Energy Technology Perspectives 2012

Pathways to a Clean Energy System

Decarbonising the power sector

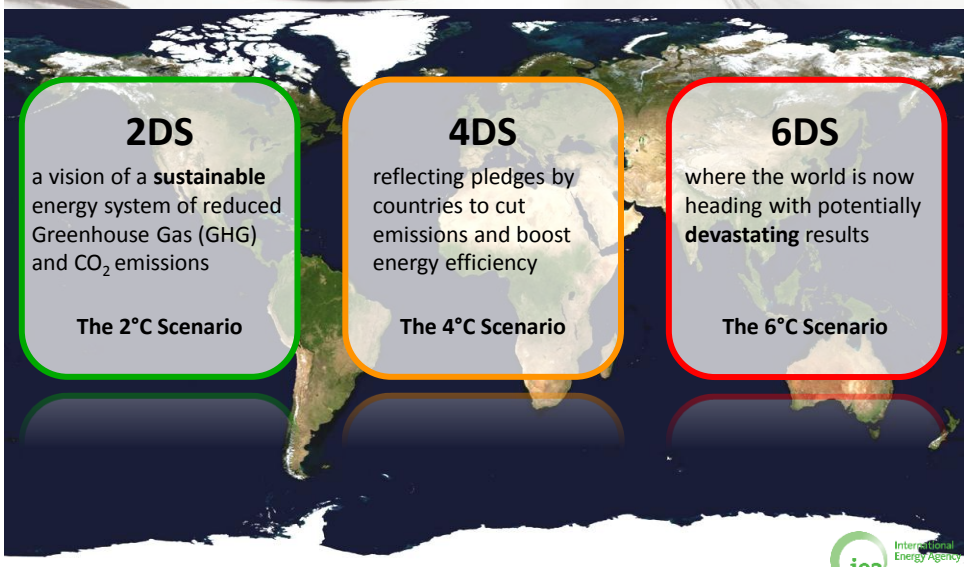
Uwe Remme

ETSAP Workshop, Cape Town, 22 June 2012

International Energy Agency

ETP 2012 – Choice of 3 Futures

ETP 2012



2DS

a vision of a **sustainable** energy system of reduced Greenhouse Gas (GHG) and CO_2 emissions

The 2°C Scenario

4DS

reflecting pledges by countries to cut emissions and boost energy efficiency

The 4°C Scenario

6DS

where the world is now heading with potentially **devastating** results

The 6°C Scenario

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ETP Modelling Framework

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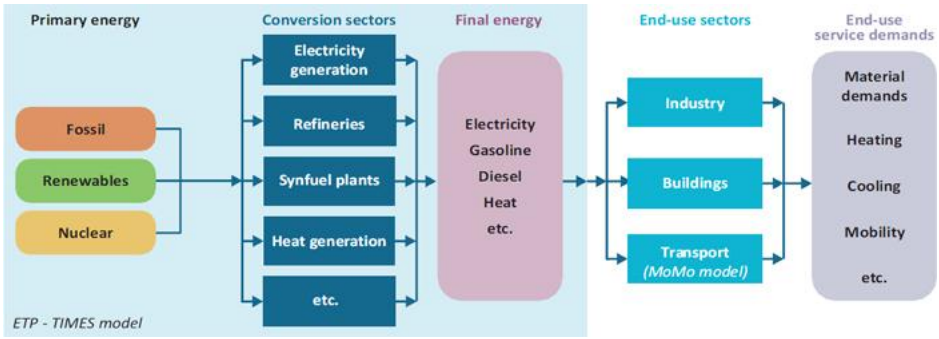

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World regions in the ETP model

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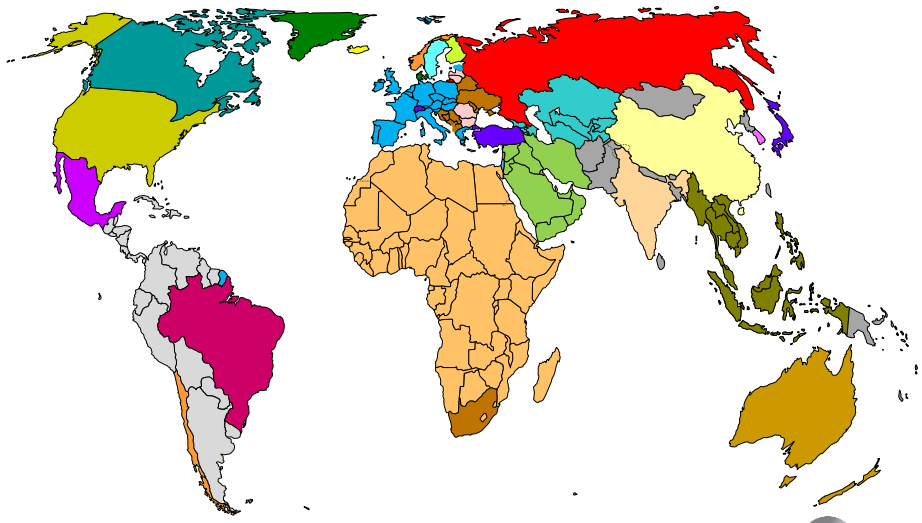

The map included herein are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

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Global CO_2 emissions

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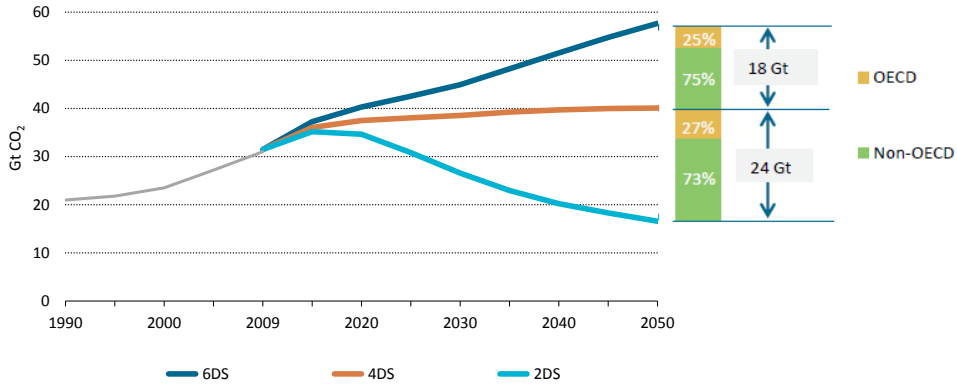

Global energy-related CO_2 emissions in 2050 must be half of current levels to limit the global temperature increase to 2 °C.

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Key technologies to reach the 2DS

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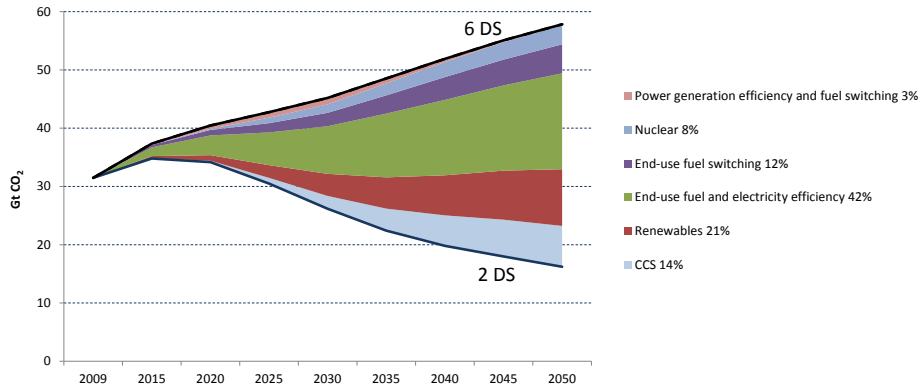

Efficiency improvements and fuel switching in the end-use sectors account for more than half of the reductions.

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Total primary energy demand

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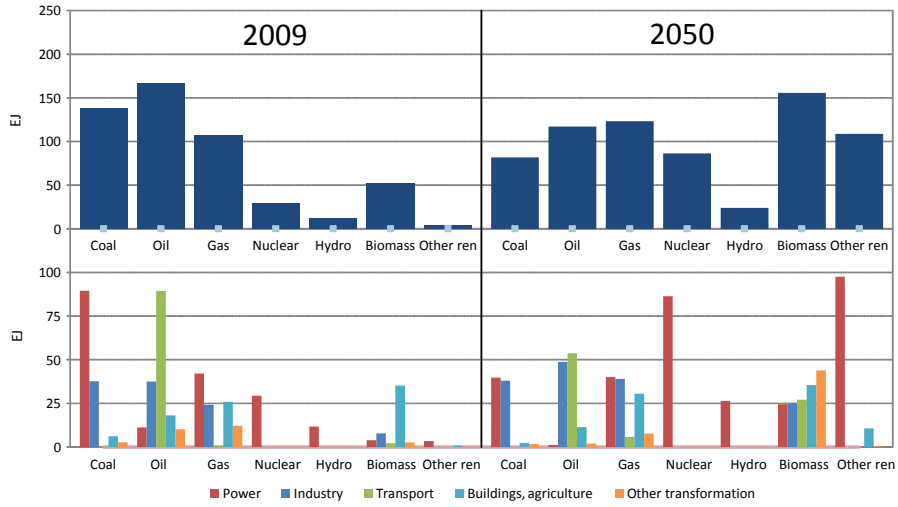

Biomass becomes the largest primary energy carrier by 2050 in the 2DS.

Energy and CO_2 impacts of electricity generation

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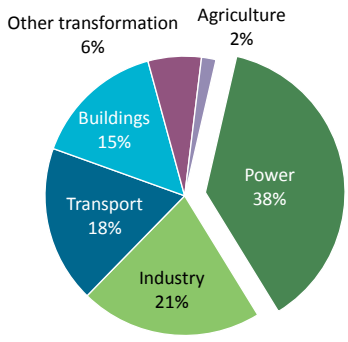
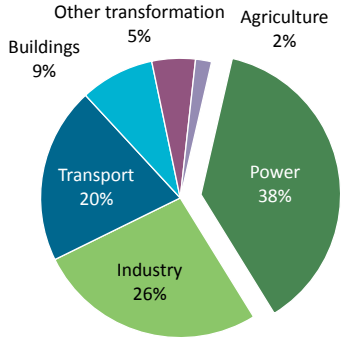


Total primary energy use: 509 EJ in 2009



Total energy-related CO_2 emissions: 31.4 Gt in 2009

Power sector accounted in 2009 for almost 40% of global primary energy use and energy-related CO_2 emissions.

Past trends in power generation

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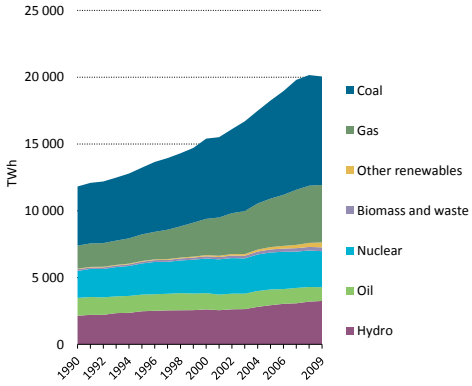
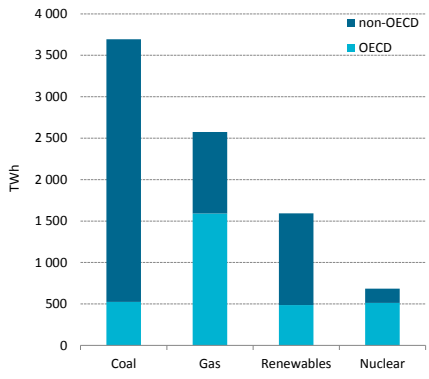
Global electricity generation by fuel



Incremental generation 1990-2009



Increase in electricity generation over the last two decades largely covered by fossil fuels, but strong growth rates for renewables

Age distribution of existing power plants

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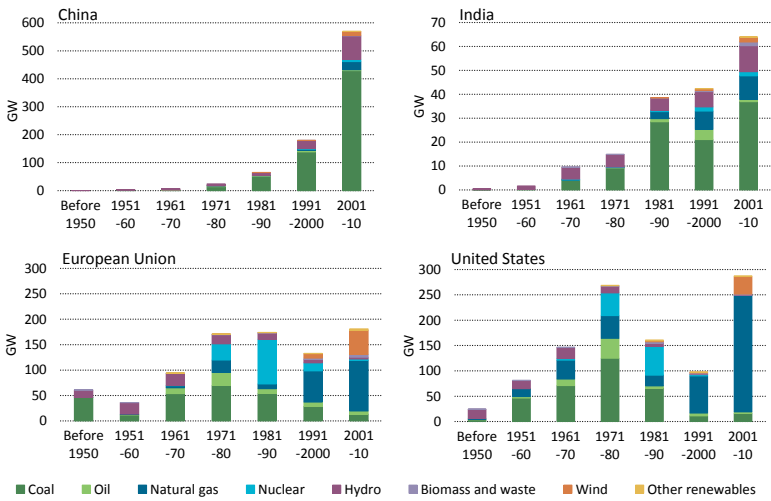

Ageing infrastructure is the challenge in many OECD countries, whereas emerging economies have to cope with a growing demand for electricity.

Electricity demand

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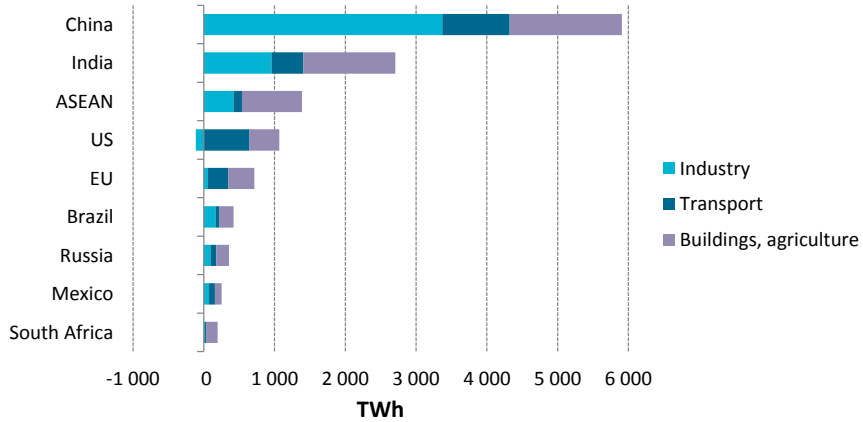
Incremental final electricity demand between 2009-2050 in the 2DS



Strong growth in electricity demand in emerging economies across all sectors, whereas in OECD countries consumption is driven by electrification of the transport and buildings sector.

Electricity generation scenarios

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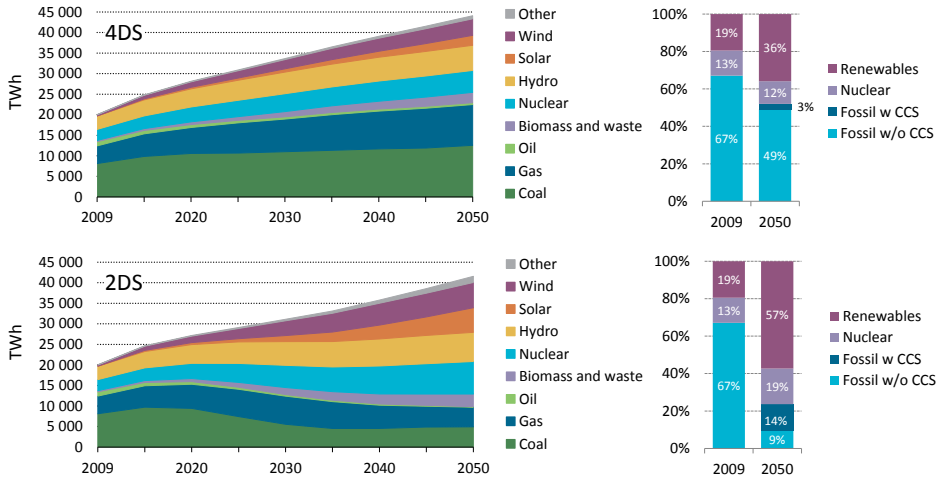

In the 2DS, global electricity supply becomes decarbonised by 2050.

Regional electricity mixes in the 2DS in 2050

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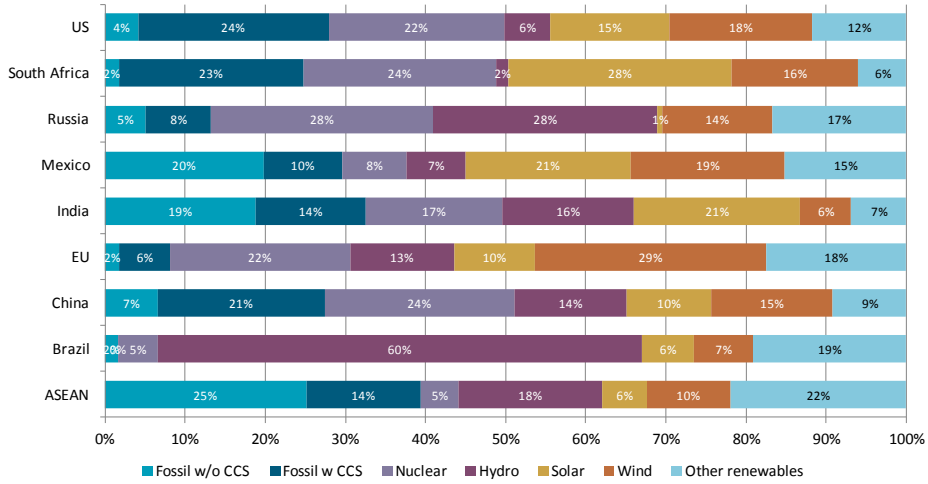

Portfolios to decarbonise the power sector depend on regional challenges and opportunities.

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Renewable electricity generation

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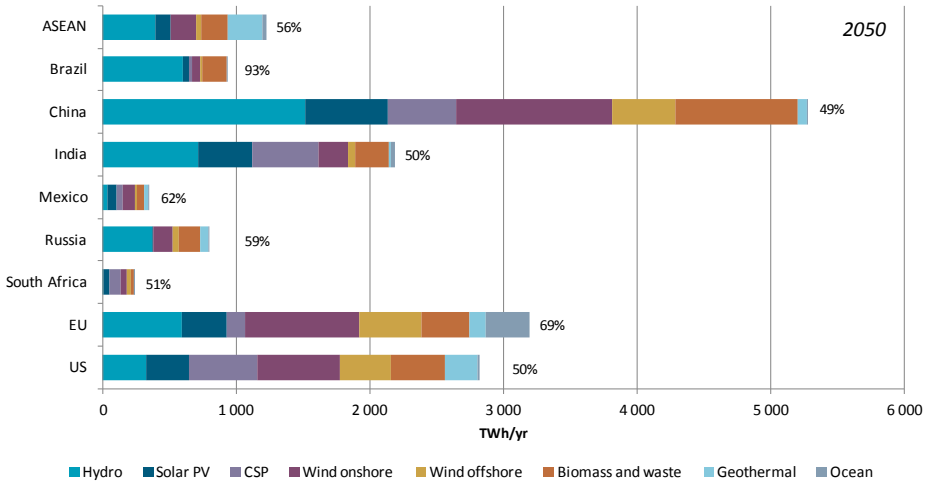

Renewables become a major part of the electricity system in 2050 in the 2DS in many countries, with the mix depending on local conditions.

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Average annual capacity additions

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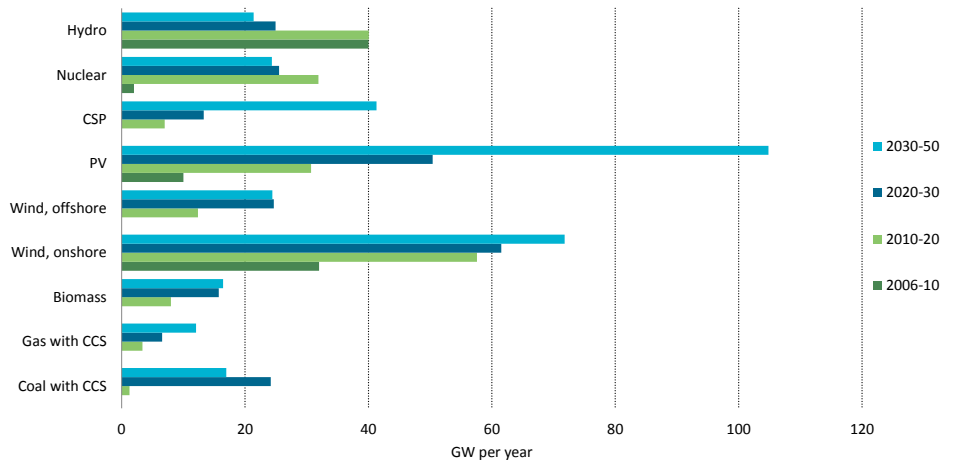

Massive acceleration of deployment of low-carbon power technologies is needed over the next four decades.

Key technologies to reduce CO_2 in the power sector

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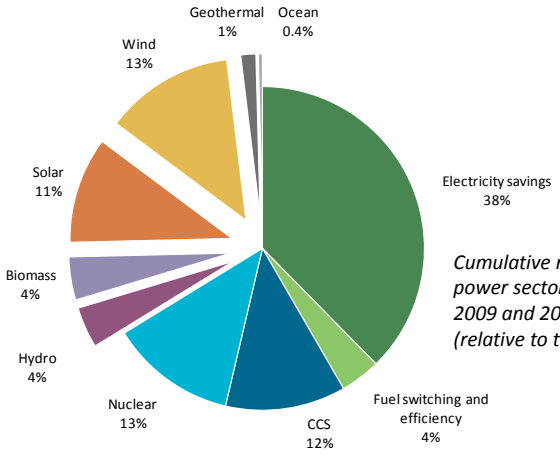

Cumulative reductions in the power sector of 474 Gt between 2009 and 2050 in the 2DS (relative to the 6DS)

Renewables provide more than one third of the cumulative reductions needed to decarbonise electricity supply in the 2DS.

After ETP is before ETP…

ETP 2012

- Roadshow underway
- Nordic Energy Technology Perspectives (launch Nov 2012)
- Brainstorming on *ETP 2014* (release spring 2014)

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Explore the data behind *ETP*

www.iea.org/etp