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## Innovation: A key enabler? Or a distraction from Action?

Innovation and the path towards decarbonisation

Jo Coleman, Strategy Director

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# Many different viewpoints in an uncertain world

Systems thinking and shared, robust evidence base is critical

## Strategic

- 2050 decarbonisation targets
- Security of supply (diversity of fuel supply and power generation capacity margin)
- Consumer attitudes, needs and engagement

## System

- = power + heat + transport + infrastructures
- Infrastructure base is aging and unfit for future purpose
- Optimisation and effective linkage cuts costs, increases security and can increase consumer engagement

## Common Evidence base

## Policy

- ‘Market decides’
- EMR delivery identifies direction
  - LCF capacity - Contracts for Difference, Capacity payments, Feed in Tariffs, etc
- Innovation support, Low Carbon Network fund, ...

## Decisions and Actions

- in an uncertain world ...
- Focus on 6 priorities
- Recognise risks, mitigations and implications
- Prepare for the future - with technology, regulation, incentives



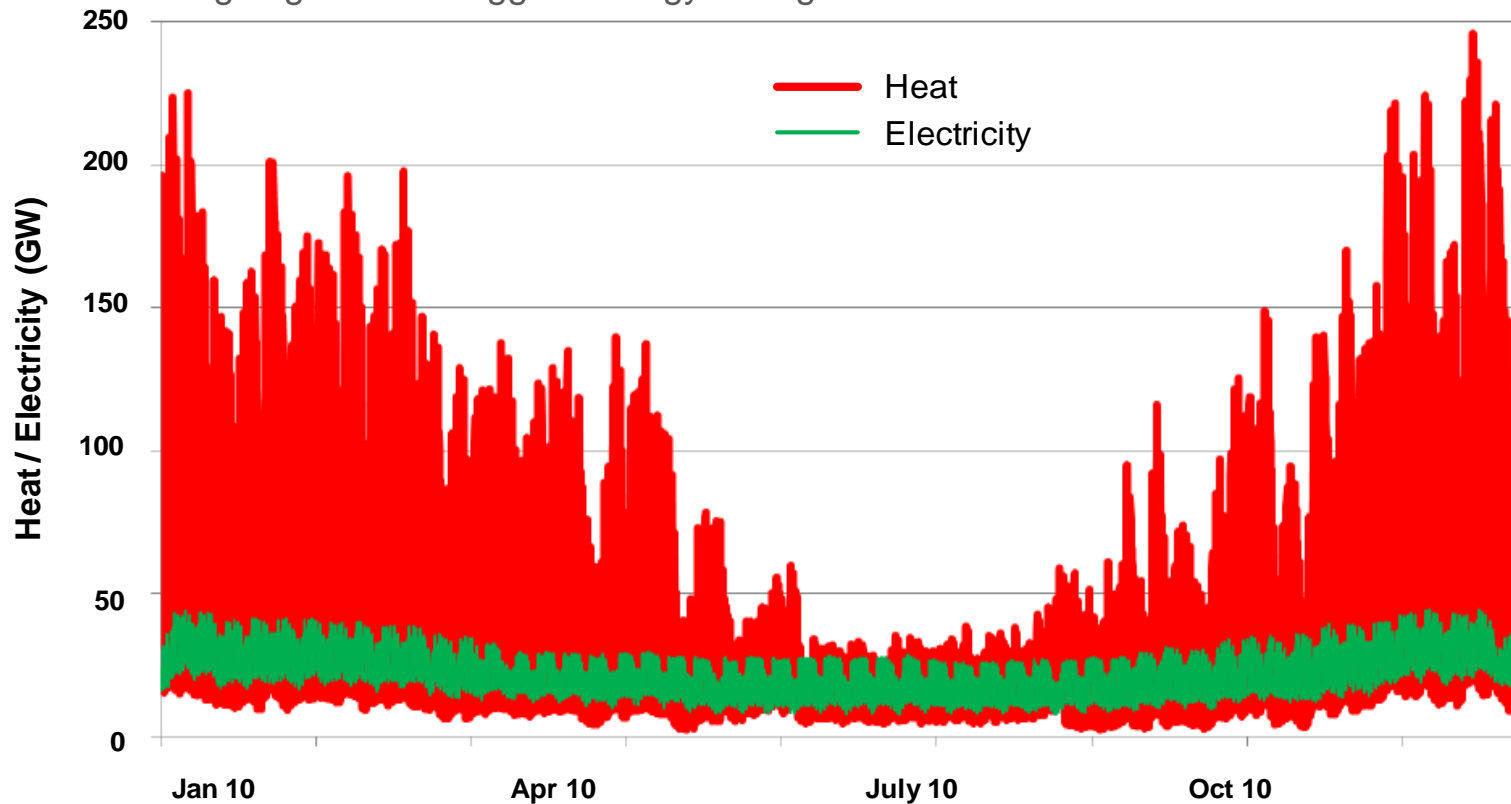
# Decarbonisation pathway in the context of...

- Increasing demand to 2050
  - Population: 65 to 77 million
  - Vehicles: 28 to 35-43 million cars
  - Housing: 26 to 38 million houses, 90% of today's housing will remain in 2050
- Action to date
  - Beginning to decarbonise power sector
  - Increasing energy efficiency (especially in cars)
- UK energy system is a unique and complex set of interlinked assets and infrastructure
  - Ageing power plants need replacing
  - Significant wind (and marine) energy potential
  - Significant offshore CO<sub>2</sub> storage potential
  - Significant opportunity for UK biomass
  - Reasonable public support for all low carbon options
  - But, poor housing stock and very significant heating challenge



# Decarbonising heat is our biggest challenge

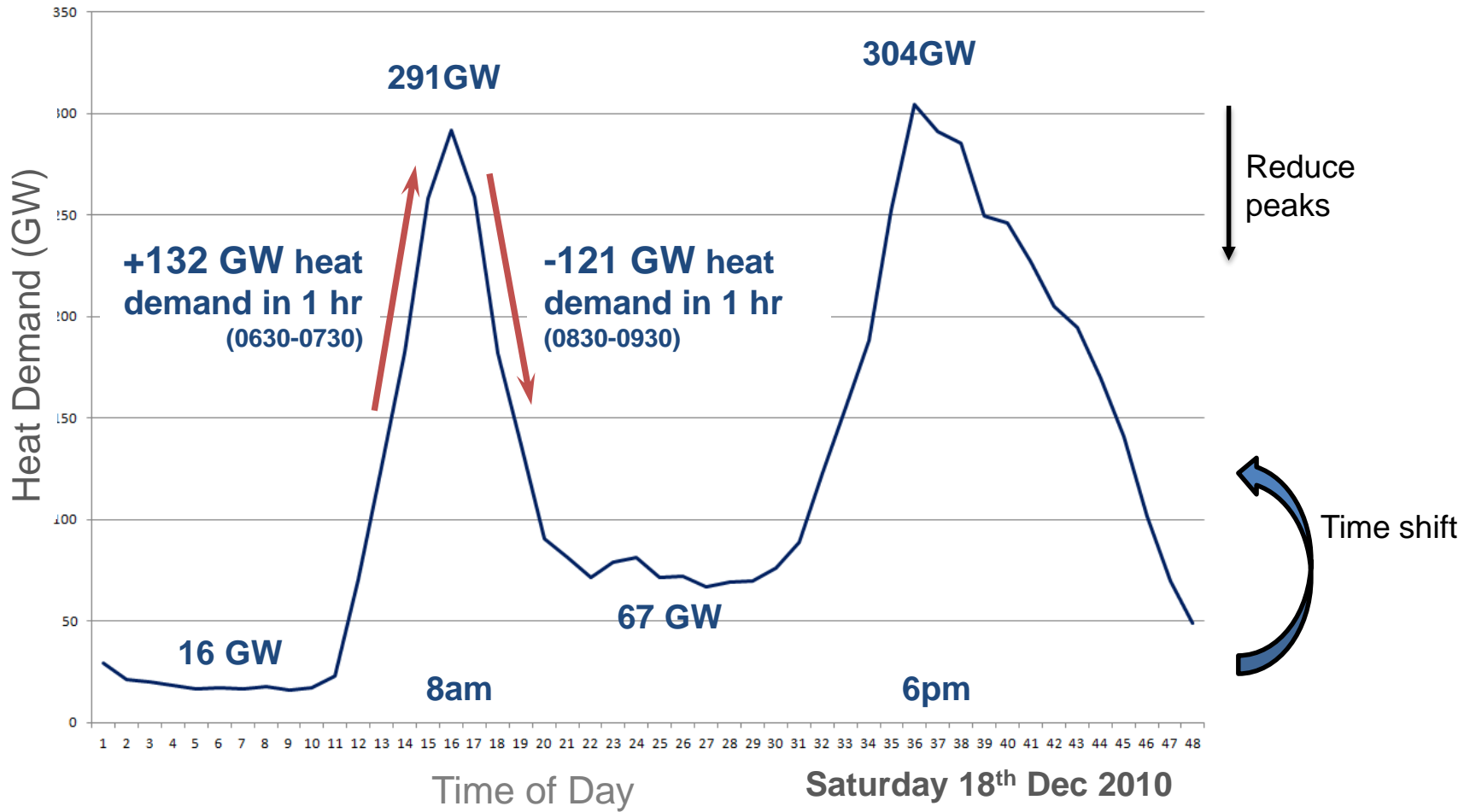
The gas grid is our biggest energy storage device



GB 2010 heat and electricity hourly demand variability - commercial & domestic



# Managing peaks & system flexibility





# A route to deliver 80% reduction in CO<sub>2</sub>

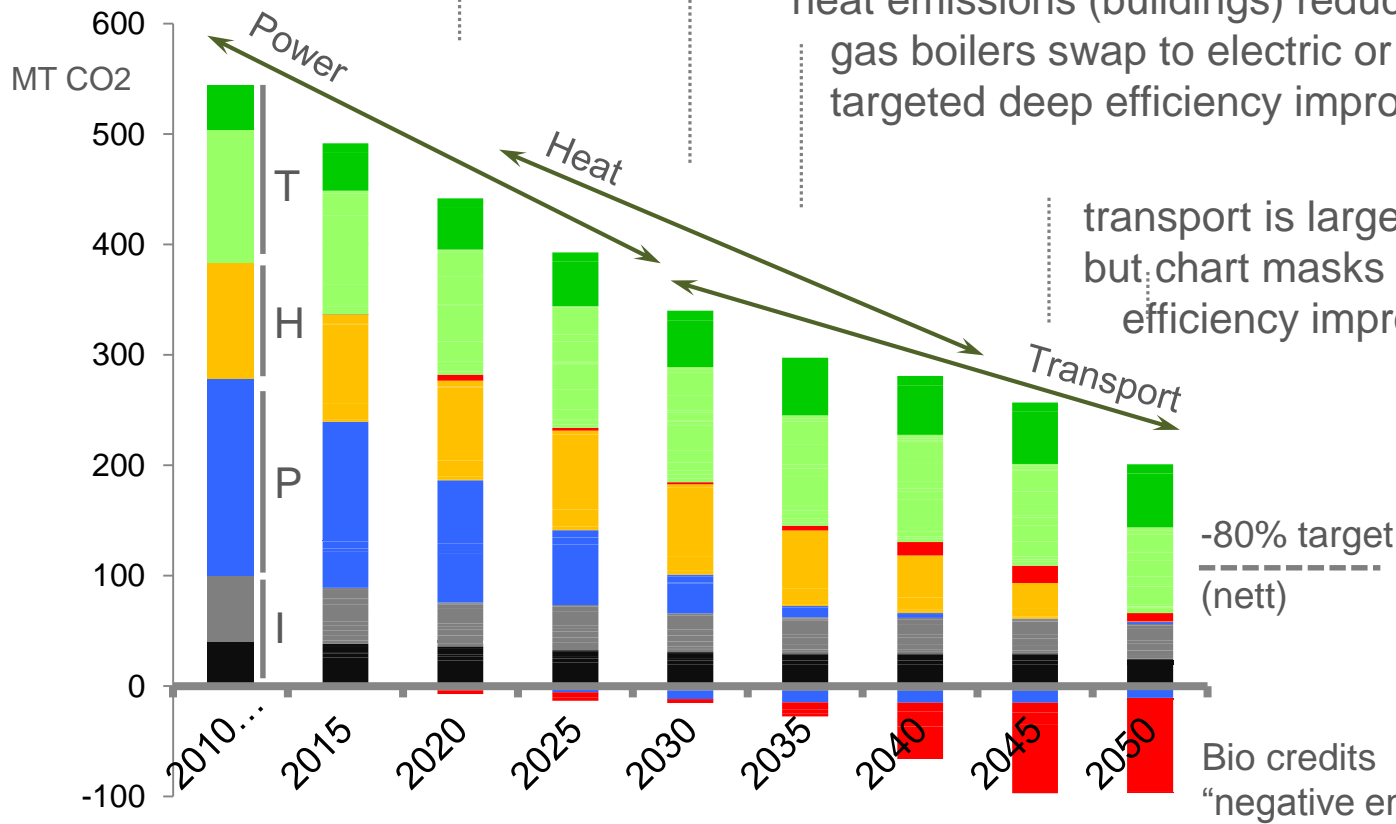
Power now, heat next, transport gradual – cost optimal

CCS and bioenergy demos operating

negative emissions through bioenergy + CCS

heat emissions (buildings) reducing as domestic gas boilers swap to electric or district heating, targeted deep efficiency improvements

transport is largest CO<sub>2</sub> emitter but chart masks significant efficiency improvements

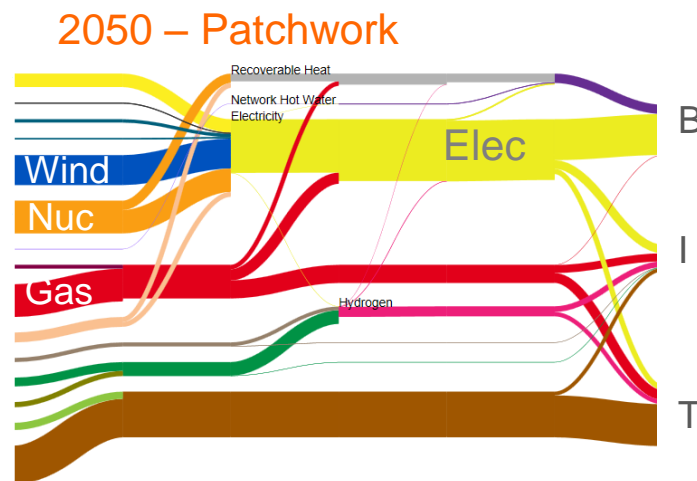
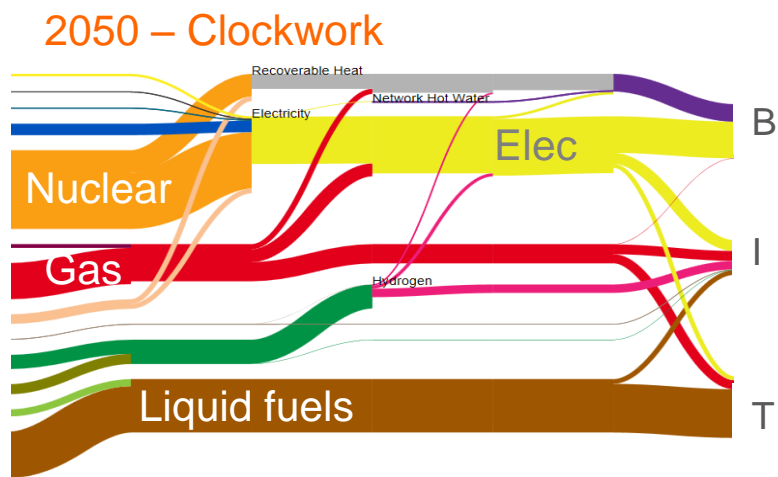
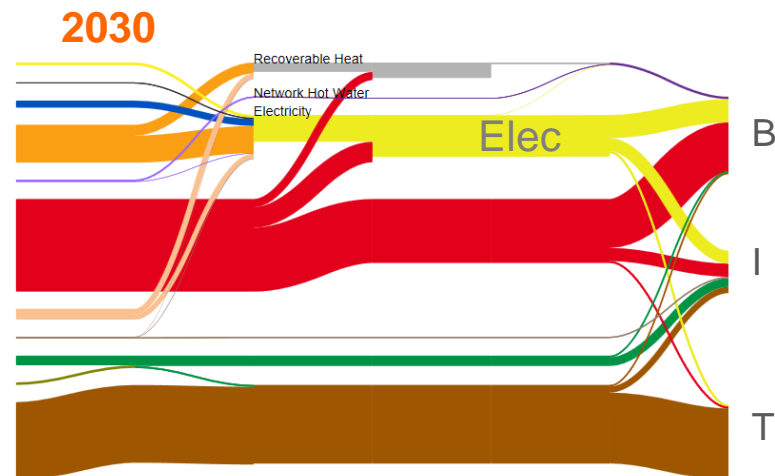
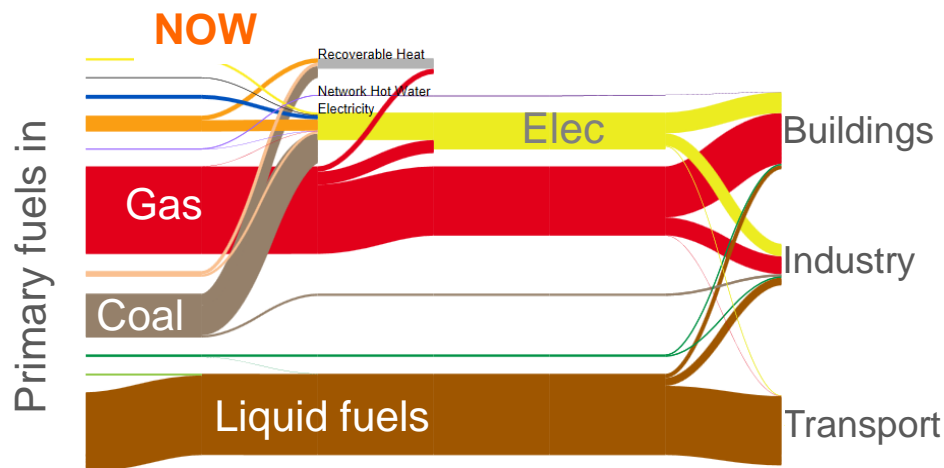


Bio credits  
"negative emissions"





# System change starts slow then accelerates





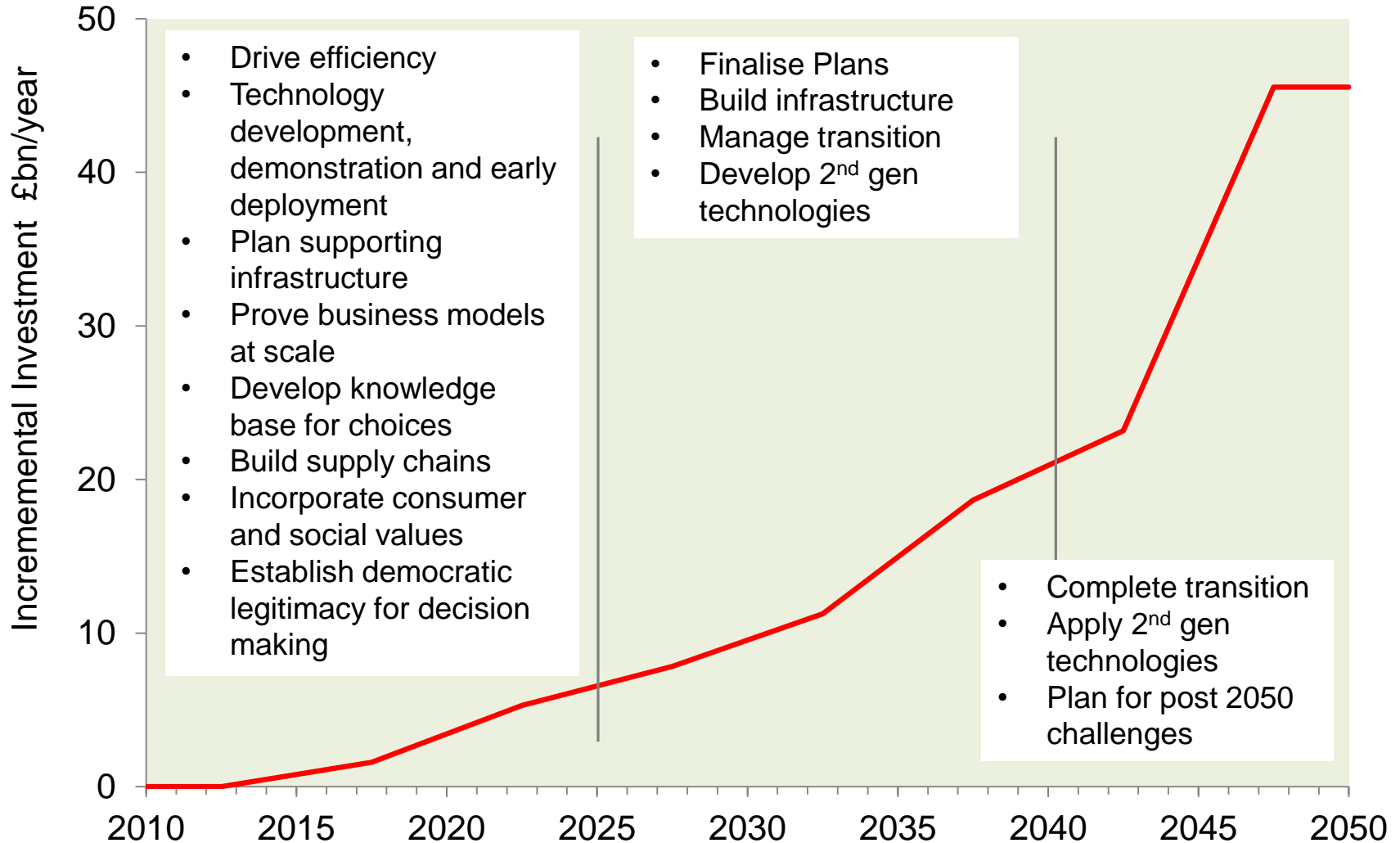


# The next decade is critical in preparing for transition

- The UK transition is affordable (~1% of GDP) and achievable, 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 low carbon heat for buildings, Nuclear, CCS, Bio, Offshore Wind, Gases (NG, H<sub>2</sub>, SNG.....)
  - Develop and prove options, prepare for widescale deployment
- 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



# Preparing over the next decade is a no regrets strategy





# What role for innovation?

- Deploy 'Known but underdeveloped' technologies
- Drive down cost, increase performance and integrate into our energy system
  - Regulate (eg cars)
  - Market (eg wind turbines)
  - Target innovation interventions (eg floating wind)
  - Supply chain & delivery skills (eg heat solutions)
- Business models, policy mechanisms, consumer propositions and community engagement activities
- Silver bullets are rare and unpredictable



# Building a shared evidence base...

## ETI Firsts

Building the world's largest wind turbine blades  
30% lighter with 5% more energy yield



Offshore Wind

Vehicle designs  
for 34% fuel  
efficiency  
improvement  
across UK HDV  
fleet



Transport

Largest UK  
investigation  
into soil carbon  
effects following  
land use  
transitions



Bloenergy



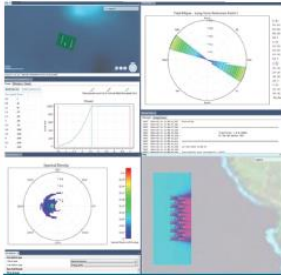
Offshore Wind

MOU to incorporate up to four  
ReDAPT turbines within  
Sound of Islay tidal array



Marine

Validated  
software tools  
predicting  
energy yield of  
tidal and wave  
sites - in use on  
current UK  
projects



Marine

15% cost  
reduction on  
offshore wind  
through floating  
platform design



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



For all general enquiries  
telephone the ETI on  
01509 202020.



For more information  
about the ETI visit  
[www.eti.co.uk](http://www.eti.co.uk)



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