IEAGHG Information Paper 2016-IP45: The Stern Report 10 years on

In 2006 the UK Government commissioned 'The Economics of Climate Change: The Stern Review' which is generally referred to as the Stern report. Lord Stern, on 27th October, delivered a lecture to the London School of Economics entitled: 'The Economics of Climate Change: The Stern Review'. A copy of the presentation can be found at: http://www.lse.ac.uk/publicEvents/pdf/2016-MT/20171027-Nick-Stern-PPT.pdf. Also a pod cast of the lecture can be found at: http://www.lse.ac.uk/newsAndMedia/videoAndAudio/channels/publicLecturesAndEvents/player.aspx?id=3627

Some of the key messages from this update taken from the slides presented are as follows:

Key messages of the Stern Review

- All countries will be affected by climate change, the poorest countries will suffer the earliest and most severely. Potential scale of damage is very large.
- "The costs of action" are far less than "the costs of inaction".
- Delay in action is dangerous.
- Climate change is the greatest market failure the world has ever seen.
- Well designed policy can deliver strong results.
- Global collaboration and action required.

These messages have stood the test of time; indeed have become still stronger.

The science is still clearer…

- The science is robust. Built on two centuries of theory and evidence. The evidence grows ever stronger that risks are immense and still larger than previously thought.
- Current emissions at 50 $GtCO_2e$ (around 41 $GtCO_2e$ in 2005). Still on an upward trend.
- Many of the effects coming through more rapidly than thought (loss of ice sheets, glaciers etc.). 15 of the 16 warmest years on record have now occurred since 2001, 2016 predicted to be warmest year on record (NASA, 2016).
- CO2e concentrations rising rapidly, now around 450ppmof CO_2e
- Adding CO_2e at a rate of over 2.5ppm per year (likely to accelerate with little or weak action). This is up from 0.5ppm per year 1930-1950, 1ppm 1950-1970 and 2ppm 1970-1990.
- Inaction or weak action could take us to over 850ppm CO_2e over a century: strong possibility of eventual temperature increase of more than 4°C or 5°C (increase in global average surface temperature above second half of the 19thcentury).

The risks are unprecedented for humankind

Potential damage from climate change intensifies as the world gets warmer:

- Already near 1°C, edge of the experience of the stable period during the Holocene (last 10,000 years) where civilisation developed (cereals, villages, surpluses…).
- Seeing strong effects now; yet small relative to what we risk.
- Serious risks of tipping points and potential irreversibility if we go beyond 1.5 °C (loss of sea ice, land ice melt, sea level rise, change in ocean current circulation, thawing of permafrost, die-back of the Amazon and other tropical rainforests). Still higher risks beyond 2 °C.
- Temperature increase of 4 or 5°C or more not seen for tens of millions of years (homo sapiens, 250,000 years):
- Likely be enormously destructive
- The reasons we live where we do would be redrawn (e.g. too much or too little water).
- Potentially causing severe and sustained conflict with migration of hundreds of millions, perhaps billions of people.

Delay is dangerous

- Uncertainty and 'publicness' of the causes of climate change might suggest delay to learn more. That would be a profound mistake.
  - The "ratchet effect"from flows of GHGs to concentrations (CO2hard to remove).
  - "Lock-in"of long-lived high-carbon capital/infrastructure involves either commitment to high emissions or early scrapping of capital/infrastructure.
  - Rapid urbanisation and building of infrastructure.
- The later the action, the smaller the likelihood of holding to 2oC and the more costly to achieve it.
- Delay also increases reliance on unproven future technologies (e.g. negative emissions) or more ambitious action in future (politically feasible?).

What to do to hold warming below 2°C

- Can do a little more earlier and a little less later and vice versa but shape of feasible paths similar.
- Stabilising temperatures requires stabilising concentrations, which will require net zero emissions. The lower the target temperature, the earlier the necessary achievement of net-zero.
- Paths to achieve under 2°C likely to require:
  - zero total emissions well before the end of century.
  - Net negative emissions in major sectors well before end of century (because some sectors likely to be positive).
- Total current Paris pledges (INDCs) are for emissions of around 55-60 $GtCO_2e$ per annum in 2030. Whilst improvement on BAU (ca. 65-68 $GtCO_2e$ per annum), need to be around 40 $GtCO_2e$ or less per annum by 2030.

The "costs of action" and investing in growth

- With hindsight Stern Review underestimated the risks and costs of inaction.
- The notion of "costs of action" is being transformed by rapid technological advances:
  - Efficiency, demand management; renewable energy (solar, wind) and energy storage technology.
  - Continuing rapid technical progress in digital, materials, bio-tech….
- Better understanding of dynamics of change and leaning; and of the consequences of dirty infrastructure (e.g. air pollution from burning fossil fuels).
- No longer a story of simple-minded trade-offs as embodied in the United Nations Framework Convention on Climate Change (1992). Action is now seen as the growth story of the future
  - Shift from a focus on the "costs" to one of "investment".

Progress in nations, cities and regions has been slow, but momentum is building

- Already, about 40 national jurisdictions and over 20 cities, states, and regions are putting a price on carbon.
- Development Banks are supporting low-carbon investment:
- Climate change and sustainable infrastructure is now a priority for regional development banks, World Bank and IMF; also FSB.
- Importance of policy credibility in generating investment:
  - Commitment to further climate action from some of the world's largest emitters: China (13thFive-year plan), EU (2030 climate & energy framework), USA (Clean Power Plan).
  - By the end of 2014, there were 804 climate change laws and policies amongst 99 countries, compared to 426 in 2009.

Outstanding progress internationally in 2015/2016: a new global agenda

2015 and 2016 breakthrough years for global collaboration around climate change and development.

- The global agenda for action has been set with agreements on:
  - Financing for development in Addis (July 2015)
  - Sustainable Development Goals (Sep 2015)
  - Paris Agreement on Climate Change (CoP 21) (agreed Dec 2015, enter into force in Nov 2016; very rapid ratification)
  - Kigali Amendment to the Montreal Protocol on HFCs (Oct 2016)
  - New Urban Agenda (Oct 2016)
- Was slower than hoped (e.g. from Copenhagen in 2009), but now strong.
- First shared global agenda since agreements after WW II.

The Paris Agreement

- Paris Agreement on Climate Change was a remarkable achievement after years of debate and fundamental disagreements; signed by 175 countries at UN on 22 April 2016 (most in history on single day).
- On 5 October 2016, the double threshold of 55 countries and 55% of global emissions was passed, meaning that the Paris Agreement will enter into force on 4 November 2016.
- Foundation of agreement was built on the understanding of:
  - the scale of risks and urgency to act, and
  - •attractiveness of alternative path as sustainable route to lasting development and overcoming poverty.
  - USA –China, mutual understanding on the need for action played crucial role.
- Paris Agreement was based on anticipation of great risk rather than grim experience (Bretton Woods).

Great opportunity to embark on new, attractive and sustainable path; but dangers of "lock-in" if action delayed

- Current development path is towards dirty infrastructure, congested and polluted cities, destruction of forests. Creating grave danger of lock-in of high carbon infrastructure and irreversible effects.
- Mitigation, adaptation, development are intertwined: agriculture, water, transport, energy, buildings, cities…
- The direction and nature of economic development matters, and it makes sense to integrate climate policy with development planning and investment decisions.
- 3.5bn people in cities now, 6.5bn in 2050; growth led by developing world creates great opportunities for transformational investment. But great danger of cities designed and built badly (congestion, pollution, emissions…)
- Investment in sustainable infrastructure is at the heart, must average $5-6 trillion p.a. over the next 20 years.
  - Around 70% will be required in developing countries.

Next 10 years requires strong policy and investment if we are to grasp the opportunities of the next 20 years.

- We now collectively have to deliver on the 21stcentury growth story:
  - If we fail to manage climate change, we will fail on the overcoming poverty.
  - If we manage climate change in a way that puts barriers to development, we will not have the coalition needed to overcome climate change.
- If we do not take the opportunities now, 2^{o}C will be out of reach and we will risk reversing development gains, having cities where we cannot move or breathe, or ecosystems that collapse. The gains are potentially great, but so too are the risks of delay.
- We have to collectively harness the momentum, increase collaboration and implement agreements. It is about working together to incentivise, foster and finance change.
- Are winning the arguments but action still far too slow.
- The actions of the next 20 years are decisive and are shaped by our actions and policies in the next 10 years.

We know what needs to be done, we know how to begin, and we will learn along the way.

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