

Lionel Robbins Memorial Lectures

# Climate Change and the New Industrial Revolution - How we can get there: building national and international action

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Centre for  
Climate Change  
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Grantham Research Institute on  
Climate Change and  
the Environment

# ***How do we get there? Building national and international action***

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Environment, Chair of the Centre for Climate Change Economics and Policy,  
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**Lionel Robbins Memorial Lecture Series**

**Lecture 3, 23 February 2012**



# Five Part Structure

- Part 1: Challenges of public action (national and international). Why so difficult?
- Part 2: International negotiations.
- Part 3: What's going on around the world?
- Part 4: Low-carbon growth and the crises.
- Part 5: Conclusion - prospects for and the fostering of change.

# Introduction

- The two defining challenges of the century are managing climate change and overcoming poverty. If we fail on one, we fail on the other.
- Can see what we have to do in terms of:
  - scale of emissions reductions and change;
  - what might be done in major sectors;
  - and the great attractions of the new energy-industrial revolution.
- Can see new technologies emerging.
- Can see appropriate economic and other policies.
- Looking like an optimistic story.
- But cannot assume it will happen and at present progress is dangerously slow. Important to try to understand why.
- What will influence national and international action?

# Challenges of public action - national (I)

- Again the basics of the science shape the difficulties: scale, risk/uncertainty, lags, publicness. Scale not yet broadly understood.
- Action involves radical change; will be vested interests who oppose.
- Major investment and some energy cost increases. But impact on domestic energy bills likely to be small if energy efficiency improvements - on average consumer bills around £13 per MWh (or 1%) higher in 2020 compared to 2010 (DECC, 2010). (See also Bowen, 2011).
- Some dislocation/losers. How to manage change?
- Uncertainty about climate outcomes and uncertainty about future technologies can be read as uncertainty about effectiveness of action. Clarity on necessary scale of change is crucial, on basis of immense risks of weak action; also on potential for discovery, innovation and co-benefits.

## Challenges of public action - national (II)

- Lags imply consequences of action not visible soon and thus not easily recognisable. But many co-benefits (more energy secure, cleaner, quieter, more bio-diverse, discoveries) come through sooner than climate effects.
- Global public good raises similar issues – international interaction discussed below.
- Some modern cultures of self-interest increase the challenge of building a collective response. But people may be ready to act responsibly and as a society if they understand the scale of risks to their children and grandchildren and can see what to do. As big or bigger risks than major war but not instantly visible.
- Political economy of change, problems in communication and misinformation, and the role of public opinion. Open public discussion and engagement crucial for democratic choice and sustainability of actions.

# Challenges of public action - international

- Difficulties with international agreements (see Barrett, 2007):
  - large number of parties;
  - setting targets with uncertainty, e.g. which temperature 2°C or 1.5°C; which concentration; recognise uncertainty of temperature and other outcomes.
  - deciding which countries do what, e.g. emissions reductions, R&D;
  - addressing non-compliance and enforcement;
  - incorporating other important interwoven aspects, e.g. adaptation, biodiversity, etc.
- Traditional game theory pessimistic in its stress on free riding.
- But much action in the absence of a collective international agreements (see section 3 and Lecture 2 section 5).
- Standard simplistic (narrow free-riding) economic modelling appears to contradict political reality – economists may need to review their choice of axioms and simplifications used to model economic, social and national behaviour.

# Challenges of public action can be overcome

- Design of action and arguments for action should be founded in the basic analytics of science, economics and ethics. But should not be left to policy wonks.
- Difficult political decisions are required - communication and leadership are crucial. Language, imagery, style, medium, all matter, so too does courage.
- Crucial to foster a shared understanding of the positive-sum game and benefits of collaboration; and of the risks from failing to collaborate nationally and internationally.
- Implicit sanctions in an integrated world. International interaction takes place on many important economic, financial, political and security dimensions so there are implicit sanctions and incentives beyond the formalities of climate agreements.



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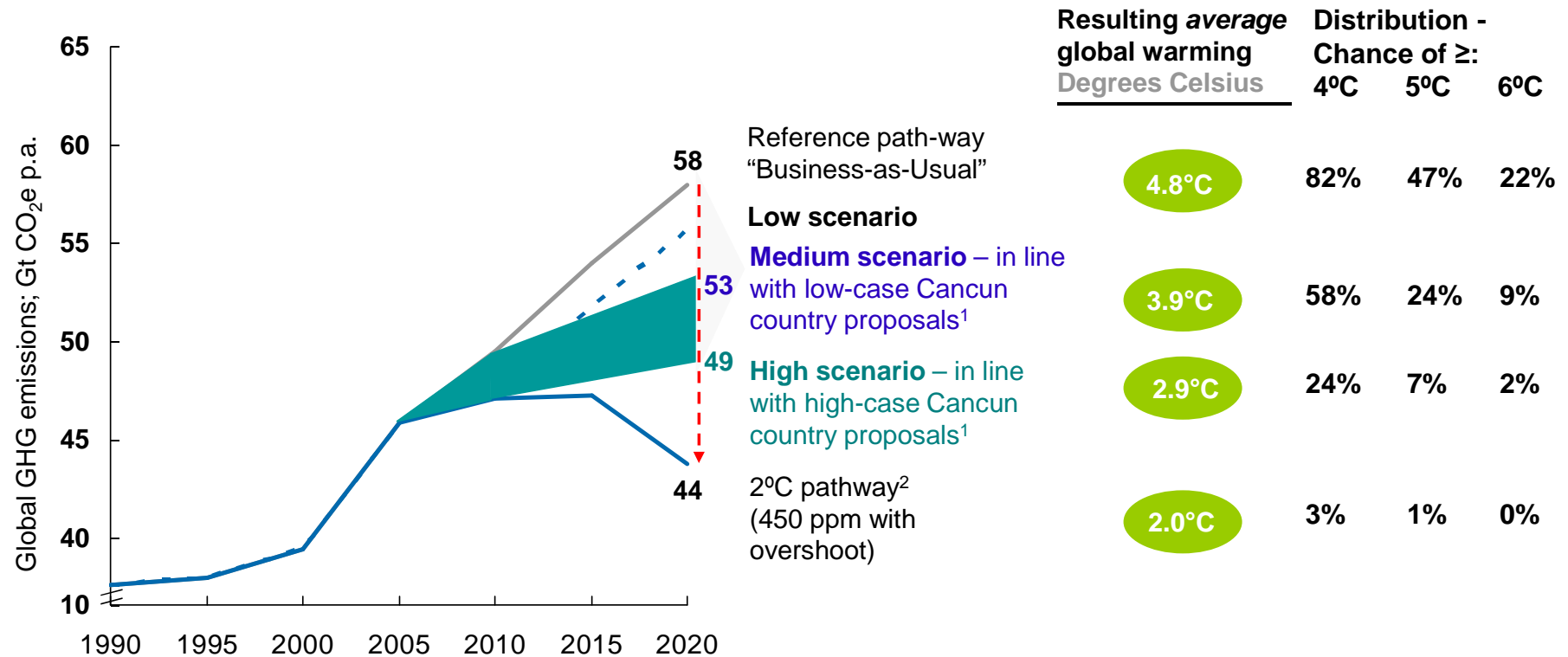
# History of international negotiations

<b>1988</b>	Intergovernmental Panel on Climate Change (IPCC). Has produced four major assessments, in 1990, 1995, 2001 and 2007.
<b>1992</b>	United Nations Framework Convention on Climate Change (UNFCCC).
<b>1997</b>	Kyoto Protocol adopted. Entered into force in 2005 following Russian ratification (Russia ratified as EU considered relaxing demands on Russia's accession to the WTO, and Russian emissions based on Soviet era production. So called 'hot air').
<b>2007</b>	Bali (UNFCCC Conference of the Parties 13, 'COP13'). 'Roadmap'
<b>2009</b>	Copenhagen (COP15). 'Accord'
<b>2010</b>	Cancun (COP16). 'Agreements'
<b>2011</b>	Durban (COP17). 'Platform'
<b>2012</b>	<b>Qatar</b> (COP18).

## Durban (COP 17) – key outcomes

- Kyoto Protocol extended for second commitment period (2013-2017); mainly Europe.
- The ‘Durban Platform for Enhanced Action’:
  - Delegates agreed to “launch a process to develop a protocol, another legal instrument or an agreed outcome with legal force...applicable to **all parties**” by 2015 which would enter into force by 2020;
  - Recognised “**gap**” between Copenhagen-Cancun pledges/commitments and 2°C target, but no agreement to enhance Copenhagen-Cancun pledges.
- Design of the Green Climate Fund (GCF):
  - Progress toward agreement on the design of the GCF, but not funding.
- Transparency:
  - New arrangements for transparency will increase the accountability of both developed and developing countries on actions to reduce emissions.
- Forests:
  - Finance from private and public sources, possibility of a formal REDD+ market mechanism under the COP; countries to report their forest reference levels.

# Cancun-Durban outcome not consistent with 2°C



<sup>1</sup> For example: 20% v 30% cuts in emissions 1990-2020 in the EU.

<sup>2</sup> Pathway that is expected to limit warming to 2°C with about a 50% probability.

SOURCE: Project Catalyst

# “Top down” and “Bottom up”

- Some argue international cooperation, “top down”, is impossible and that “bottom up” will be enough.
- To argue for “bottom-up” without “top-down” is a misunderstanding of the economics (investment hampered by lack of confidence), the science (dangers of delay) and the politics (domestic action enhanced by progress in international). Bottom-up encouraged by top-down.
- Top-down encouraged by progress at firm, city and country levels.
- ‘Top down’ and ‘bottom up’ support each. There is no artificial horse race between the two.
- Mutual confidence is a key ingredient for national and international action. Requires understanding of economics, history and culture of other countries. Not same thing as fully fledged formal agreement.

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## Action from developing world is key

- On current plans (Cancún) emissions in the developing world could rise from around 28 billion tonnes of CO<sub>2</sub>e today, to around 32-33 billion tonnes in 2020 (possibly higher), to 37-38 in 2030 (note 'budget' is around 32 for a 2°C path in 2030) (See lecture 1, Part 5).
- The increase reflects the changing structure of the world economy.
- 2°C (50-50) path simply not possible without strong action in developing world from now on.
- Developing countries are starting to move towards lower carbon intensity, e.g. China, Ethiopia, Rwanda, Korea (see Lecture 2, Part 5).
- They not only see the dangers and recognise responsible behaviour but also see the attractiveness of the new low-carbon growth path and the potential of the new markets.
- Strong moral and self-interest arguments for support from developed countries.
- See report of UN Secretary General's High-Level Advisory Group on Climate Financing, October 2010.

# Action from the developed world (I)

- Events of recent years have encouraged some to say we should delay, should go back and further question the science, and should try to restore high-carbon growth. Some reasons:
  - Obama elected (2008) and subsequent weakness on climate change;
  - Continued shift in the structure of the world economy, e.g. China's rise;
  - Weakness of Copenhagen COP meeting;
  - Attacks on the science (climate-gate), widespread failure to understand scale of risk;
  - Ideological attacks on regulation of GHGs (alleging “distortion of markets”, “red planners return in green hats”);
  - Failure to understand Pigou/Meade on market failure and Hayek/Schumpeter on innovation and discovery;
  - Deep financial and economic crises in some developed countries.



## Action from the developed world (II)

- There is nevertheless much action across developed countries at all levels (see Lecture 2).
- **Nations/states:** e.g. California cap-and-trade legislation, US EPA Mercury ruling, Australia carbon tax/trading scheme, UK 4<sup>th</sup> carbon budget, growth in renewable energy investment (despite the slow-down).
- **Cities:** e.g. “Covenant of Mayors” commits signatories of EU cities and towns to reduce CO<sub>2</sub> emissions by more than 20% 1990-2020 - close to 3,500 signatories to date. NYC has reduced GHG emissions by 13% below 2005 levels (US around 8% reduction) with a target for a 30% reduction by 2020.
- **Firms:** e.g. Dupont, The co-operative, Waste Management and Maersk (see Lecture 2). BT has cut its carbon intensity ('000 tonnes per £m value added) by 59% over the period 1997-2011, with an 80% target by 2020. Wal-Mart has ambitious sustainability goals and impressive achievements, including: 80% reduction in waste to landfill in California; US truck fleet efficiency improvement of 65% 2005-2010; plans to deploy rooftop solar to 75% of stores by 2013.
- Public policy to foster transformation (see Lecture 2); bad policy raises costs.
- ***The power of example is key to change.***

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# Low carbon growth and the crises (I)

- Financial and economic crises have dominated the developed world in recent years. New sources of growth are needed if deficits are to be closed and debt burdens reduced.
- The private sector is sitting on record levels of savings.
- Long-term interest rates low.
- Government policy can “create viable new markets, boost private investment and innovation, and stimulate the economy without requiring large public expenditure” (Zenghelis, 2011).
- The crisis presents a unique opportunity: now is the time to invest for low-carbon growth. Such periods happen rarely. Policy crucial.

## Low carbon growth and the crises (II)

- Good (clear and credible) public policy to correct market failures (see Lecture 2) can restore confidence and leverage large private investment opportunities with little threat of crowding out.
- Will require government instruments that help manage risk: feed-in tariffs; standards; super-grids; the Green Investment Bank. GIB involvement can help reduce policy risk as well as take long-term view with flexible finance. Mostly private investment and finance.
- If any government borrowing is warranted surely it is borrowing (at near zero rates) of the most sensible kind; to foster investment and innovation, mostly stymied by market failures, which can lay foundations for the private investment which can drive long-term growth and greatly add to the environment inherited by our children. See Lecture 2.

## Low carbon growth and the crises (III)

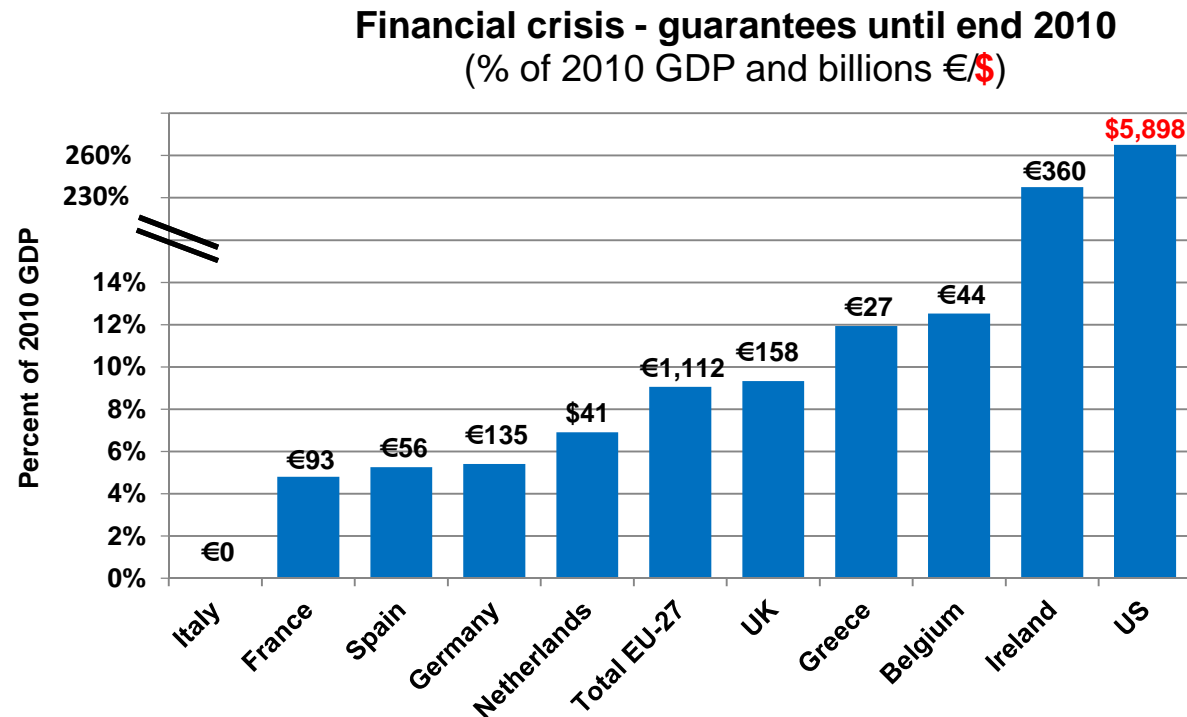
- Revenue from auctioning carbon permits and carbon taxes can promote low-carbon growth and help the fiscal.
- The claim that climate action is “market distorting” is wrong: it is overcoming market failure and thus pro-market.
- The claim that public investment may crowd-out private in this context is wrong: the economy has slack, there is finance, and (e.g.) good infrastructure facilitates investment. It will lever private investment and foster growth (with sound policy).

## Low carbon growth and the crises (IV)

- Delay in investment risks missing out on attractive and rapidly growing low-carbon markets. Also risks technological “lock-in” and more rapid and expensive change later.
- Strong action in greening the economy presents an opportunity to develop new skills across the economy.
- Many attractive, and potentially negative net cost, energy-efficiency projects.
- Great scope for collaboration with developing world as international division of labour changes.

# Low carbon growth and the crises (V)

- Governments will spend if disaster imminent but not if catastrophe is some way off.



- 2% of world GDP (likely necessary investment) is \$1,200 billion. Vast majority would be private sector and would have large co-benefits (energy security, new technologies, cleaner, quieter, more bio-diverse...) beyond reduced risks of climate change. And some guarantees/risk-reduction would help greatly.

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# Communication (I)

- The potential challenge is for public reasoning to come to sound conclusions and create political will. Vested interests and losers will and should have a voice but not a veto.
- A vision of a different way of producing, consuming and living that requires articulation and communication. Breaking the link between production/consumption and emissions allows growing and sustainable prosperity. This breaking is essential; cannot radically reduce emissions by 2030 simply by trying to stop growth. And anti-growth strategies will fail politically or hamper fight against poverty in developing world.
- The overall communication on climate change to date has not grappled effectively with describing risks from unmanaged climate change and the attractions of a different way of producing and consuming.

## Communication (II)

- The sceptics, in contrast, have been effective in influencing public opinion and key decision-makers in some rich countries, even though the arguments are generally shoddy and weak.
- See “Merchants of Doubt” for a description of how poor arguments can be financed and given apparent credibility (confuse risk with absence of knowledge, find a few errors in many thousands of papers, personal attacks...). Create impression of controversy over a “theory” (as in smoking and health, acid rain, evolution...).
- Bad arguments do have a right to be heard but also to be scrutinised. And no right to be accepted as sound if badly flawed or straight wrong.
- Strong action on climate change is generally good economics and pro-market, pro development and a vital element in the fight against world poverty. Inaction or delay is inefficient, inequitable and undermines the efficient functioning of markets: bad economics.

## Communication (III)

- The anti-market, anti-sustainable growth nature of inaction must be part of the public discussion.
- The basic structure and implications of the science: scale, risk/uncertainty, lags, publicness, make communication particularly difficult as all stretch public understanding.
- Above all must discuss as a problem of risk management. And recognise that creating the low-carbon growth is the only way to tackle the two defining challenges of our century – overcoming poverty and managing climate change.

# Prospects for advance in 2012

- Rio+20 (June 2012, Rio) and B20/G20 (June 2012, Mexico):
  - **Rio+20** - provides an opportunity to boost the sense of urgency and to place climate change together with key and intertwined issues of biodiversity and ecosystem management.
  - An opportunity for developed countries to work constructively with developing countries both on overall low-carbon growth and on specific issues, e.g. on marine and forest ecosystem protection.
  - The current draft Rio document is long, the sense of urgency not prominent, and the text weak. Government responses to the Rio+20 draft document were due by 17 February.
  - **B20/G20** in Mexico - few days before Rio+20. Opportunity to focus the agenda on key actions and programmes such as “Sustainable Energy for All”, recognise urgency and bring in private sector.
- Understanding role of low-carbon growth in recovery is of great importance.

# Will we act on the scale required?

- Can see the scale of what we need to do. Can identify the policies and the necessary technologies. There is great optimism about what is possible.
- The opportunities and growth that have followed previous periods of economic transformation/industrial revolution are clear from economic history but cannot be foreseen in their entirety ex ante. A process of 'discovery' à la Hayek, Schumpeter.
- But will we act on the scale required or are we too late?
  - The science is looking ever more worrying.
  - Since the Stern Review world emissions have increased from around 43 or 44 billion tonnes of CO<sub>2</sub>e to 49 or 50 billion tonnes and continue to rise.
  - Can the necessary acceleration in emissions reductions materialise?
  - The prospects look bad (see Lecture 2 and slide 11).

# Encouraging signs and progress (I)

- **There are some encouraging signs:**
  - Deforestation in the Amazon has been cut from around 27,000 km<sup>2</sup> in 2004 to around 6,000 km<sup>2</sup> in the year to July 2011. (Target is to cut deforestation 80% by 2020 - baseline is the average deforestation rate over the period 1996 to 2005 of 19,600 km<sup>2</sup>).
  - In May 2011 the President of Indonesia signed an order imposing a 2 year moratorium on new logging concession licences, with \$1 billion in support from Norway. Potential of using degraded land.
- **There are exciting examples of progress and a growing awareness of the challenges:**
  - **US Navy:** fostering the development of algal biofuels for a “Great Green Fleet” by 2016. In contrast to dithering in Washington and a short-term focus, the US Navy, driven by long-term concerns over energy security, is pushing ahead with action. Many in military go beyond short term and understand science, potential of technology and risk of conflict.

## Encouraging signs and progress (II)

- **TaKaDo:** an innovation that uses statistical and mathematical algorithms to detect, alert and provide real-time information on water network inefficiencies, such as leaks, drastically reducing losses: 25-30% of water supply is lost in distribution networks. Around 3.3 billion litres of water wasted in the UK per day, mainly in pipes. Water closely related to energy.
- An example of the overlap between the ICT revolution and the new clean energy revolution. Increasing water efficiency benefits development, mitigation and adaptation.
- **Fab Labs (MIT-based):** high tech community innovation labs where inventors can build their ideas. Designs tailored to individuals, on-the-spot production and designed for recycling.
- **New Vision for Agriculture:** in next 40 years, between now and 2050, the world must produce as much food as our civilisation has over the last 10,000 years. Urges increased investment in agriculture to boost food production by 20%, cut emissions by 20% and reduce rural poverty by 20%, **every decade**.

## Encouraging signs and progress (III)

- **Sustainable Energy for All:** plans to achieve universal access to modern energy services, double the global rate of energy efficiency improvement, and double the share of renewable energy in the global energy mix by 2030. Benefits for development, mitigation and adaptation. Can empower the 1.3 billion without access to electricity and 2.7 billion without access to clean cooking facilities (IEA, 2011). SELCO in Karnataka, Grameen Shakti in Bangladesh.
- **Greater appreciation of the role of energy and resource efficiency.**
  - McKinsey (2011): resource productivity improvements could meet nearly 30% of demand for resources in 2030, saving society between \$2.9 and \$3.7 trillion in 2030 (around 3% of likely world GDP).
  - WEF (2012): Action to increase resource efficiency could save up to \$2 trillion in 2030 and action to enhance energy efficiency could save up to \$1 trillion in 2030.



## Encouraging signs and progress (IV)

- **Provision of information is improving** - shows some countries making progress on sustainability and ecosystem management.
  - e.g. EPI (2012): tracks performance and progress on environmental health and ecosystem vitality. The top ranked countries in 2012 were Switzerland, Latvia, Norway, Luxembourg, and Costa Rica.
- **Developing world is acting** and the blame game is no longer shackling developed-developing country interaction as the advantages of the new low-carbon paths and the disadvantages of high-carbon growth become clear, e.g. China's 12<sup>th</sup> plan and the willingness of developing countries to sign up to a “unified” international agreement by 2020.
- Momentum for a **WEO** increasing: could begin with a data focus.

# Weak arguments against strong action (I)

- Arguments against strong action at national level often very confused and fail to understand basic economics of market failure. Action is overcoming market failure and thus pro-market.
- *“We’re not going to save the planet by putting our country out of business”*. George Osborne, Conservative Party Conference, October 2011.
- *“Industry will migrate to ‘dirty’ countries”*. Weak evidence; and have to look ahead to future action to “get greener” by others (Lecture 2).
- *“Others are doing nothing”*: wrong – the world is changing. Time to be more aware of the world.

## Weak arguments against strong action (II)

- Costs of many green technologies falling fast. Past industrial revolutions involved a transformation that saw two or more decades of strong innovation, investment and growth, with investment flowing to the pioneers. Overlap with the ICT revolution increases potential and attractiveness (e.g. TaKaDo and Fab Labs). Smart grids and energy management.
- Strong action will avoid future obstacles: likely and justified taxing of dirty products, e.g. EU Fuel Quality Directive review is considering minimum environmental standards for fuels imported to Europe.
- But sound and steady policy is crucial to fostering growth and keeping down costs.
- Europe's strongest economies (Scandinavia/Germany) are those taking this issue most seriously. UK should join them in the vanguard for both growth and the environment.

# Conclusion (I)

- There is growing optimism on what can be done and many signs of progress.
- There is an exciting story of investment, opportunity and growth, and protection of the natural world: growing understanding of the benefits of a transition to the low-carbon economy and of the low-carbon economy itself.
- Examples of real progress and leadership at all levels: farm, village, town, city, province, country and region (examples given throughout the lectures).
- Thomas Edison (1847-1931) in conversation with Henry Ford and Harry Firestone 1931 (shortly before he died):

*“We are like tenant farmers chopping down the fence around our home for fuel when we should be using Nature’s inexhaustible sources of energy – sun, wind and tide. I’d put my money on the sun and solar energy. What a source of power! I hope we don’t have to wait until oil and coal run out before we tackle that.”*

## Conclusion (II)

- But ever greater worry about messages from the science (e.g. absorptive capacity of some oceans is falling, damage to ecosystems happening faster than predicted).
- And on basis of current pace of action and rising emission looks as if we are headed for an average temperature increase of 3-4°C with strong possibilities of still higher temperatures. Catastrophic rewrite of relationship between humans and the planet within lifetimes of those being born today.
- At times bad economics; not understanding market failure à la Meade and Pigou, and failing to take on lessons of Hayek and Schumpeter, the economists for whom Lionel Robbins had a special admiration. Meade and Hayek were his LSE colleagues.
- Only strong action can allow us to rise to the twin challenges of our century: overcoming poverty and managing climate change. The prize from success is enormous; failure would be devastating.
- Optimism about what can be done is not the same as optimism about what will be done. Analysis, evidence, communication, leadership, are crucial.

## Conclusion (III)

- Further research:
  - Innovation and industrial revolutions.
  - Inter-relations between climate change and sustainability more generally.
  - A dynamic public economics for fostering change.
  - Political economy of relevant vested interests and obstacles.
  - Moral philosophy of great risks and collective action.
  - Inequality and opportunity in radical transformations.
  - Political economy of mutual confidence in international action.
- This is an agenda that combines: economics, philosophy, politics, finance, economic development, international relations, geography, economic history, history, sociology, communications, mathematics/statistics, computer science, the subjects of LSE, as well as science and technology. It would have excited Lionel Robbins and his combination of talents could have made a special contribution.
- Cannot delay: must research, act and learn as we go.

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