

# An Assessment Of The Viability Of SMRs For The UK

A presentation to UKTI Programme

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# Introduction to the ETI

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- The Energy Technologies Institute (ETI) is a public private partnership between global industries and UK Government

## Delivering...

- Targeted development, demonstration and de-risking of new technologies for affordable and secure energy
- Shared risk

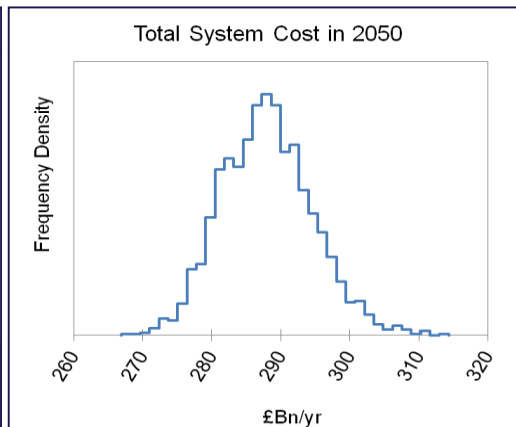
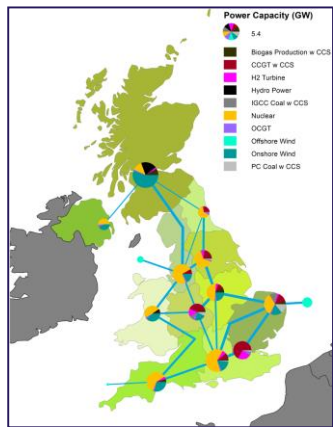
## ETI members



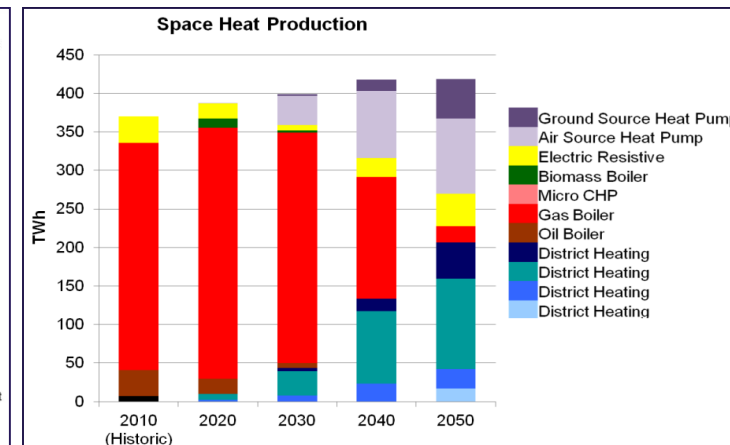
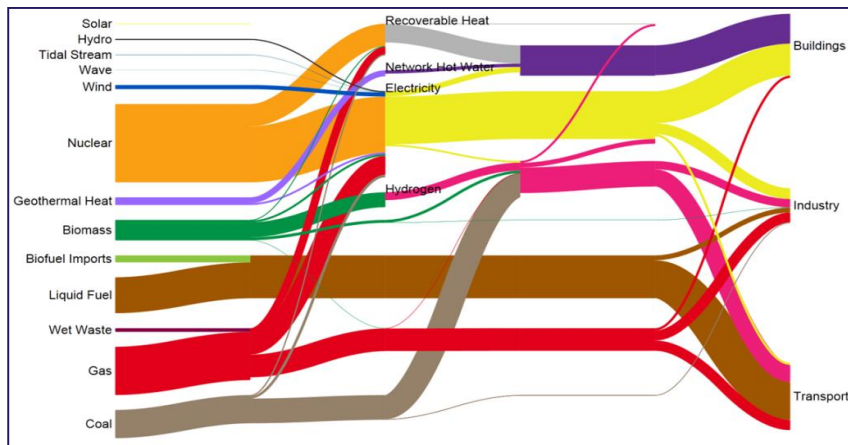
## ETI programme associate



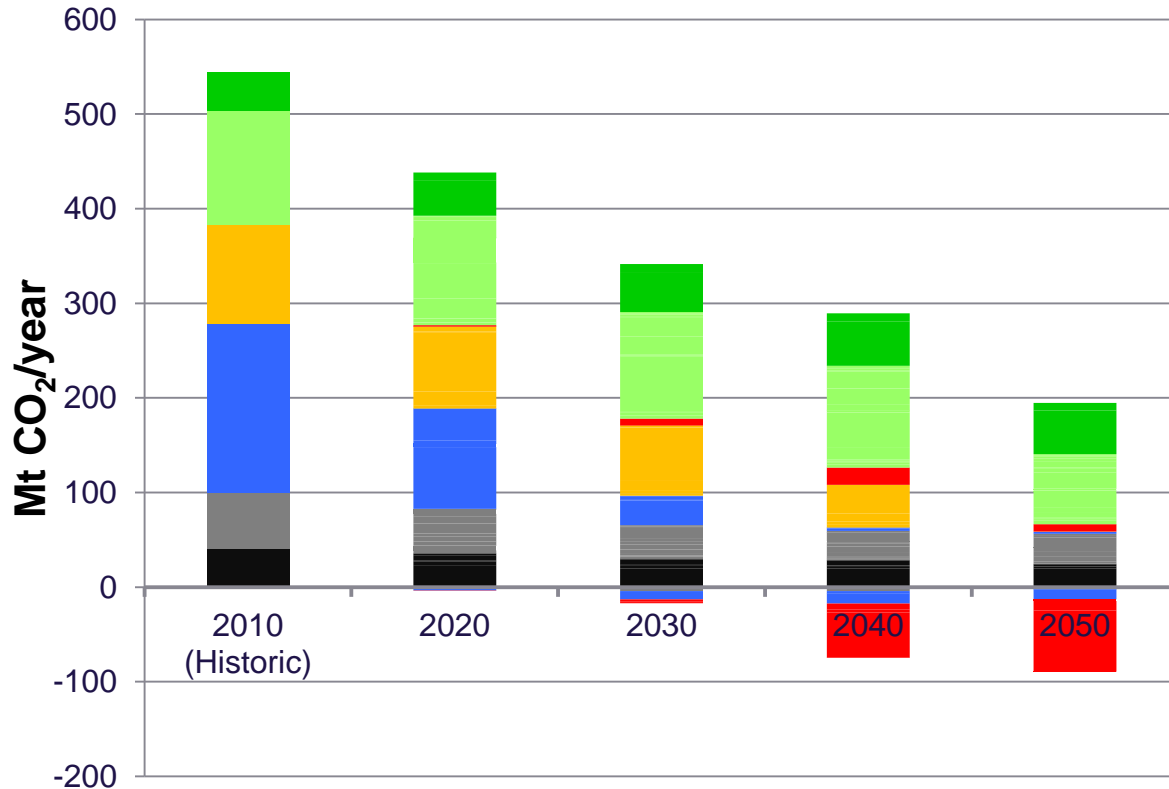
# Typical ETI Modelling System Outputs



Energy  
System  
Modelling  
Environment



# Net UK CO<sub>2</sub> Emissions



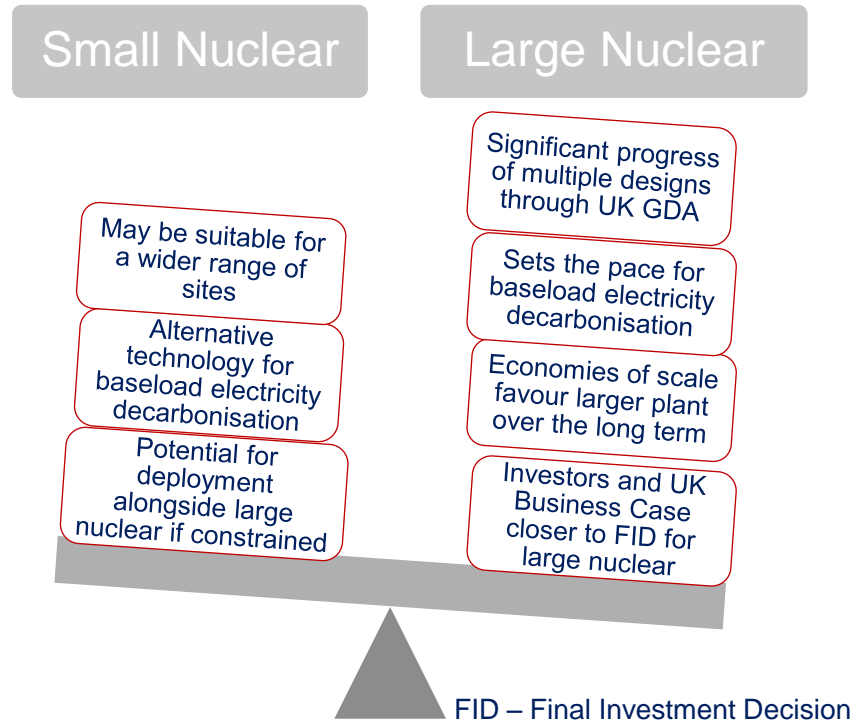
## Notes:

- Usual sequence in the least-cost system design is for the power sector to decarbonise first, followed by heat and then transport sectors
- “Biocredits” includes some pure accounting measures, as well as genuine negative emissions from biomass CCS.

# Can Small Modular Reactors (SMRs) Find A Niche?

## For SMRs to be deployed in UK:

- technology development to be completed
- range of approvals and consents to be secured
- sufficient public acceptance of technology deployment at expected locations against either knowledge or ignorance of alternatives
- deployment economically attractive to
  - reactor vendors
  - utilities and investors
  - consumers & taxpayers



**Realistic objective for SMRs to be economically attractive to all stakeholders**

# Can Small Nuclear find a market niche in the UK?

## Single Revenue Stream



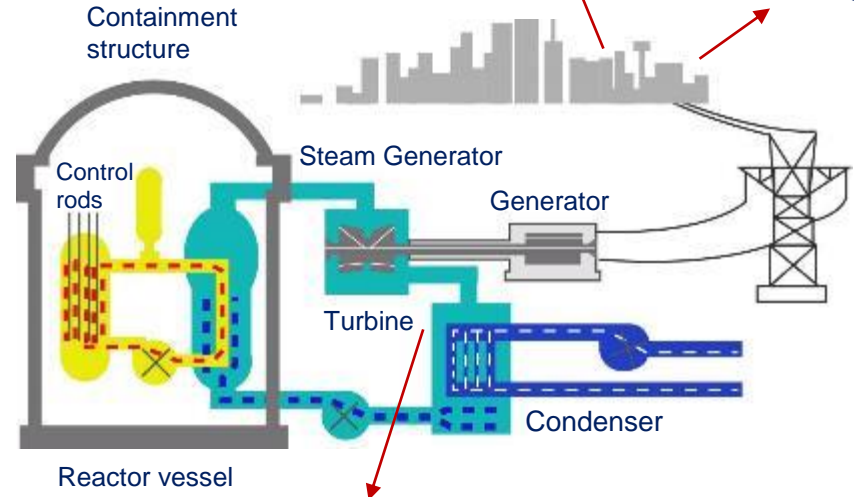
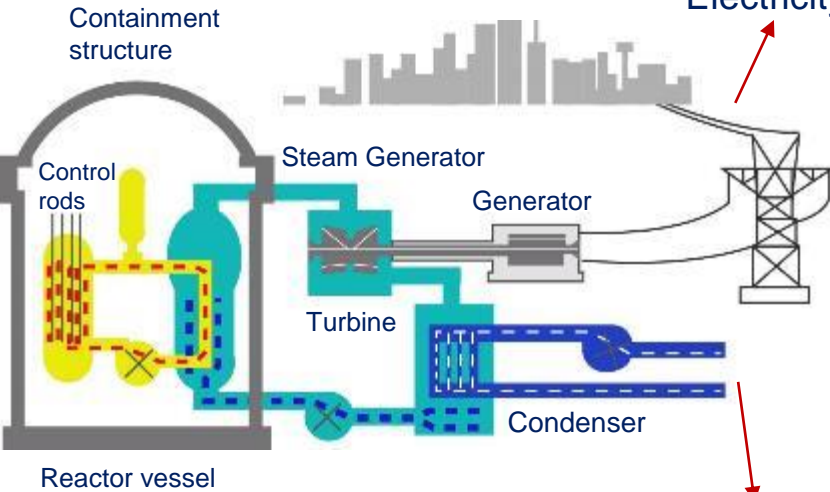
## Multiple Revenue Streams

1. Baseload Electricity

1. Baseload Electricity + 2. Variable Electricity To Aid Grid Balancing

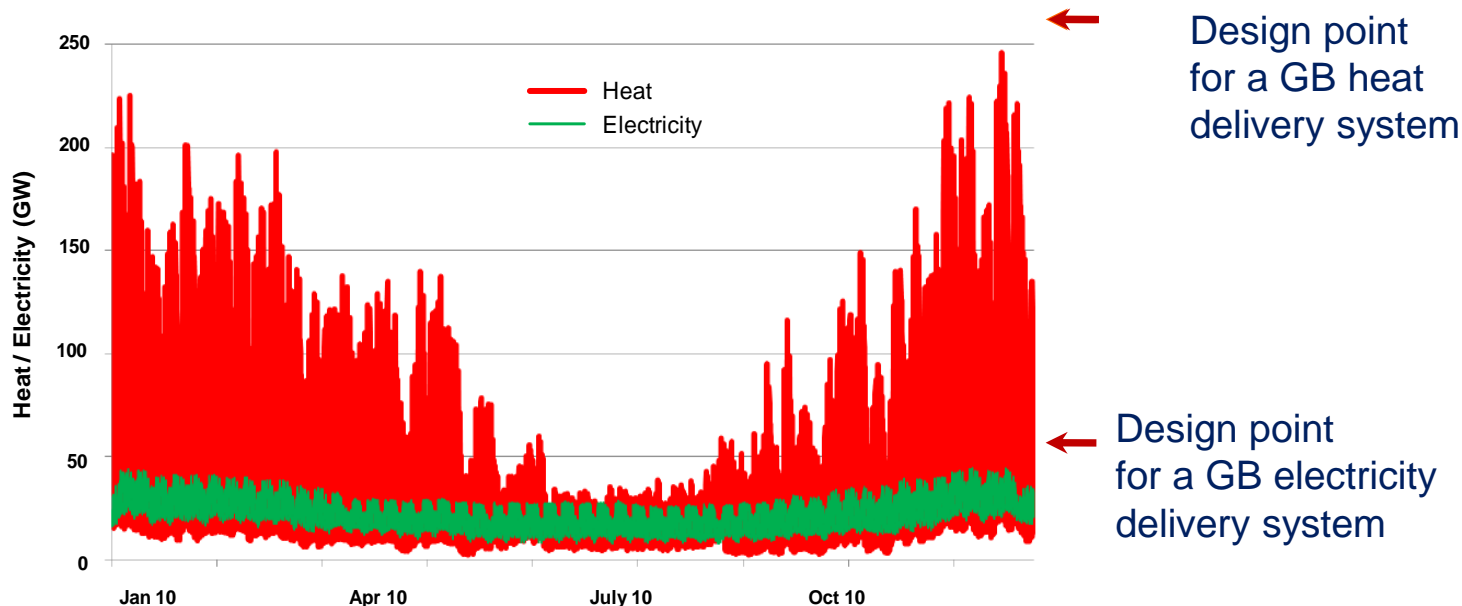
Waste Heat Rejected To The Environment

+ 3. Heat Recovery To Energise District Heating Systems



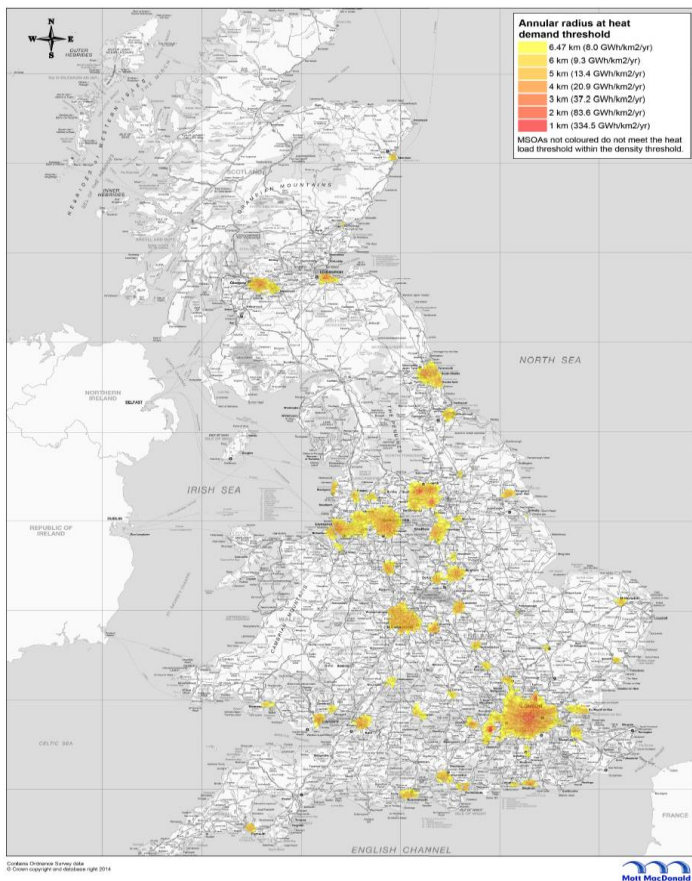
# Decarbonising Heat Is Challenging In The UK

## Heat demand variability in 2010 – Unattractive to electrify it all



GB 2010 heat and electricity hourly demand variability - commercial & domestic buildings  
 R. Sansom, Imperial College

# Potential Future Heat Networks IN GB



- A range of solutions will be involved in de-carbonising heat
- District heating is a proven technology and may be cost effective as part of the solution
- Almost 50GB urban conurbations with sufficient heat load to support heat networks which could be energised by SMR's
- Would theoretically require 22.3GWe CHP SMR capability
- Deployment of district heating driven by decarbonisation, not SMRs



# Conclusions From Published ETI Insights

10 YEARS  
TO PREPARE  
for a low  
carbon transition

Nuclear is part of the mix in an affordable low carbon transition



potential roles for both large nuclear and small modular reactors (SMRs)

Large reactors are best suited for baseload electricity production

upper capacity limit  
site availability of

35 GWe



Actual deployment will be influenced by a number of factors and could be lower

Future nuclear technologies will only be deployed if there is a market need



and these technologies provide the most cost effective solution



SMRs could fulfil an additional role in a UK low carbon energy system by delivering combined heat and power



a major contribution to the decarbonisation of energy use in buildings



using district heating infrastructure

SMRs offer more flexibility with deployment locations that could deliver heat into cities via hot water pipelines up to

30 km  
in length



Flexible power delivery likely to be required

Assessed deployment capacity of at least

21 GWe

A decision is required now regarding

10 years

of enabling activities for a first commercially operated UK SMR with earliest operational date around

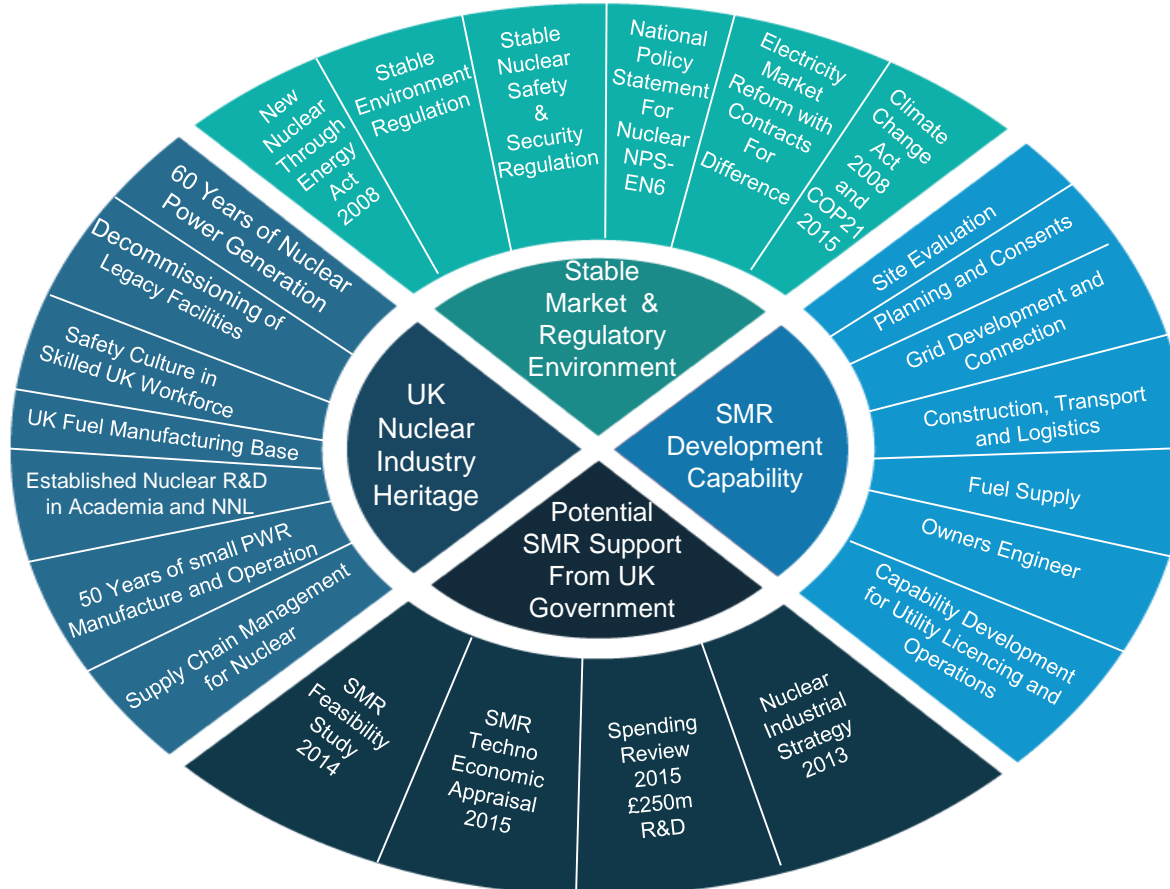
2030

A strategic approach to reactor siting together with public consultation



will be important for both large nuclear and SMRs

# UK Capability To Support SMR Development



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