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ETI Bioenergy Programme – Domestic Resources

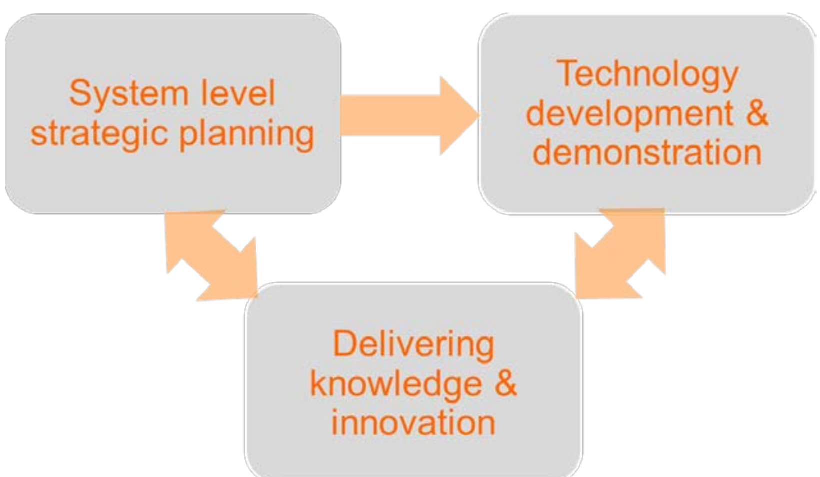
Hannah Evans, Bioenergy Strategy Manager

ETI10 TEN YEARS OF INNOVATION 2007 – 2017

What is the ETI?

energy technologies institute

- Public-private partnership
- Set up to identify and accelerate the development and demonstration of an integrated set of low carbon technologies



ETI members

bp

CATERPILLAR®

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EPSRC Pioneering research and skills

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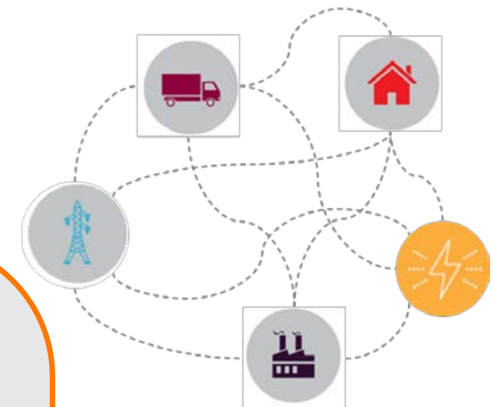
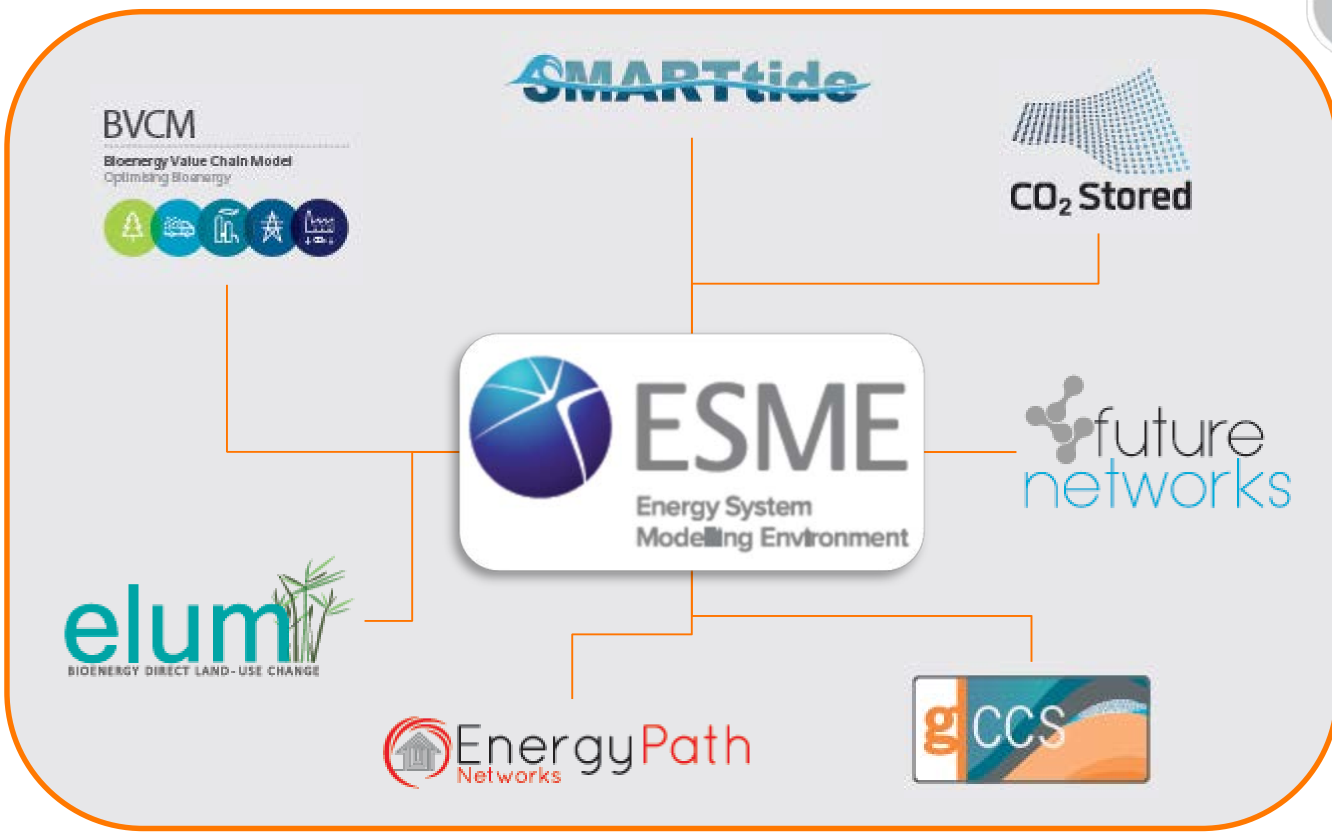
HITACHI Inspire the Next

WHOLE ENERGY SYSTEM MODELLING AND ANALYSIS





A route to meeting - 80% CO2 for the UK

Power now, heat next, transport gradual – cost optimal

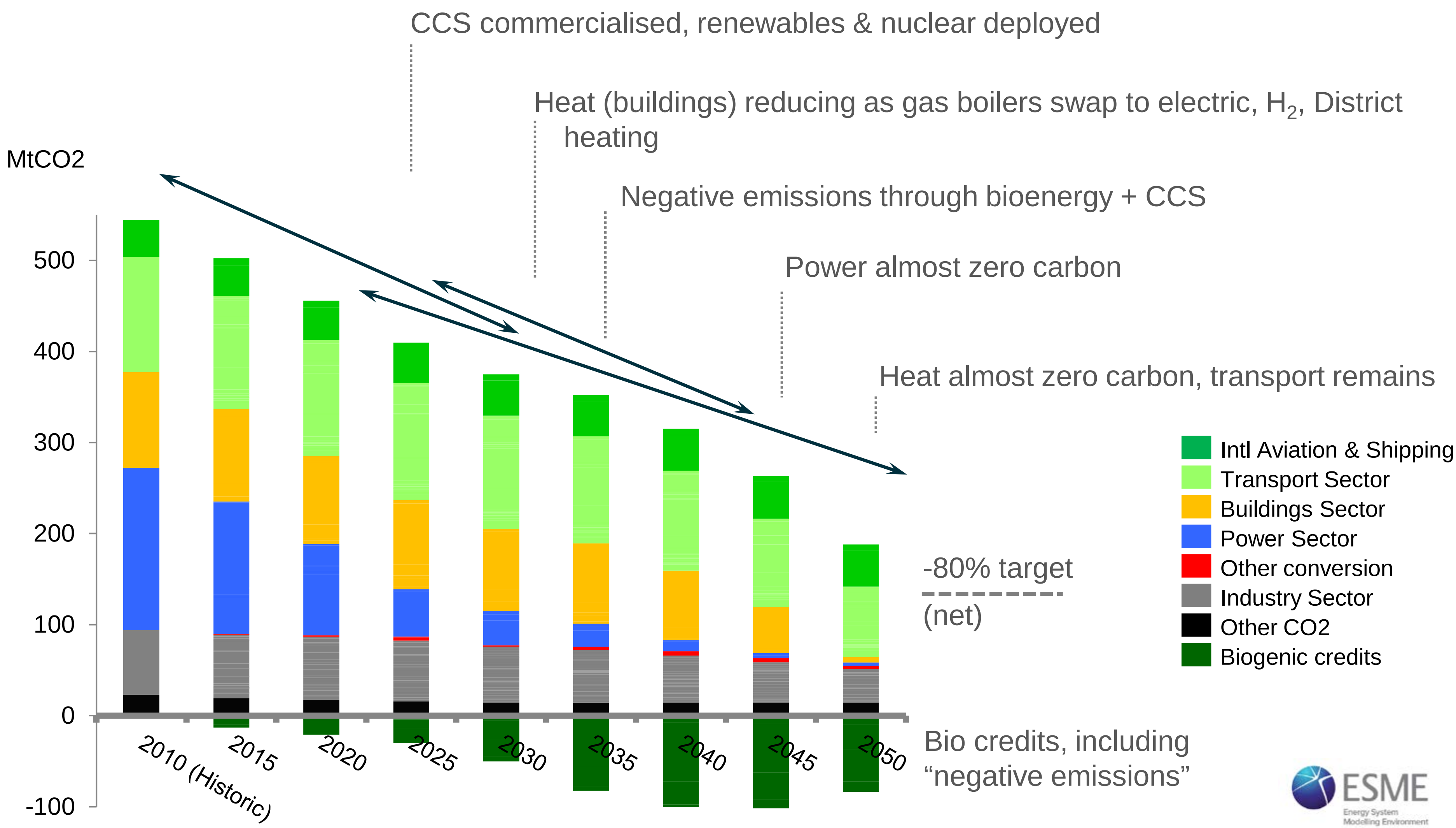


Chart data from case v42

ETI's 'ESME' model indicates an important role for bioenergy and CCS in the UK

Additional cost of delivering 2050 -80% CO_2 energy system

NPV £ bn 2010-2050

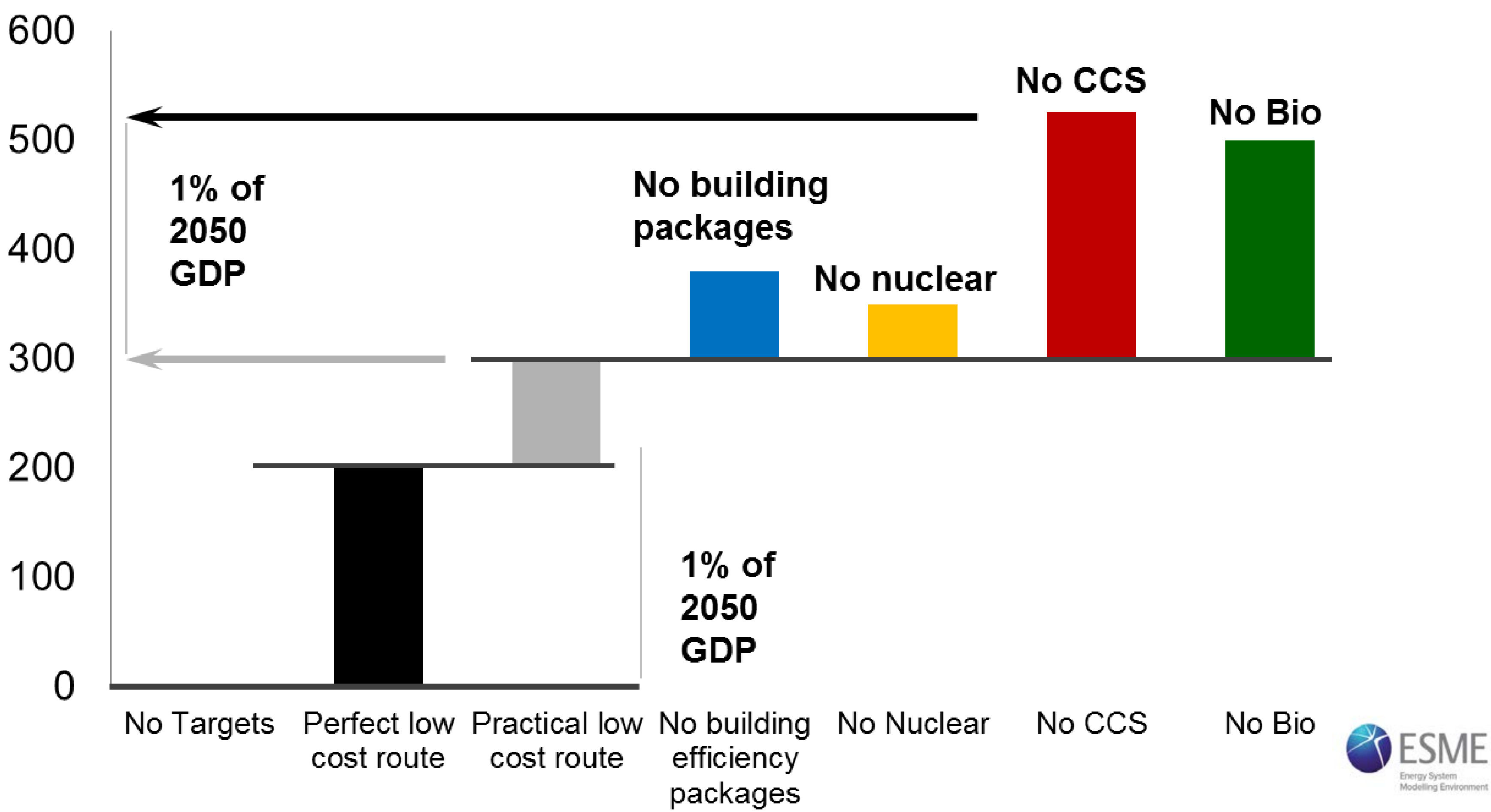


Chart data from case dc14

Bioenergy Programme - Key Questions

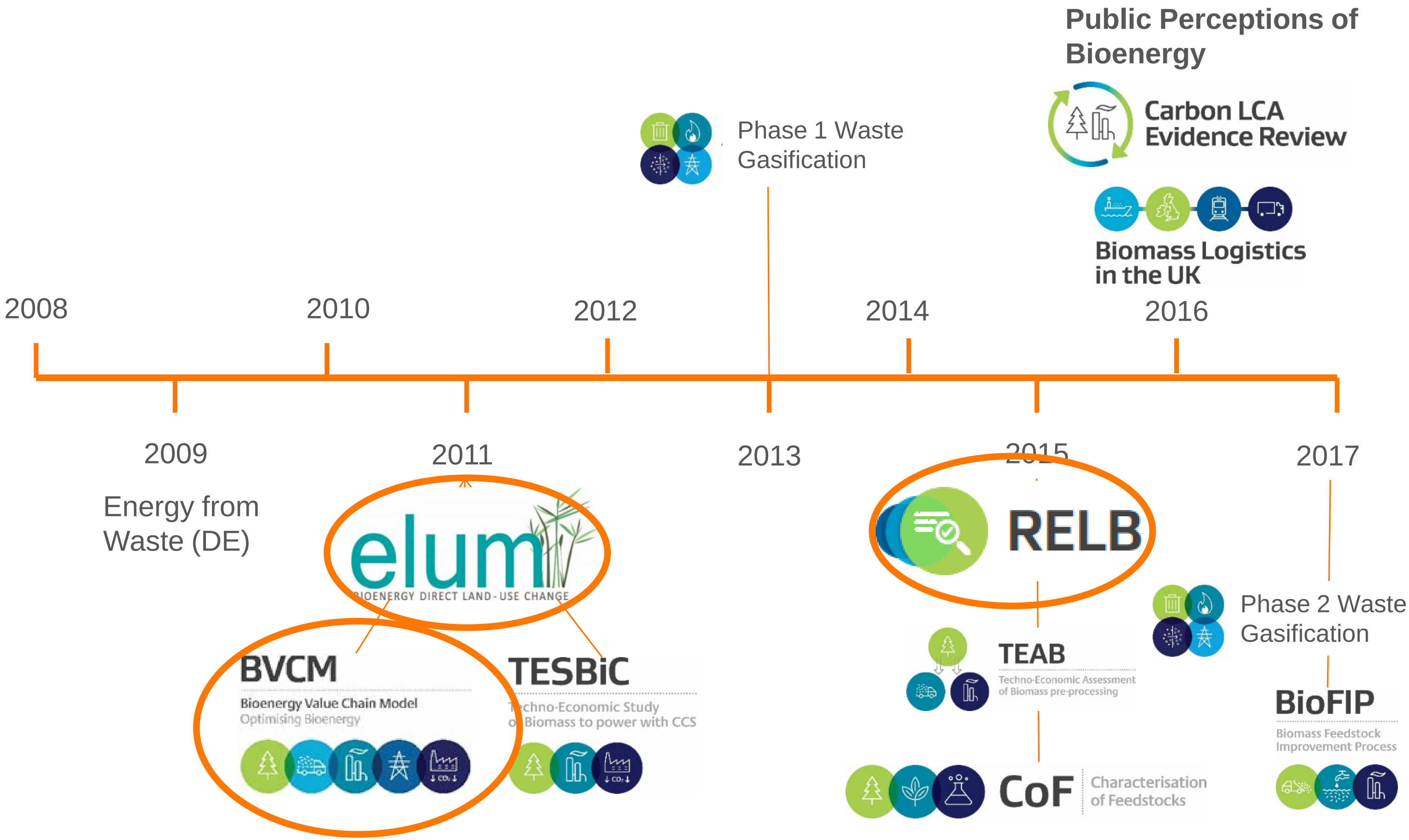
How much negative emissions could be realised through bioenergy deployment in the UK?

What would be the best ways to use this bioenergy in the future UK energy system?

What are the right combinations of feedstock, pre-processing, and conversion technologies?

Enabling policy, regulatory and market frameworks. Understanding public perception

Bioenergy Programme



The Bioenergy Value Chain Modelling (BVCM) Project

energy technologies institute

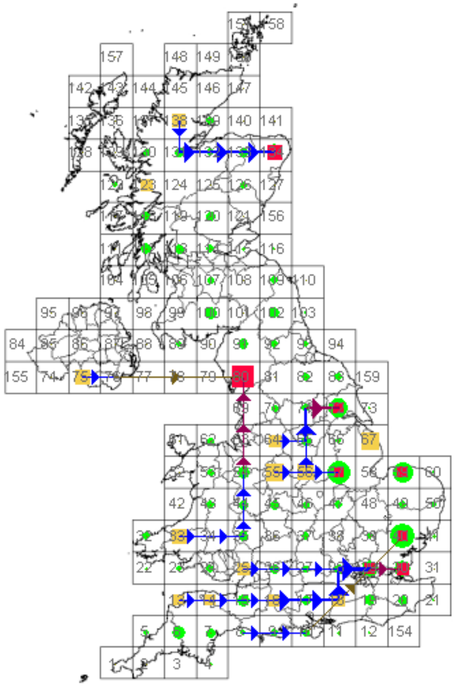
Problem definition:

What is the most effective way of delivering a particular bioenergy outcome in the UK, taking into account the available biomass resources, the geography of the UK, time, technology options and logistics networks?

Development of a comprehensive and flexible toolkit for whole system biomass value chain analysis and optimisation

Project commissioned:

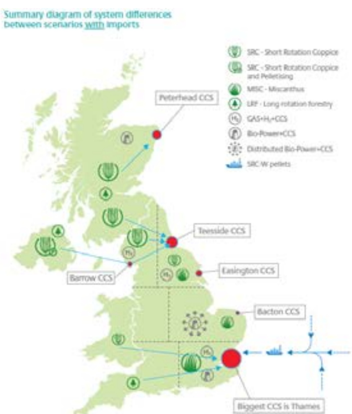
- Pathways optimised based on: minimum cost, minimum GHG emissions, 'maximum profit' (inclusion of GHG substitution credits) or a combination
- Can include GHG targets and energy target ranges
- 93 'Resources' and 69 distinct 'Technologies' at different scales and with multiple feedstocks
- UK production factors (land constraints; yields); imports; logistics
- 157 cells (50km x 50km); 5 decades and 4 seasons

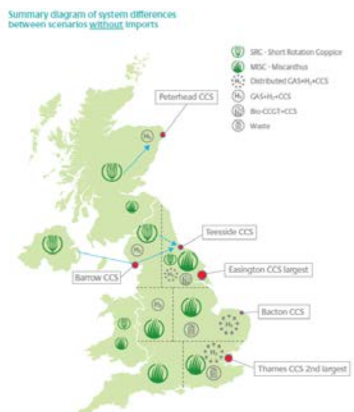


BVCM
Bioenergy Value Chain Model
Optimising Bioenergy

E4tech Imperial College London EIFER ROTHAMSTED RESEARCH University of Southampton Forest Research BLACK & VEATCH AgraCEAS Consulting

BVCM enables the bioenergy sector to be modelled under different conditions





Key insights from modelling the bioenergy sector under different scenarios out to 2050:

- Gasification technology is a key bioenergy enabler and resilient to a number of different scenarios
- Planting around 1.4 Mha of second generation bioenergy crops would make a significant contribution to the sector.
- Deployment of BECCS makes a significant difference to the bioenergy sector:
    - With CCS, BECCS technologies dominate, clustered around key coastal hubs
    - Without CCS, more heat and biomethane are produced and the sector is more spatially distributed

Biomass Feedstocks

- Numerous bioenergy value chains can deliver genuine carbon savings across all key vectors of power, heat, liquid and gaseous fuels

- With increases in total land productivity and reductions in waste, up to 1.4 Mha of suitable land could be made available for bioenergy crops by the 2050s

- Investment is needed in production of plant breeding materials, planting and harvesting equipment and skills development
- The majority of job opportunities will be seasonal but complimentary to other farming activities

Biomass Feedstocks – Case studies

Aim: To produce three positive case studies of farms growing Willow and Miscanthus showing the impacts the crop has had on farm economics, food production and biodiversity

Key findings:

£ All three case studies demonstrate that planting energy crops can increase the profitability of the land

When optimising the use of land across the farm, impacts on food production can be minimised. In the two Miscanthus case studies, food impacts were minimised by targeting poor yielding land or intensifying production elsewhere on the farm. In the SRC Willow case study the crop was planted on surplus land

? The farmers in these case studies chose to grow energy crops for a variety of reasons— making better use of difficult or underutilised land, diversifying income and reducing workload. In addition, all farmers cited the importance of obtaining secure fixed term contracts with buyers in their decision making.

Thank you for listening

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21st – 22nd November
County Hall, London

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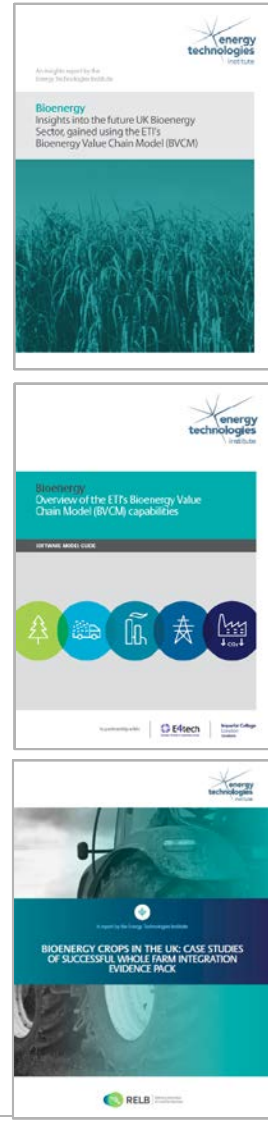

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Join us at our event

10 Years of Innovation
A showcase of a decade of research

ETI10 TEN YEARS OF INNOVATION 2007—2017

County Hall, London
21st and 22nd November

Register online at - www.eti.co.uk/10Years

Registered Office
Energy Technologies Institute
Holywell Building
Holywell Park
Loughborough
LE11 3UZ

For all general enquiries telephone the ETI on 01509 202020

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