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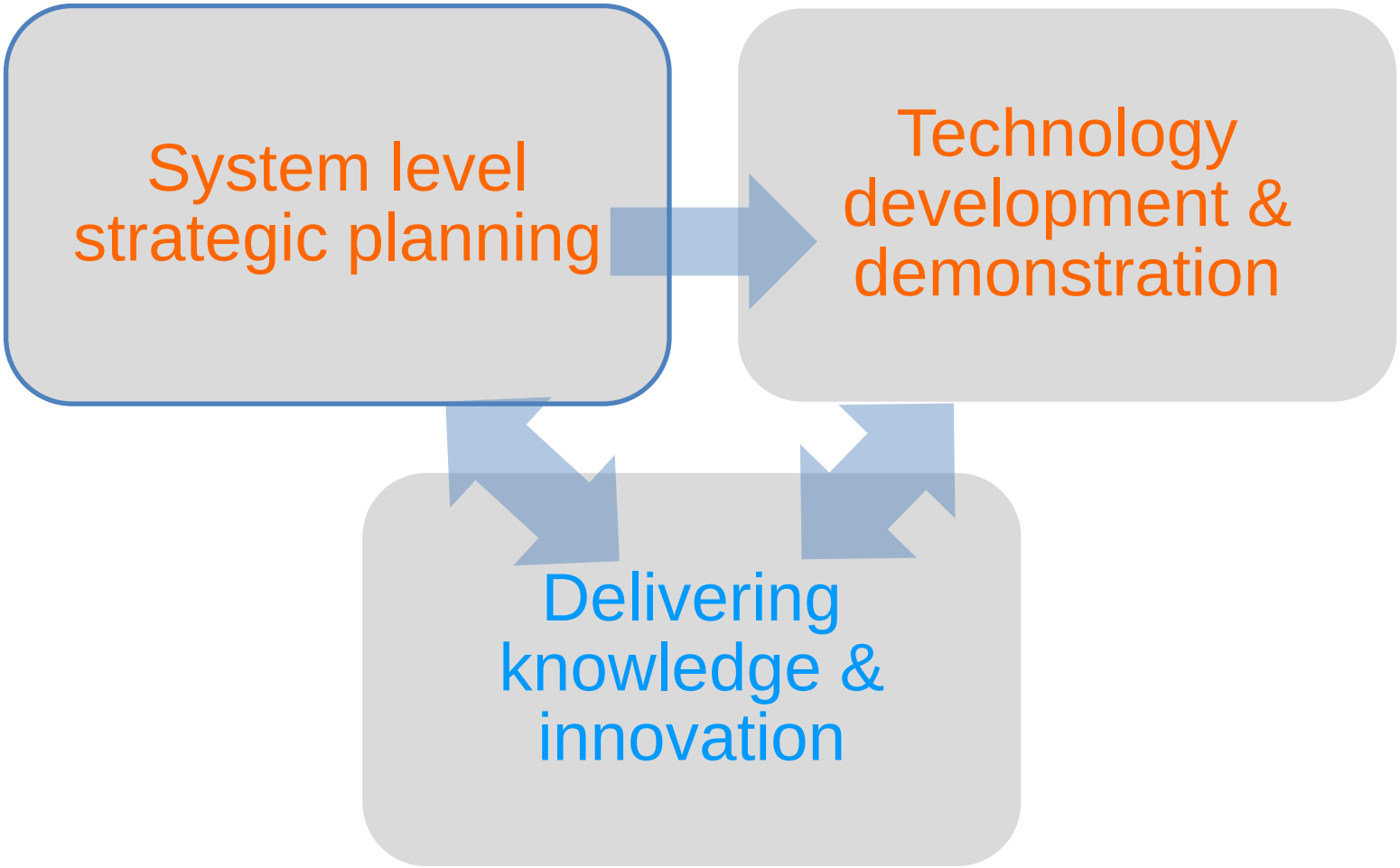
A decade to develop and prove our low carbon options: The role and value of CCS in the broader energy system

Jo Coleman, Strategy Director

What do we do at the ETI?



The next decade is critical in preparing for transition

- The UK can implement an affordable (~1% of GDP) 35-year transition to a low carbon energy system by developing, commercialising and integrating known - but currently underdeveloped – solutions

- We need to focus deployment on a basket of leading contender technologies
  - Efficiency of vehicles, efficiency and heat for buildings, Nuclear, CCS, Bio, Offshore Wind, Gases

- There is enormous potential and value of CCS and bioenergy
  - The ability (or failure) to deploy these two technologies will have a huge impact on the cost of achieving the climate change targets and the national architecture of low carbon systems and future infrastructure requirements

- To avoid wasting investment, crucial decisions must be made about the design of the future energy system, driven by choices on infrastructure

Delivering an 80% reduction in UK CO_2

Power now, heat next, transport incremental – cost optimal

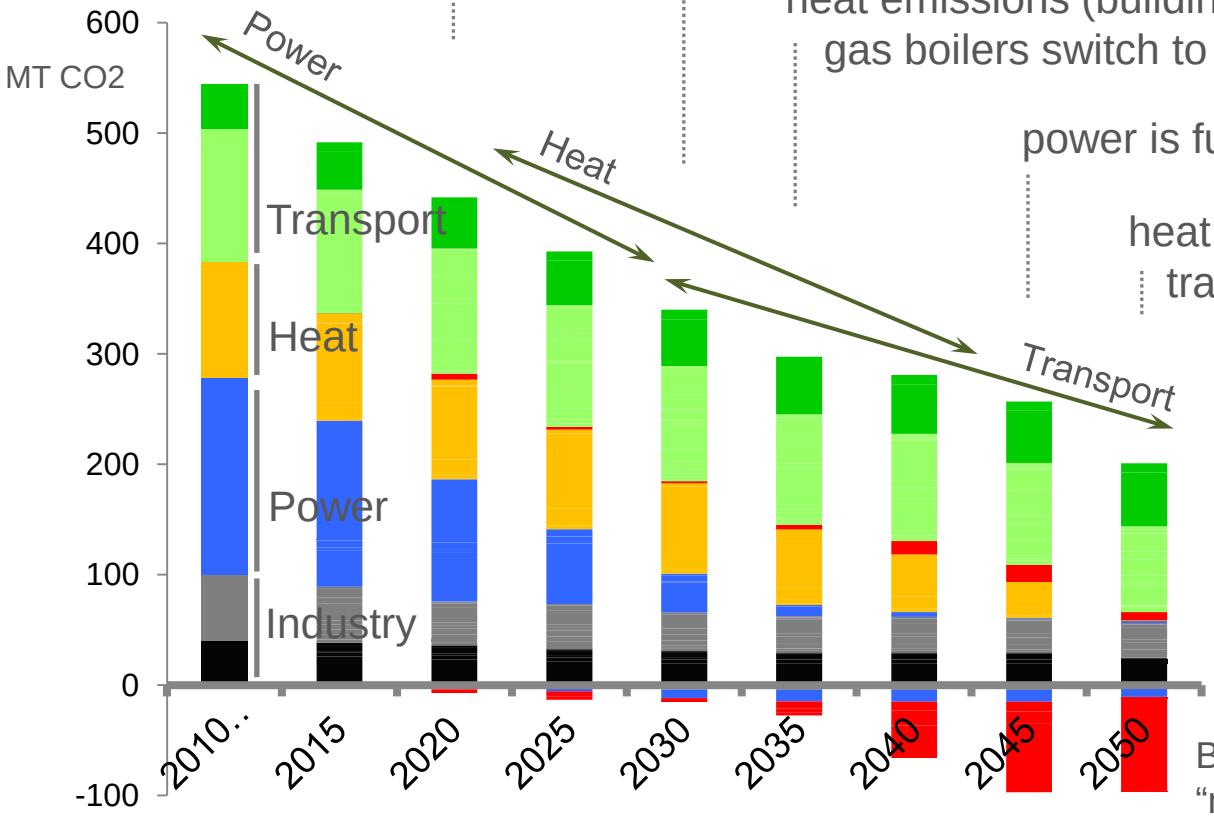
CCS and bioenergy demos operating

negative emissions through bioenergy + CCS

heat emissions (buildings) reducing as domestic gas boilers switch to electric or district heating

power is fully zero carbon

heat (buildings) zero carbon, transport is largest CO_2 emitter

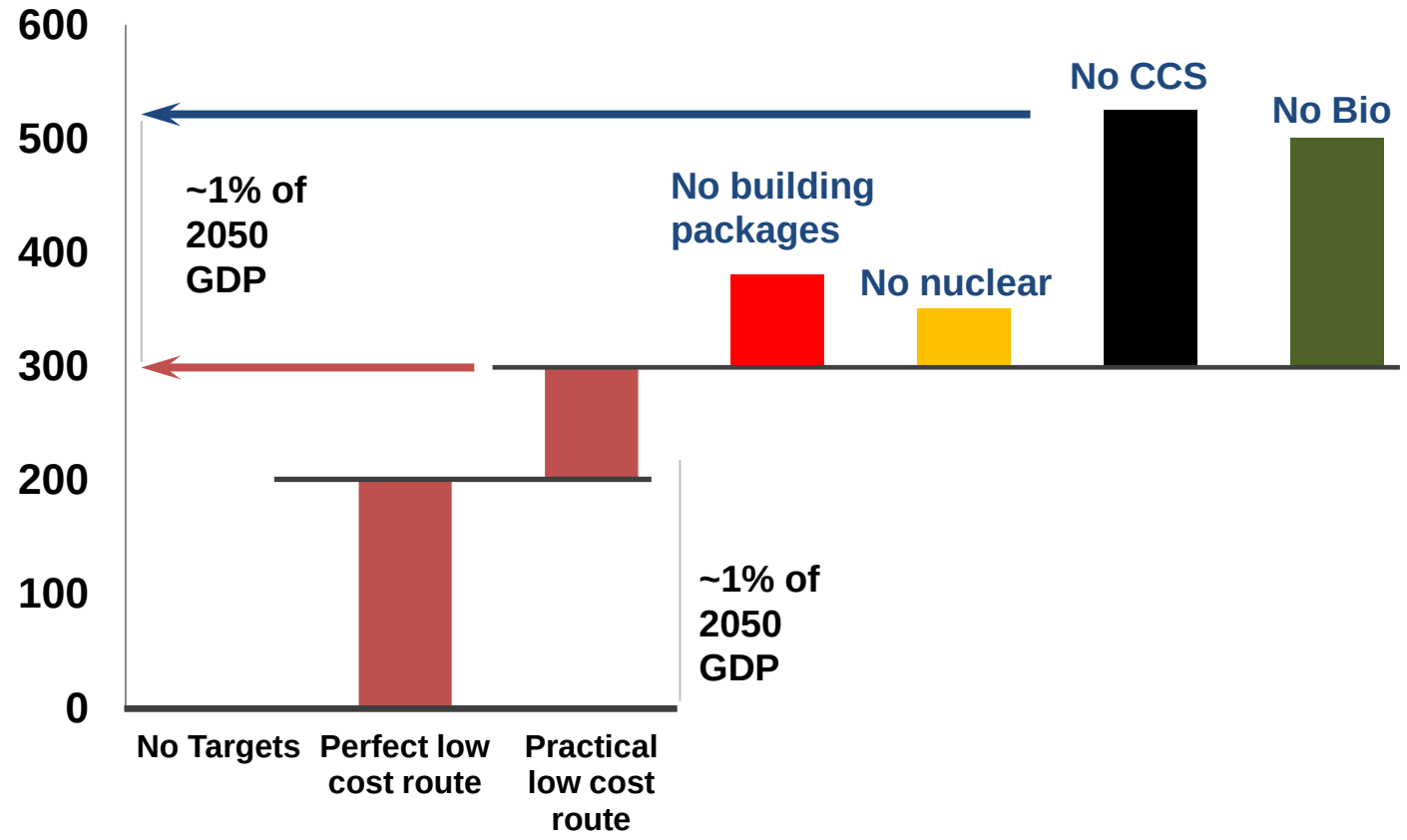


Bio credits "negative emissions"

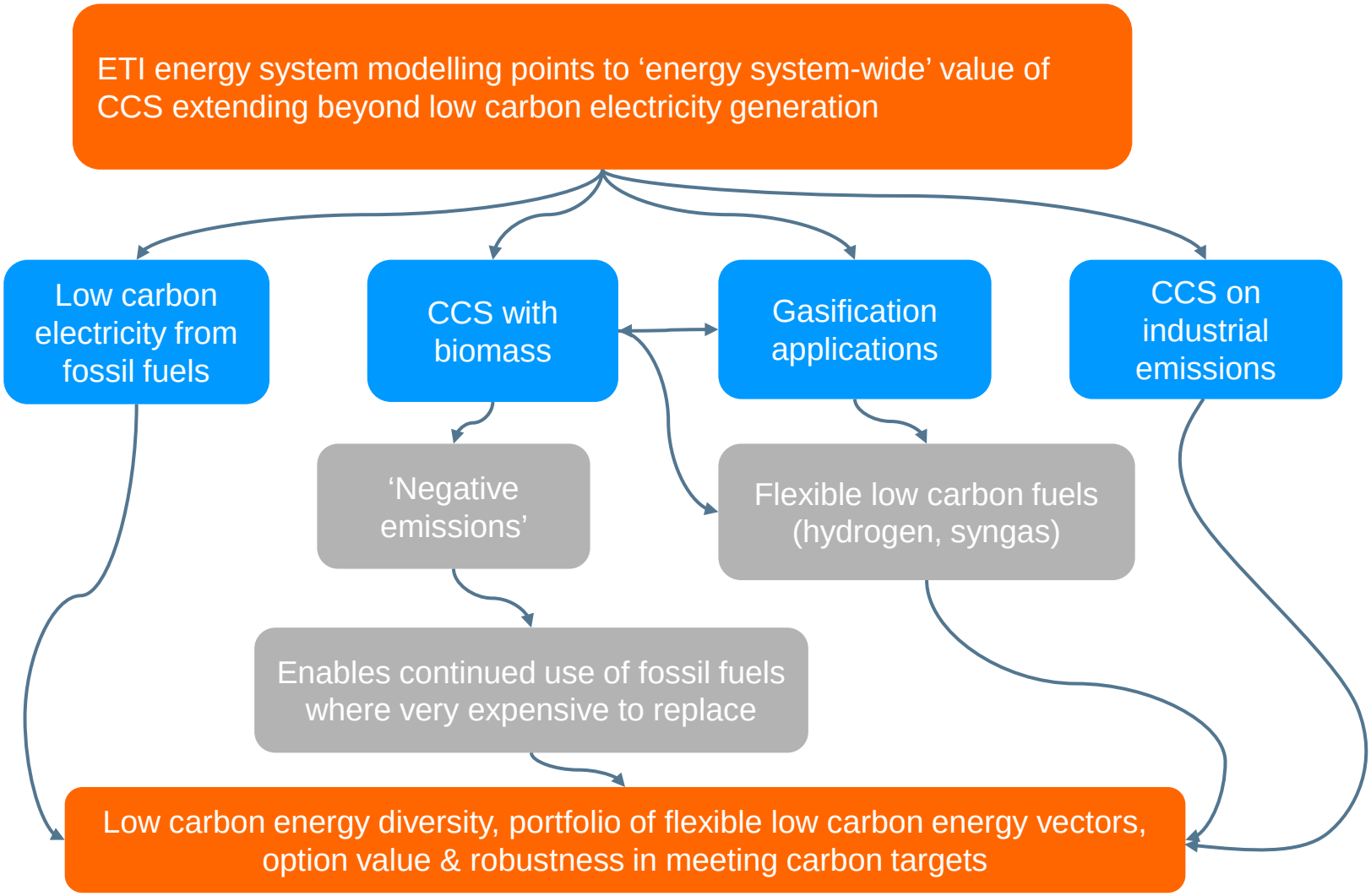
The UK can achieve an affordable transition but system optimisation key

Additional cost of delivering 2050 -80% CO2 energy system

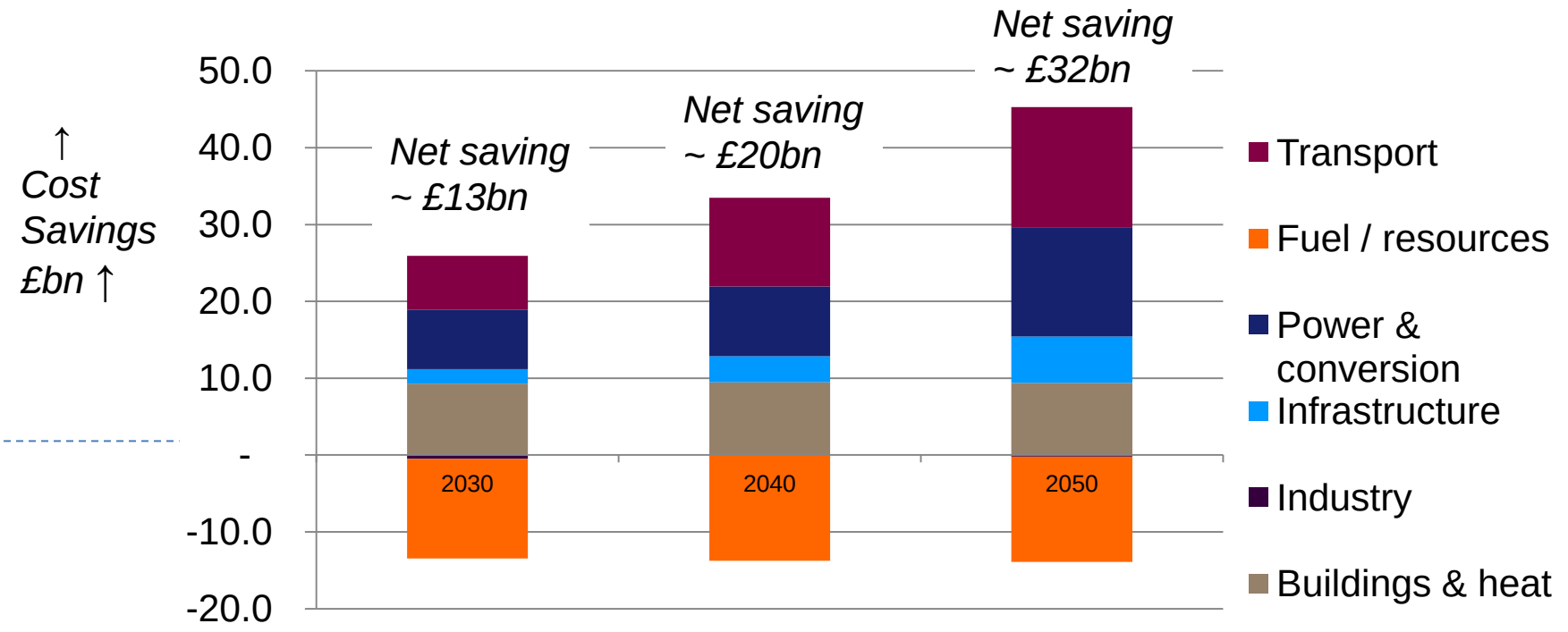
NPV £ bn 2010-2050



The Value of CCS is in many roles



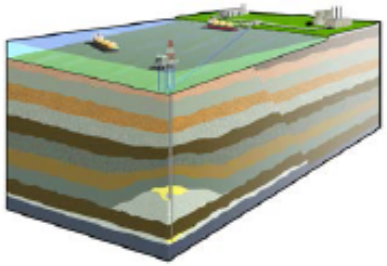
Deploying CCS cuts cost of meeting UK carbon targets by £billions



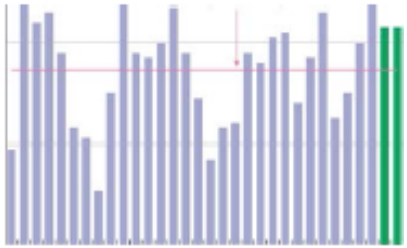
Fuel costs are higher, but there is less need for expensive low carbon vehicles, building retrofits, (intermittent) generation capacity & transmission infrastructure resulting in net savings which grow over time.

ETI projects, in-house tools and strategic analysis informing national transition planning

CO_2 Stored



ESME
Energy System Modelling Environment



UKSAP CO_2 Stored

Comprehensive database of potential UK CO_2 Storage licensed to The Crown Estate and British Geological Survey
Database developed out of ETI £4m UK Storage Appraisal Project

Project Partners

CCS System Modelling Toolkit

The creation of a system modelling toolkit capable of simulating the operation of all aspects of the CCS chain from capture and transport to storage and maintenance.

Project Partners

ESME

A national energy system design tool focusing on a whole systems analysis integrating power, heat, transport and infrastructure and their interactions.

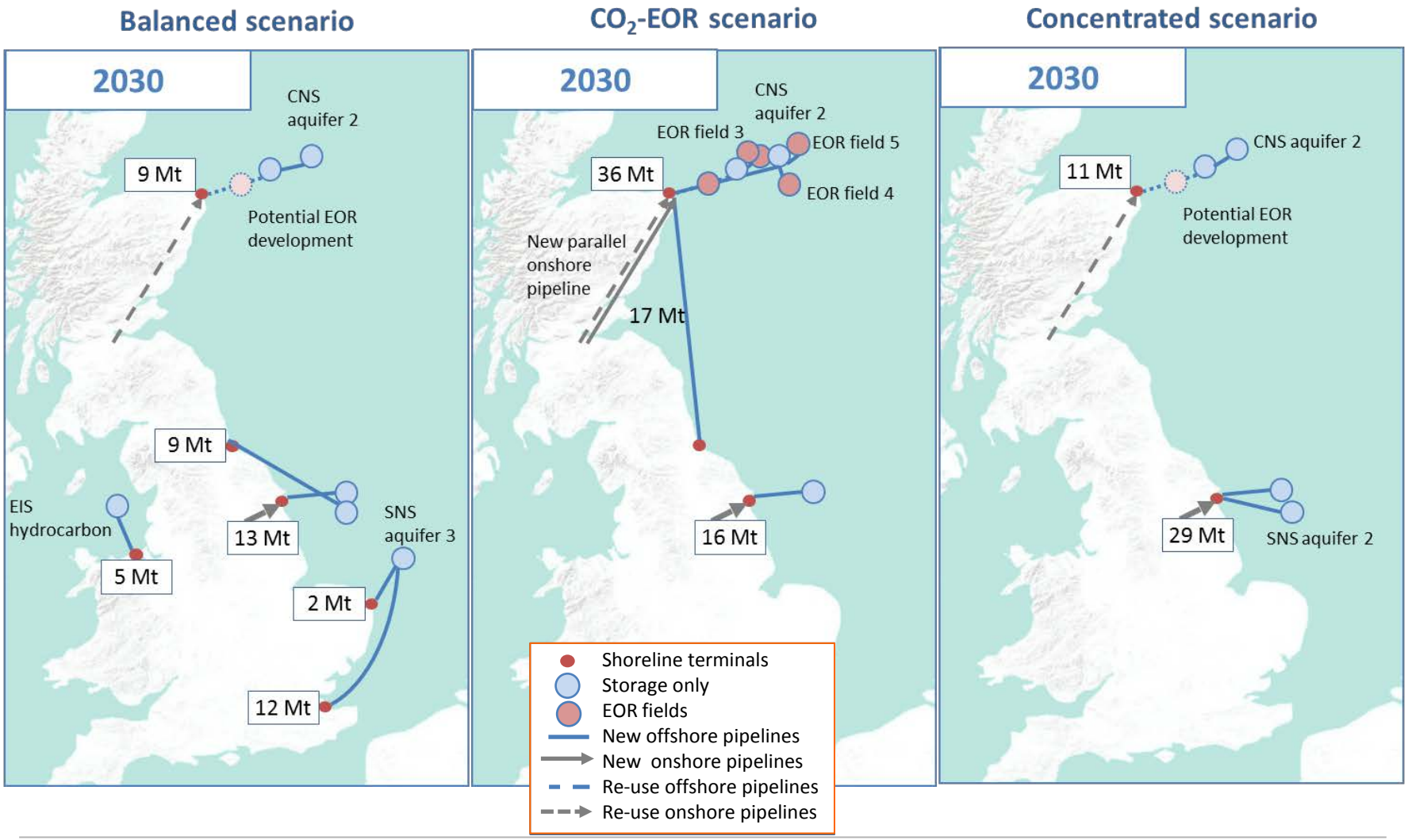
CO_2 Nomica

An economic model for in-house use which builds up estimated costs for the offshore infrastructure such as onshore compression, pipelines, platforms and wells.

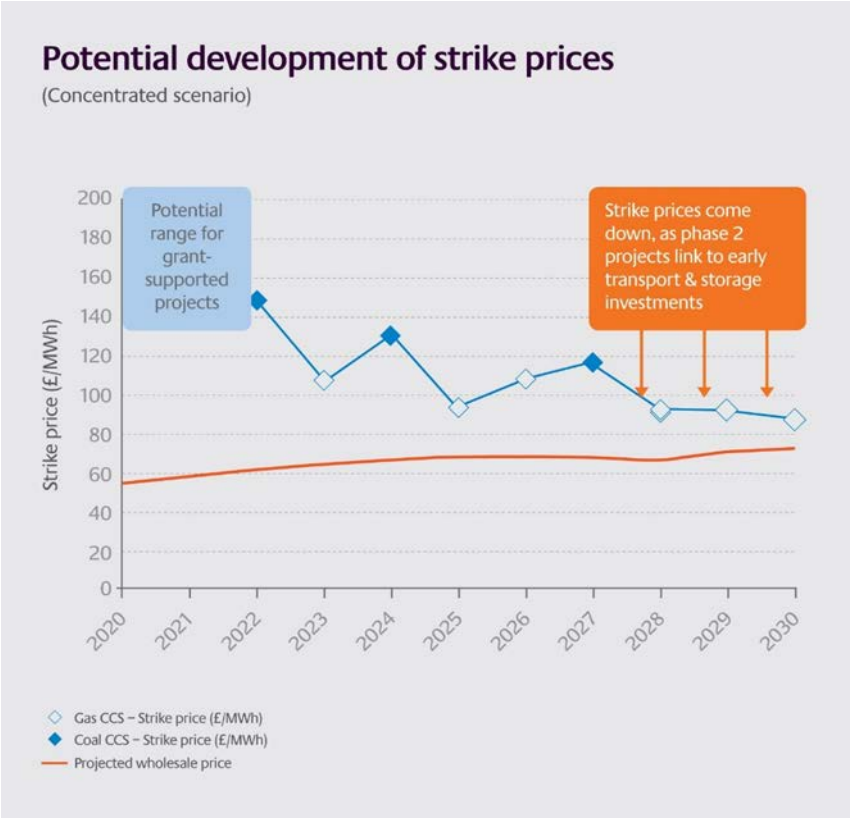
Project Partners

elementenergy

UK scenarios for CCS for 2030



Develop and prove the option - an infrastructure plan to 2025



Develop at least 2 Hubs

- Pathway set by commercialisation programme
- Anchor projects

Pursue network development

- Secure, low cost, multiple emitters (gas, coal, industry)
- Expandable ramp up capability

New CCS power plant needed

- 2-3GW by 2025
- Co-ordination of sites

7 New Aquifers needed

- One appraised every year between 2018 and 2025

Conclusions

- CCS is a critical tool in cost-effectively decarbonising the UK energy system
- The value of CCS comes from its ability to address power and industry, as well as achieving negative emissions (with biomass) and enabling low carbon gases
- To achieve roll out in the most cost effective way will involve the development of key clusters and ultimately linking these into a comprehensive CO_2 transport and storage system
- Anchor Projects are critical to establish CCS clusters – these will most likely be large scale power – capture – storage projects
- We need to be developing follow up opportunities (capture and storage) – but avoid diverting focus from the establishment of Anchor Projects

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