

UK Research Frameworks and Tools

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Overview

- ☐ Global Challenge
- ☐ Practical Mitigation Options

Global research – the AVOID Programme



Article 2...stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system...

- What levels of climate change are potentially dangerous?
- What emissions pathways will avoid “dangerous” climate change?
- What is the technical and economic feasibility of such pathways?

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What did AVOID look like?



- A multi-disciplinary research programme
- Total cost approximately £2.5 million since 2009
- A Consortium led by the MO Hadley Centre with:
 - Walker Institute (University of Reading)
 - Tyndall Centre (University of East Anglia)
 - Grantham Institute (Imperial College, London)
- Over 120 researchers from over 40 institutes and organisations
- 26 peer-reviewed papers published or submitted

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- **The impact on people, infrastructure and natural systems** in a future with continuing high levels of greenhouse gas emissions is likely to be **large**,
- Benefits of mitigation can be quantified:
 - A **sizeable fraction of impacts can be avoided**
 - For those impacts not avoided there is a benefit of **extra time to adapt**
- **Limiting warming to 2 ° C is possible from a climate system perspective** – it requires early peaking of emissions and rapid emissions reduction. It may need negative emission source
- **Limiting warming to 2 ° C appears extremely challenging from a technological, economic and political perspective**
- However, at **national levels credible low carbon transition pathways can be constructed**

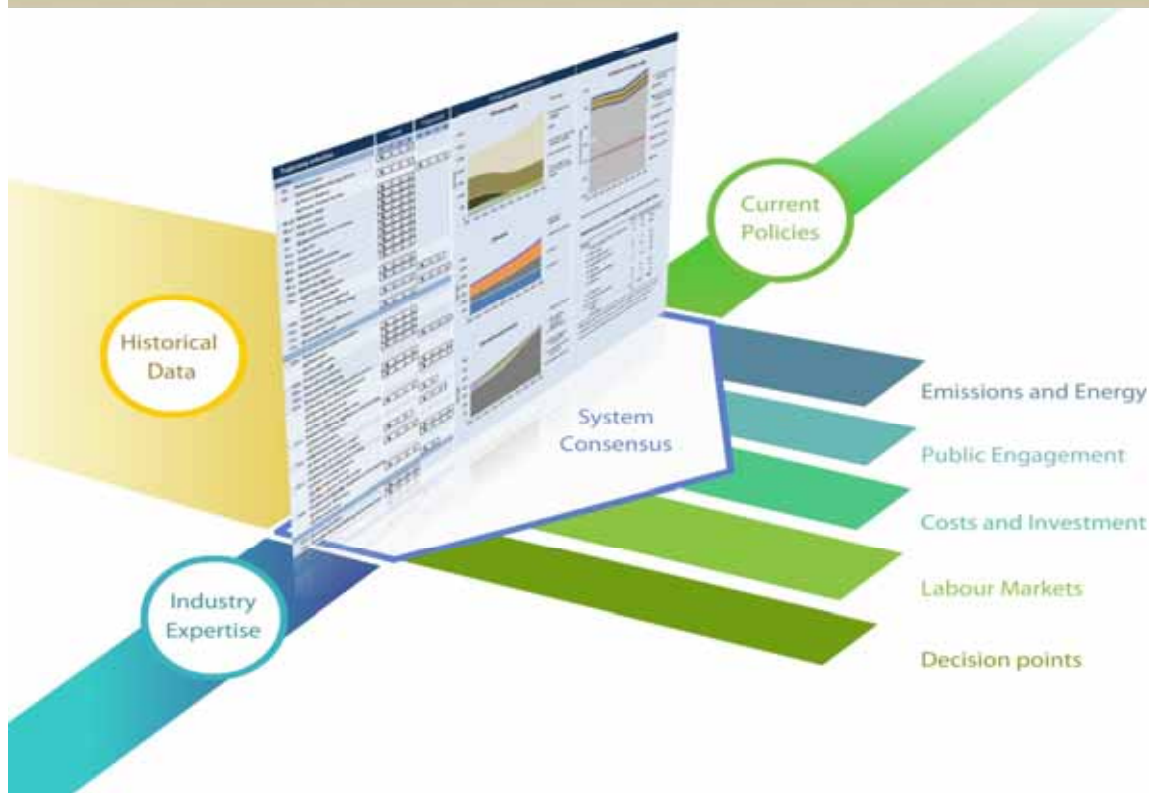
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Some key issues for Phase 2

- Limits to global rate of de-carbonisation?
- Feasibility of negative emission technology?
- Bio-energy and impact on LULUCF
- Linkage between energy, water and food

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The 2050 Calculator - a platform for an 'energy literate debate'



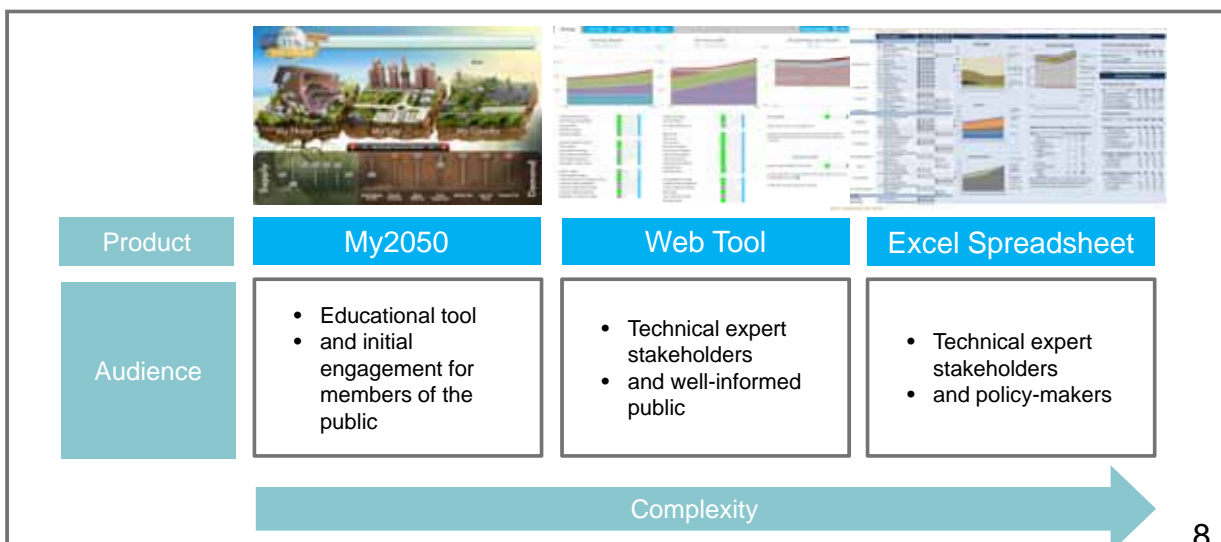
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What is the 2050 Calculator?

2050 Analysis

- **All energy and all GhG emissions** options calculated in an easy-to-use and open-access model
- Understanding **what can 'happen on the ground'** from an engineering and land-use perspective
- Aim is to better understand **trade-offs, impacts and scales of change in a holistic way**

2050 UK Outputs



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How 2050 Calculator impacted our policy debate and formulation?



- Understanding of **what is plausible technical potential for each sector**, e.g Wave *vis-à-vis* Wind, Photo-voltaic *vis-à-vis* Concentrated Solar, Transport electrification *vis-à-vis* Home insulation.
- Resulting in seeing what are the big **fish and the minnows**
- **Seeing the interactions:**
 - How do transport and industry choices impact on electricity demand?
 - What happens if we rule out nuclear.....or have high nuclear ambition?
 - Scale of demand reduction through industry greenness growth?
- **Seeing impacts of choices:**
 - Importance of bioenergy, but see its **impact on land use**.
- **Speeded up debates** within government, with parliamentarians, stakeholders and general public
- **Government analysis for 2020/2030/2040 individual sectors** such as decarbonisation of grid target, role of gas, energy security impacts etc.

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2050 Calculator can assist addressing international energy, climate and growth challenges



Problem	How the 2050 Calculator can assist	Offer
<ul style="list-style-type: none"> • Multifaceted challenges of energy demand growth, infrastructure, resource scarcity, energy security etc. • Complex analysis hard to access • Weak consensus as too sector-focussed (e.g. 'departmentalisation') • Low level of decision-makers' engagement due to complexity • Low comprehension of national scale of challenge 	<ul style="list-style-type: none"> • Showing correlation of energy choices on costs, land use, security, water, air quality etc • All relevant data on one page and easy-to-use • Each sector expert view is considered within overall picture – expert buy-in • 2050 webtool and My2050 used in ministerial, parliament and public encounters • A long term plan which 'adds-up' 	<ul style="list-style-type: none"> • All 2050 software and analysis open-access and free • Collaboration offer of 2050 international community of analysts (such as China 2050 team) • UK 2050 team dedicated to work with others to improve and adapt tool for other circumstances • International Climate Fund support for national 2050 teams

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Two major research programmes of relevance to the LCS:

- AVOID – Global, long term, flexible and modular, policy focussed
 - Can engage the academic community
- 2050 Calculator – focussed on the practical ways to reduce emissions – excellent policy and public engagement tool – can be adapted for different countries.