

# COAL MATTERS

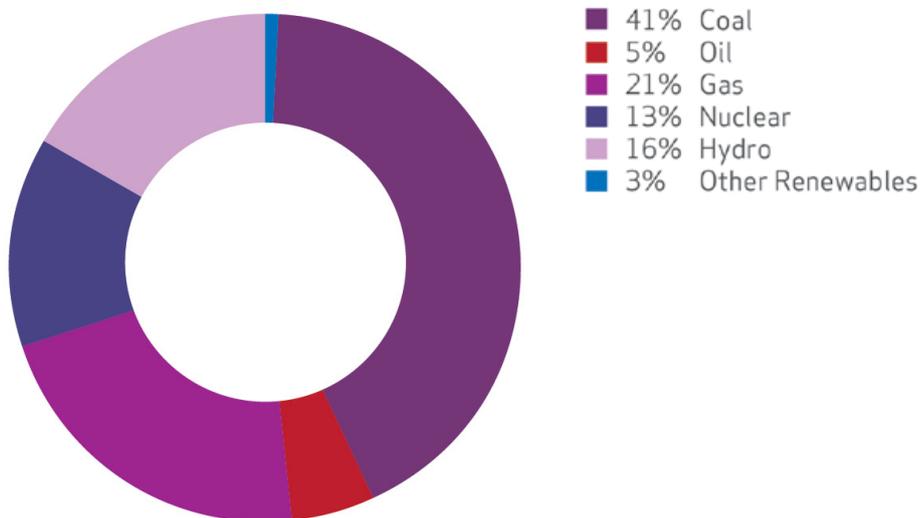
## 3/Coal and Electricity Generation

### The largest source of electricity in the world

Coal accounts for 41% of the world's electricity generation. It is the key fuel for generating electricity on almost all continents, with almost all developed and developing countries relying on coal for the stable and secure supply of electricity. Over the last ten years, most new coal-fired power plants were built in China.

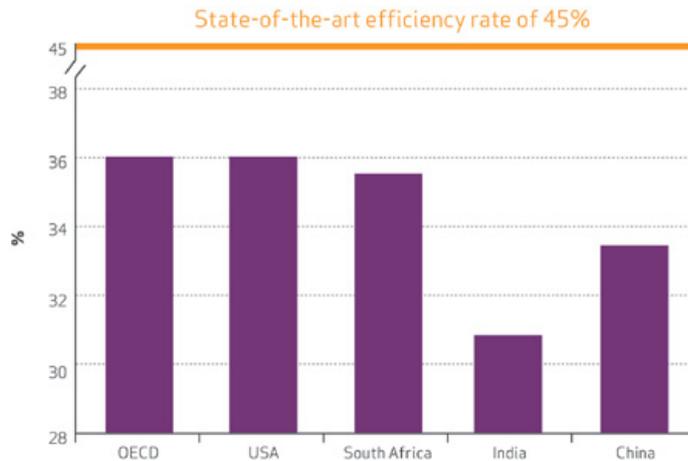
This provided almost all the energy needed to fuel China's extraordinary economic growth and, in turn, brought numerous benefits to the Chinese people and the countries enriched by Chinese exports.

### World electricity generation by source in 2009



Source: IEA World Energy Outlook 2011

### Average coal-fired generation efficiencies

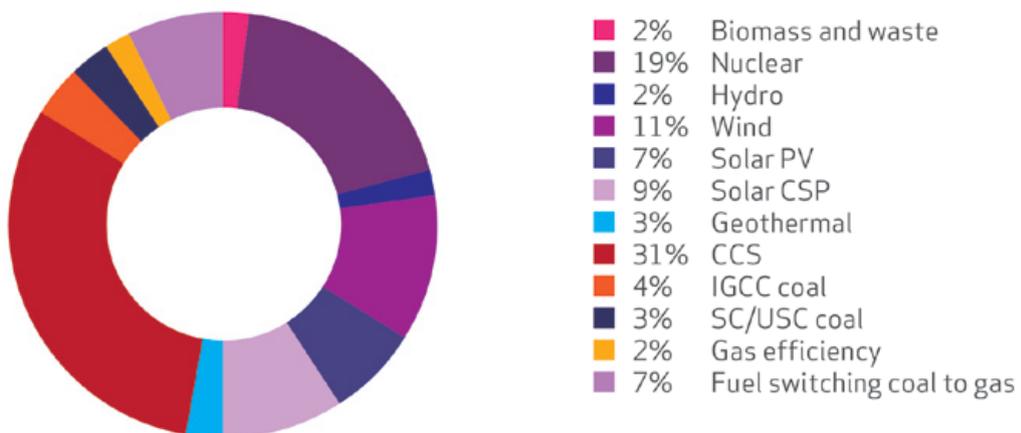


Source: IEA Clean Coal Centre 2010

Average efficiency of coal-fired power plants around the world is around 34%, which is well below the state-of-the-art rate of 45%. This means that substantial CO<sub>2</sub> savings can be made by renovating old plants or replacing them by more efficient ones. In fact, increasing the efficiency of coal-fired power plants by 1% reduces CO<sub>2</sub> emissions by between 2 – 3%.

Upgrading the world's older (>30 years old) and smaller (<250 MW) coal power plants with newer, larger coal plants would reduce global greenhouse gas emissions by 5.5% - which is more than the intended effect of all the measures included in the Kyoto Protocol on Climate Change.

### Contribution of different power sector technologies to reductions in CO<sub>2</sub> emissions

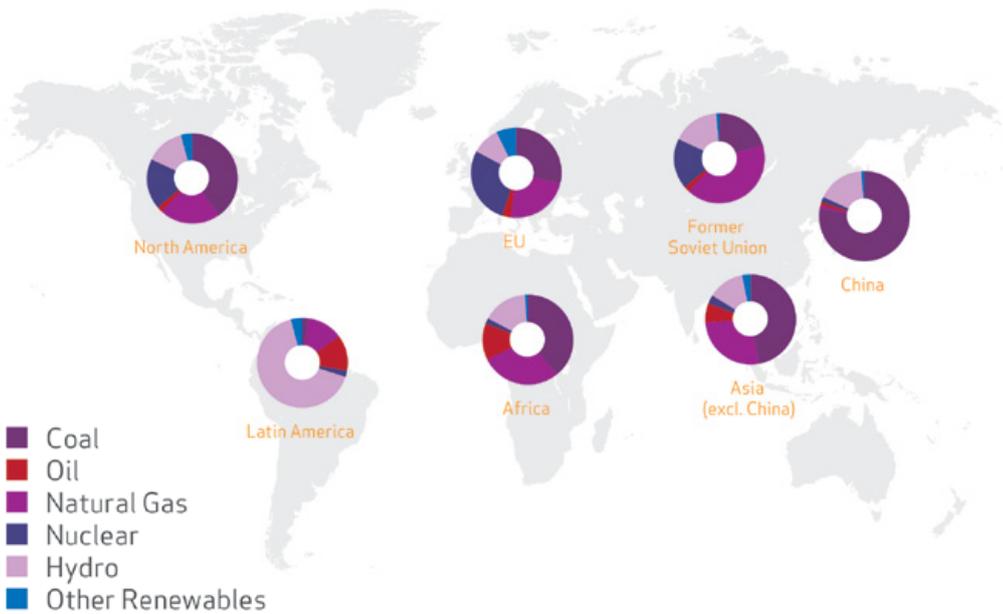


Source: IEA Energy Technology Perspectives 2010

The IEA estimates that advanced coal technologies, including Supercritical (SC), Ultra Supercritical (USC) and (IGCC) plants, could deliver 7% of the necessary CO<sub>2</sub> emissions cuts in the power sector through to 2050. This is just as much as the estimated contribution

of solar photovoltaics (PV) and slightly less than the potential contribution of wind turbines. Carbon Capture and Storage (CCS) could deliver almost one third of the entire mitigation effort needed in the power sector.

### Electricity mix in 2009 by region



**41%**

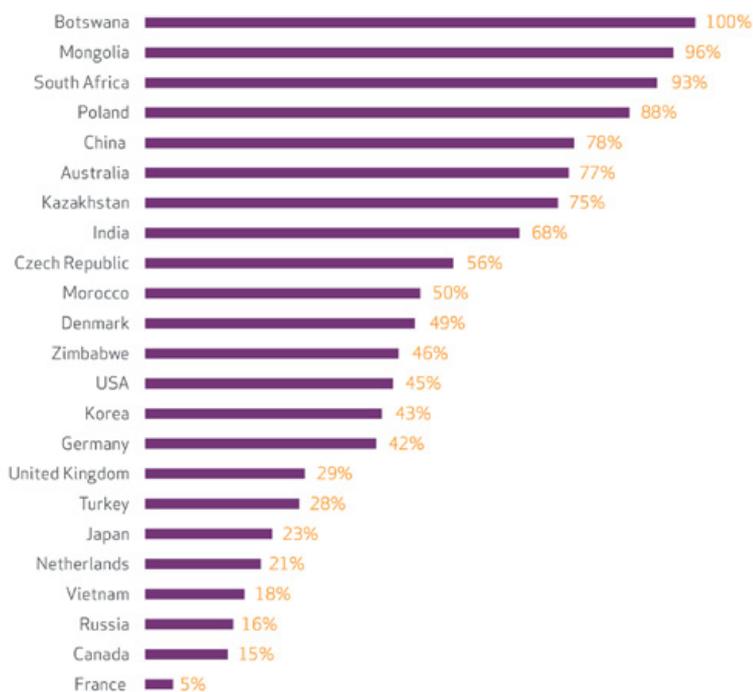
COAL ACCOUNTS FOR 41% OF THE WORLD'S ELECTRICITY GENERATION

**31%**

CCS IS EXPECTED TO REPRESENT 31% OF ALL THE NECESSARY CO<sub>2</sub> EMISSIONS REDUCTIONS IN THE POWER SECTOR THROUGH TO 2050

Source: IEA Electricity Information 2011, European Commission EU Energy in Figures 2010

### Coal in Electricity Generation



Source: IEA Electricity Information, 2011

## An affordable and reliable source of electricity

### Comparison of electricity generation costs across international studies (US\$/MWh)

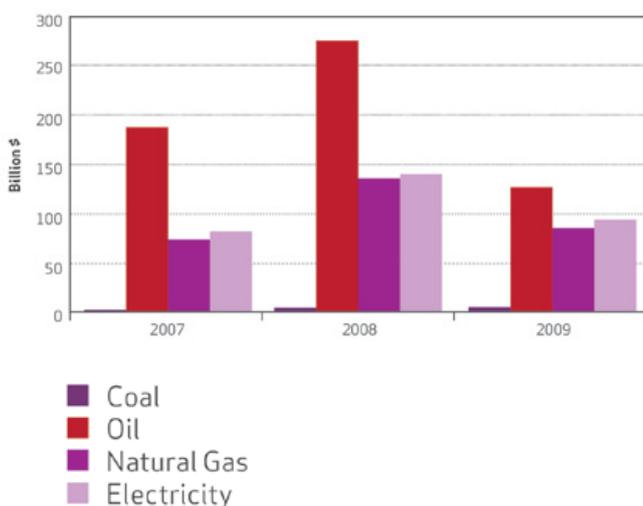
	IEA/NEA 2005	CBO 2008	EC 2008	EPRI 2008	House of Lords 2008	MIT 2009
Coal	28-75	56	52-71	64	82	62
Gas	44-69	58	65-78	80	78	65
Nuclear	33-74	73	65-110	73	90	84
Biomass	54-109	n/a	104-253	80	180	n/a
Hydro	69-262	n/a	45-240	n/a	n/a	n/a
Wind	50-156	n/a	97-181	91	146-162	n/a
Solar PV	226-2031	n/a	674-1140	n/a	n/a	n/a

IEA/NEA: International Energy Agency/Nuclear Energy Agency, CBO: Congressional Budget Office, EC: European Commission, EPRI: Electric Power Research Institute, MIT: Massachusetts Institute of Technology

Source: IEA Projected Costs of Generating Electricity, 2010

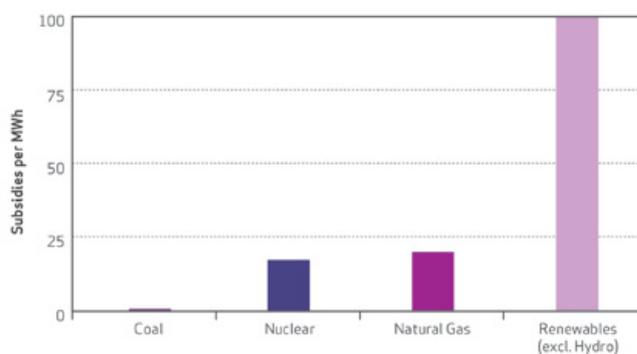
Existing coal-fired power plants generate electricity at a very competitive cost in comparison to other fuels and technologies. Compared to many other energy sources which are heavily subsidised, subsidies for coal extraction are almost non-existent.

### Fossil fuel subsidies by type (billion US\$)



Source: IEA World Energy Outlook 2010

### Estimates of relative subsidies to energy sources (US\$/MWh)



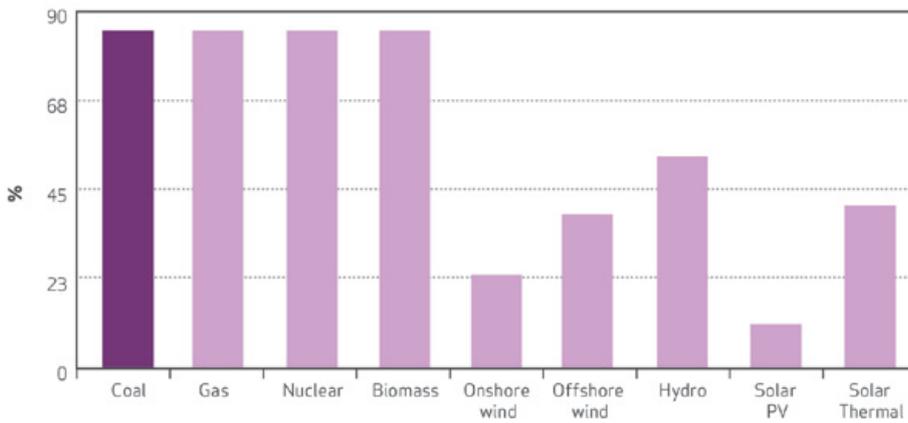
Source: IEA World Energy Outlook 2010, Relative Subsidies to Energy Sources, Global Subsidies Initiative, 2010, IEA Key World Energy Statistics 2010

Coal-fired plants have a much higher availability, or average load factor, than many other alternatives which are exposed to weather variations. Typically, coal-fired power plants provide base-load 24/7 electricity supply – as opposed to the more specific peak-load supply provided by more expensive and intermittent technologies.

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COAL RECEIVES 28 TIMES LESS SUBSIDIES PER UNIT OF ELECTRICITY PRODUCED THAN NATURAL GAS

### Average load factors for various energy technologies and fuels



Source: European Commission 2008

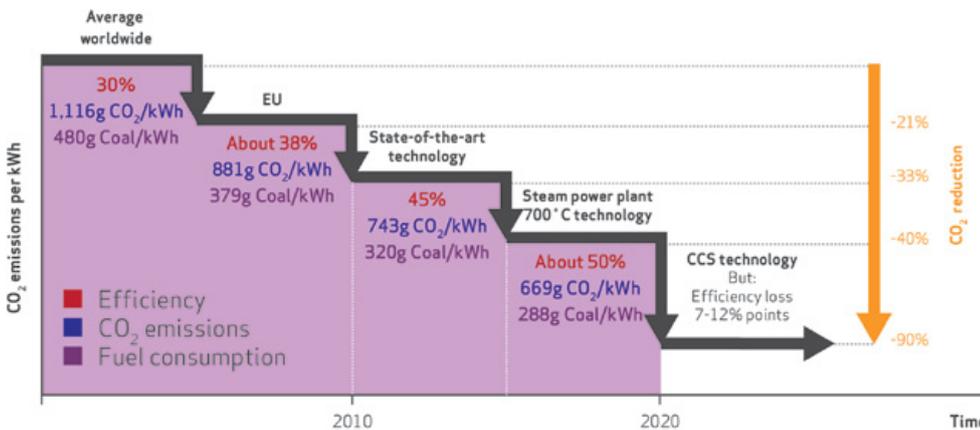
2-3%

INCREASING THE EFFICIENCY OF COAL-FIRED POWER PLANTS BY 1% REDUCES CO<sub>2</sub> EMISSIONS BY BETWEEN 2 - 3%.

## An essential element of the low-carbon transition

Replacing old coal-fired power plants by more efficient ones substantially reduces CO<sub>2</sub> emissions associated with coal combustion. With Carbon Capture and Storage technology CO<sub>2</sub> emissions from coal power plants can be reduced to very low levels.

### CO<sub>2</sub> reduction potential of coal-fired power plants by increased efficiency



Source: VGB PowerTech, 2010

## The World Coal Association is a non-profit, non-governmental association

Membership is open to coal enterprises and stakeholders from anywhere in the world. The WCA has more than 40 members spread across the globe. Our membership includes many of the world's largest coal producers and includes mining equipment manufacturers, national coal industry associations and coal research bodies. Member companies are represented at Chief Executive level. The WCA is the only international body working on behalf of the coal industry worldwide.

### Objectives

The coal industry, including both internationally traded and domestic coal, needs to present a united front to the challenges it faces this decade and beyond. The orthodoxy that views coal only as a CO<sub>2</sub> emitter – without regard to its role in economic and social development, essential to electricity generation and steel manufacture – may be at a turning point. However, the industry needs to cooperate to ensure that this turning point occurs. For that reason, the WCA has adopted a forward looking strategy that aims to position:

- coal as a strategic resource that is widely recognised as essential for a modern quality of life, a key contributor to sustainable development, and an essential element in enhanced energy security; and
- the coal industry as a progressive industry that is recognised as committed to technological innovation and improved environmental outcomes within the context of a balanced and responsible energy mix.

The strategy can only be achieved with the commitment of leading coal producers and stakeholders.

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