UKCRIC

UK COLLABORATORIUM FOR RESEARCH ON INFRASTRUCTURE & CITIES

Inspired infrastructure for better living

Energy Systems Cluster

17th May 2022

@PEARL

Energy Systems

UKCRIC

NEWS

Home | War in Ukraine | Coronavirus | Climate | UK | World | Business | Politics | Tech | Science | Health

Business | Your Money | Market Data | Companies | Economy | Global Car Industry | Business of Sport

Energy bills could reach £3,000 as oil and gas prices soar

By Tom Espiner
Business reporter, BBC News

3 March | Comments

Russia-Ukraine war

Figure 2: UK emissions in 2019

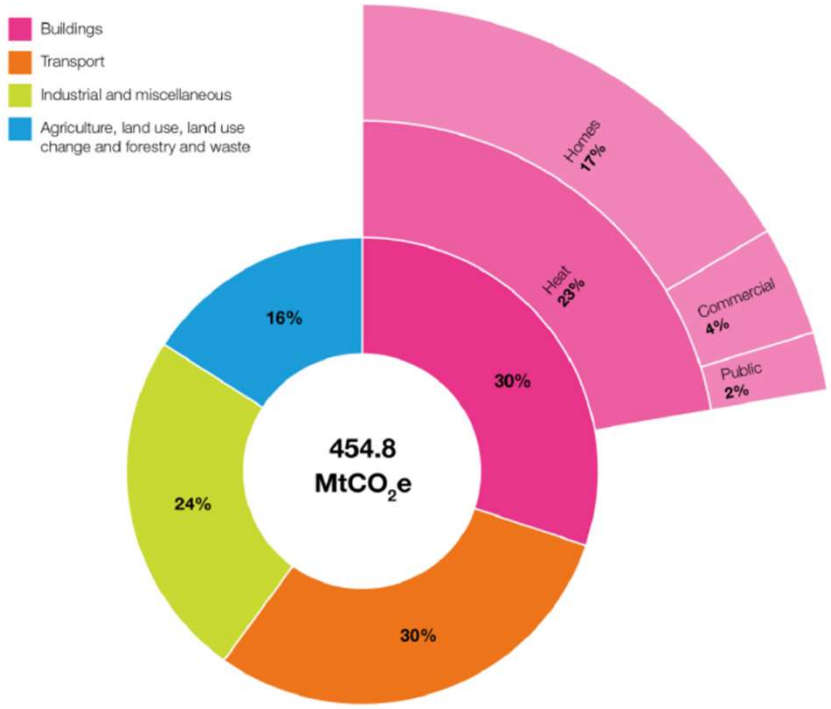
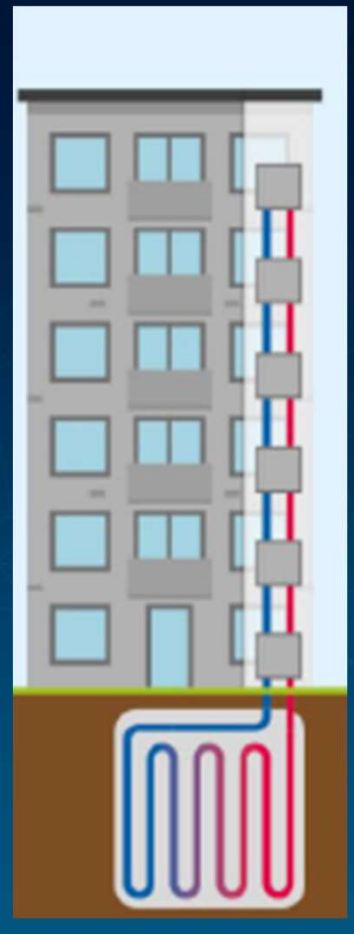


Figure 2 shows the proportion of emissions in 2019 from buildings to the nearest whole number; of the 454.8 mega tonnes of carbon dioxide equivalent ($MtCO_2e$) total emissions, 23% were due to heating buildings, with the largest proportion of this stemming from homes.[35]

Energy Systems

Transdisciplinary & complex systems, e.g.

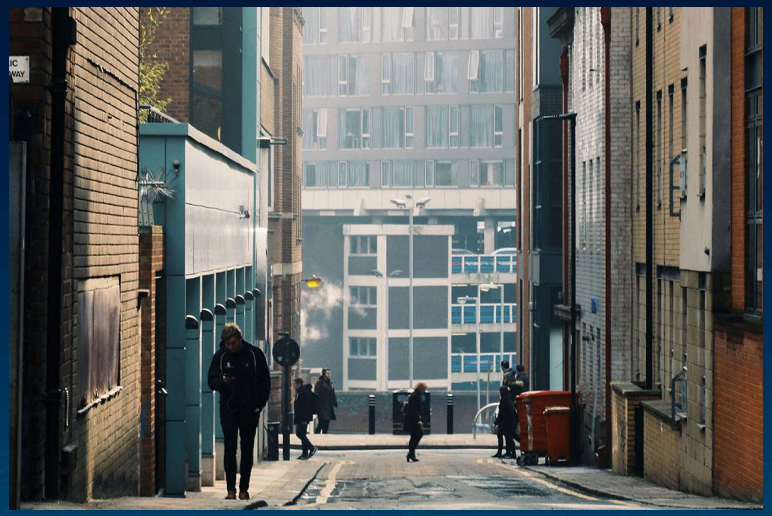
- Geology, civil, mech, building services engineering
- User perceptions & behaviour
- SMEs, utility models
- National and local policy
- Design & use patterns impacts grid
- Interfaces with generation, storage, other electrification (EVs)



UKCRIC Facilities

Transdisciplinary & complex systems research, using UKCRIC Facilities, e.g.:

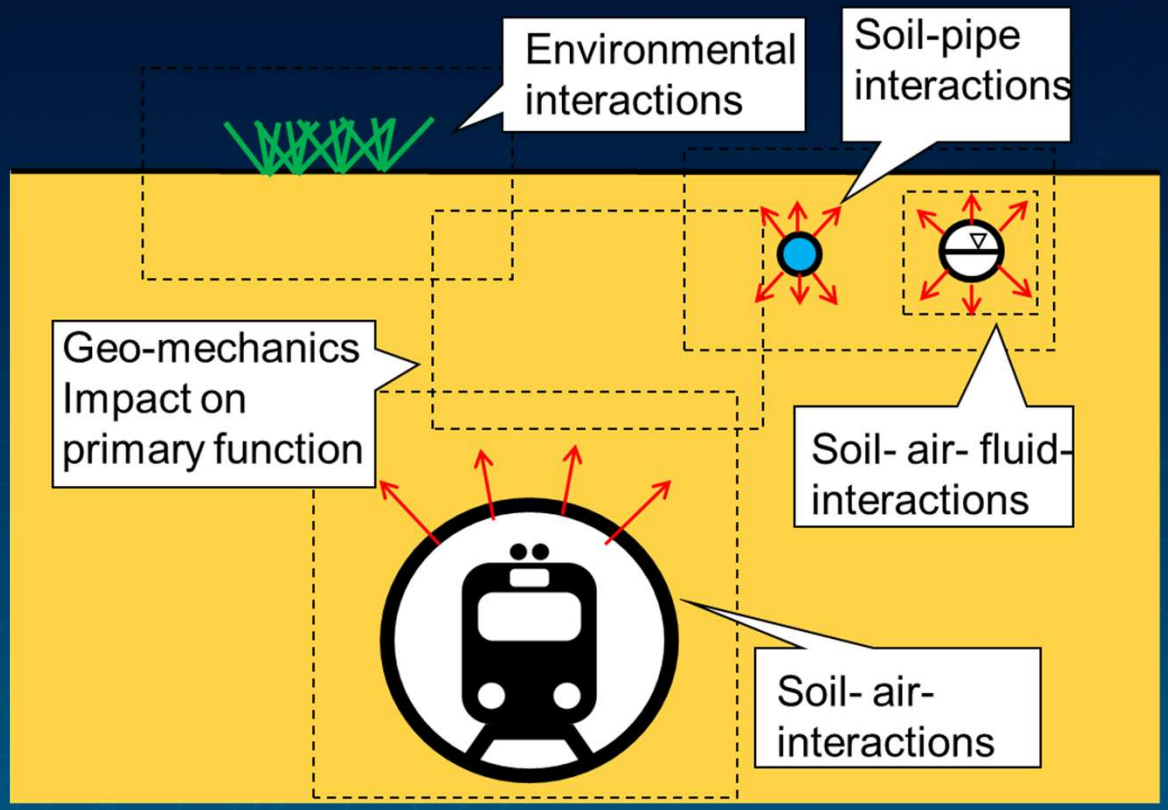
- High Fidelity Energy Monitoring through IoT (Urban Flows Laboratory, Sheffield)
- Wave & tidal energy challenges (FloWave Ocean Energy Research Centre, Edinburgh)



UKCRIC Facilities

PLEXUS Project:

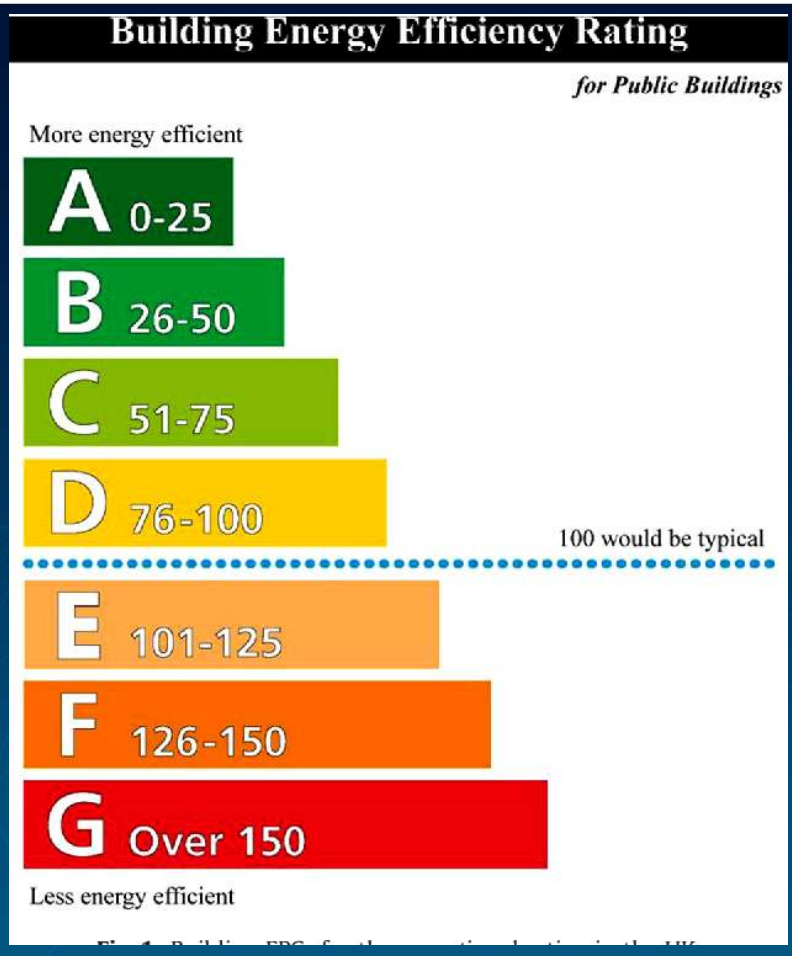
- National Green Infrastructure Facility
- National Distributed Water Infrastructure Facility
- National Research Facility For Water And Wastewater Treatment
- National Research Facility for Infrastructure Sensing
- Advanced Infrastructure Materials Laboratory
- Geo-energy Facility at the Centre for Infrastructure Materials



Future Challenges

Reduction in demand

- Building energy demand reduction
  - e.g. energy efficiency over life cycles, Design4Energy, Loughborough
- Load shifting
  - e.g. Prosumers, peer to peer trading, TwinENERGY, Bristol
- Industrial energy usage
  - e.g waste and heat recovery and conversion, data science & digital methods, OPTEMIN Project, UCL



Future Challenges

Generation and Transmission

- Resurgence of nuclear
  - SMR, finance, waste storage, Imperial, Leeds
- Hydrogen & necessary infrastructure
  - Leeds, Cranfield, Imperial, UCL & more
- Bio-methane & bio-hydrogen
  - Food water energy nexus, STEPPING UP, Manchester
- Business models
  - Energy service companies, e.g. Leeds, Manchester, Newcastle, Edinburgh

Future Challenges

Storage

- Battery technology
  - e.g. Flywheel battery hybrid energy storage, Sheffield
- Thermal energy storage
  - e.g. Integrated Infrastructure for Sustainable Thermal Energy Provision, Leeds
- Other storage
  - e.g. Storing renewables as liquid air, Cryohub, Cranfield
- Integration

Connectedness

To the missions

To other clusters

To the twin challenges of mitigation and adaption

Systems thinking and collaboration across disciplines, institutions, sectors

About Us

We are a Coalition of prominent public and private infrastructure businesses and academic institutions who are committed to achieving net-zero.

Our goals are to; rapidly mobilise the UK infrastructure sector to meet the net-zero challenge by 2050 or earlier and support the UK in becoming an international leader in net-zero across the global infrastructure sector.

The Net-Zero Infrastructure Industry Coalition will demonstrate clear leadership, innovative thinking and collective expertise to realise our goal of a ‘good’ net-zero; one that supports economic prosperity and a just transition.

About Us - Members

UK GBC

CARBON TRUST
Making business sense of climate change

MOTT MACDONALD

Hawkins\Brown

nationalgrid

KPMG

TRANSPORT FOR LONDON
EVERY JOURNEY MATTERS

Pinsent Masons

anglianwater

ENGIE

SKANSKA

Leeds CITY COUNCIL

UKCRIC

CATAPULT
Energy Systems

‘Mission Statement’

July 2019

At the Net Zero Infrastructure Industry Coalition’s inception, a report was released, identifying five overarching challenges that must be urgently addressed.

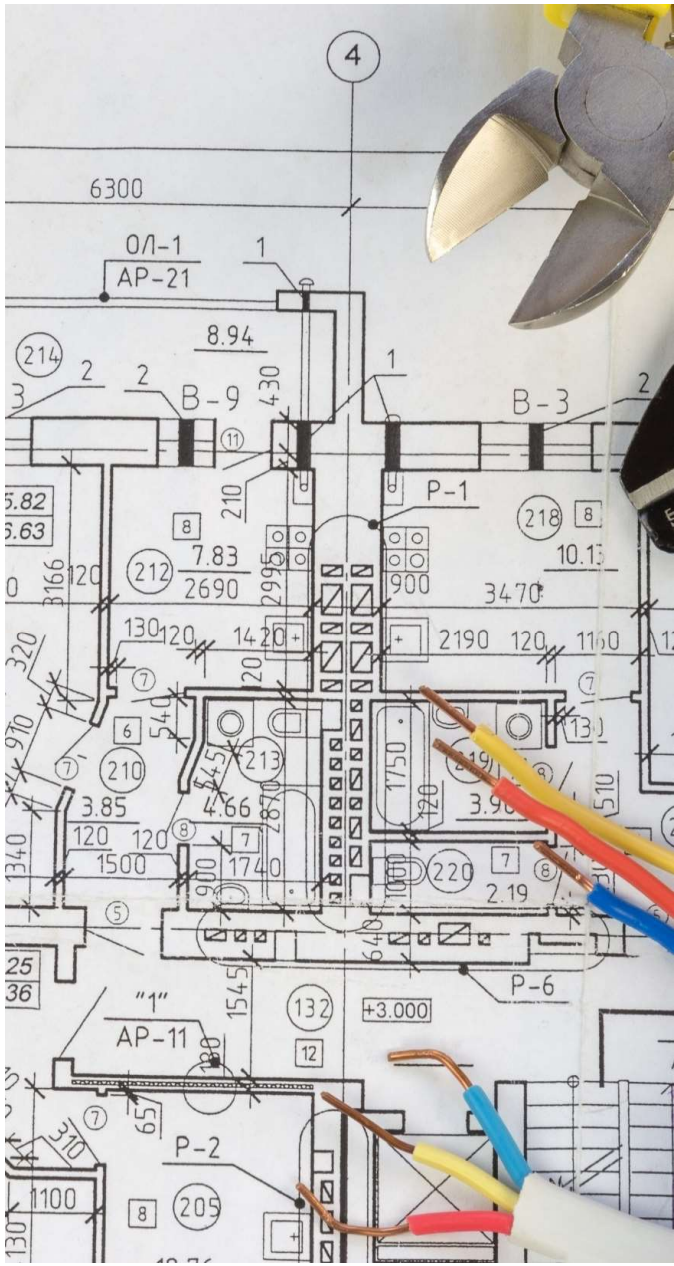
The net-zero challenge has been compared with the space race of the 1960s. As with the first manned flight to the moon 50 years ago, reaching net-zero will require extraordinary effort and collaboration between business, government and society. It will also generate innovations and opportunities that will define this century.

The report summaries the vision and objectives of the Net Zero Infrastructure Industry Coalition, highlighting why infrastructure matters and recommending the scale of transformation required. It hammers home the need for urgency and the critical role of government before reviewing the five key challenges and potential actions.

UKCRIC | One of the first six members in 2019.

5 Key Challenges

1. Delivering an urgent transition in a flexible way
2. Developing institutional and regulatory frameworks for net-zero
3. Mobilising and transforming supply chains
4. Maximising the Benefits
5. Minimising costs and mobilising finance



Led by Mott MacDonald

UKCRIC | Leading contributor.

‘The Path to Zero Carbon Heat’

July 2020

This report presents an overview of the three pathways to decarbonising heat (electrification, hydrogen and hybrid). It discusses the challenges and recommendations associated with each pathway.

If the UK is to meet its commitment to reaching net-zero carbon emissions by 2050, one of the key challenges will be to decarbonise the way it supplies heat to homes and businesses, ending its reliance on natural gas. This activity currently accounts for **20%** of the UK’s carbon’s emissions.

The report gives an infrastructure delivery perspective to better understand how the UK can decarbonise within three decades, supporting industry and Government to plan, make decisions and take action.

The roadmaps show when key decisions must be made, activities undertaken and key infrastructure implemented.

Key Conclusions

1. Decarbonising heat (any way) will require a transformation of our infrastructure systems
2. Decarbonising heat is a very true system challenge
3. Leadership is required at all levels of government
4. Urgent action is needed now to ensure the UK stays on track
5. A hybrid pathway could reduce the overall infrastructure challenge

Supported By

Led by Mott MacDonald

UKCRIC | Leading contributor.

‘A Place Based Approach to Net-Zero’

March 2021

A report focussing on how local insight, capability and connectivity can help nations move towards a net-zero environment.

Through workshops and focussed discussions with representatives from central government, city government and the energy and transport sectors, the report looks at the city transition through a ‘systems thinking lens’ – considering the multiple, complex systems within a city and how they interact.

The findings of the report cover topics such as partnerships, knowledge sharing, local applicability, mobilising local investment and unlocking local benefits. These findings are integrated into a four-pillar strategy with recommendations on Powers, Partnerships, Platform and People.

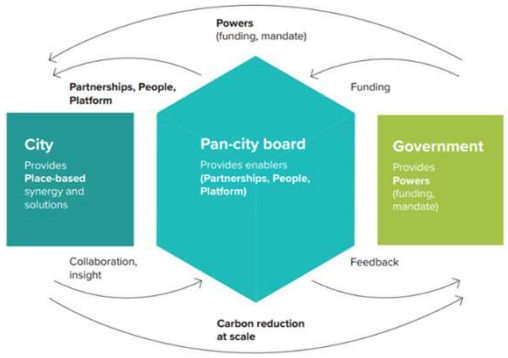
24 Collaborators

Including local authorities, city councils, universities, private energy and gas companies and independent public bodies.

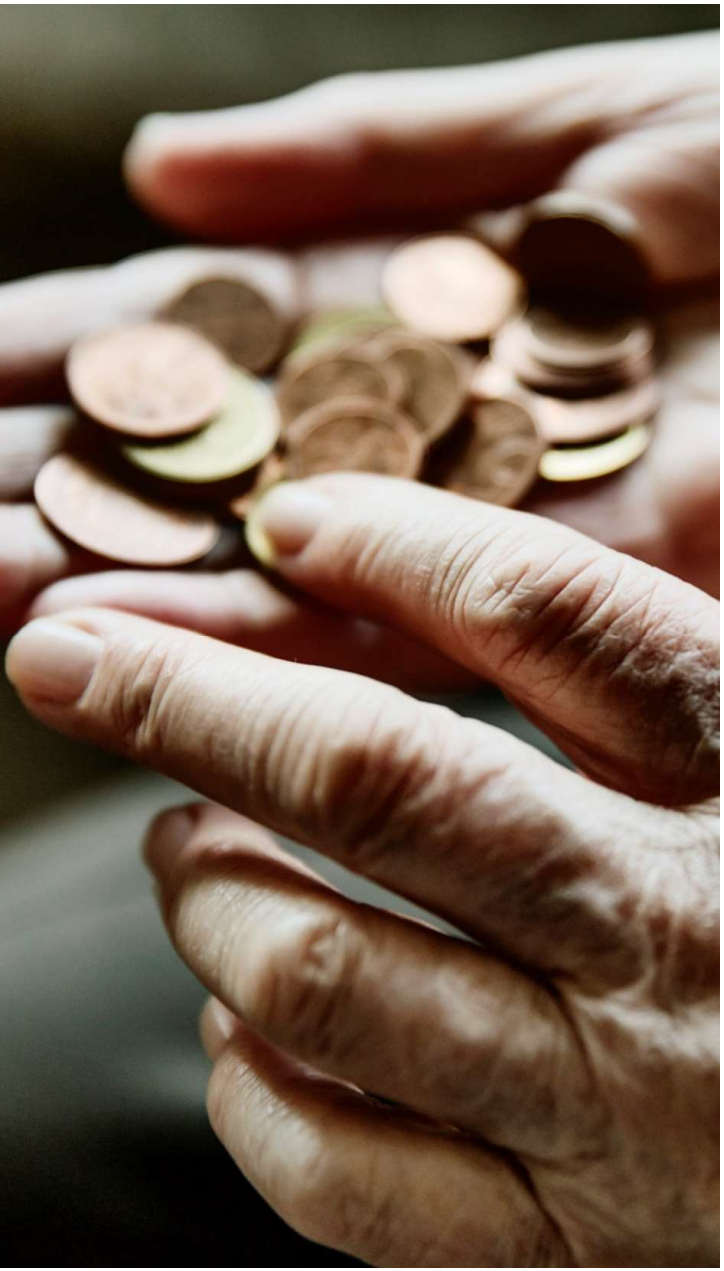
7 Response Articles

Including Manchester Climate, The Business Desk and Sustainability West Midlands.

4 Pillar Strategy



Led by Mott MacDonald



‘Is Our Carbon Wallet Empty?’

UKCRIC | Contributor

April 2021

A report calling for urgent action on carbon measurement to achieve net-zero by 2050.

This report revealed that unreliable data is responsible for variances of up to 2000% in forecasting carbon usage, prompting an urgent call for common data standards, reporting structures and changes in asset design.

A common wide industry approach is recommended as essential to the availability, quality and transparency of data, underpinning initiatives to achieve net-zero carbon by 2050.

The report gives four key recommendations;

- An agreed carbon zero definition
- Planning framework guidance for carbon assessment
- Shared understanding of the sector share of the UK’s carbon budget
- A carbon neutral design option for each asset

Led by Skanksa

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