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Transitioning to a low carbon energy system: network challenges

All-Energy

Session: *Energy Systems*

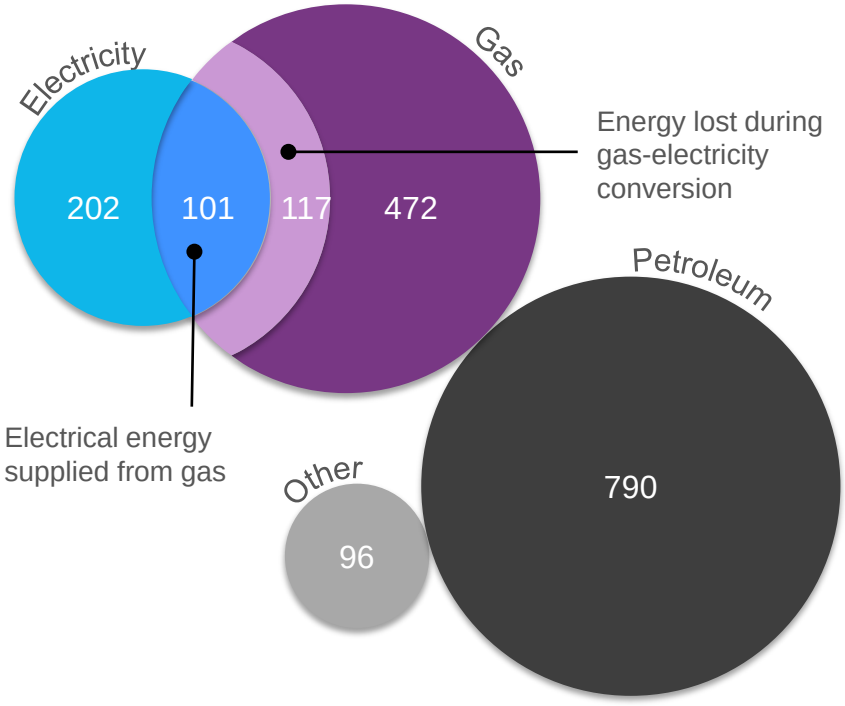
Wednesday 10th May 2017

Liam Lidstone

ETI10 TEN YEARS OF INNOVATION 2007 – 2017

Energy networks as a part of the energy system

- Energy networks are a core part of a functioning energy system – enabling the right amount and type of energy to be delivered to where and when it is needed
- Long term changes are expected for:
  - energy generation type and geographic location
  - demand patterns and energy use requirements
- The UK's energy network infrastructure will need to evolve to manage these fundamental long term changes



Energy carried by networks in the UK (TWh/yr)

Estimated from data published by DECC (2014)

Energy system scenarios

Clockwork *– national level, coordinated planning for the energy system*

- Large scale investments in centralised thermal power generation (nuclear and CCS) alongside deployment of renewable generation
- Increased electrification of heat and transport
- Deployment of large scale heat networks
- A phased shut-down of the local gas distribution network
- Hydrogen used as a fuel for generating electricity at peak times
- Gas used for industrial process heating in conjunction with CCS

Patchwork *– locally led development and implementation of energy strategies with strong societal engagement*

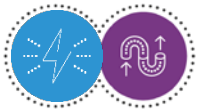
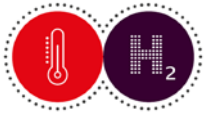
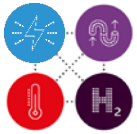
- A prominent role for renewable generation (large scale and distributed) with a continued role for large thermal power generation
- Increased electrification of heat and transport.
- In different areas, the gas distribution network is either:
  - decommissioned
  - retained as backup to heat pumps
  - utilises significantly decarbonised gas supply
- Small and medium scale heat networks are deployed in some towns and cities

Available at:
http://www.eti.co.uk/insights/options-choices-actions-uk-scenarios-for-a-low-carbon-energy-system/

Or search for: ***ETI scenarios***

ESME
Energy System Modelling Environment

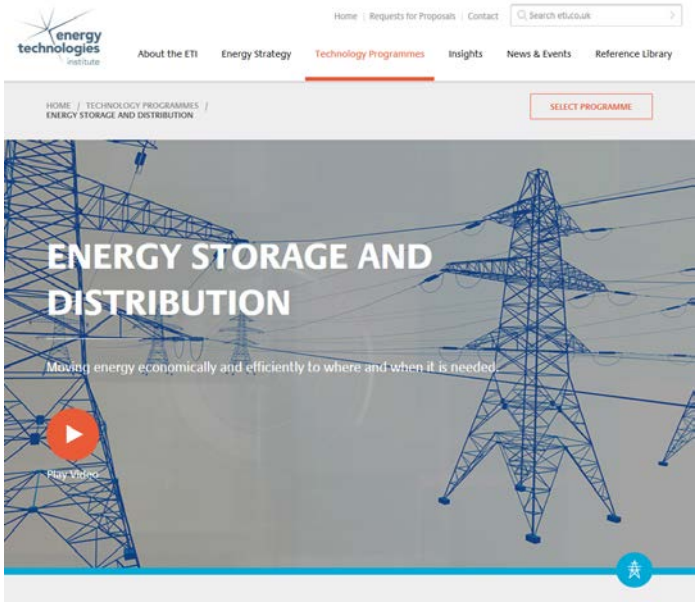
Network transition challenges

Adapting and enhancing existing networks	Creating efficient and effective new networks	Integrating networks to optimise performance across energy vectors
		

Electricity	Gas	Heat	Hydrogen
Handling increased capacity	Decommissioning (especially within the distribution network)	Cost reduction and technology advancement	Meeting the needs of different sectors
Delivering new connections	Operating at much lower utilisation	Supply-chain scale-up	Scale-up
Delivering new connections	Integrating low carbon fuels at significant levels	Adoption	

Evidence base

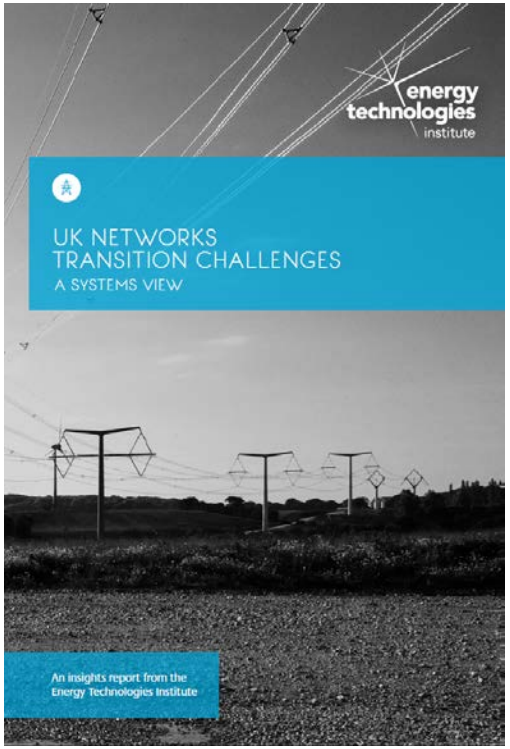
The ETI has invested **£28m** in **20** projects in the ***Energy Storage and Distribution*** programme

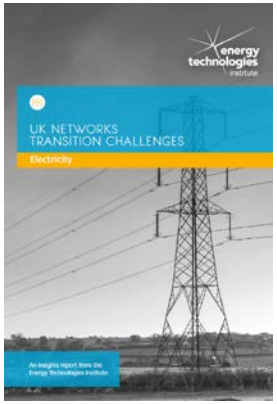


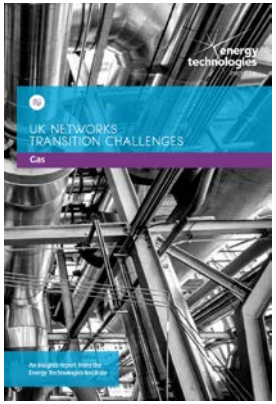
http://www.eti.co.uk/programmes/energy-storage-distribution

- Fault current limiter development
- Offshore Connection
- Infrastructure Cost Calculator
- Heat Infrastructure Development
- futurenetworks: Multi-Vector Integration
- Storage and Flexibility Modelling
- futurenetworks: Transition Analysis
- Smart Systems and Heat (programme)
- EnergyPath Networks
- Electricity Distribution and Intelligent Infrastructure
- Consumers, Vehicles and Energy Integration
- Salt Cavern Appraisal for Hydrogen and Gas Storage
- CCS Next Generation Gas Capture Technology
- Gas Well to Motion
- Macro Distributed Energy
- Power Plant Siting Study
- System Requirements for Alternative Nuclear Technologies
- Enabling Efficient Low Carbon Networks
- Biomass Systems Value Chain Modelling

Available on the ETI's website

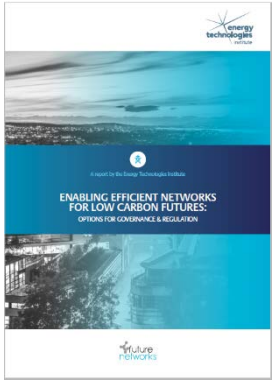






Available at: http://www.eti.co.uk/insights/uk-network-transition-challenges-a-system-view

Or search for: ***ETI network transitions*** or ***network transition challenges***



Additional ETI Insights Papers

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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