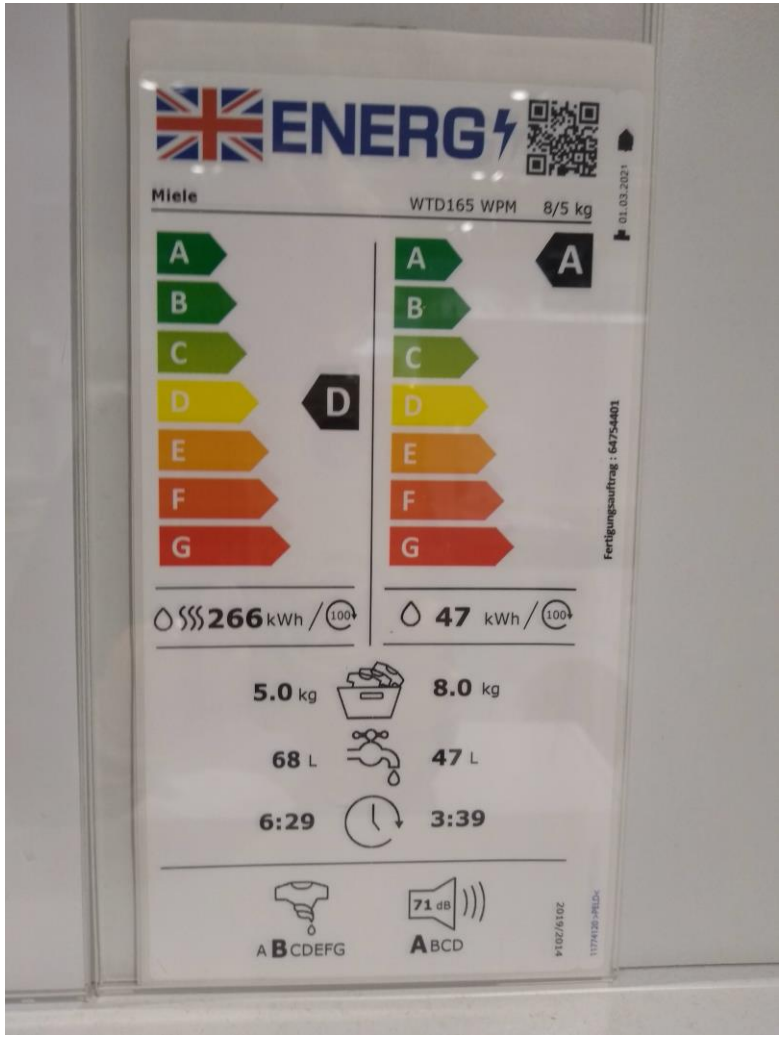
Source: www.renovate-europe.eu

Heat pumps & hydrogen

Despite their undoubted attractiveness (?), heat pumps have fewer additional benefits than low-energy retrofit, and are currently expensive.

The main alternative to heat pumps is using hydrogen instead of natural gas – but this is further away from implementation & benefits still very much under debate.

Appliances, lighting and other products



There are still opportunities to increase the efficiency of many products used in buildings.

How this will proceed now the UK is no longer in the EU remains to be seen.

Examples of our research contributions: Smart local energy system trials

Local Energy Oxfordshire

Energy Superhub Oxford

ReFLEX ORKNEY

Engineering and Physical Sciences Research Council

https://net-zero-research.co.uk/network-hc/

Examples of research projects

Pricing decisions in peer-to-peer and prosumer-centred electricity markets: Experimental analysis in Germany and the United Kingdom

22 December, 2021

Publications

Social and economic value in emerging decentralized energy business models: A critical review

24 November, 2021

Publications

SME and sustainability research – the beginning of a new research network?

10 November, 2021

Blog

Changing our way of living – why and how?

02 November, 2021

Blog

Old for new? Mapping skills and communication networks for local traditional and off-site modular building energy retrofit

This project uses Social Network Analysis to map the skills and communication networks of supply chain actors recruited into local traditional and off-site modular building retrofitting strategies.

Adding another layer? A future for clothing in heat demand reduction and decarbonisation

This project aims to inspire greater research and policy interest in clothing and greater recognition of its potential significance in the transition to low-carbon heating.

Multi-level Governance

This project looks how policies for building efficiency differ in England and Scotland as well as monitor Welsh and Northern Irish policy developments.

Have we got the policy in place to radically reduce energy demand & switch to low carbon energy?

Sadly, no.
But we hope to provide some better options

We are doing policy research into:

- How to design, implement and evaluate policy (in the climate emergency)
- Policy mixes
- New policy ideas
- New policy domains
- New institutional arrangements
- Governance of energy use in buildings
- Policy & governance of new technologies, markets, business models
- …..

A 10-Point Plan to Reduce the European Union's Reliance on Russian Natural Gas

Fuel report — March 2022

Source: IEA, 2022

A 10-Point Plan to Reduce the European Union's Reliance on Russian Natural Gas

Measures implemented this year could **bring down gas imports from Russia by over one-third,** with additional temporary options to deepen these cuts to **well over half while still lowering emissions.**

Action 1

No new gas supply contracts with Russia

Impact: Taking advantage of expiring long-term contracts with Russia will reduce the contractual minimum take-or-pay levels for Russian imports and enable greater diversity of supply.

Action 2

Replace Russian supplies with gas from alternative sources

Impact: Around 30 bcm in additional gas supply from non-Russian sources.

Action 3

Introduce minimum gas storage obligations to enhance market resilience

Impact: Enhances the resilience of the gas system, although higher injection requirements to refill storage in 2022 will add to gas demand and prop up gas prices.

Action 4

Accelerate the deployment of new wind and solar projects

Impact: An additional 35 TWh of generation from new renewable projects over the next year, over and above the already anticipated growth from these sources, bringing down gas use by 6 bcm.

Action 5

Maximise generation from existing dispatchable low-emissions sources: bioenergy and nuclear

Impact: An additional 70 TWh of power generation from existing dispatchable low emissions sources, reducing gas use for electricity by 13 bcm.

Action 6

Enact short-term measures to shelter vulnerable electricity consumers from high prices

Impact: Brings down energy bills for consumers even when natural gas prices remain high, making available up to EUR 200 billion to cushion impacts on vulnerable groups.

Action 7

Speed up the replacement of gas boilers with heat pumps

Impact: Reduces gas use for heating by an additional 2 bcm in one year.

Action 8

Accelerate energy efficiency improvements in buildings and industry

Impact: Reduces gas consumption for heat by close to an additional 2 bcm within a year, lowering energy bills, enhancing comfort and boosting industrial competitiveness.

Action 9

Encourage a temporary thermostat adjustment by consumers

Impact: Turning down the thermostat for buildings' heating by 1°C would reduce gas demand by some 10 bcm a year.

Action 10

Step up efforts to diversify and decarbonise sources of power system flexibility

Impact: A major near-term push on innovation can, over time, loosen the strong links between natural gas supply and Europe's electricity security. Real-time electricity price signals can unlock more flexible demand, in turn reducing expensive and gas-intensive peak supply needs.

Conclusions

- There is a lot to do & it won’t be easy
- However, there will be many benefits aside from carbon reductions, particularly from improving the efficiency of buildings & products
- We do know how to do a lot of what is needed (technically)
- Working out how to deliver this in practice is challenging
- Research & knowledge exchange can help accelerate progress

Thank you!

Tina Fawcett

tina.fawcett@eci.ox.ac.uk

@fawcett_tina

Environmental *Change* Institute

UNIVERSITY OF OXFORD

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