

Our Programme Areas

Together, the ETI's nine programme areas are addressing some of the key challenges in delivering the UK's future energy needs.

UK Energy System Modelling Environment

(ESME) esme@eti.co.uk

ESME is a key tool for exploring the impact of individual technologies on the future energy system under a number of 2050 demand scenarios. It integrates the ETI, Members and leading independent advisers' best judgements of energy service demands, technology performance and cost trajectories, and the availability of the UK's energy resources.

Key challenges:

Identifying affordable technology paths to the 2050 energy system Integrating opportunities across power, heat and transport.

- ◆ Identifying affordable technology paths to the 2050 energy system
- ◆ Integrating opportunities across power, heat and transport

Offshore Wind

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The UK has excellent wind resources with the potential to meet more than one-quarter of the UK's electricity demand. Offshore wind in particular, will be a major contributor towards achieving the UK's renewable energy targets in 2020 and beyond.

Key challenges:

- ◆ Affordable floating structures
- ◆ Maintenance
- ◆ Installation
- ◆ Turbine reliability and cost reduction

Marine

Power marine@eti.co.uk

Technologies that can harness the UK's substantial wave and tidal power resources could make an important contribution to reducing CO₂ emissions in the electricity sector. There are a number of promising system designs and innovations that could establish the UK as a market leader in this field.

Key challenges:

- ◆ Affordable, reliable and rapid installation technology
- ◆ Maintainability
- ◆ Performance predictability and modelling tools
- ◆ Affordable, reliable subsystems

Distributed Energy

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The opportunity to produce energy near to the final consumer is likely to play a role in addressing the UK's climate change targets.

Key challenges:

- ◆ Delivering overall system efficiency improvements
- ◆ Effective use of 'waste' heat
- ◆ Integration of low-carbon energy sources including biomass and waste streams

Buildings

Infrastructure, Heat, Power buildings@eti.co.uk

32% of UK energy is used for space and water heating in buildings. (44% of UK energy is used for all heat, including industrial processes & cooking). UK building stock is highly diverse with a relatively low turnover in building replenishment presenting a real challenge.

Key challenges:

- ◆ Energy management systems
- ◆ Insulation
- ◆ Integration of local energy generation including solar thermal water heating and heat pumps
- ◆ CO₂ mitigation from many small scale sources

Energy Storage and Distribution

Infrastructure, Power, Heat esd@eti.co.uk

The UK's transmission system and distribution networks will require new capacity to accommodate renewable sources of generation and substantial investment. There is scope for significant innovation in the way that energy is delivered to consumers.

Key challenges:

- ◆ Storage technologies to cover intermittent generation
- ◆ Heat networks
- ◆ Heat storage
- ◆ Gas storage including biogas
- ◆ Hydrogen – generation, storage and effective use

Carbon Capture and Storage (CCS)

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CCS has the potential to mitigate a significant proportion of emissions from industry and from fossil fuels in particular. Although the component technologies are generally proven, they have yet to be demonstrated at full scale and face barriers such as capture costs, regulations and standards, storage appraisal and monitoring. The UK has natural advantages in geological storage including depleted oil and gas reservoirs, and offshore saline aquifer formations.

Key challenges:

- ◆ Storage capacity – how much and where?
- ◆ Storage modelling and verification tools
- ◆ Transport system design and safety
- ◆ Separation system efficiency and cost reduction

Transport

Transport, Infrastructure transport@eti.co.uk

Transport accounts for almost 30% of UK CO₂ emissions. Cars, heavy goods vehicles, off road machinery, light vans and marine vessels are the major sources of emissions.

Key challenges:

- ◆ Increasing vehicle and overall system efficiency
- ◆ Drive train and sub-system efficiency
- ◆ Alternative fuels including biofuels and hydrogen
- ◆ Transport electrification including hybrids and battery electric vehicles

Bio Energy

Power bio@eti.co.uk

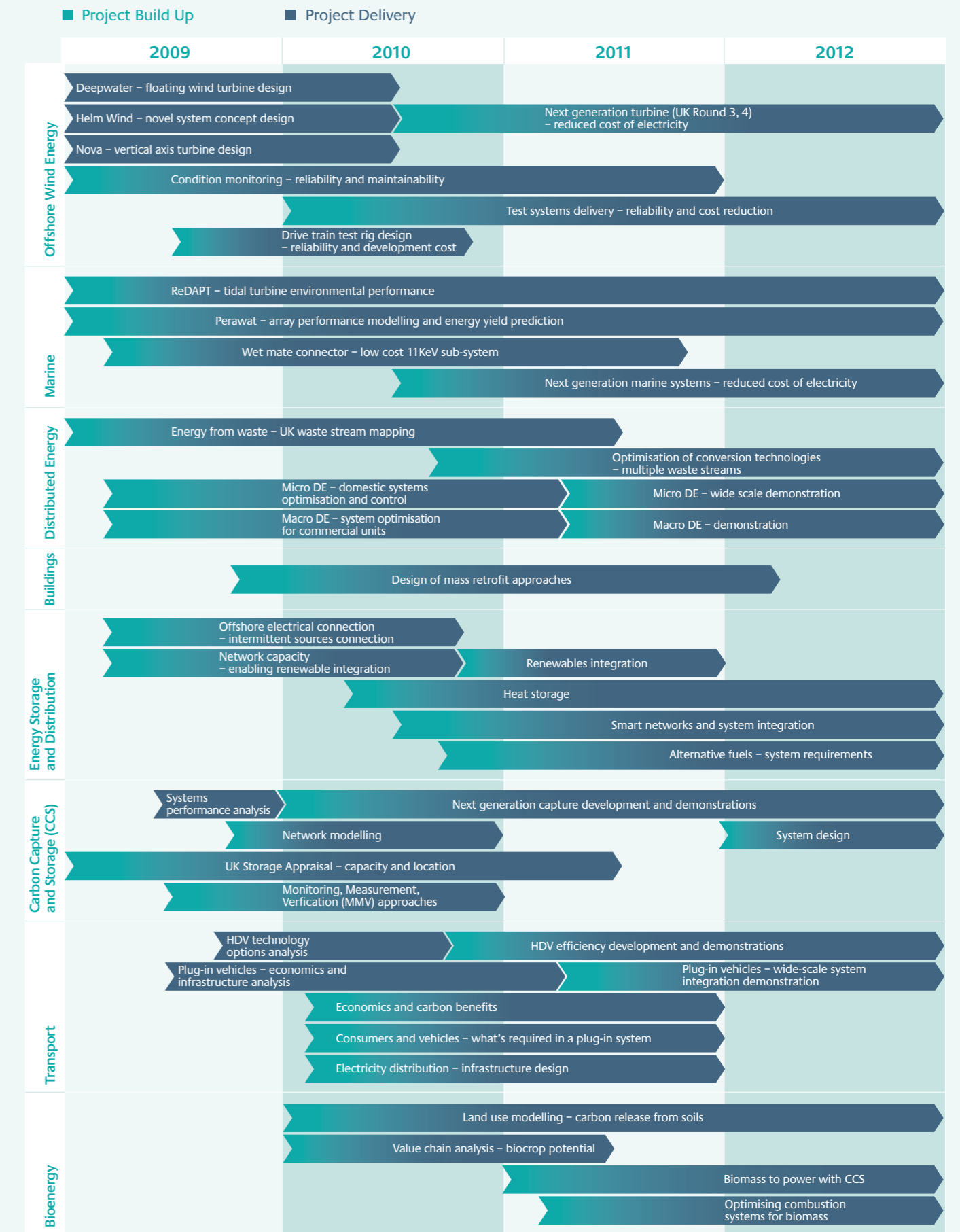
The UK has the potential to generate significant additional biomass. Some of this could be in the form of managed upland forestry in areas where the terrain is unsuitable for harvesting energy crops. Some could be additional energy crops on lower productivity land that is not required for food production. This would require that food production is further optimised to release some capacity from this land.

Key challenges:

- ◆ Soil chemistry effects and CO₂ release
- ◆ Value chain assessment from field to consumer
- ◆ Land-use competition and mono-culture considerations
- ◆ Plant growth efficiency and land management
- ◆ Societal impacts and benefits

Energy Technologies Institute Programme Plans

- ◆ The investment and technology plans below are flexible, and may change as commercial opportunities develop and the UK's needs evolve.
- ◆ The ETI works on large-scale, higher risk projects that may not succeed at the assessment points where indicated.
- ◆ The ETI refocuses at review points to ensure delivery on objectives.



'Defining future energy choices'