

Global Energy Transformation to Low CO2 Emissions

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The Foundation for Science and
Technology

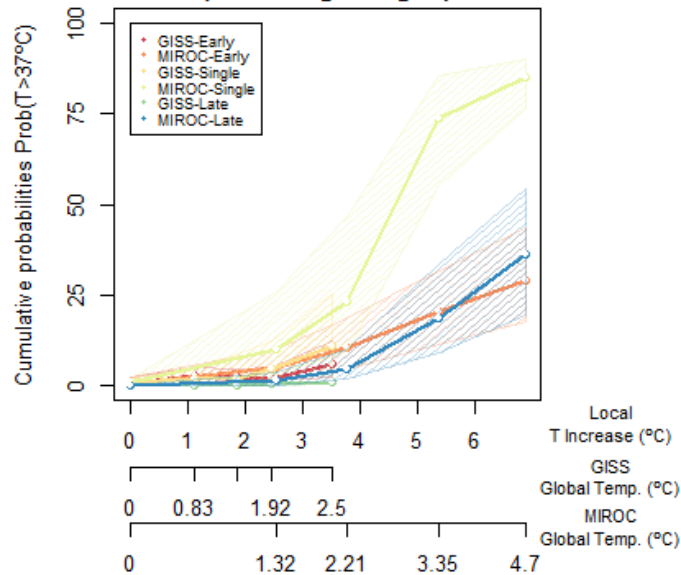
The Royal Society, London

8th July 2015

- Climate Change Risk: looming catastrophe to be avoided, with benefits including:
 - Energy Security
 - Health
 - Prosperity
- UK commitment: 80% CO2 emissions reduction compared with 1990; 52% by 2028.

Risk of Crop Failure (Rice)

Critical Temperatures Risk (Flowering-Jiangsu)

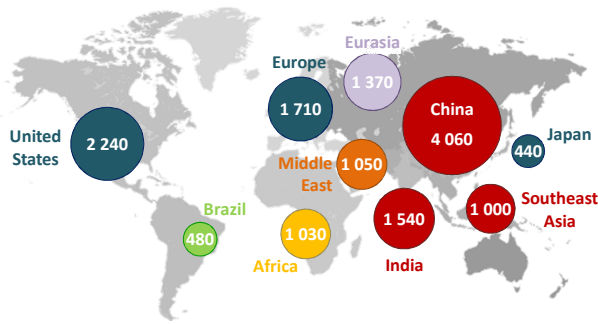


I'd put my money on the sun and solar energy.
What a source of power! Edison, 1931

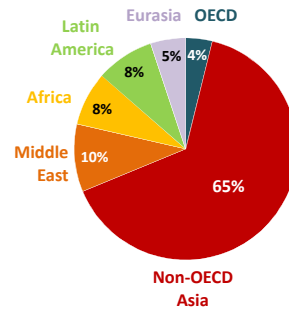
- Actions are urgently needed to reduce energy use, and actions to make energy clean.
- One thing would be enough to make this happen: if clean energy became less costly to produce than energy based on coal, oil or gas.
- This requires a major focus from scientists, engineers and entrepreneurs.
- We need a new R, D & D Programme into CO₂-free energy.

The engine of energy demand growth moves to South Asia

Primary energy demand, 2035 (Mtoe)



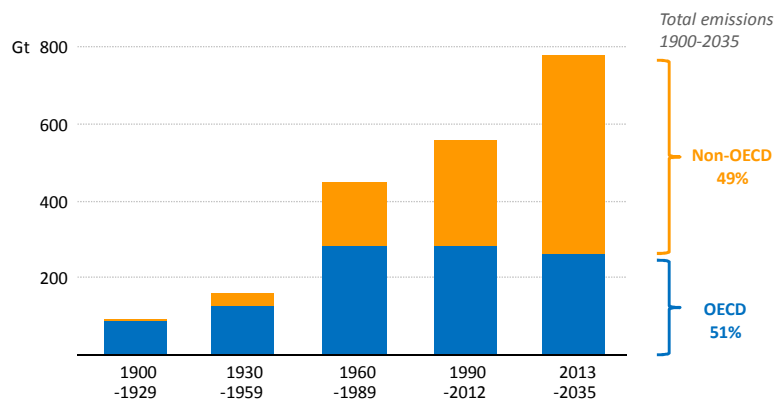
Share of global growth 2012-2035



China is the main driver of increasing energy demand in the current decade, but India takes over in the 2020s as the principal source of growth

Emissions off track in the run-up to the 2015 climate summit in France

Cumulative energy-related CO₂ emissions



Non-OECD countries account for a rising share of emissions, although 2035 per capita levels are only half of OECD

Energy-related CO₂ emissions



Redrawing the Energy-Climate Map, World Energy Outlook Special Report. Paris: OECD/IEA (Figure 1.16)

How the price of silicon PV modules has fallen as installed capacity has risen

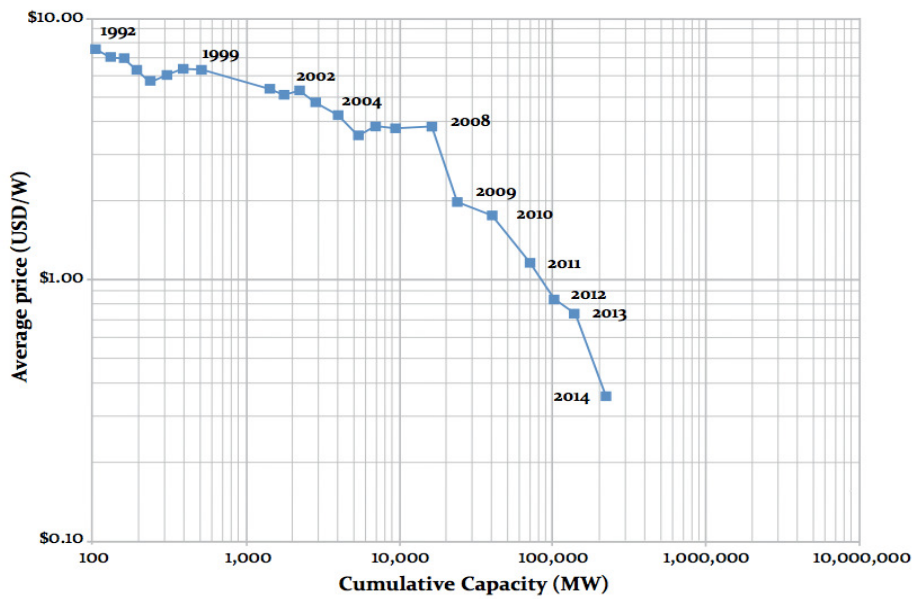
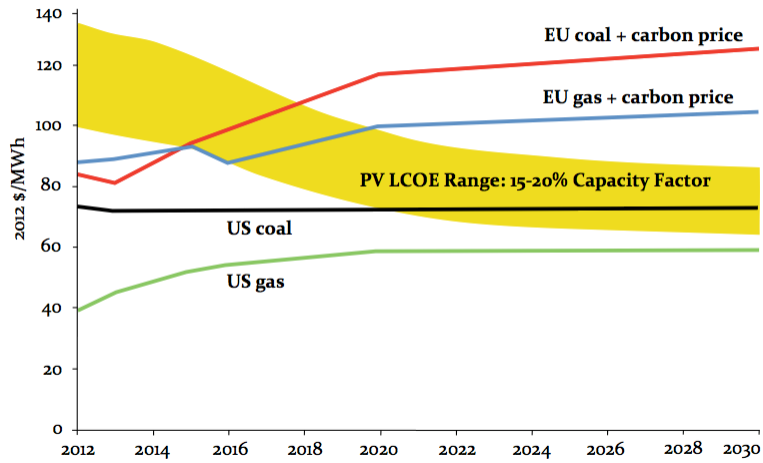


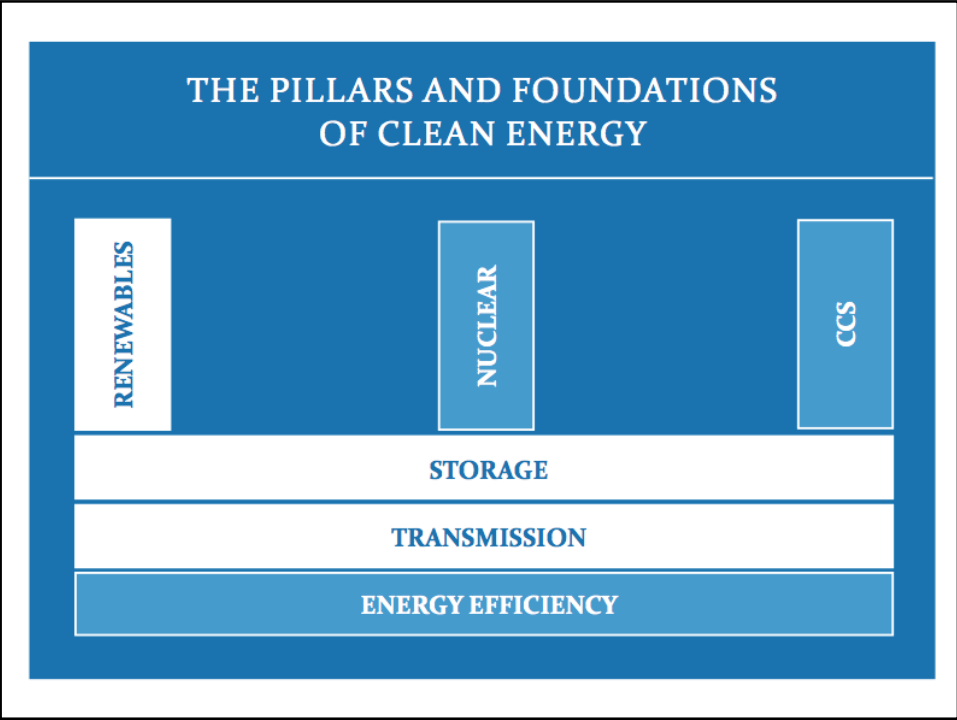
Figure A3: Levelised cost of electricity from PV, coal and gas – 2012-2030



Source: Bloomberg New Energy Finance (2013).

Q : " can radical technological innovation reduce the cost of supply?"

A : **Yes, but we need to target our innovation support**



The Global Programme Proposals

- **Scale:**
Member Governments of the Programme agree to Coordinate RD&D on the Mission –Oriented Programme from 2016 to 2025.
- **Roadmap:**
Consortium of scientific and industry experts to identify bottlenecks to be tackled by RD & D, and Deployment, activity. Private sector in the slipstream to roll out products to the market place.
- **Target:**
New-build renewable energy to become cheaper, including energy storage, than new build coal in sunny regions of the world by 2020, and in all the world by 2025.

A range of new electricity storage technologies needed for a range of applications:

- Small scale for distributed systems, eg for off-grid villages, kW hr to MW hr
- Large scale for country-wide grids, GW hr to tens of GW hr.
- Different time scales, from 14 hour day-night to inter-seasonal.
- Cost target: < \$100 per kW hr.

Global support to date

- Considerable interest expressed from a wide range of countries and regions, including:
- EC, UK, France, Germany, Italy, USA, Japan, Korea, Mexico, UAE, India, Brazil and China
- Raised at recent G7 Energy Ministerial, and approved for action at G7 Heads of Government in Germany last month.
- Expect to be able to announce statements of intent from participating countries to form the Commission before the Paris CoP in December this year.

G7 Heads of Government meeting, June 2015

- Commitment to “decarbonise the global economy over the course of this century.”
- “ We will work together and with other interested countries to raise the overall coordination and transparency of clean energy research, development and demonstration, highlighting the importance of renewable energy and other low-carbon technologies. We ask Energy Ministers to take forward this initiative and report back to us in 2016.”

