Bridging the scenario-implementation gap: the role of technological innovation

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The scenario – implementation gap: how do we get from here....



After 2030

.....to there.....and beyond?



Homework questions raised by the Paris Agreement

- → The dynamics of long-term emissions pathways
- → Short-medium term actions (2020-2030) and optionality for the long-term (2050-2100)
- Mid-century, long-term low greenhouse gas emission development strategies
- → Peaking of emissions when and how do we know we've got there
- → Balancing sources and sinks energy and other sectors
- → Strengthening cooperative action on technology development and transfer
- → Global stocktake and the aggregation of efforts
 - Emission inventories (TFI)
 - Aggregation of NDCs
 - NDCs and the long-term aims

Can we tell when emissions peak? Aggregate fossil fuel CO₂ emissions of 12 countries whose emissions peaked in the period 2001-2010



Source: based on IEA data

Balancing sinks and sources and long-term low greenhouse gas emission development strategies (Article 4)



Note: one illustrative scenario with a 65% probability of getting below 2°C warming

Source: derived from AR5 database

Long-term aims and benchmarking against least-cost mitigation pathways What does "least-cost" imply?



What do deep dives into the AR5 scenarios tell us about preand post-2030?

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Carbon price



Attribution of mitigation to 2030

- This single scenario is: likely (65% probability) to get below 2°C by 2100; unlikely to get below 1.5 °C (20% probability)
- The mix of mitigation measures beyond 2030 is different from that before 2030
- The level of effort, as measured by carbon price, needs to increase exponentially beyond 2030

Source: derived from AR5 database

On what path do the NDCs take us? What aspects of socio-economic development and ambition persist beyond 2030?

A Emissions pathways



B Temperature probabilities

Beyond headline emission indicators A bridge to implementation?

→ Possible macro-indicators

- Sectoral emissions (e.g. AFOLU v energy)
- Regional emissions
- Decomposition of effort
 - Energy/GDP ratios
 - "Zero-carbon" energy supply
 - Fossil fuel mix
 - CO₂ Removals
- → Technology indicators
 - Deployment of key technologies
 - First use
 - Market share indicating "commercialisation"
 - Demonstration activities
 - Investment in R&D
- → Financial flows
- Policy formation and implementation

Phases of the innovation timeline



Source: UKERC, 2015

Timeline and duration of innovation for various technologies



Source: UKERC, 2015

Development and commercialisation timelines



Source: UKERC, 2015



Source: ETP, 2010

Final technology questions

- → Balancing deployment (short-medium); demonstration (medium) and R&D (medium-long term)
- → Pushing water uphill (CCS?) and technologies that surprise (PV, electric vehicles?)
- Mission Innovation, Breakthrough Coalition and the Technology Mechanism
- → It may not all be about technology changing growth strategies

