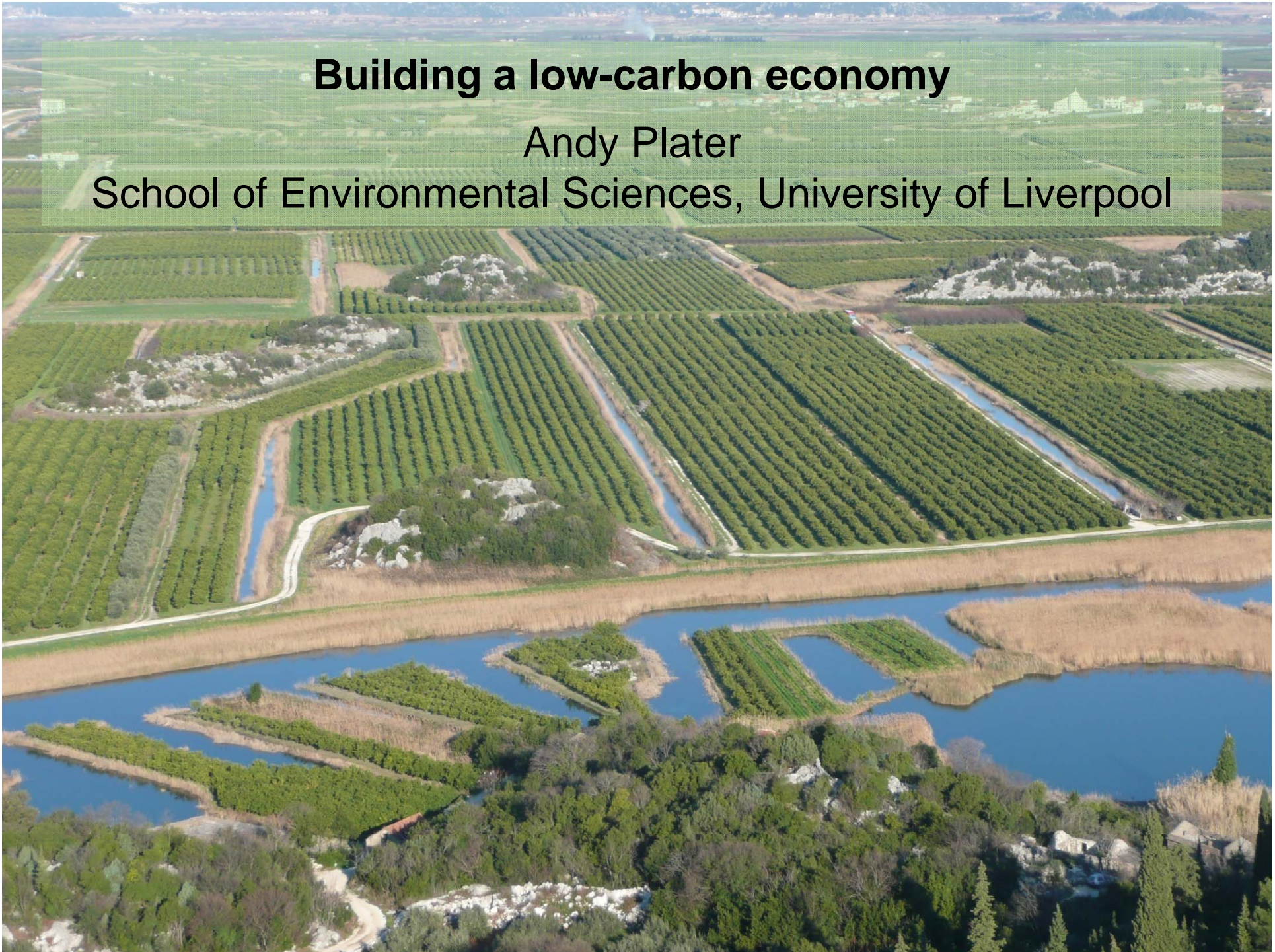



Building a low-carbon economy

Andy Plater

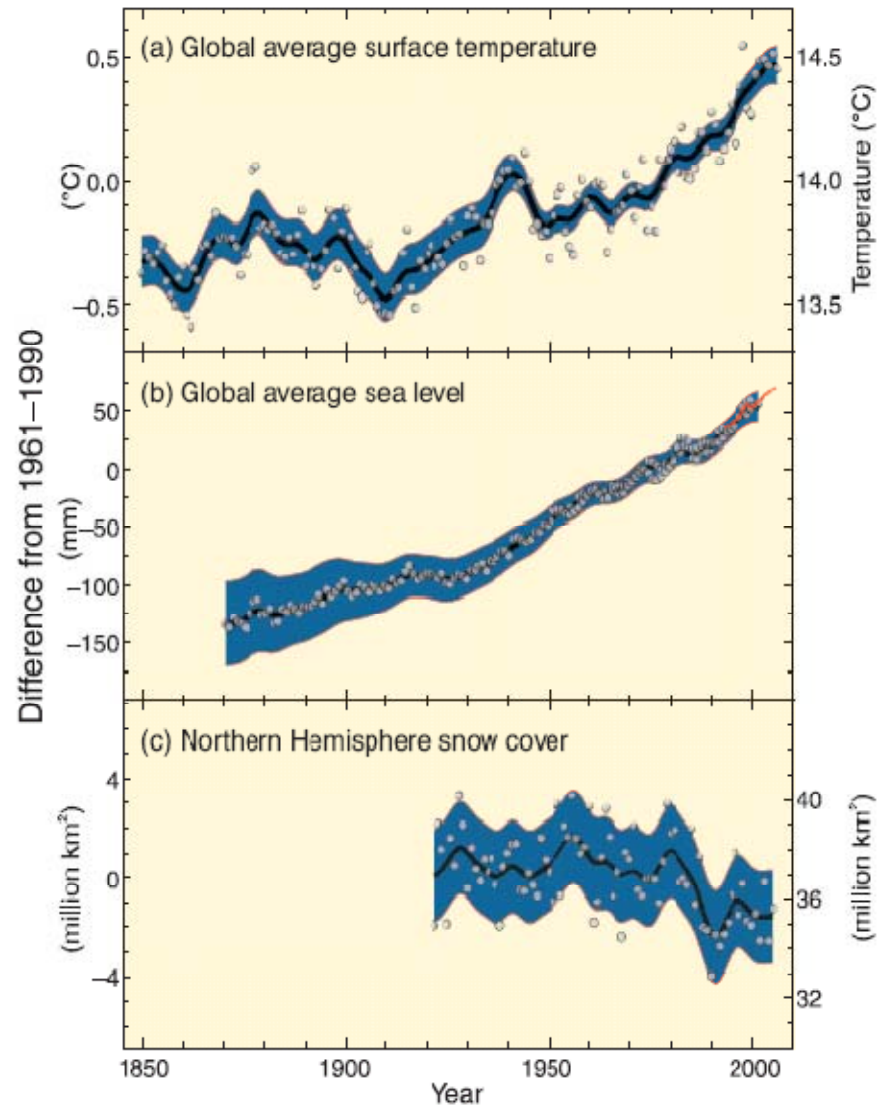
School of Environmental Sciences, University of Liverpool



- 
- Climate Change, Carbon and Energy
 - Adaptation
 - Mitigation
 - Building a low-carbon economy
 - Liverpool Green Economy Incubation Network:
L-GrEco

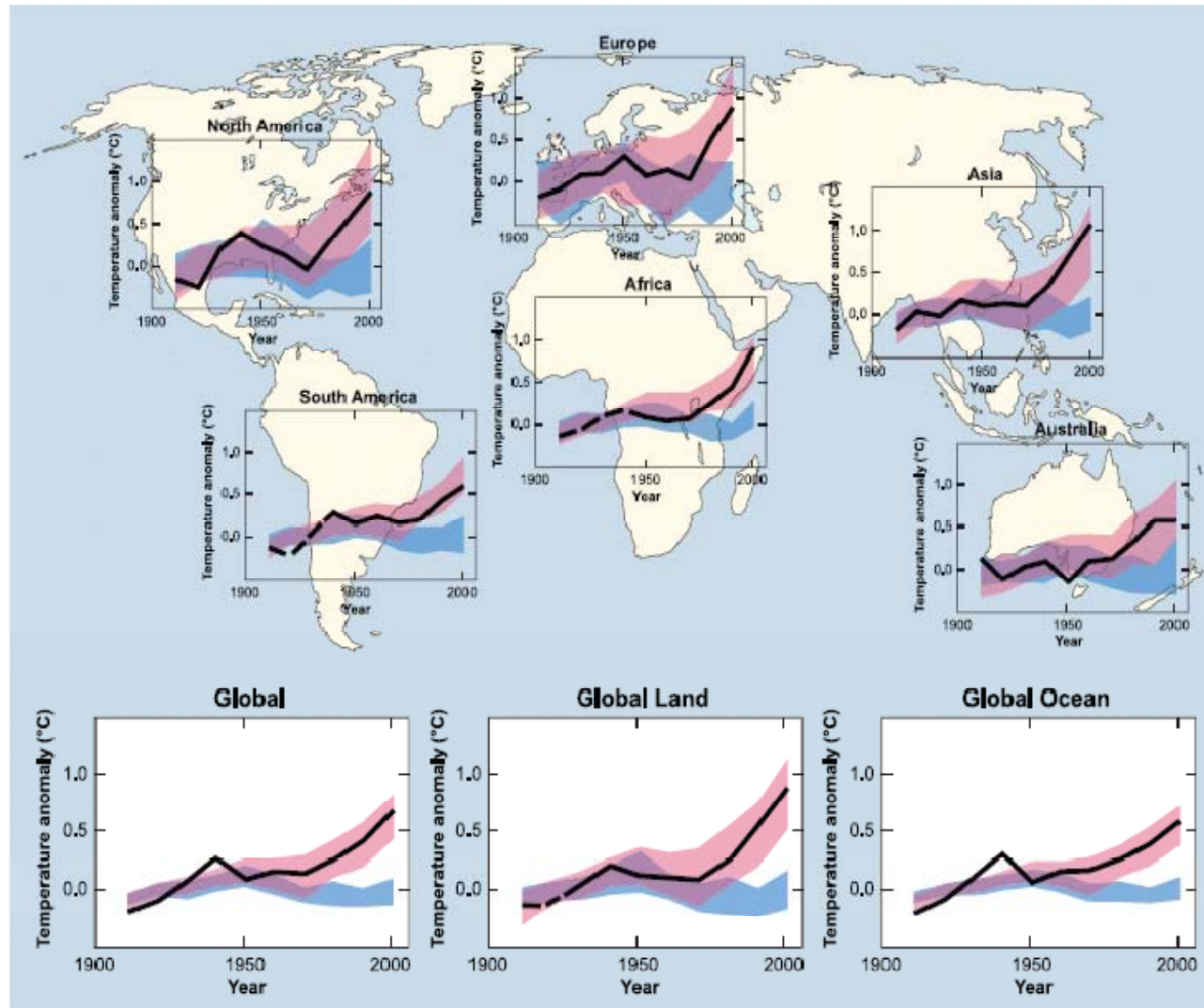


Changes in temperature, sea level and Northern Hemisphere snow cover





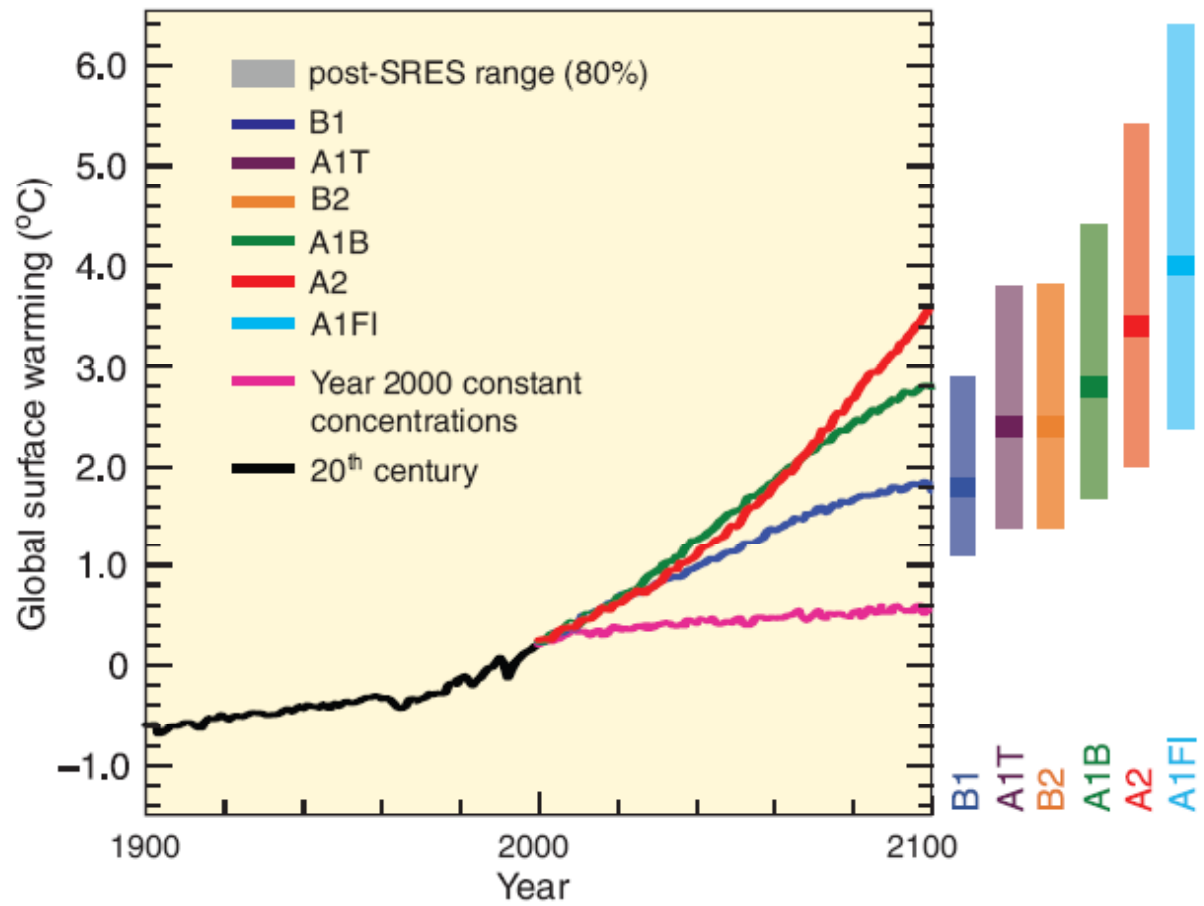
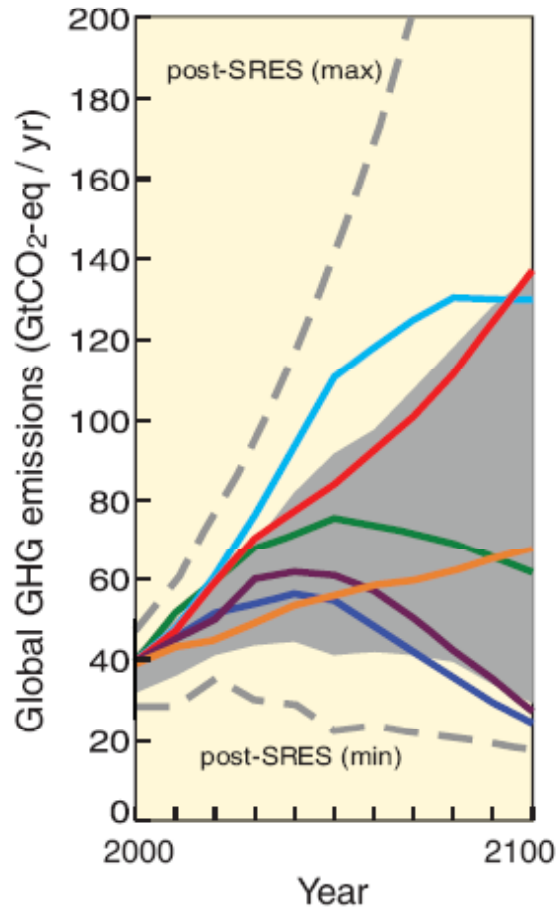
Global and continental temperature change



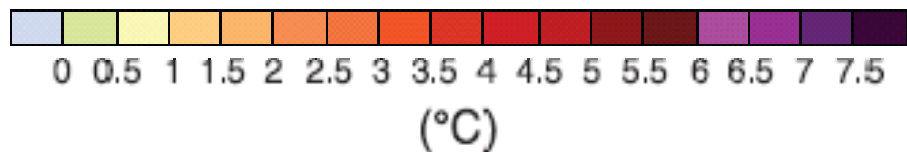
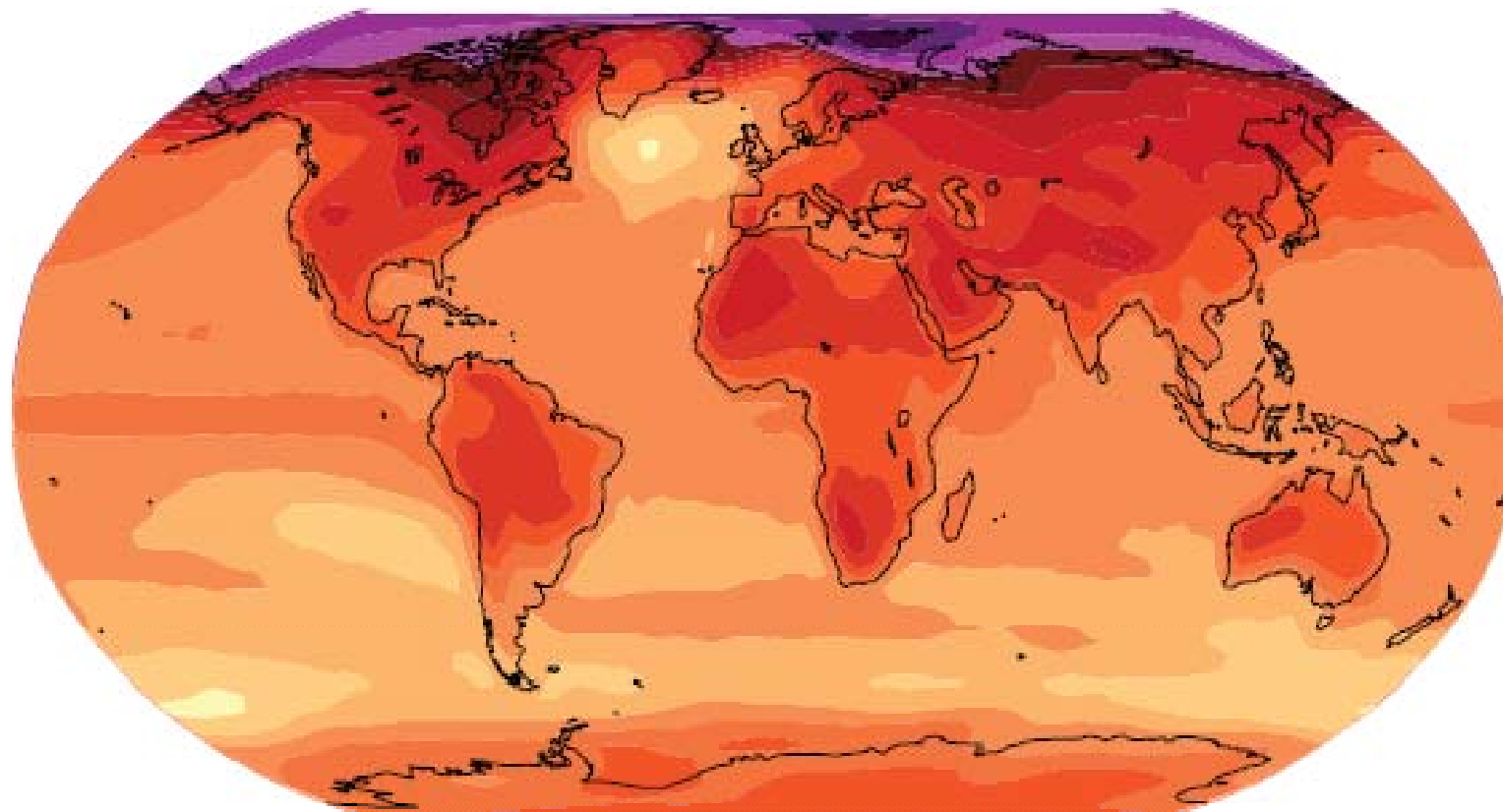
models using only natural forcings
models using both natural and anthropogenic forcings

observations

**Scenarios for GHG emissions from 2000 to 2100 (in the absence of additional climate policies)
and projections of surface temperatures**



Geographical pattern of surface warming



The **climate** is changing –
what's the **outlook** for you?

Key findings:
Observed
trends

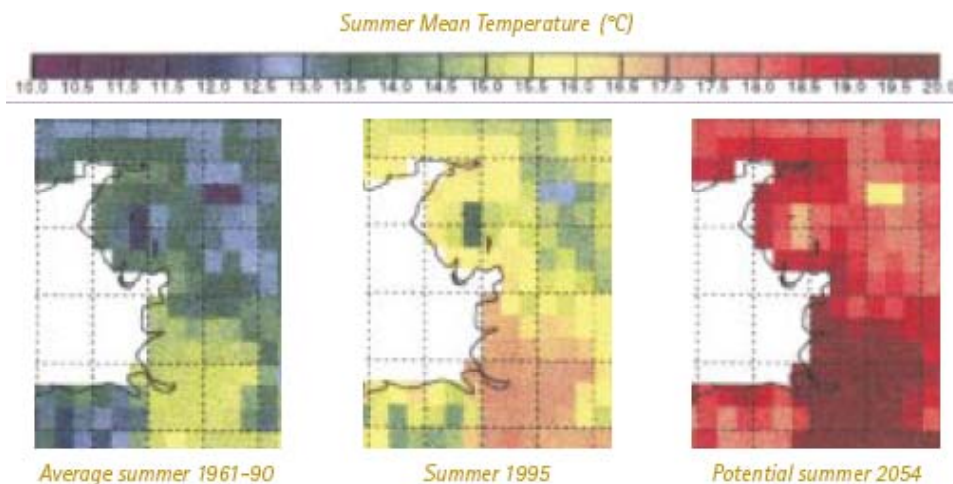
Key findings:
UK-wide

Key findings:
Administrative
regions

Key findings:
Sea level rise

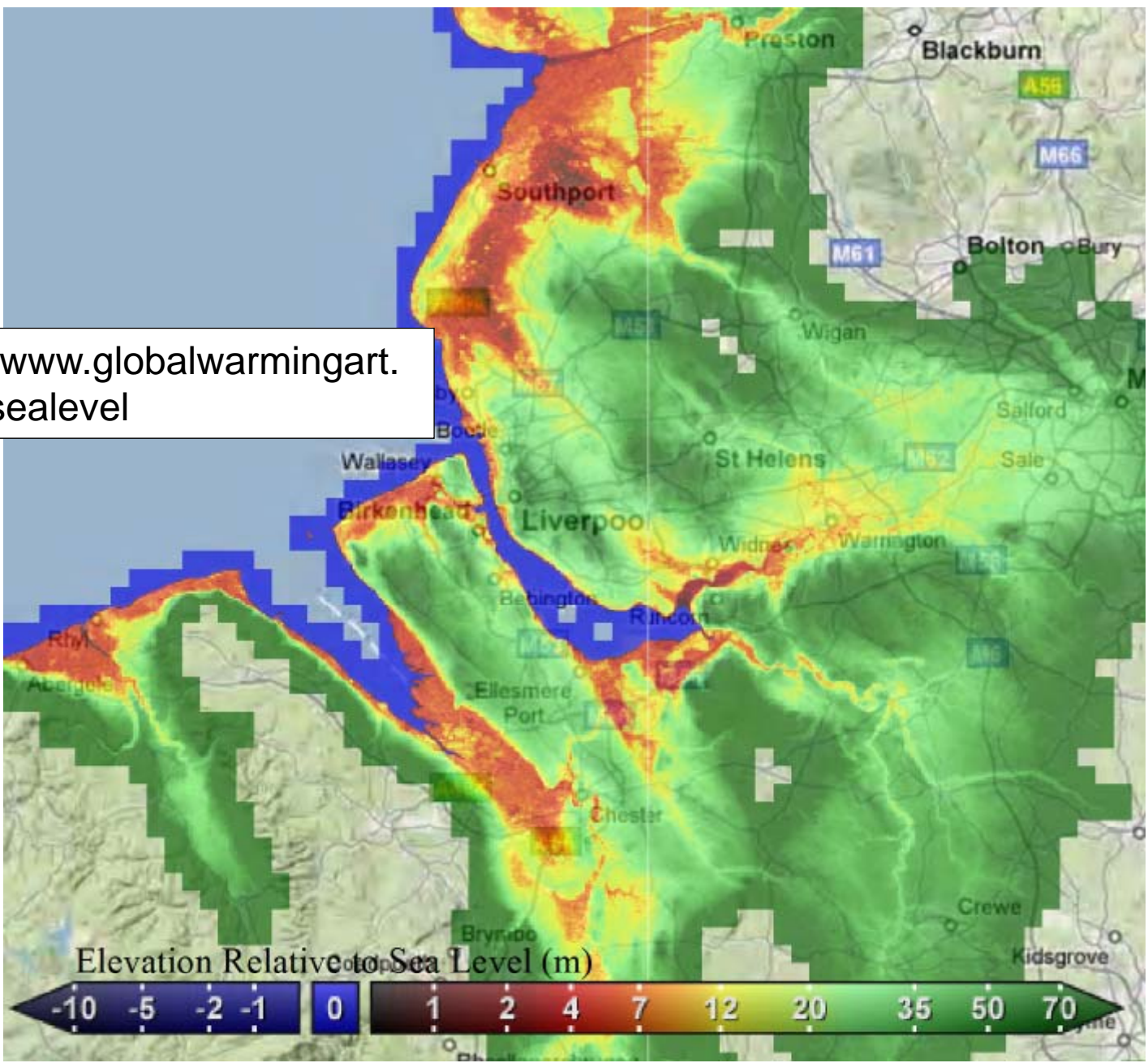


- Average temperatures in the 2050s will have increased by between 0.8°C and 2°C
- Winter rainfall in the 2050s will have increased by between 6% and 14%
- Summer rainfall may be reduced by up to 10% by the 2050s
- Sea level will rise by between 12cm and 67cm by the 2050s

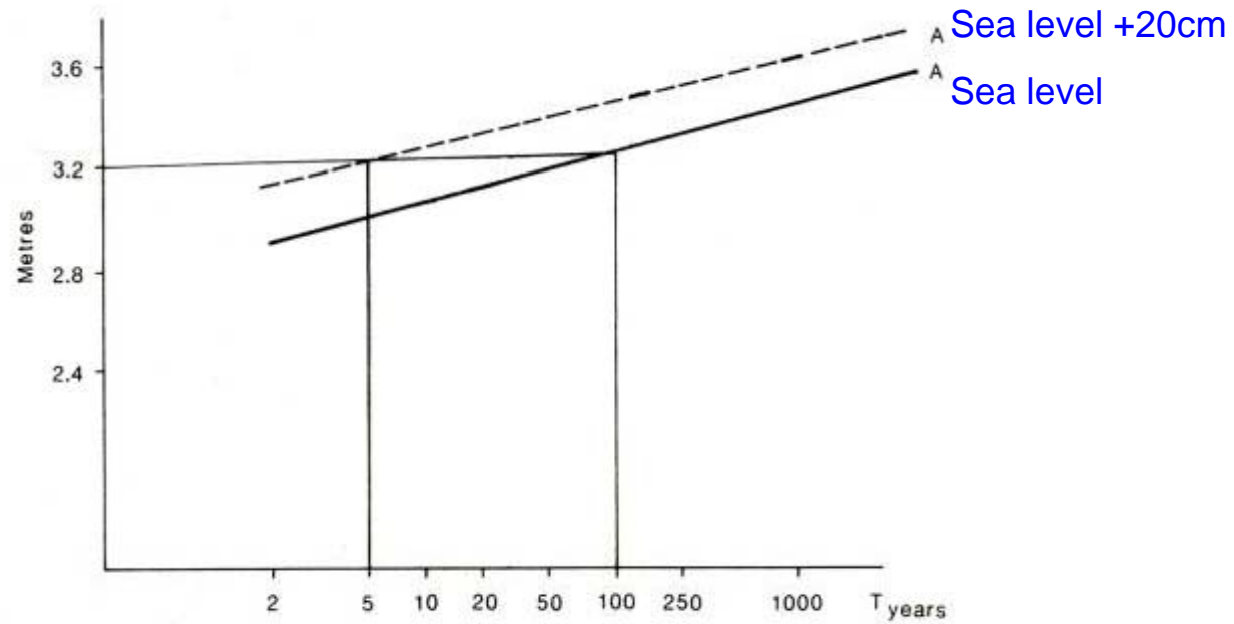


Adaptation

<http://www.globalwarmingart.com/sealevel>



Rossiter (1962) - West Coast x3 increase @ 15 cm



Agriculture...

The region's farmers will feel the impact of climate change both directly and indirectly.

Rising temperatures and longer growing seasons will give the opportunity to diversify and grow a greater range of crops, while changing rainfall patterns might require irrigation or water storage facilities to ensure summer water supplies.

A changing climate could see new pests and diseases affecting crops and livestock, e.g. bluetongue.

As lifestyles and tastes respond to a changed climate, there may be shifting demands that could impact on existing farm produce.

Manufacturing, industry and business...

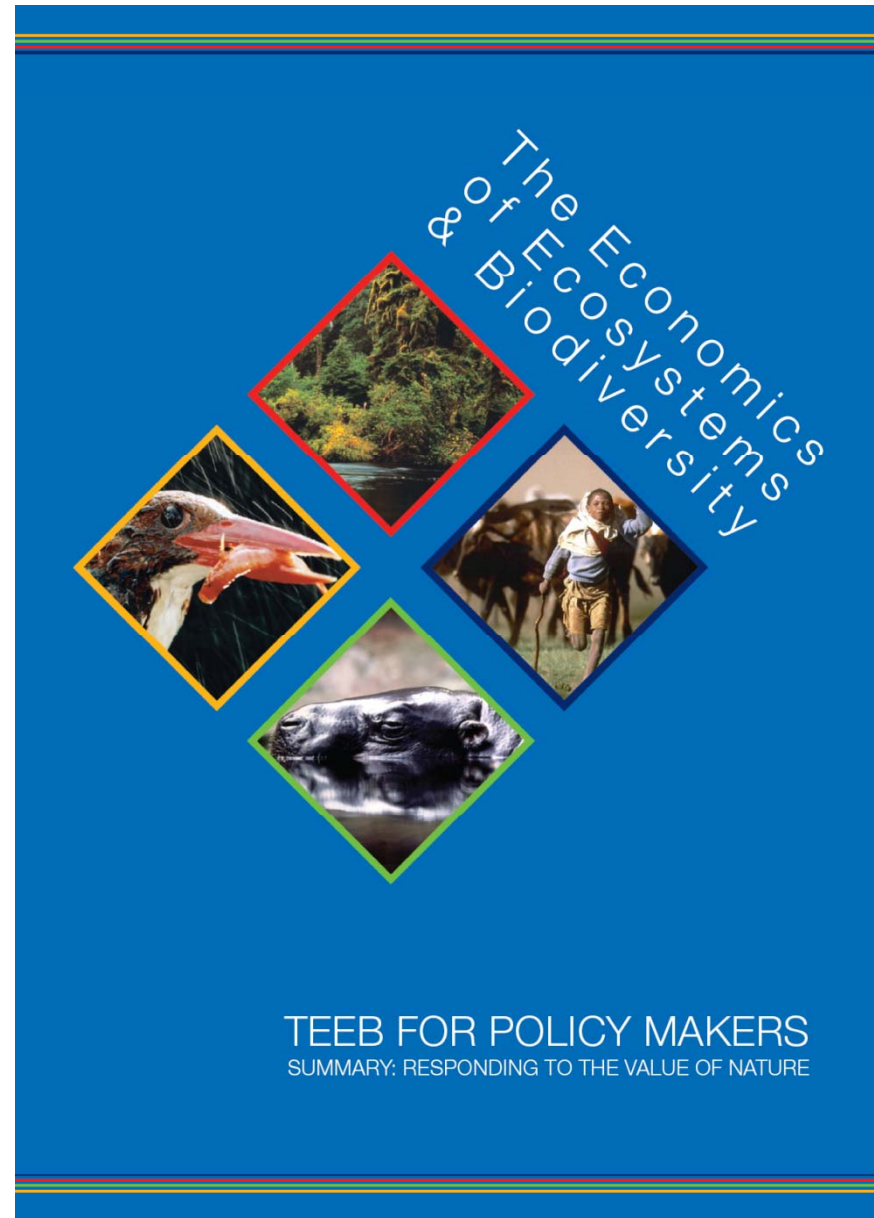
The trend for warmer drier summers, milder wetter winters, and more extreme weather events will result in unexpected costs and changes to the operating environment – lower energy bills in winter, higher bills in summer

Some impacts will be felt across all sectors, e.g. potential for disruption to distribution networks, but the consequences for individual businesses will depend on where they are, what they are doing, and what their business priorities are.

SMEs represent a large contribution to the UK economy and are potentially more vulnerable to the climate risk than larger, better resourced companies.



- Predict the impacts of climate change and promote sustainable solutions through mitigation and adaptation
- Manage ecosystem services for human well-being and to protect the natural environment in a changing world
- Promote human well-being, alleviate poverty and minimise waste by ensuring a sustainable supply of food and water
- Protect human, plant and animal health from diseases, pests and hazards in a changing environment
- Make infrastructure, the built environment and transport systems resilient to environmental change, less carbon intensive and more socially acceptable
- Understand how people respond to a changing environment and develop thriving, cohesive and informed communities





Rising to the Challenge

A Climate Change Action Plan for England's Northwest 2007-09



INVESTING IN
englandsnorthwest

<http://www.nwda.co.uk/areas-of-work/business/sustainable-consumption/climate-change.aspx>

Northwest Climate Change Partnership

The [Northwest Climate Change Partnership](#) is a group of organisations that drives and supports the implementation of the Climate Change Action Plan



LRAP

Working In Partnership

Adapting to Climate Change

Guidance notes for NI188

Version 1.7

The Local and Regional Partnership Board works to support Local Government and Regional Bodies on Adapting to climate change. Partners are drawn from:



- Delivering national adaptation aspirations and targets:

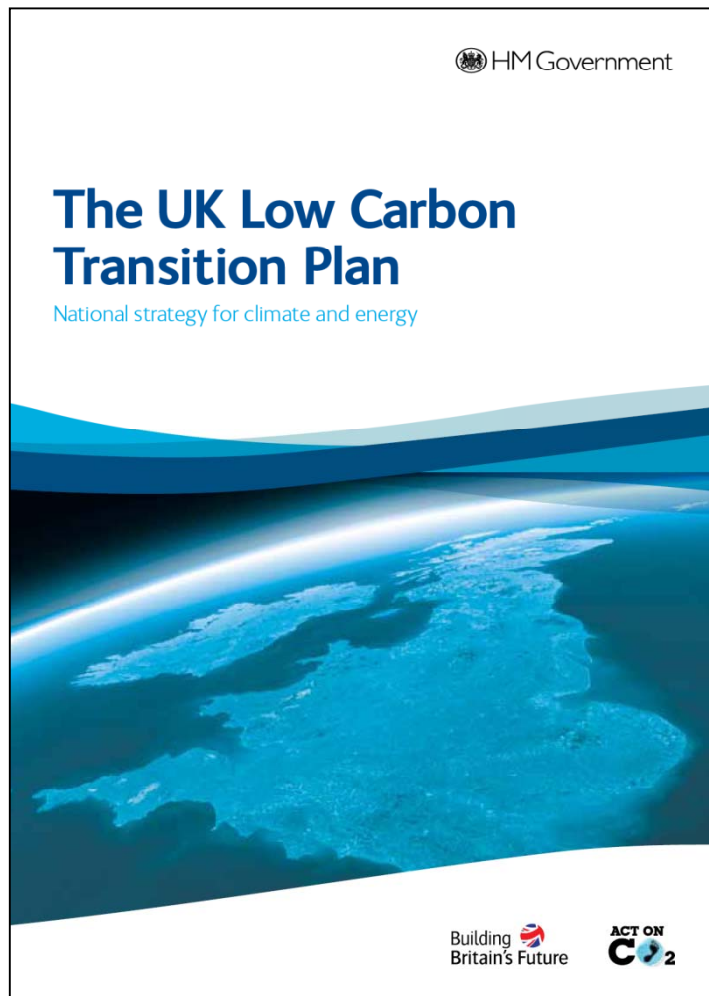
- Science community
- Media?
- Individuals?
- Businesses?
- Regulatory authorities?
- Local government?

- Efficacy of UKCP09

- Refocusing and communicating science and technology:

- Climate/carbon/energy
- Climate/weather
- Environment/economy
- Risk/uncertainty

Mitigation

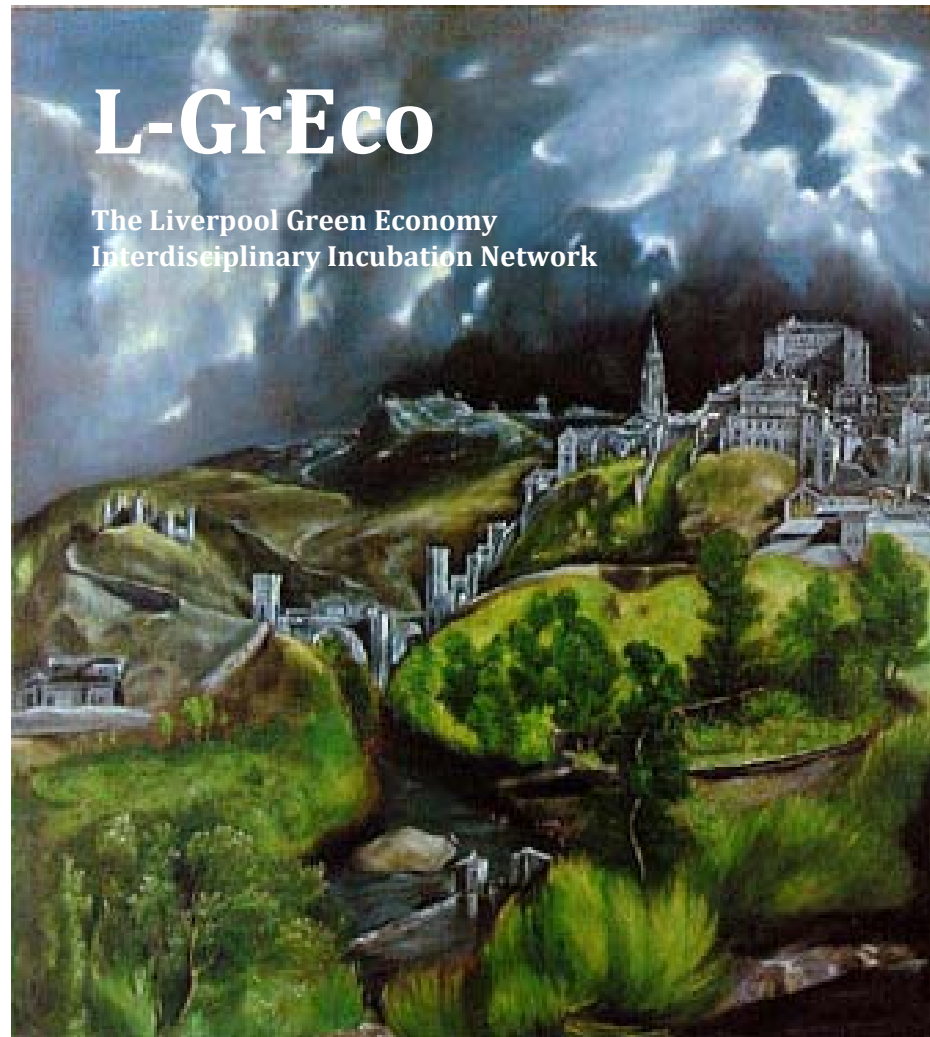


- Cut emissions from the power sector and heavy industry by 22% on 2008 levels by 2020 - using 40% of electricity from low-carbon sources.
- Produce around 30% of our electricity from renewables; invest in carbon capture; facilitate the building of new nuclear power stations.
- c.£120m will be invested in offshore wind, and an additional £60m in marine energy.
- Cut emissions from homes by 29% on 2008 levels, e.g. households become more energy efficient.
- Create jobs in the low-carbon industry by investing in research and development of new low-carbon technologies.
- Cut carbon dioxide emissions from new cars; provide financial assistance from 2011 to reduce the price of electric/hybrid cars; invest in low-carbon bus technology.
- Research better ways of measuring, reporting and verifying agricultural emissions.
- Encouraging woodland creation to increase forest carbon uptake.
- Support for anaerobic digestion turning waste and manure into renewable energy.
- Reduce the amount of waste sent to landfills and better capture of landfill emissions.

The Economic and Social Research Council (ESRC) and the Engineering & Physical Sciences Research Council (EPSRC) are delighted to announce the opening of a new, jointly funded £7.5 million investment: the 'Energy and Communities Collaborative Venture'



- Energy literacy and visibility
- Transformative innovation, lifestyles and social technical practices
- Communities, ownership and social movements
- Policy, governance and legislation



The Liverpool Green Economy Incubation Network (L-GrEco) intends to develop the intellectual basis, evaluate the technological opportunities and challenges, and formulate a series of investment and policy steps necessary for the transition of society from its current unsustainable position to one where environmental issues are embedded in policy and practice, underpin economic stability and enhance human health and well-being.

L-GrEco Research Themes

1. Coastal Cities: Rising to the Challenge of Future Energy Demands

The Liverpool city region is superbly placed to lead the way as a low-carbon coastal city that is both self-sufficient in its energy needs and has the capacity to export energy within the region and more widely. Research will focus on the capacity for coastal cities such as Liverpool to meet their energy demand through (i) infrastructural electricity generation (tidal, wave and wind power), (ii) community-based approaches to energy management and electricity generation, (iii) integrated, small-scale heating and energy distribution systems, (iv) generating electricity from waste, (v) nuclear power and waste reprocessing, (vi) devolvement of benefits from businesses to the region, (vii) retrofitting existing building stock for energy conservation and recycling.

L-GrEco Research Themes

2. Connecting Science and Innovation to Policy and Practices

Key strengths of The University of Liverpool lie two areas: Science & Innovation, particularly in the area of climate change, energy, and marine sciences; and governance practices. In building a Green Economy, the challenges in bringing these two aspects together cannot be underestimated – particularly how science and technology are perceived and integrated, how regional and local government are able to take practical measures to address climate change adaptation and mitigation, and how communities are empowered and engaged in the decision-making process.

L-GrEco Research Themes

3. Economic Sustainability

It is essential that we move from the imperative of unfettered economic growth to a workable model of economic sustainability. The foundations of this sea change are (i) resource and energy efficiency – and, as a direct consequence, reduction in carbon use and emission, (ii) re-valuing the concepts of wealth and affluence as means to optimise quality of life and basic human needs, (iii) recognising the importance of healthy ecosystems in sustaining human health and well-being, through provision of goods and services that are the cornerstone of a sustainable economy.

L-GrEco Research Themes

4. Global-Local Trade and Carbon Life-Cycle

A green economy is based on a vision where consideration is given to resource use and waste accumulation in the provision and acquisition of goods and services. Research is currently focussed on the whole-life analysis of carbon from production to consumption, aiming to reduce carbon (and other resource) footprints. Similarly, consideration is being given to food- or commodity miles, finding new and more resource efficient ways of transporting goods and promoting more local sources and markets. Mechanisms and approaches for promoting these aspects require fundamental research – linking to issues such as global oil and gas exhaustion projections, and consequent geopolitical dynamics. In the area of innovation and technology, port cities such as Liverpool have the potential to lead the way globally in developing environmentally sustainable port facilities, promoting international trade using solar- and wind-supported ships, i.e. Green Port.

Conclusions

- Knowledge of climate change impacts not readily attuned to information needs – focus, timescales, uncertainty
- Adaptation goes hand-in-hand with mitigation
- Adaptation and mitigation delivered across disciplines, sectors, agencies, policy instruments, stakeholders and individuals
- Cross-cutting nature of a low-carbon (green) economy necessitates a trans-disciplinary approach, a potential refocus of research priorities, and better communication (knowledge transfer, shared learning)
- New approaches to meeting energy demands and increasing energy efficiency are at the heart of a low-carbon (green) economy – a key feature of the UK Low Carbon Transition Plan
- L-GrEco established to contribute to the development of research income and outputs that aim to build a sustainable future