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Building the pathway to cleaner coal

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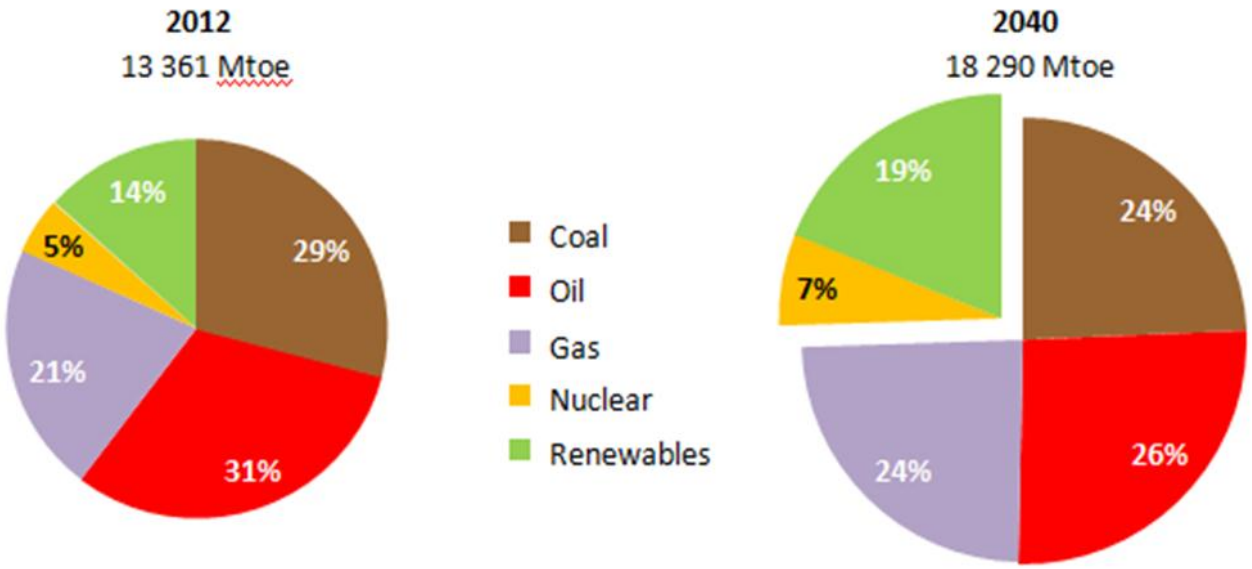
Chief Executive

Fossil fuels remain an important part of the global energy mix

- Under the IEA's NPS global energy demand will increase 37% and fossil fuel contribution will reduce only from 81% to 74%
- Coal will reduce only slightly from 29% to 24% of the total, however grows in total tonnes



Source: IEA, WEO 2014

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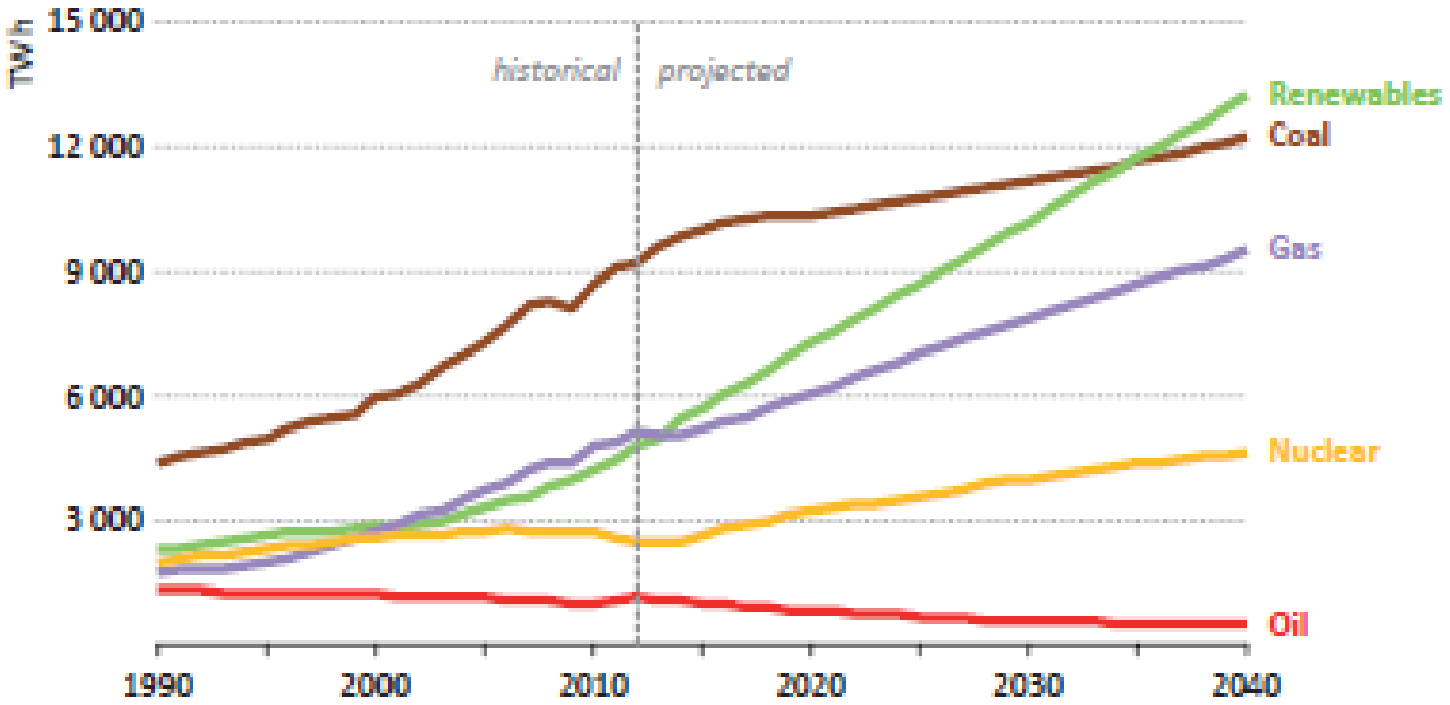
Coal is critical to the present and future global energy mix

Figure 6.7 ▷ World electricity generation by source in the New Policies Scenario



Source: IEA, WEO 2014

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20% of the world population has no access to modern energy services

- 1.3 billion people in the world who live without access to electricity
- 2.6 billion who rely on traditional fuels for cooking.

People without access to modern energy services by region

Source: World Energy Outlook 2011

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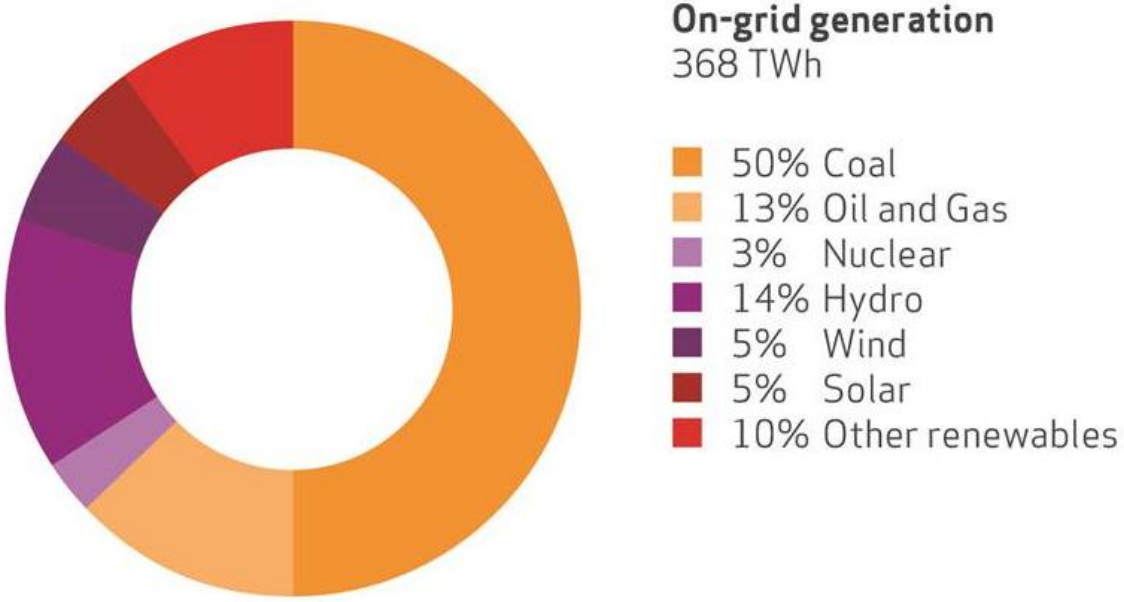
Coal is a key energy resource in the ongoing global fight to address energy poverty.

- As the world's most abundant and affordable energy fuel, coal has a role to play in delivering universal energy access.
- China provides an excellent example of an electrification strategy based on coal, with a 400% increase in China's coal consumption and 660 million people lifted out of poverty since 1980s.

Additional on-grid electricity generation (Energy for All Case compared with the New Policies Scenario, 2030.



Source: World Energy Outlook 2011

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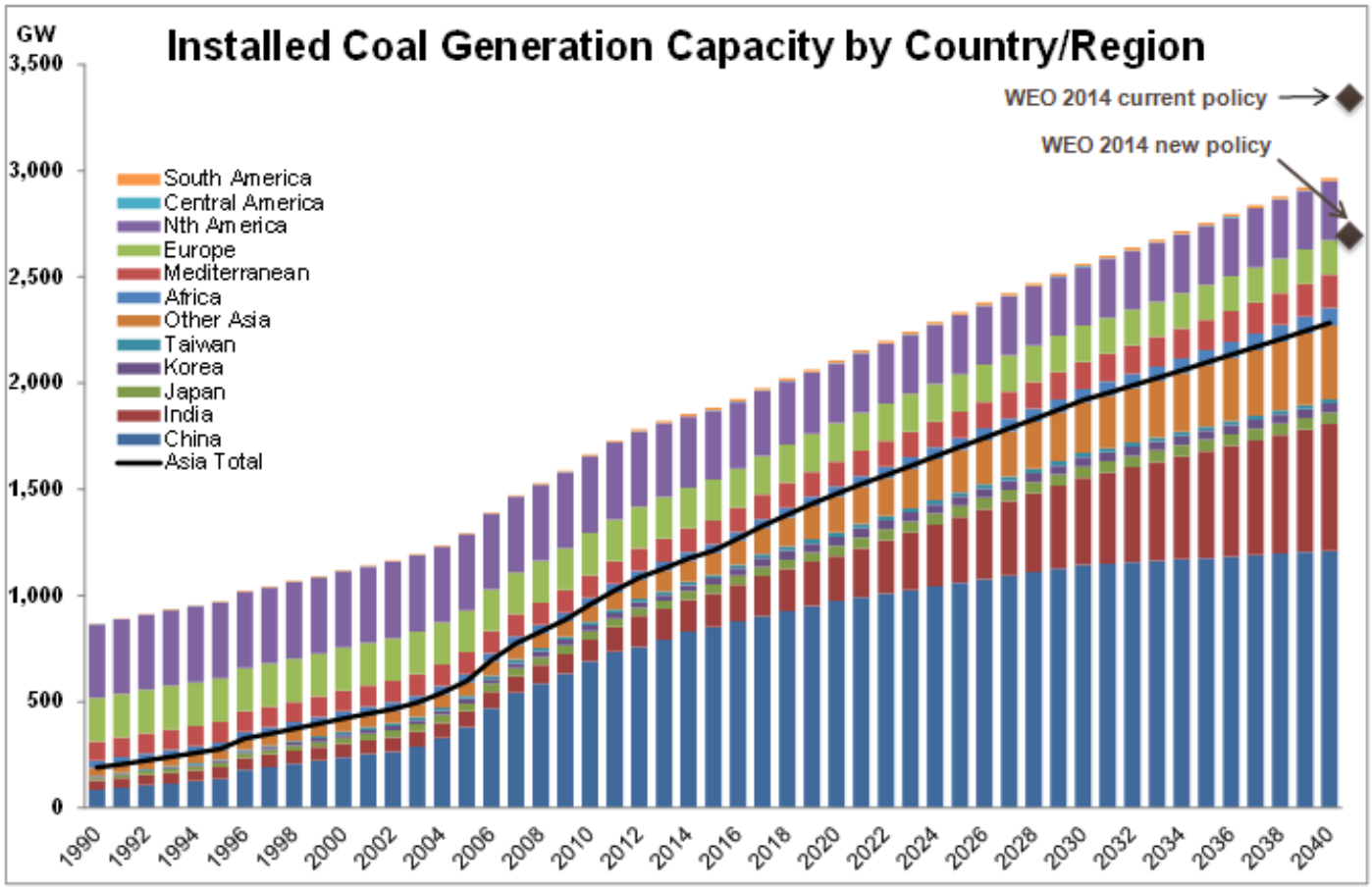
New installed capacity post 2015 will require an additional 1.8Btpa coal

Asian share – 2000 (38%); 2015 (69%); 2040 (77%)



Source: WCA

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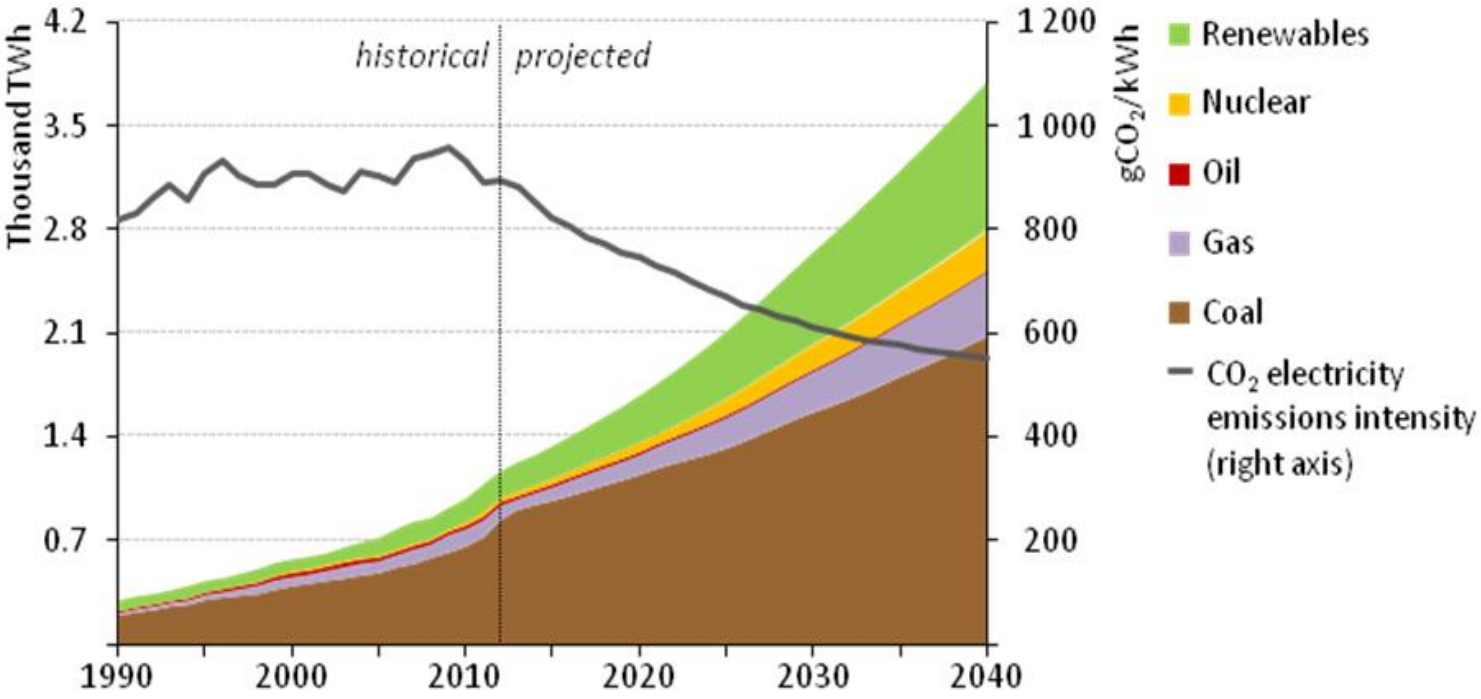
India will grow electricity generation significantly



Source: IEA, WEO 2014, New Policies Scenario

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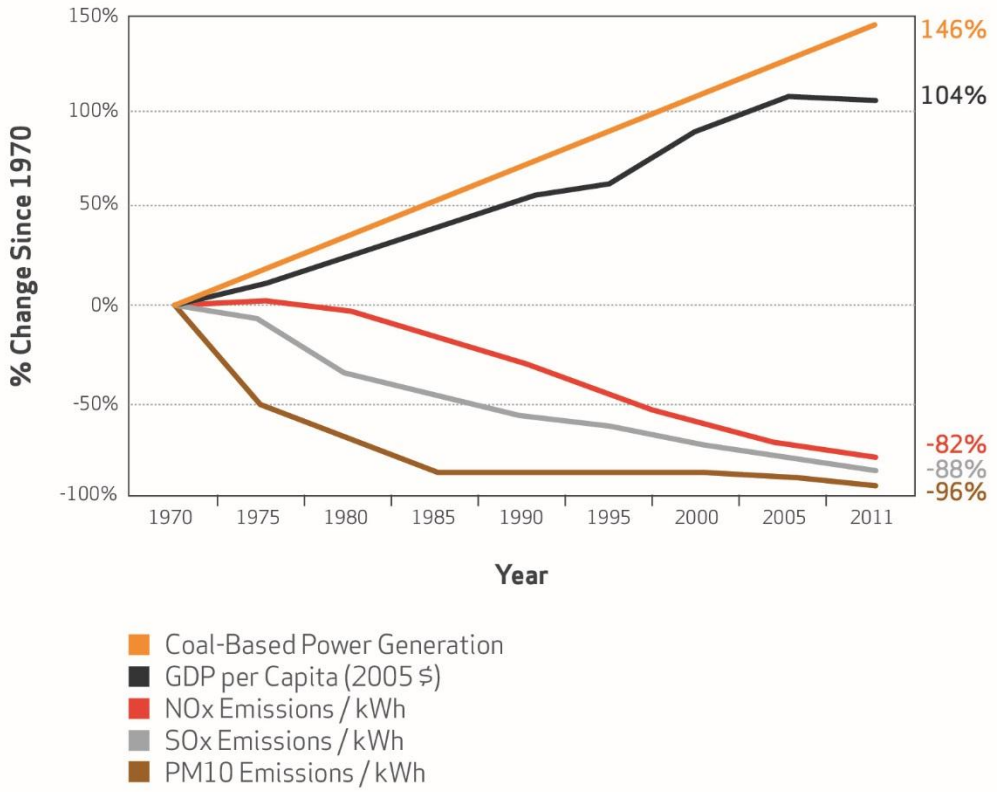
Cleaner coal technologies have addressed environmental challenges

- Clean coal technologies, such as electrostatic precipitators, fabric filters, selective catalytic reduction systems, wet and dry scrubbers, sorbents and activated carbon injection can reduce the emissions of pollutants from coal combustion by 90% to 99.9%.

- In the USA the emissions of of NOx, SOx and PM were reduced by 82 to 96% since 1970, while coal consumption increased by 146%

Evolution of coal demand and emissions of pollutants in the USA since 1970



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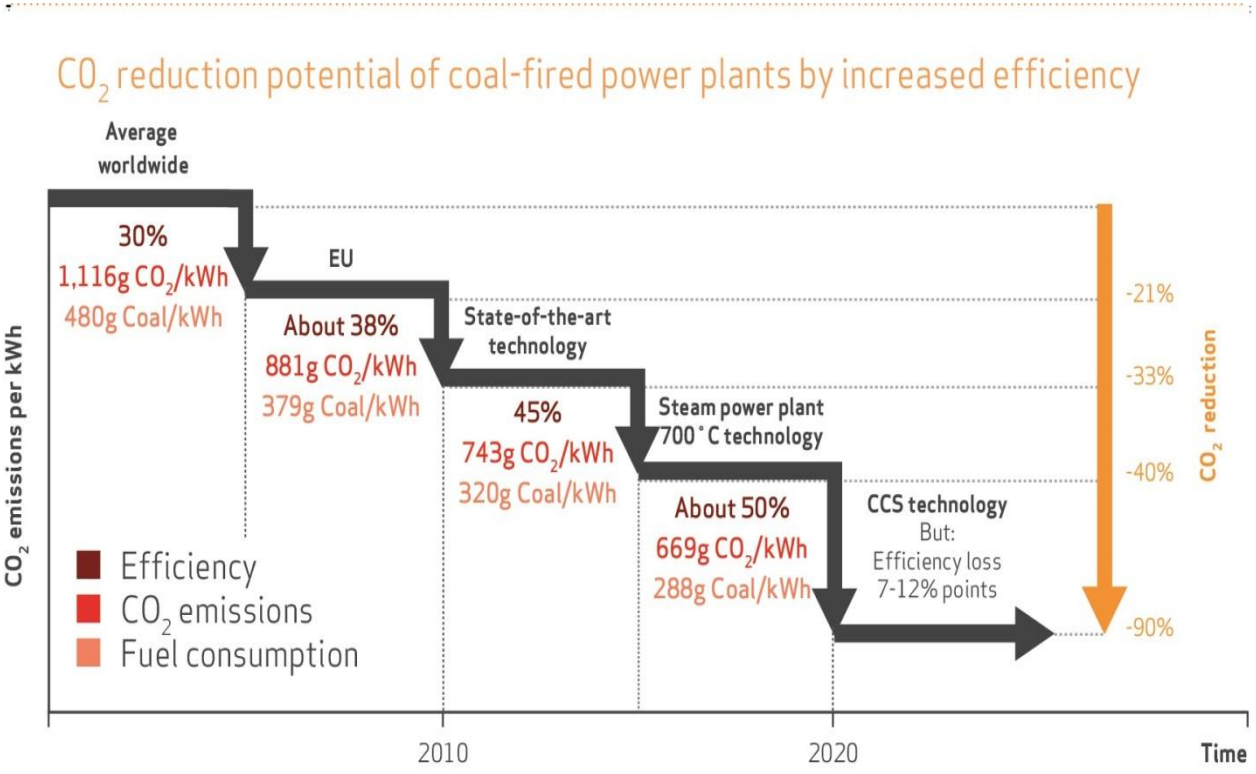
Efficiency improvements can significantly contribute to CO2 emission reductions

- The most important near-term action to reduce CO2 emissions is to increase the efficiency of coal-fired power plants.
- 1% increase LHV efficiency = 2–3% points decrease in CO2 emissions.
- Moving the current average global efficiency rate of coal-fired power plants from 33 to 40% by deploying more advanced technology could cut 2 gigatonnes of CO2 emissions (equivalent of India's annual CO2 emissions)



Source: VGB PowerTech 2013

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Comparative climate actions

Initiatives needed to cut 2 Gt of CO_2 emissions

- Run the EU ETS for 53 years
- Run the Kyoto Protocol 3 times
- Multiply the world's current solar power capacity by 195
- Increase the efficiency of all coal power plants from 33% to 40%

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A global platform to drive HELE technology is needed

Advancing technological development through coordinating research efforts using a technology centre model and identifying and leveraging financial support.

Technology

Global Action

Define a model for best available technology and practice in high efficiency, low emission coal-fired power generation.

Implement the recommendations and actions of the IEA's 2012 Technology Roadmap for High-Efficiency, Low-Emissions Coal-Fired Power Generation with a view to maximising achievement of the milestones contained in that report.

Promote knowledge and technology transfer to support development and deployment of more advanced technologies in developing countries.

National Action

Develop roadmaps and regulatory frameworks with governments to facilitate the deployment of high efficiency, low emission coal-fired power plants in preference to less efficient technologies with higher emissions.

Support the upgrading of existing coal-fired power plants to improved technologies to reduce emissions.

Support actions that promote better resource efficiency for coal (such as reuse rather than disposal of coal ash and increased efficiency along the coal value chain, including through improved coal handling, drying and washing)

Finance

Identifying and working with funding partners to ensure cost is no barrier to deployment of the most efficient technologies, including work with financial institutions (eg, development banks) and carbon market mechanisms (eg, the CDM).

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WCA proposes the PACE concept to support HELE

- International platform to help drive deployment of HELE technologies in developing and emerging economies
- Public private partnership
- Currently seeking partners to help build an initial alliance

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The potential impact is significant in a global context

Emission reductions by policies / actions, bn tonnes CO_2 equivalent

Policy / Action	Cumulative emissions	Period	Annual emissions*
Montreal protocol	135.0bn	1989-2013	5.6bn
Hydropower worldwide	2.8bn	2010	2.8bn
Nuclear power worldwide	2.2bn	2010	2.2bn
Increase average global efficiency of coal-fired power plants to 40%			2bn
China one-child policy	1.3bn	2005	1.3bn
Other renewables worldwide	600m	2010	600m
US vehicle emissions & fuel economy standards†	6.0bn	2012-2025	460m
Brazil forest preservation	3.2bn	2005-2013	400m
India land-use change	177m	2007	177m
Clean Development Mechanism	1.5bn	2004-2014	150m
US building & appliances codes	3.0bn	2008-2030	136m
China SOE efficiency targets	1.9bn	2005-2020	126m
Collapse of USSR	709m	1992-1998	118m
Global Environment Facility	2.3bn	1991-2014	100m
EU energy efficiency	230m	2008-2012	58m
US vehicle emissions & fuel economy standards†	270m	2014-2018	54m
EU renewables	117m	2008-2012	29m
US building codes (2013)	230m	2014-2030	10m
US appliances (2013)	158m	2014-2030	10m
Clean technology fund	1.7bn	project lifetime	na
EU vehicle emission standards	140m	2020	na

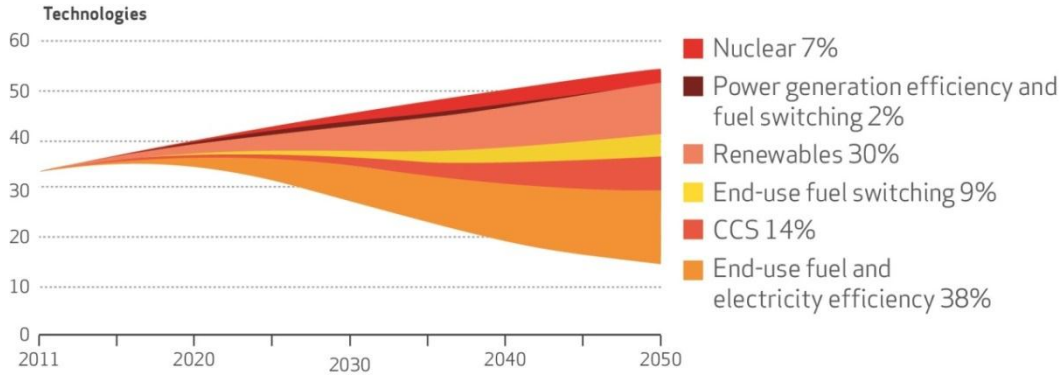
*Annual emissions are cumulative emissions divided by the relevant period.
The estimate for the current emissions avoided under the Montreal protocol is eight billion tonnes of CO_2e.
The annual figure for the collapse of the USSR refers to the years 1992-1998 *Cars and light trucks †Heavy trucks

Sources: The Economist 2014 and International Energy Agency 2013

CCS is critical to global climate objectives

- CCS technology can reduce GHG emissions from coal-fired power plants by up to 90%
- CCS is expected to deliver 14% of cumulative GHG emissions cuts through to 2050. It is therefore a key low-carbon technology
- The world's first large scale integrated CCS project capturing CO2 from a coal-fired power plant – Sask Power's Boundary Dam – has just started full scale operation at the end of September 2014

Contributions of different technologies to annual emissions reductions



Source: IEA Energy Technology Perspectives 2014

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CCS needs more public support

- Total annual value of renewables subsidies in 2011 at US$88 billion, increasing to US$240 billion in 2035, with a cumulative subsidy for renewable technologies through to 2035 estimated at US$3,500 billion
- Between 2007 and 2012 US$10.02 billion was spent (according to the IEA) on CCS projects, with US$7.7 billion of that amount privately financed
- GCCSI estimates that the total global commitment to CCS is US$20.7 billion, less than 3% of the funding already being committed towards renewables
- Policy parity of all low emission technologies is essential

Key WCA recommendations

The World Coal Association therefore calls for:

1. Recognition of the CO2 mitigation potential of high-efficiency, low emission (HELE) coal-fueled power generation and the absolute necessity of international financial support for such projects.

2. Recognition of the imperative of carbon capture, utilisation and storage (CCUS) for meeting global climate objectives and support increased international action and financial support to deploy this technology.

3. CCUS technologies be given policy parity with other low emission energy technologies in international climate mechanisms and national policy settings.

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