



Avoiding Dangerous Climate change – The AVOID Programme

AVOID is funded by the Department of Energy and Climate Change and the Department for Environment, Food and Rural Affairs



- Need for policy-relevant research results that can be used by UK negotiators
- Need for cross-disciplinary work that brings together climate science, economic and social aspects of mitigation, impacts and adaptation
- DECC-led programme that brings focus to the Government effort on avoiding dangerous climate change



The AVOID programme

Providing key advice to UK Government on avoiding dangerous climate change

Jason Lowe

Met Office
Chief Scientist for AVOID

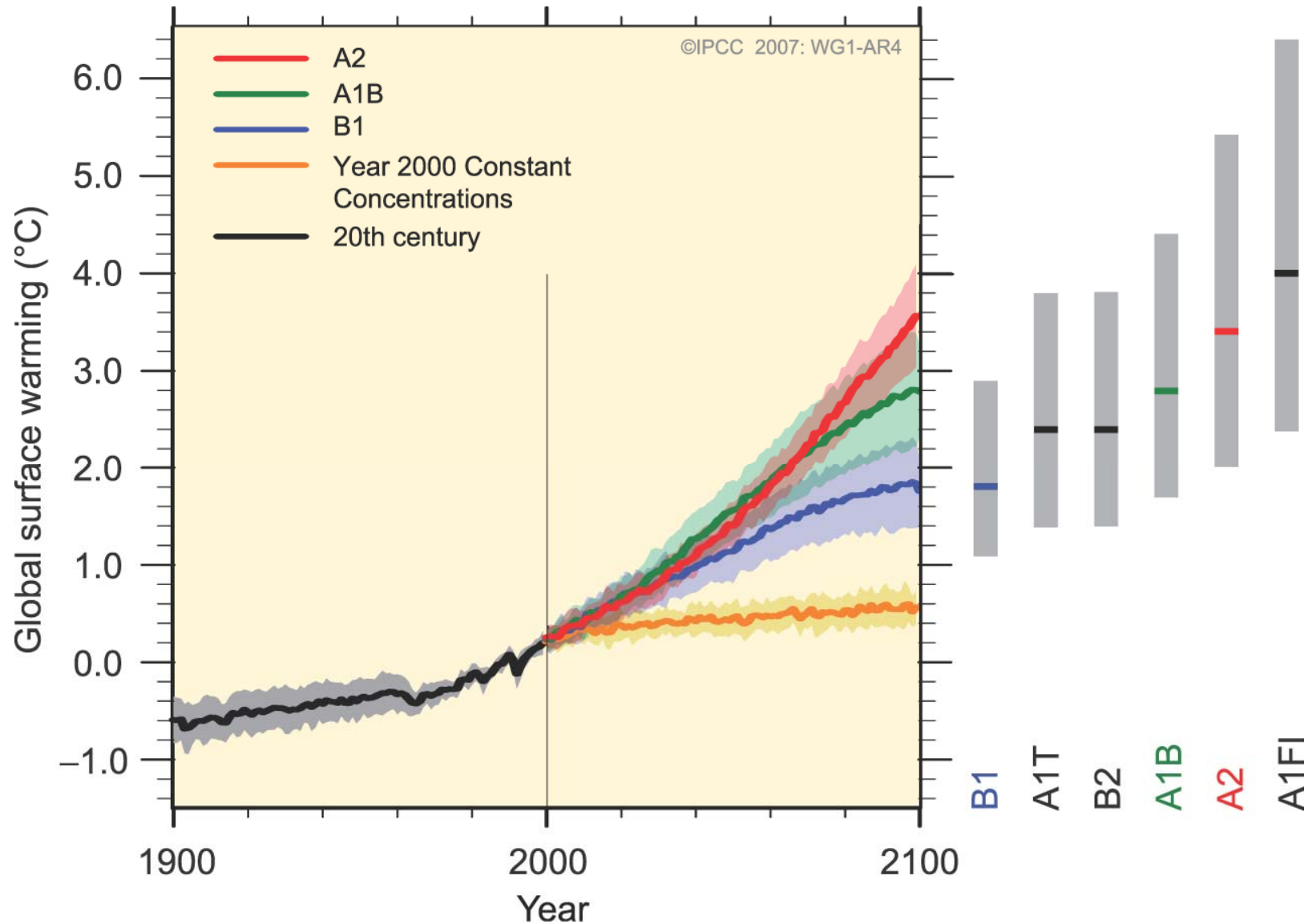
www.avoid.uk.net

AVOID Programme Launch – 26 February 2009

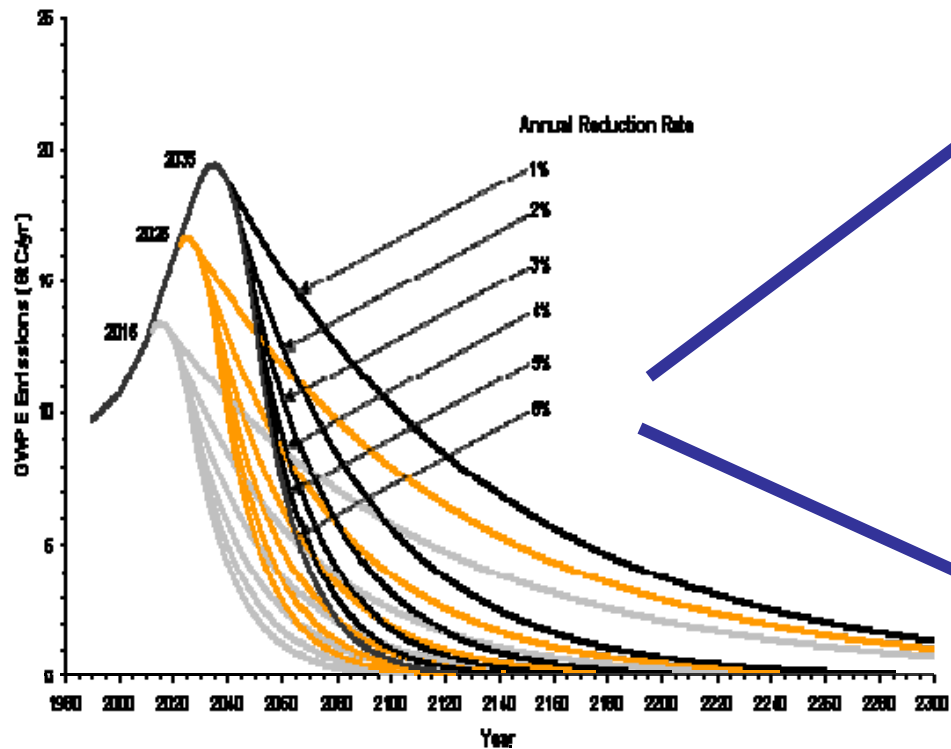
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Without mitigation global warming may reach more than 6°C



AVOID will quantify and communicate the avoided impacts and residual impacts for a range of mitigation policies



Emissions



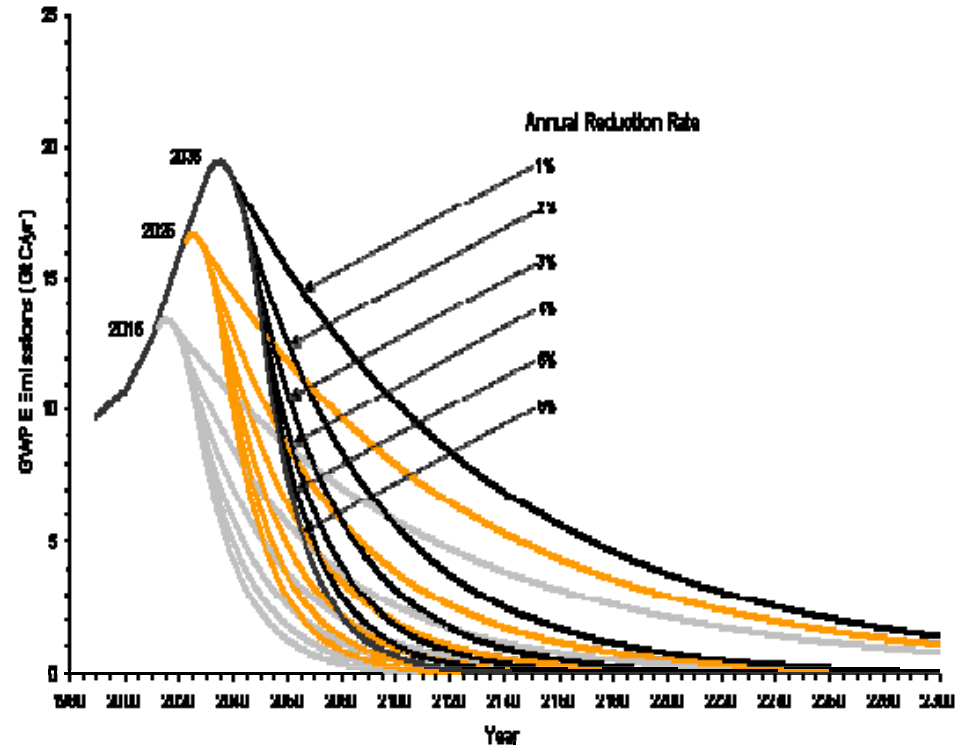
AVOID will also consider how emissions reductions might be achieved



Costs



Technology



Emissions



AVOID will provide:

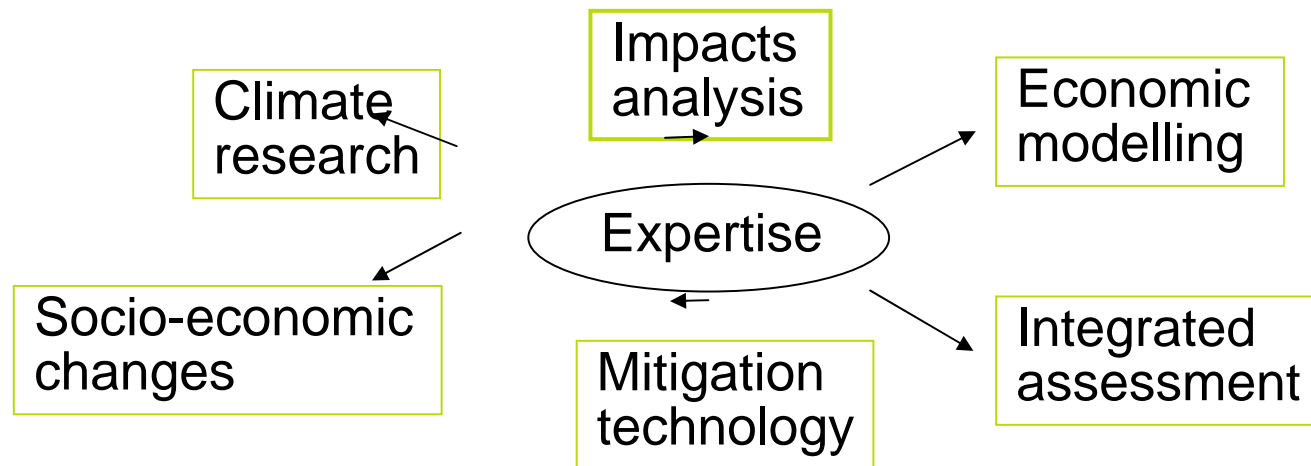
- **Tailored** policy relevant evidence and research **across** Government
- Core research for understanding dangerous climate change and mitigation
- A framework to bring together climate science and socio-economic research

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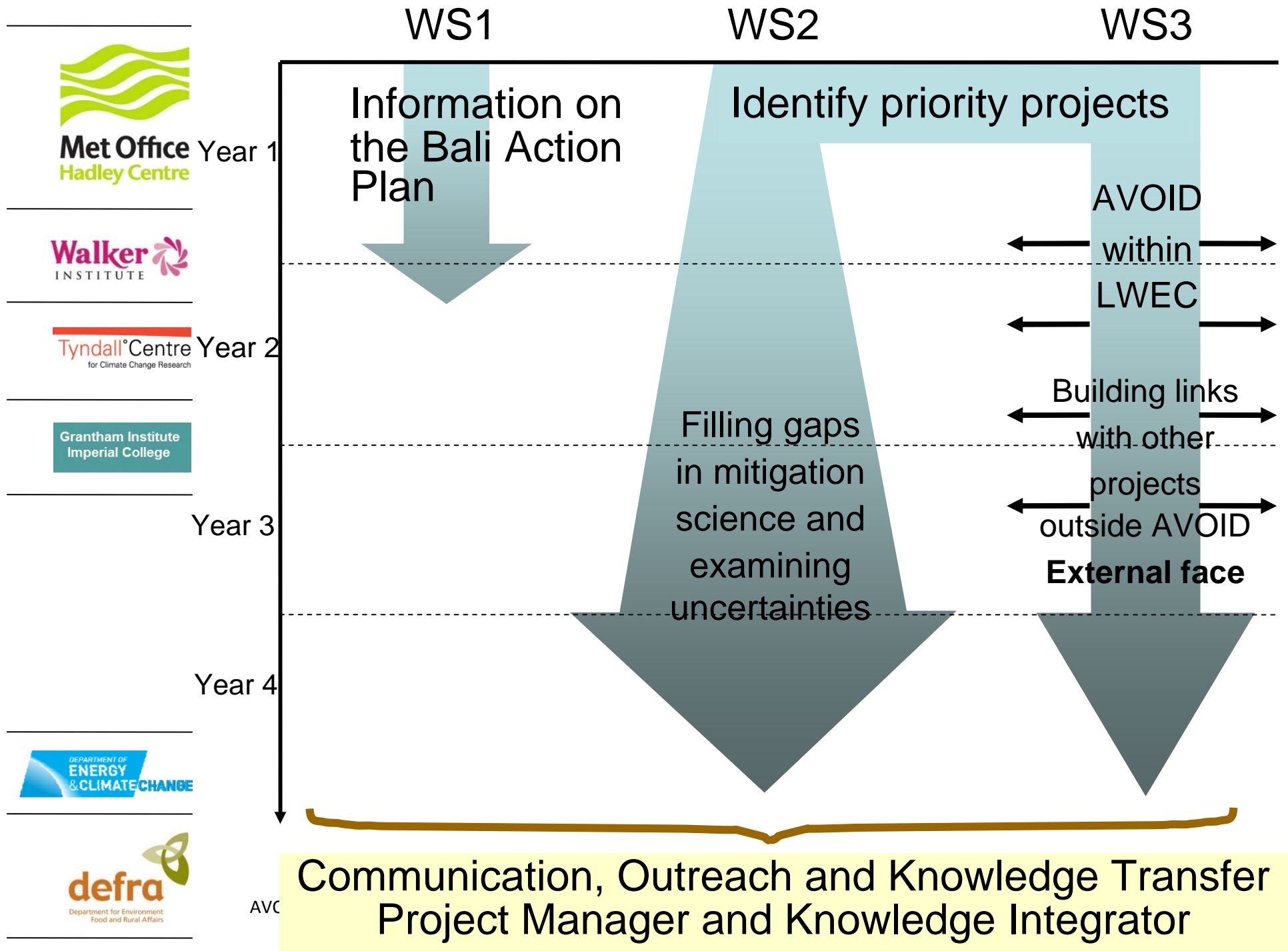


The implementing consortium

- Met Office Hadley Centre
- Walker Institute, University of Reading
- Tyndall Centre
- Grantham Institute, Imperial College



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Avoid Work Stream One (WS1)



Purpose: provide evidence to support UK Negotiations for the Bali Action Plan



How?



- Look at a **range of global emission reduction paths**
- Calculate **AVOIDed global & regional climate change**
- Calculate **AVOIDed regional impacts**
- Calculate required **global carbon prices**
- Provide literature review of **post-AR4 science**



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#1. Range of emission reduction pathways



- Scenarios **extend set provided for CCC**
- Scenarios specify **peak global emission year Y, and subsequent emission reduction rate R**
- Wider range of R and Y to be explored
- **Sensitivity study** - emission floor E
- Sensitivity study – **baselines** e.g. GLOCAF



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#1. Outputs from climate scenarios: AVOIDed global climate change



- Time series **10, 50, 90% outcomes for CO₂ equivalent concentrations & global warming T** since pre-industrial
- **Cumulative distribution functions** of T in 2100, 2200
- If T exceeds 2, 3, 4°C does it recover by 2200?
- How cc affected by **emission reductions by 2020, 2050**
- Climate response to changes in R, Y, E, and climate sensitivity



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#2. AVOIDed regional climate change & impacts; economics

Computer simulations of 21st century world economy, global/regional climate change/impacts.



Compare no-policy scenarios (SRES, GLOCAF) with policy scenarios taken from #1 and deduce:



- Avoided climate change (global and regional)
- **AVOIDed climate change impacts (regional)**
- Calculate **AVOIDed regional impacts**
- Required **global carbon prices**
- GDP effects
- Abatement costs



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#2. Tools for AVOID WS1

- **Community Integrated Assessment System (CIAS)**

(Tyndall) A flexible complex integrated model coupling together models of economy, climate and impacts

- **QUEST-GSI (Walker Institute)**

Set of spatially explicit impacts models

- **E3MG (4CMR, University of Cambridge)**

A post-Keynesian disequilibrium global economic model

- **PAGE (Judge Institute of Management)**

A simple integrated model



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#2. Outputs – economic requirements: carbon prices & abatement costs



E3MG in CIAS: for median climate change outcome-



- Time series 2000-2100 of global carbon pricing
- Real GDP effects by region



PAGE: for median climate change outcome -

- Global and regional cc damages as %GDP
- Marginal damage costs
- Total abatement costs



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#2. Outputs – AVOIDed regional Climate change and AVOIDed impacts



CIAS & QUEST-GSI:

- **AVOIDed regional climate change T & precipitation**
- Maps and tables of **climate impacts in time-slices** centred on **2030, 2050, 2100**
- **AVOIDed regional & sectoral impacts** upon moving from no-policy to policy scenario



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#2. AVOIDed regional impacts: indicators

- **Millions at increased risk of:**

Water stress, malnutrition, river & coastal flood, flood-related ill-health



- Change in supply-demand **water balance**

- **River flood** risk



- **Change in productivity of:**

crops/fisheries/terrestrial ecosystems

- Change in **cereal prices**

- Change in **biome type & soil carbon stocks**



- Change in **climate space & extinction risk** for species



- **Loss mangrove & saltmarsh** area

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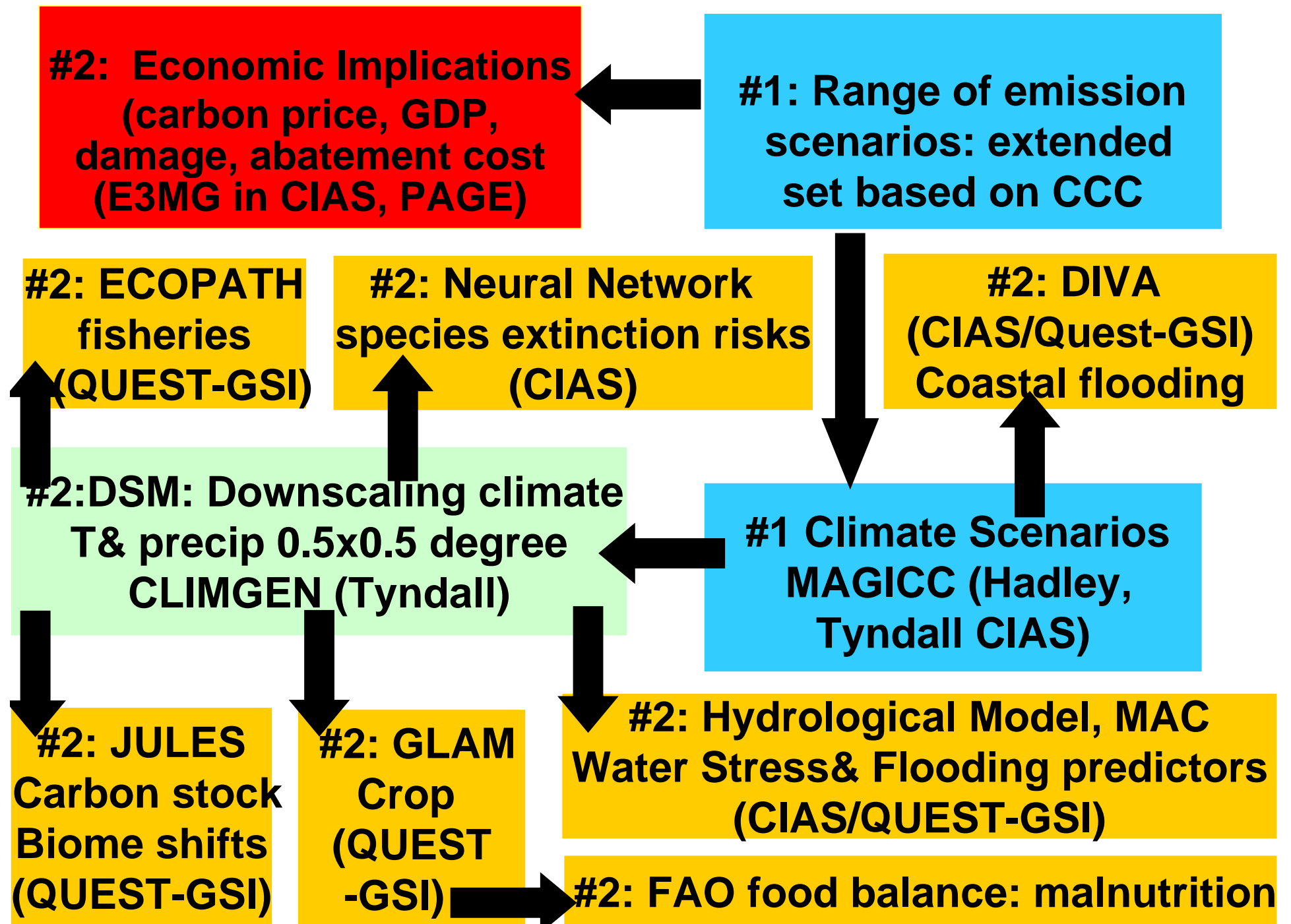
#2. Sensitivity studies



- GCM pattern
- 10% and 90% climate change outcomes
- Scoping study of burden sharing
- Additional projections using sectoral/regional damage functions from QUEST-GSI



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#3. Literature Review

Extends IPCC AR4, particularly WGII e.g.



- New literature on **tipping points**
- New literature on **(ir)reversibility**
- New literature on **climate change impacts**
- Implications for scenarios studied

Provides guidance on **AVOIDed risks not yet included in modelling** outputs #1 or #2.



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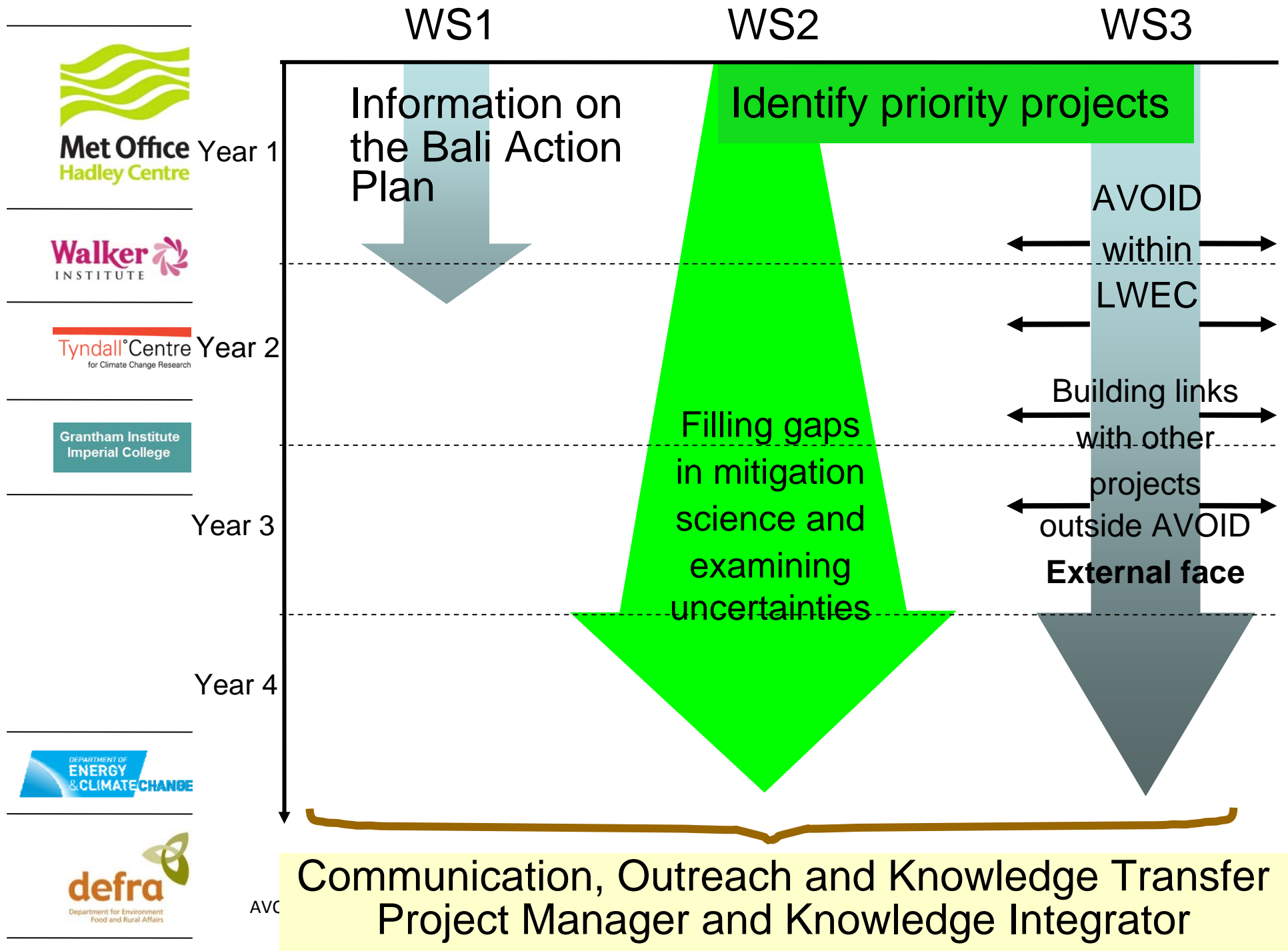
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Work stream 2 of AVOID



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Aims of WS2

- To better characterise dangerous climate change
- Translate new information on dangerous climate change into a policy relevant form
- Ensure mitigation advice is placed on a very strong scientific foundation. Including contributing to IPCC AR5
- Helping to set wider research agenda on mitigation and adaptation science



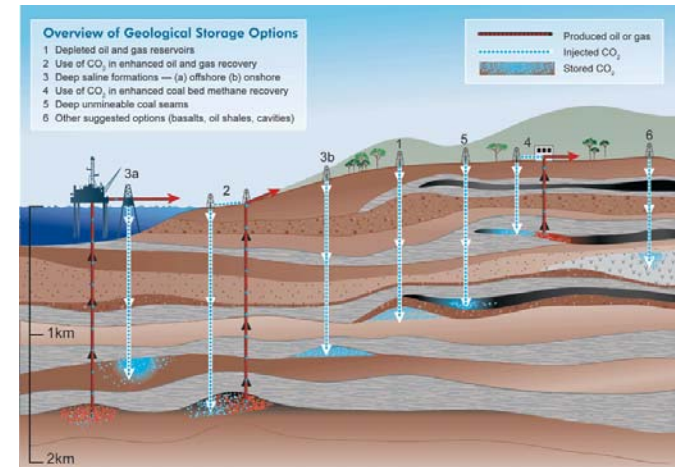
WS2 – projects

- 18 “priority projects” that are fully scoped and funded.
- 30 “option projects” that require extra funding from stakeholders.
- Several add-on projects requested by stakeholders since the project began:
 - Food security
 - Vulnerability of port cities



WS2 – Improved scenario advice

- Implications of technology development for national and international climate policy
- Role of biofuels and avoided deforestation policies
- Narrative description of impacts
- Impacts of different greenhouse gas mixes
- Detailed information about recovery from exceeded target levels
- Repeating WS1 when enough new advice





Some selected “option” projects

- Improved methane release modelling
- Uncertainty in impact costing
- Uncertainty in mitigation costs
- Modelling the effect of Greenhouse gas mitigation policy on air quality
- Measuring temporary resiliency of human and infrastructure systems
- Scope and effect of negative carbon emissions
- Extending CIAS into a graphical policy maker tool

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AVOID Programme Work Stream 3 – “Developing the programme”

Nigel Arnell

Walker Institute, University of Reading
Co-Leader of AVOID WS3

www.avoid.uk.net

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Objective

to grow AVOID into a multi-disciplinary, multi-stakeholder programme focussed on high-quality, policy-relevant research on avoiding dangerous climate change

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How?

- 1) Integrate and deliver government departments' objectives, with additional funding

understand requirements
understand output formats
identify funding opportunities

Vicky Pope, Hadley Centre



How?

- 2) Engage research councils/
academic community to
identify (and fund) cross-
disciplinary projects

integrate AVOID into LWEC
identify other national/international
research programmes



Nigel Arnell, Walker Institute

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Outcomes



Identification of additional projects meeting AVOID science and policy objectives



define the science agenda

Development of funding streams for these activities



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Stakeholder discussion



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Policy questions

- What information do you need as a stakeholder?
- Are there any policy-relevant gaps in the work plan?
- How can we best engage and communicate with you?



Science questions

- Are there any major science gaps or opportunities?
- How does AVOID relate to other existing or planned initiatives?
- Would you be interested in supporting AVOID?

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AVOID benefits:

- International negotiations –
UK Government better informed
- Mitigation and adaptation policy –
grounded in quality science
- Scientific information –
more accessible to stakeholder
- Research on climate change –
effectively integrated

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AVOID – Next steps

- Stakeholder analysis
 - written questionnaire
 - at other meetings
 - telephone interviews
- Production of early set of climate scenarios
- Selection of scenarios to take forward to detailed impacts and economic modelling
- Selection of priority WS2 projects

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AVOID – Next steps



Contact Jo Thorpe (j.thorpe@decc.gsi.gov.uk)
for more information on how to join us as a stakeholder



Contact Jason Lowe (avoid-chiefsci@metoffice.gov.uk)
for more information on the scientific content of AVOID

www.avoid.uk.net



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