A Green Economy for Europe:

Costs, Benefits, Opportunities and Policies

A Presentation to the Eionet Webinar on resource efficiency policies
'Green Economy: Opportunities for Jobs, Growth and Innovation in Europe'

Paul Ekins
Professor of Resources and Environmental Policy
Director, UCL Institute for Sustainable Resources
University College London

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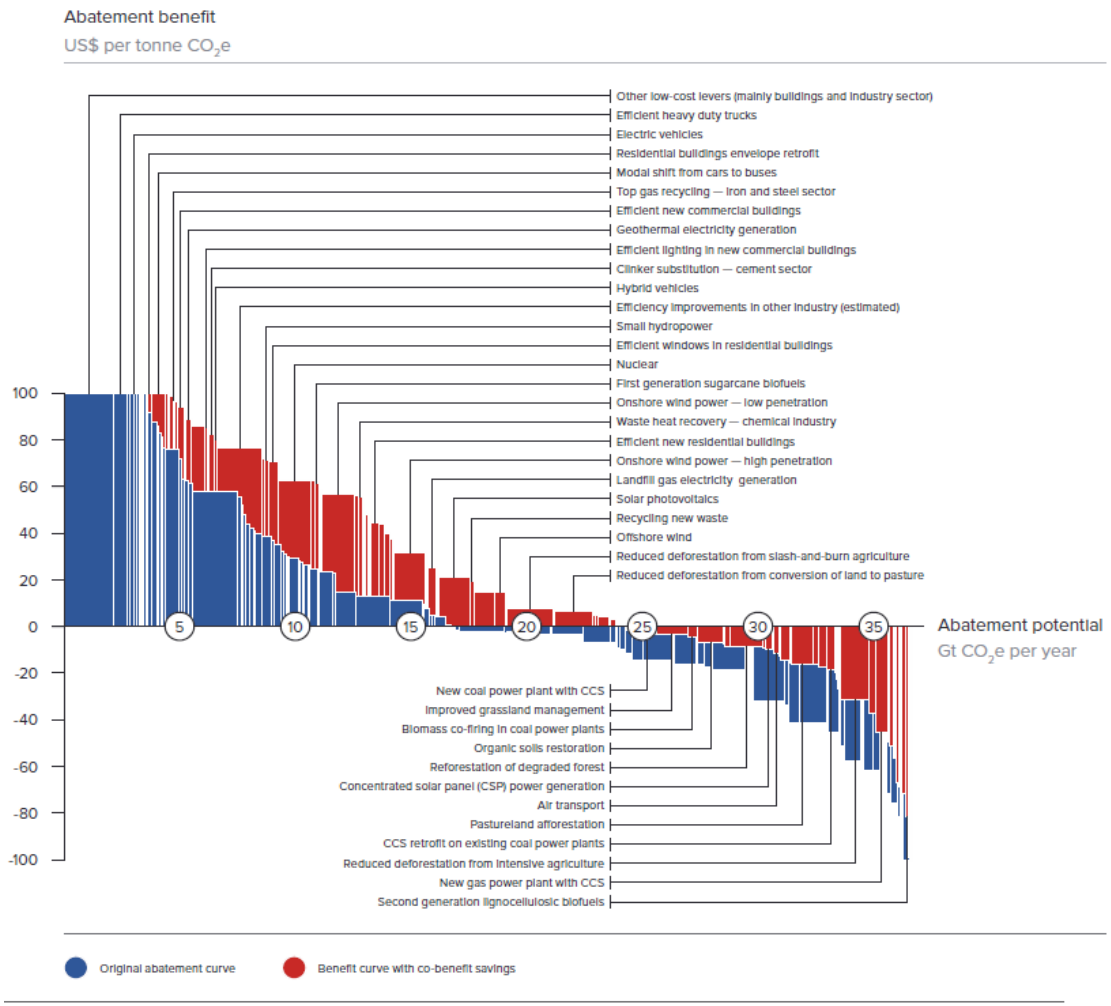
The world needs a green economy

- To obtain the benefits of climate stability, resource security, environmental quality
- Green economy requires greening of the whole economy, not focusing only on core ‘green’ sectors
- Economic growth resulting from this process – ‘green growth’ – will be sustainable, unlike ‘brown growth’, which will be increasingly undermined by climate and resource disruptions and instabilities

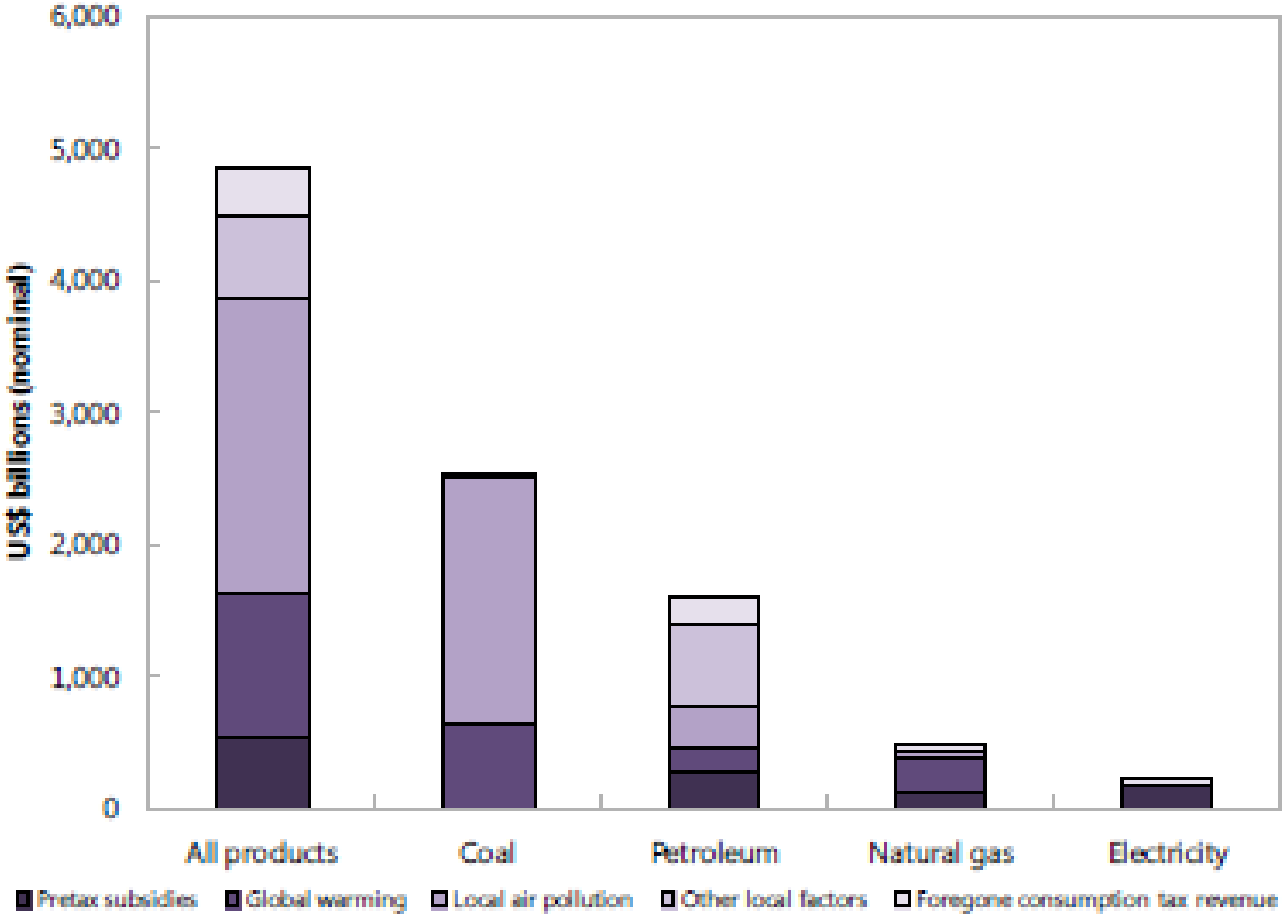
Benefits of a Green Economy



Source: New Climate Economy 2014, Figure 5, p.26 [Marginal Abatement Benefits Curve for 2030]

The costs of a fossil fuel economy

Source: IMF 2015, Figure 6: Global Post-Tax Subsidies by Product and Subsidy Component, 2013, p.22



Source: Authors' calculations, based on sources in Appendix Table 2.
Note: Other local factors apply only to petroleum products and refer to non-internalized externalities from congestion, accidents, and road fuels.

Foundations and pillars of a green economy

Source: Ekins et al. 2014, Figure 2, p.11

Negative cost opportunities for resource efficiency

- Globally USD 2.9 trillion in 2030 (70% at 10% internal rate of return) (McKinsey 2011)
- EU net benefits of €603 billion (AMEC and BIO IS for European Commission 2013)
- UK economy £23 billion (Oakdene Hollins 2011)

National Industrial Symbiosis Programme (NISP)

NISP outputs (investment £28m over 5 years)

5-year figures = 60% attribution and 20% annual persistence decay

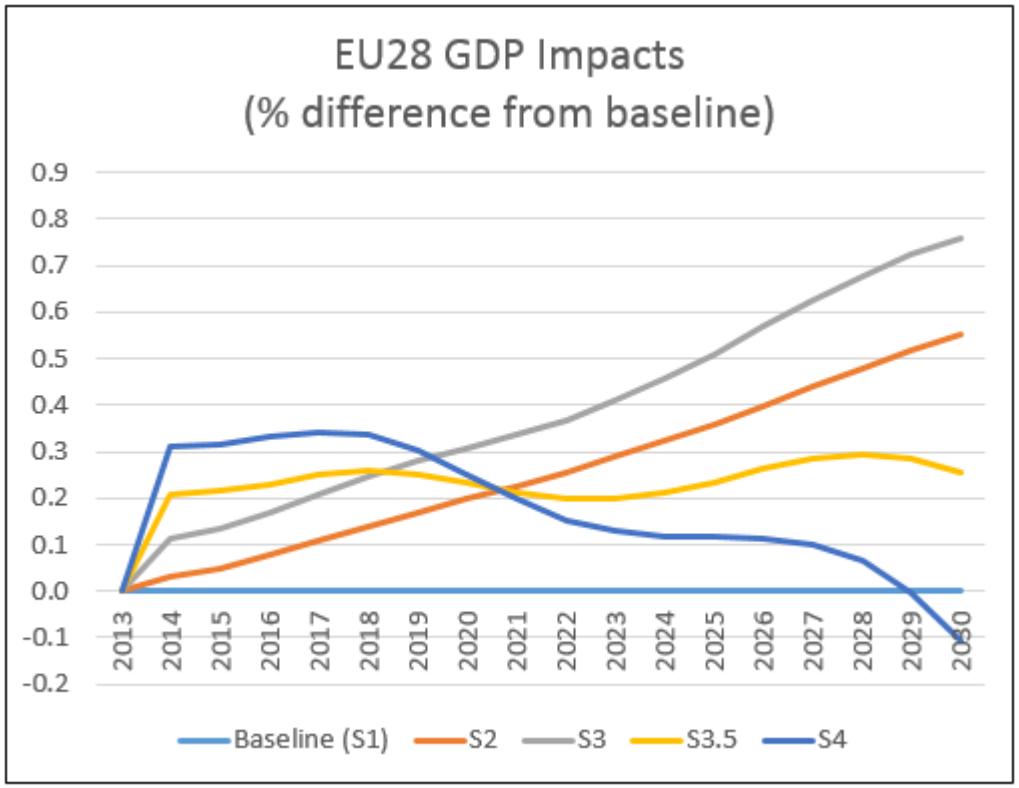
	Actual	**5 years**	**Public investment/ unit output**
Landfill diverted (mt)	7.0	12.6	0.31 (£/t)
CO_2 reduction (mt)	6.0	10.8	0.36 (£/t)
Virgin materials saved (mt)	9.7	17.5	0.23 (£/t)
Hazardous materials reduced (mt)	0.36	0.7	6.04 (£/t)
Water saved (mt)	9.6	17.2	0.23 (£/t)
Extra sales (£m)	176	317	0.012 (£/£)
Costs saved (£m)	156	281	0.014 (£/£)
PLUS			
Extra Government revenue (£m)		89	0.31 (£/£) Fiscal multiplier: 3.2 (£/£)
Private investment (£m)	131		
Jobs created	3683		
Jobs saved	5087		

The EU needs a green economy

- Europe is the continent most dependent on raw material imports, in competition with 9 billion people (by 2050), 3 billion new middle class consumers (by 2030), the 'nexus' of inter-related concerns around food, water, energy, climate (and biodiversity), plus 'critical' raw materials
- In this context resource efficiency is an imperative

- Resource Efficiency: RMC Study
  Study on Modelling of the Economic and Environmental Impacts of Changes in RMC (DG Environment, European Commission, 2013)
- *"To assess the economic, social and environmental impacts of alternative policy packages to improve European resource productivity (RP), as measured by Raw Material Consumption (RMC) per unit of GDP"*
- Model used: Cambridge Econometrics' E3ME

Macroeconomic Impacts



Overall resource productivity improvement between 2014 and 2030

Scenario	Description	Approximate Improvement (2014-30)
S1	Baseline	14 %
S2	Modest and flexible improvement	15%
S3	Enhanced and flexible improvement	30%
S3.5	Further enhanced and flexible improvement	40%
S4	Ambitious and flexible improvement	50%

e3me

Findings of European Commission study

Source: Study on Modelling of the Economic and Environmental Impacts of Changes in RMC
(DG Environment, European Commission, 2013)

- Absolute decoupling of material consumption is possible
- Cutting down resource consumption helps boost EU28 GDP by
  - promoting resource and energy efficiency R&D investment
  - reducing EU dependency on raw material imports
  - boosting household income by using tax revenues to reduce other tax rates
- Two million additional jobs in the EU could be created in S3
  - from higher investment and reduction in labour costs
- Beyond RP improvement of 2%pa (S3) improvement options are becoming more expensive

Estimating the macro-economic cost of increasing resource productivity

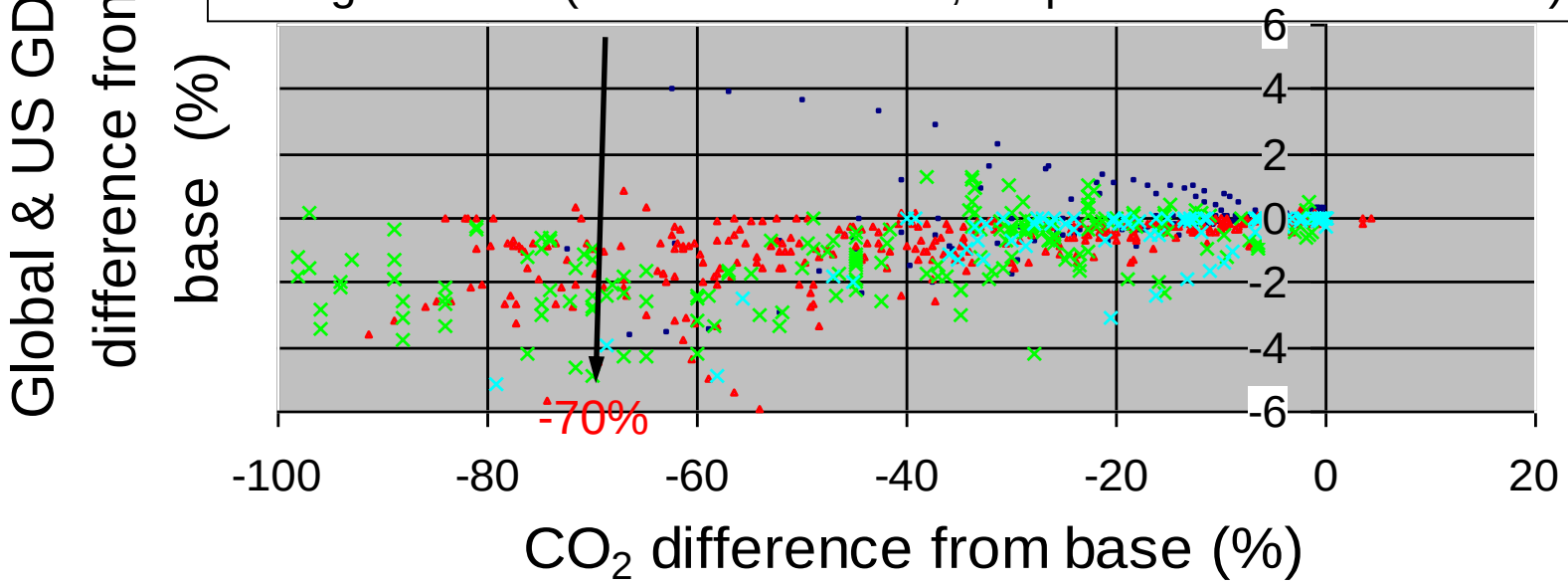
- Models are essential to integrate cost data in a representation of
  - The economy: macro-econometric/general equilibrium models
  - Good models are 'garbage in – garbage out'; need to get the inputs right
- Model results depend on three crucial factors:
  - *The robustness of the model structure.* The model should be theoretically sound, well represented in the scientific literature, and based on robust data.
  - *The plausibility of the input assumptions*. The input assumptions should be plausible.
  - *The quality of the data*. The data should be recent, and come from expert, independent sources, generated in the main by official agencies or engineering consultancies on official contracts.

Macroeconomic modelling issues

- Major issues with macroeconomic modelling
  - **Lack of representation of environmental damage, so that baselines lack credibility and climate change mitigation nearly always shows up as costs (unless it is possible to correct other economic distortions [e.g. through reducing labour taxation])**
  - Inadequate representation of innovation processes
  - Standard CGE representation of full employment (not so in macro-econometric models, e.g. MDM-E3, GINFORS)

Scatter plot of model cost projections, 2000-2050

Each point refers to one year's observation from a particular model for changes from reference case for CO2 and the associated change in GDP (from four sources, for periods over 2000-2050)



- IMCP with ITC dataset
- post-SRES dataset
- WRI dataset (USA only)
- EMF-21 with multigas

- Source: Barker et al. 2006 (cited in Stern 2007, p.270).

Projections from the 2011 UNEP Green Economy Report

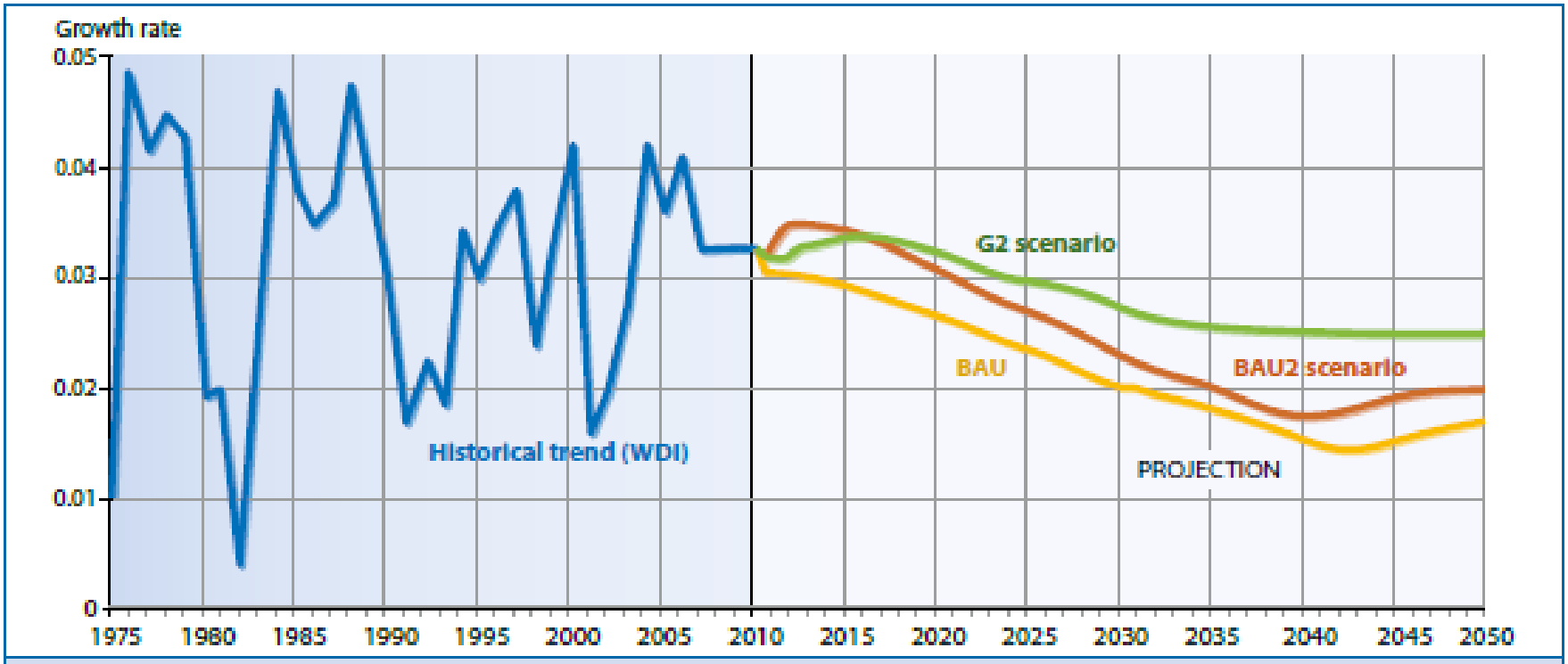


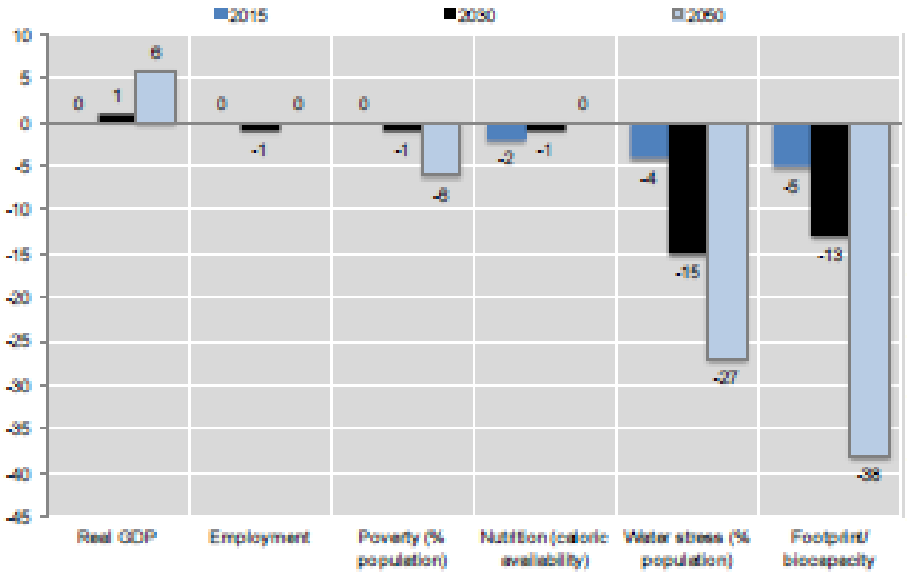
Figure 13: Trends in annual GDP growth rate, historical data (WDI, 2009) and projections in BAU, BAU2 and G2 scenarios

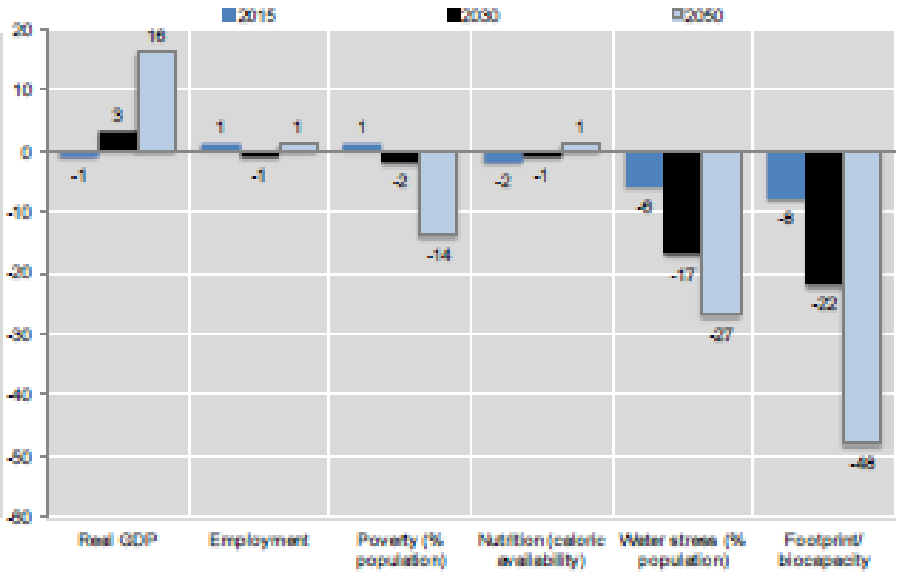
Source: UNEP 2011, Figure 13, p.519

Projections from the 2011 UNEP Green Economy Report

Source: OECD 2014 *Greener Skills and Jobs*, OECD Green Growth Studies, OECD, Paris

RESULTS OF GREEN 1 AND 2 SCENARIOS AGAINST BUSINESS-AS-USUAL





Conclusions on moving towards a green economy in the EU

- Negative cost opportunities for resource efficiency
- Innovation and investment: new technology, economic activity, exports
- Increased resource security (reduced vulnerability): food, water, energy, rare materials
- Increased welfare from environmental improvement: reduced GHG emissions and air pollution, waste to landfill, extraction of virgin materials
- International credibility, and exports, as the global community gradually goes in the same direction
- None of these benefits can be achieved without government intervention to provide massively increased information through a new knowledge infrastructure, and incentives and regulation to guide innovation in the direction of greater resource productivity

References for Figures

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Thank you

p.ekins@ucl.ac.uk

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