ENERGY TECHNOLOGY

IEA Tracking Clean Energy Progress and Technology Roadmaps

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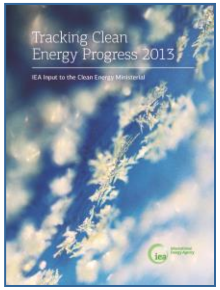
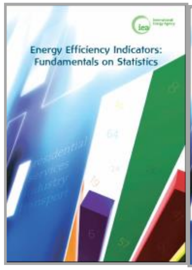
IEA's work on clean energy

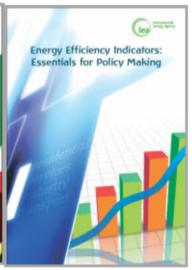
- Where do we need to go in the long term?



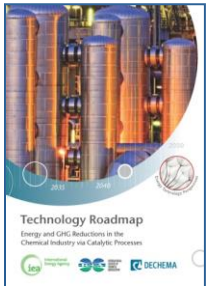
- Where are we today?

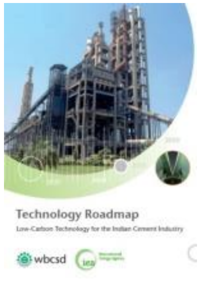
- Where are heading?





- How to evaluate energy efficiency?

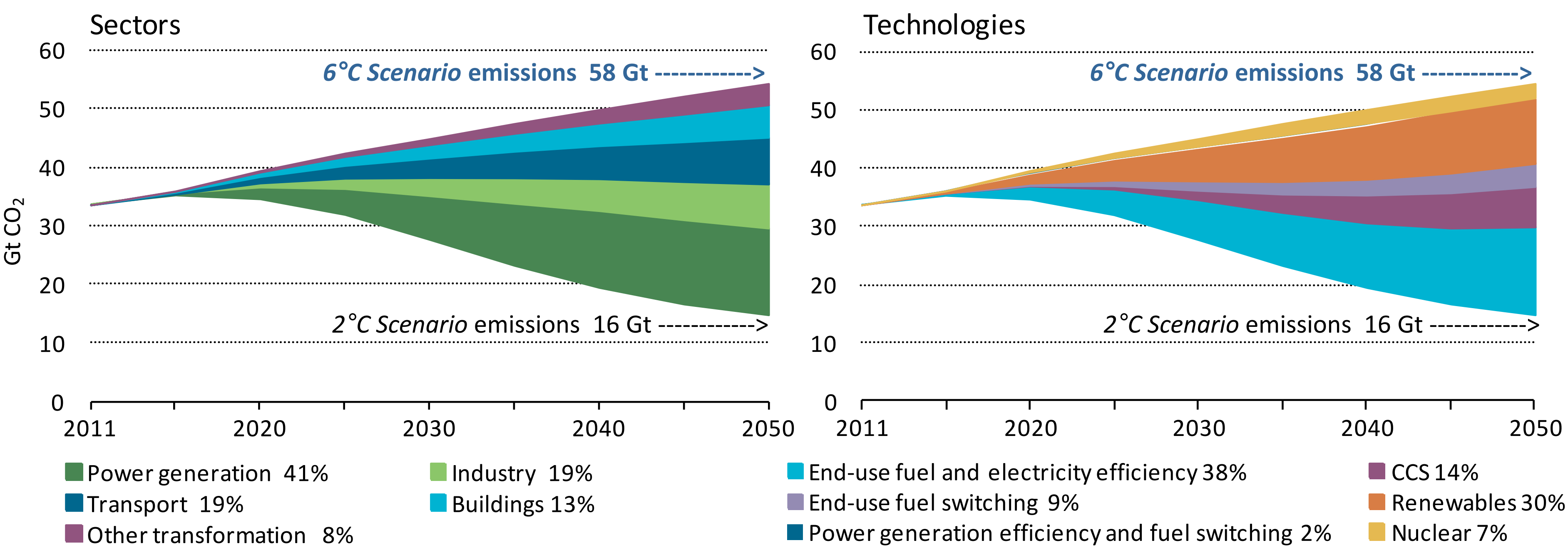




- How do we get there?

Key technologies for reducing global CO_2 emissions

ETP 2014



Source: Energy Technology Perspectives 2014

- **6°C Scenario – business-as-usual; no adoption of new energy and climate policies**
- **2°C Scenario - energy-related CO_2-emissions halved by 2050 through CO_2-price and strong policies**

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Progress is not just about deployment

Technology penetration	*Are technologies being deployed at the rates expected?*	• Capacity and generation • Growth rates • Share of market • Market concentration
Market creation	*Are governments creating markets that drive private sector investments?*	• Enabling policies and policy environment • Investment levels
Technology development	*Are technologies advancing as expected?*	• Public investment in RD&D • Technology performance • Technology cost

Progress is assessed in three dimensions

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Technologies are available , but need the right market conditions

ETP 2014

Market maturity/ saturation	ASEAN	Brazil	China	European Union	India	Japan/ Korea	Mexico	Middle East	Australia/ New Zealand	Russia	South Africa	United States/ Canada
Double-glazed low-e glass	●	▲	▲	★	▲	●	●	▲	●	●	●	★
Window films	▲	▲	▲	●	▲	●	▲	▲	●	▲	▲	●
Window attachments (e.g. shutters, shades, storm panel)	●	▲	●	★	▲	●	▲	●	●	▲	●	★
Highly insulating windows (e.g. triple-glazed)		▲	▲	●		▲		▲	▲	▲	▲	▲
Typical insulation	★	●	★	★	●	★	●	★	★	★	●	★
Exterior insulation	●	▲	●	★	●	●	▲	●		▲	▲	★
Advanced insulation (e.g. aerogel, VIPs)				▲		▲				▲	▲	▲
Air sealing	●	▲	▲	★	▲	●		▲	▲	▲		●
Cool roofs	▲	▲	▲	●	▲	▲	▲	▲	▲			★
BIPV/ advanced roofs	▲	▲		▲	▲	▲			▲	▲	▲	▲

★ Mature market ● Established market ▲ Initial market

Policy efforts are increasing but are still insufficient to ensure implementation of cost-effective measures that are widely available already

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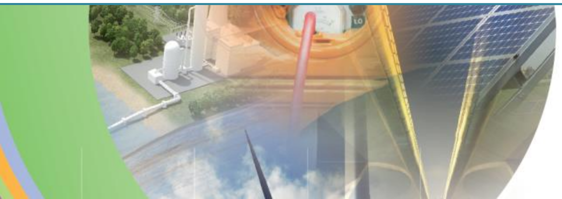
Technology roadmaps provide answers

- **Where is technology today?**
  - GW installed capacity/kWh of savings
  - Leading countries/regions
  - Cost, efficiency

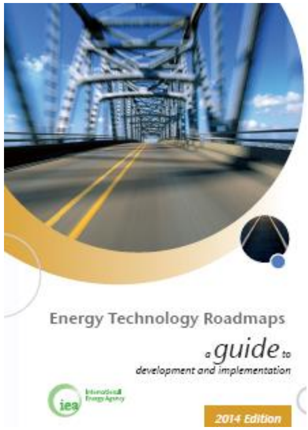
- **What is the deployment pathway needed to achieve 2050 goals?**
  - Use IEA Energy Technology Perspectives 2°C scenario
- **What are the priority near-term actions?**
  - R&D gaps and how to fill them
  - Identify barriers and obstacles and how to overcome
  - Market requirements and policy needs
  - Technology diffusion/transfer and international collaboration needs



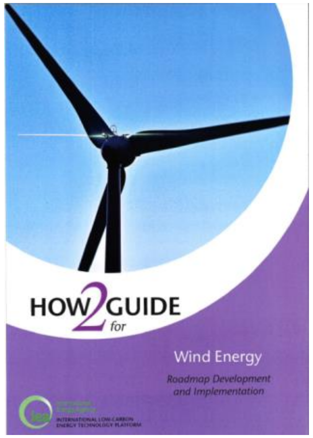
Energy technology roadmaps guide

- Guides published by IEA
  - Understanding roadmaps
  - Roadmap development process
  - Tailoring the roadmap process

http://www.iea.org/publications/free_new_Desc.asp?PUBS_ID=2291



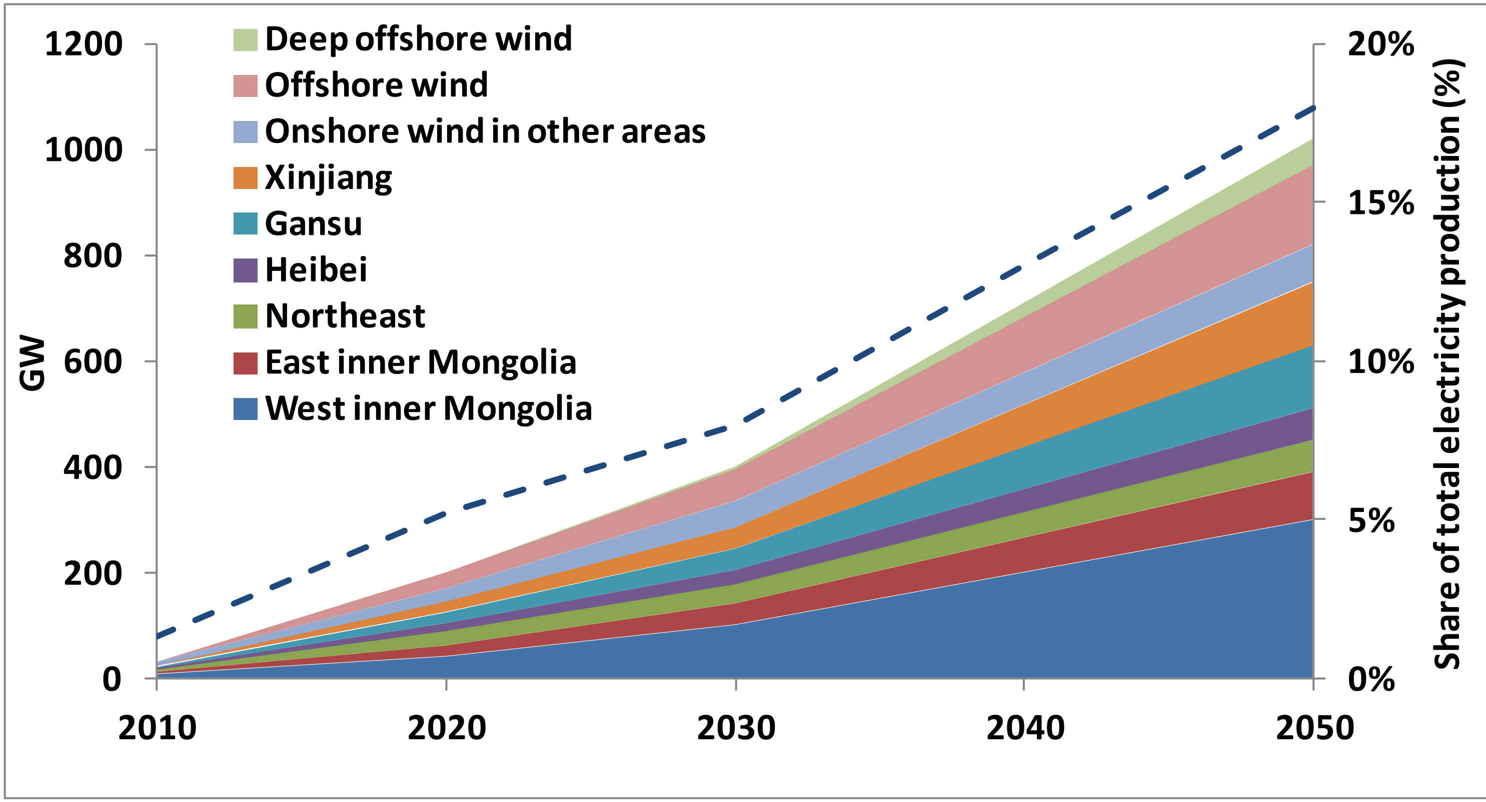
- How2Guide for Wind Energy
  - Manual to guide policy and decision makers in developing and implementing wind technology roadmaps tailored to national / regional frameworks



Roadmap logic

- Goal to achieve
- Milestones to be met
- Gaps to be filled
- Actions to overcome gaps and barriers
- What and when things need to be achieved

China wind roadmap



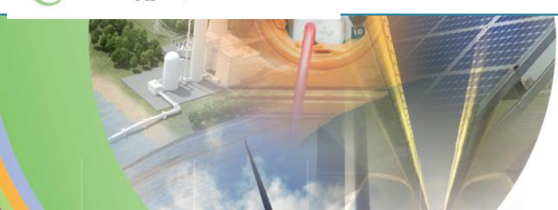


Table 1: Key indicators for Indian cement industry in the 2DS

		Low-Demand Case			High-Demand Case		
	2010	2020	2030	2050	2020	2030	2050
Production (Mt)	217	416	598	780	492	848	1 361
Per-capita consumption (kg/capita)	188	309	400	467	364	565	812
Clinker-to-cement ratio	0.74	0.70	0.64	0.58	0.70	0.64	0.58
Electric intensity of cement production (kWh/t cement)	80	76	73	71	75	72	70
Thermal intensity of clinker production (kcal/kg clinker)	725	709	694	680	703	690	678
Alternative fuel use (as a share of thermal energy consumption) (%)	0.6	5	19	25	5	19	25

Notes: Data for 2010 is for financial year 2009/10 ending 31 March 2010. The electric intensity of cement production does not include the reductions that may come from the use of WHR.

Lessons Learned

- IEA roadmaps are having a clear impact
  - Informing initiatives, policies, debate
- Tracking Clean Energy Progress
  - Annual input to Clean Energy Ministerial
- Implementation requires further effort
  - Partnering with industry, CEM initiatives, others
- National roadmaps to support implementation
  - IEA supporting national roadmap development

For more information

- Download the roadmaps:

  http://www.iea.org/roadmaps/

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