CAETS 2021
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Engineering a Better World
THE FUTURE OF ENERGY

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How can Engineers work with Policymakers to achieve Emissions Reduction Targets

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Overview of the challenges

- The importance of visions and roadmaps: a positive view of the future
- Reactive versus proactive
  - Respond to requests or set out our own agenda?
- Engagement and difficulty of reaching consensus
- The importance of neutrality
- Case study: “Systems approach to net zero”

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The NEPC

NATIONAL ENGINEERING POLICY CENTRE

- We are a unified voice for 43 engineering organisations, representing 450,000 engineers
- We give policymakers a single route to advice from across the engineering profession
- We inform and respond to policy issues for the benefit of society

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NEPC and Net Zero

NEPC Net Zero project applies a multi-disciplinary systems perspective to climate change policy.

Draws on the expertise of diverse engineering disciplines as well as social sciences and systems science.

We explore key issues relating to the transition to a net-zero future, such as infrastructure, governance, skills and resilience, and do ‘deep-dives’ into specific sectors such as construction and aviation

Why a systems approach?

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Systems approach: an integration of all relevant factors and wider context into decision making, as is often used in engineering to address complex problems with many changing elements

- Net zero by 2050 requires **rapid and simultaneous transformations of multiple vital, interconnected infrastructure systems.**
- It is crucial that these changes are co-ordinated to ensure that the future UK infrastructure and technology works together in an integrated, cost-efficient way
- Without a systems approach, seemingly unrelated decisions such as housing design can 'lock-in' the use of more expensive or higher emission technologies like combustion engine vehicles.

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Strong leadership and governance structures

Developing shared understanding among stakeholders

Low-regrets: systems thinking can identify early wins that wont work against you later

Mapping of the interdependencies and interactions between sectors

A different way of understanding the problem

NEPC - Net zero project themes

THEME 1. Build awareness of the value of a systems approach and demand for engineering advice on net zero.

THEME 2. Support government in operationalising systems approaches for net zero.

THEME 3. Provide systems insights and other engineering-based advice in relation to net zero.

In response to the current context:

- **Influence the green recovery and net zero.**
- **Support government on COP26.**
- **Support government on other plans (e.g. 10-point plan)**

www.raeng.org.uk/net-zero

Systems approaches to policymaking

- Identify **elements or pressures** in the system which are working against the overall goal along with points of greatest leverage where interventions will make most difference;
- Reveal important **synergies and interdependencies** between different decarbonisation strategies and different policy priorities, help balance **trade-offs** and realise opportunities for additional benefits such as improved health outcomes;
- Account for **social, cultural and behavioural** factors that can act as both barriers to and levers for change;
- Understand **time pressures and sequencing**, determining when there is a window of opportunity to intervene and what information is required to inform those decisions;
- Identify **risks and mitigation** strategies to reduce the impact of unintended consequences;
- Develop **adaptive approaches** to manage future **uncertainty** and target real-time assessment and monitoring;
- Demonstrate the **scale** of the transition challenge; and
- Monitor effects and **adapt responses** over time.

Systems approaches to policymaking: national scale

Strengthen the institutions, governance frameworks and leadership structures needed across central government to galvanise action to achieve net zero.

i. Integrated multi-disciplinary analytical hub supporting all government decisions on climate
ii. Translate the net zero target into all areas of policy
iii. Stable leadership from the top of government

Develop the analytical capability, flow of information, and reporting needed to inform decision.

i. Ensure that the all government bodies are collecting the right data and passing the information to the analytical hub.
ii. Publish carbon emissions assessments for all public sector policies, including major infrastructure projects or investments.

Maximise the contribution of technology, mobilise financial systems and galvanise international collaboration.

i. Mission-driven research and innovation
ii. A National Infrastructure Investment Bank
iii. International collaborations on trade, investment, finance, technology, capacity building and R&D.

Case Study: decarbonising construction

Four areas of the UK's construction industry landscape are crucial for an effective net zero transformation.

1. **product outcomes**
2. **design and specification**
3. **construction and re-use**
4. **government procurement**

We explored each of areas and the ways they interact with each other dynamically,

We identified a large number of sometime surprising changes in each to bring about transformation of the sector, including regarding:

- Industry culture
- Long-term certainty
- Education and skills
- Design standards and materials
- Insurance regulation
- What outcome is being valued

By taking a holistic [systems] approach at project level, decision makers can address carbon and broader **social, environmental and economic f**actors.

At a policy level, it can identify where indirectly related structures such as **finance and insurance** are blocking emissions reduction, and how they could instead enable it.

Decarbonising construction – systems map

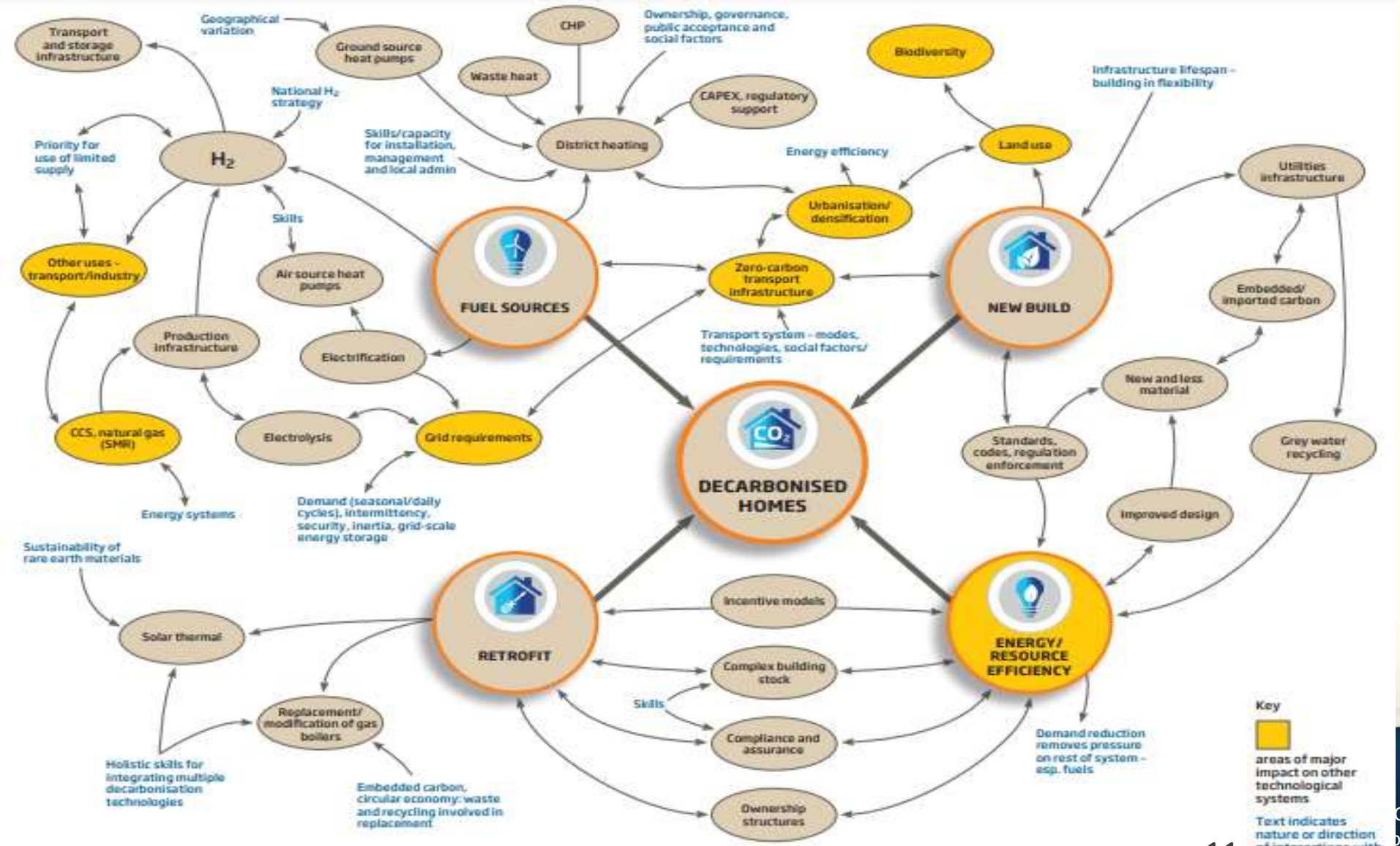

Figure 1: Synergies and interdependencies in the decarbonisation of homes

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Net zero – what does success look like? (1)

THE UK MEETS THE 2050 EMISSIONS TARGET IN THE OPTIMAL WAY

Government has a clear vision of the system required to meet net zero and all stakeholders are aligned with this goal.

Government departments work effectively together towards the shared goal, with the tools and evidence to address complex interactions between policies, technologies and sectors.

Government is empowered to act rapidly in the face of uncertainty, while establishing mechanisms for monitoring and evaluation to allows adjustments.

Government is clear about where decisions should be devolved.

Government's analytical capability includes tools to analyse systems issues, including pathways and trade-offs

Government has the governance mechanisms and systems capability to coordinate cross-departmental and cross-sectoral activity

Government has access to the best engineering expertise to inform net zero policymaking

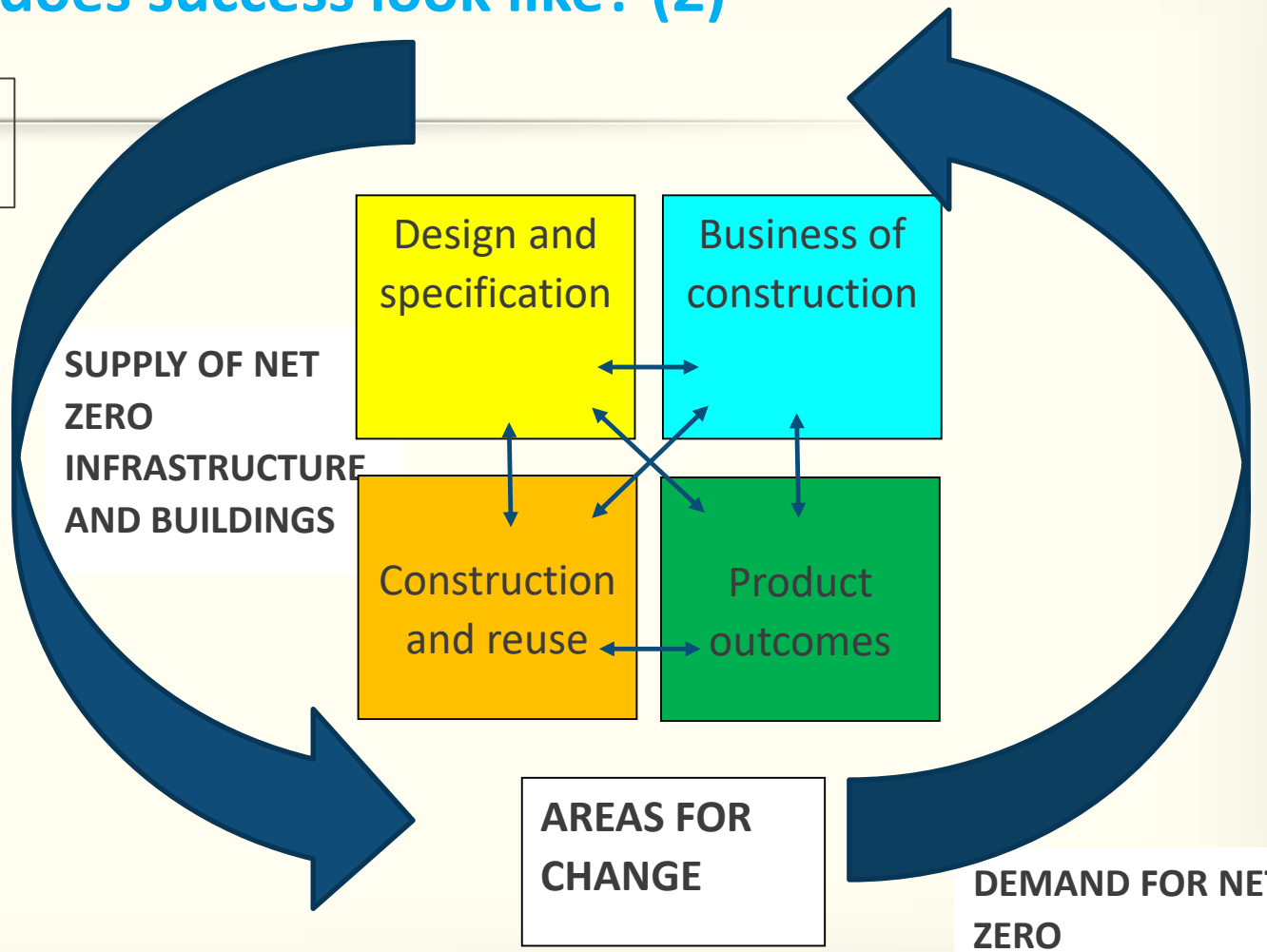
Net zero – what does success look like? (2)

THE UK MEETS THE 2050 EMISSIONS TARGET IN THE OPTIMAL WAY

The 'system' – policy, regulation, education, industry capability and business models, structures, finance etc. – is tuned towards delivering the net zero goal and co-benefits

Ambitious, but realistic, interim decarbonisation targets for every sector

Stakeholders understand their role in the net zero system and are incentivised and empowered to act



Example from Decarbonising Construction work: change required across four interconnected areas

Some conclusions

- Take time to develop a consolidated view
  - Hard to get consensus even within the engineering profession
- Focus on the challenges which add value to current policy
  - Hence our focus on systems thinking rather than individual technologies
- Aim for interactions at key points to allow for adaptation
- Be proactive and pre-empt the major policy challenges

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THANK YOU

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