

Establishing a Framework for Whole System Co-Optimisation between sectors

Thursday 25 September
University of Warwick



cigre

For power system expertise

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Scottish & Southern
Electricity Networks

TRANSMISSION

Overview – Whole Energy System



What is the scope?



Why energy?



Building blocks



Bringing it all together

What is the scope?

Whole system

Whole systems thinking and outcomes

Whole energy system

Whole energy system modelling

Whole energy system planning

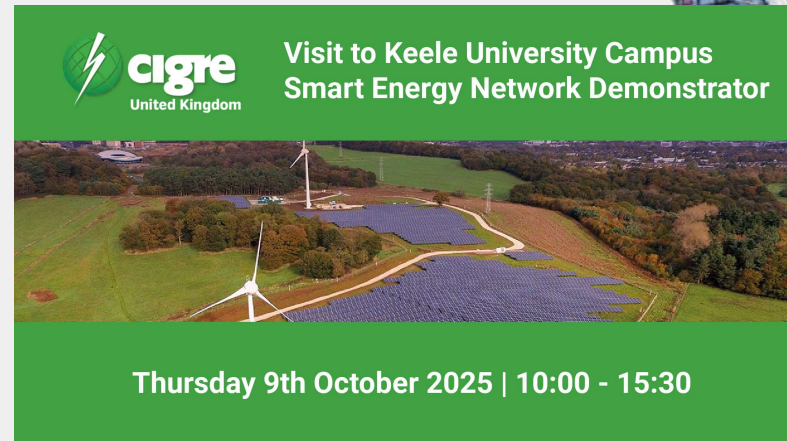
Whole home energy system

“To us: The whole energy system comprises electricity, gas, heat and transport networks and components that serve GB society.”

Enabling whole energy system outcomes,
SSEN Transmission, 2019

We tend to define whole energy systems in terms of those elements that are within our organisational influence...

Even within CIGRE we have many parallel efforts



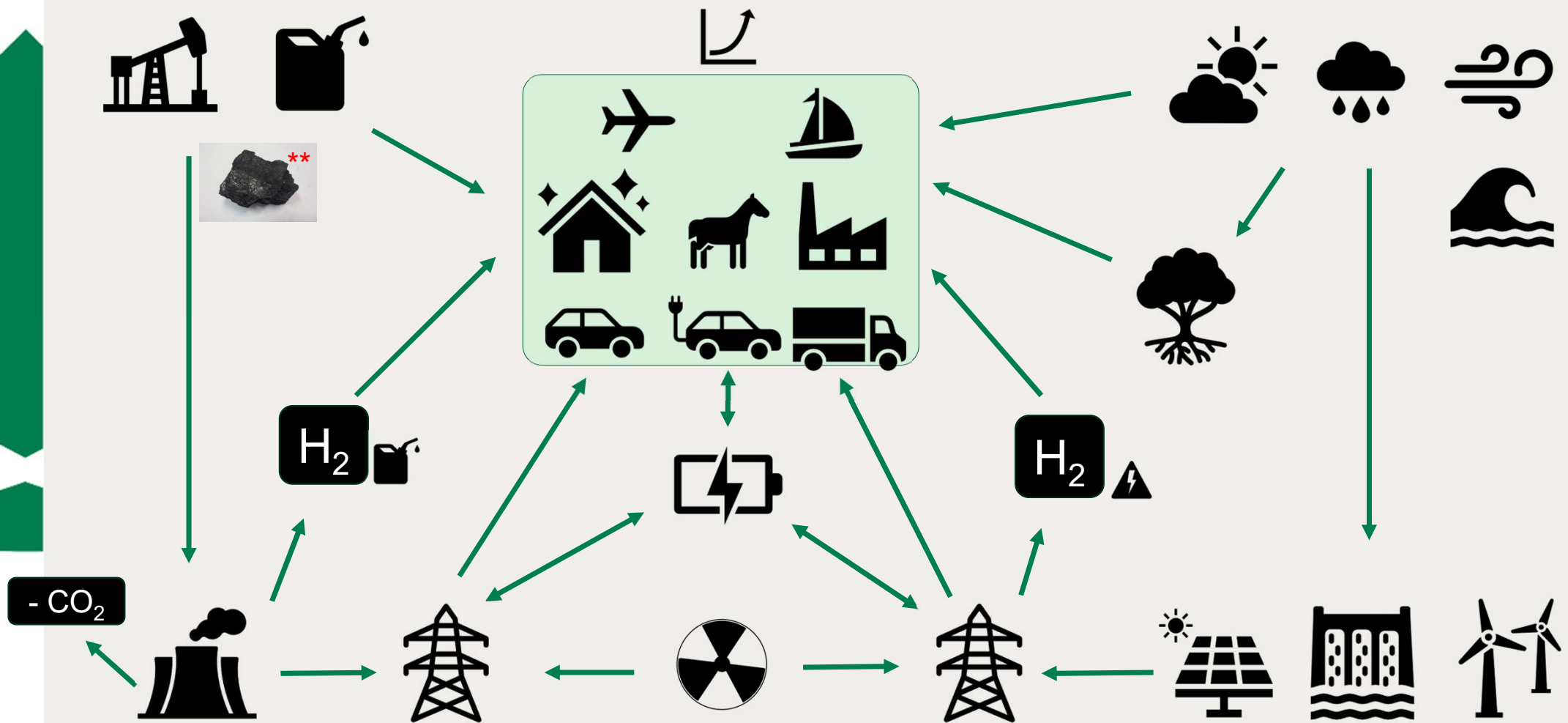
Could there be value in establishing
a whole energy system framework?

Why Energy?

“Energy is a driving force for growth, productivity and innovation across the economy in closely related sectors such as transport, agriculture, construction, financial services, information technology, telecommunications, waste, and many more. The transition to a cleaner energy system creates a significant opportunity for job creation and investment in green skills.”

NESO, <https://www.neso.energy/about/whole-system-challenge>

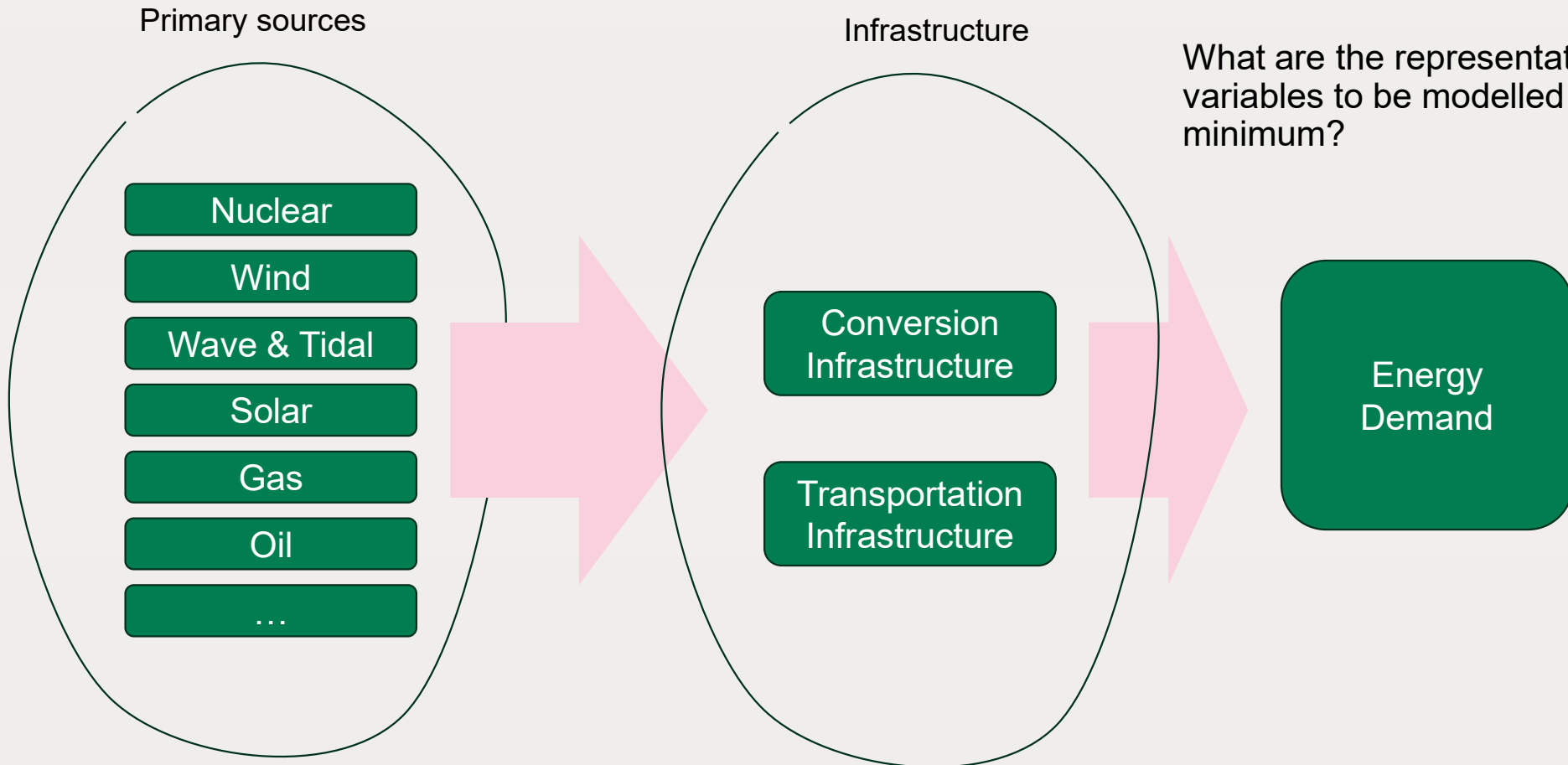
Whole energy system – Building blocks



Building blocks - Subsystems

How do we develop generic models for different functional parts of the energy system?

What are the representative variables to be modelled as a minimum?



Bringing it together

Sources

- ☐ Extraction/refinement where relevant
- ☐ Cost
- ☐ Specific technology and resource characteristics
- ☐ ...

Conversion

- ☐ Cost
- ☐ Efficiency
- ☐ External dependencies
- ☐ Specific technology and resource characteristics
- ☐ ...

Transport infrastructure

- ☐ Cost
- ☐ Technology characteristics
- ☐ External dependencies
- ☐ ...

Energy system modelling

Within vector

Cross vector

What does the minimum viable product look like?

Test cases, performance metrics, ...

Application in whole energy system planning and operation...

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