



## Are the costs of using coal higher than the cost of cleaning it up?

In 2003, coal overtook oil as the leading contributor to global energy-related carbon dioxide emissions. According to the International Energy Agency (IEA), CO<sub>2</sub> emissions from energy sources may grow by up to 90% by 2030 and coal will account for 43% of global emissions, unless policy interventions are made (World Energy Outlook 2006, BAU scenario).

This potential increase in global coal use is driven by its increasing use in China, India, and Russia for power stations, as well as a fresh rush for coal in OECD countries like the United States and European Union resulting from higher natural gas prices and power plant replacements.

In 2030 under this business-as-usual scenario the IEA predicts that the top 4 emitters of carbon dioxide will be:

- 1<sup>st</sup> – Coal-fired power plants from China
- 2<sup>nd</sup> – Coal-fired plants in the United States
- 3<sup>rd</sup> – Oil for transport in the United States
- 4<sup>th</sup> – Coal-fired power plants in India (World Energy Outlook 2006)

Coal use is growing around the world and much of this growth is driven by its low cost, the growing demand for electricity, the quest for more diverse energy supply and perceived risk of a dependence on natural gas, and, finally, the expectation that coal can be made clean enough to not harm the climate.

This briefing explores some of the costs of coal that are often ignored and puts this in the context of the cost the switch to cleaner fuels and a concerted push by governments and industry to advance carbon capture and storage as the future for coal.

### Growing coal use and its rising costs around the world:

#### Around the world:

The power sector is the single largest and fastest growing carbon emitter globally. The rapid increase in use of coal for power generation is the biggest threat to climate-friendly development in most industrialized and emerging economies. In the last 4 years coal use around the world grew by 22% (BP, 2006) and this had led to world CO<sub>2</sub> emissions increasing at a record rate of 3% annually (IEA, 2006).

#### In the United States:

In 2004, coal burning created 81% of the United States' power sector CO<sub>2</sub> emissions (World Energy Outlook 2006) which grew 18% since 1990. Approximately 150 gigawatts (GW) of new coal (300 – 450 new plants) are on the drawing board (Department of Energy, 2005). The IEA predicts that US coal power emissions will increase by 32% to 2030 unless new measures are taken.

To reverse this trend the US needs to promote a switch to clean energy sources, the advance of legislation mandating the use of carbon capture and storage, and investment in demand side initiatives.

Despite stricter environmental standards, coal use in the United States has significant environmental costs. For example, 35% of lake acres and 25% of river miles in the US are now under fish consumption advisories, largely due to mercury from coal-fired power plants (EPA - <http://www.epa.gov/mercury/advisories.htm>).

#### In China:

In China coal is used to generate 75% of the electricity. China's CO<sub>2</sub> emissions from coal burning have doubled since 1990 and in 2004 coal accounted for 82% of China's total CO<sub>2</sub> emissions (IEA, 2006)

A World Bank study states that if the current trend in coal use continues, health effects from coal pollution will cost China US \$39 billion in 2020, accounting for 13% of its GDP (World Bank, ). The increase in coal use has increased the level of other air pollutants. Between 2000 and 2004, China's sulphur dioxide emission rose by 13% and its nitrogen oxide emissions rose by 8.3% (Energy Foundation, 2007).

The government's National Green GDP report estimated that China suffered an economic loss from environmental pollution totalling 51.18 billion Chinese Yuan (\$6 billion USD) in 2004, accounting for

3.05% of its GDP. The environmental cost for air pollution specifically was estimated at 21.98 billion Yuan (\$2.8 billion), 42.9% of the total cost (Energy Foundation, 2007).

#### In India:

Coal-fired power plants generate  $\frac{3}{4}$  of all electricity and are a major source of air pollution in India's 20 largest cities. India's reliance on coal has undermined some of the early achievements of car-oriented air quality initiatives in cities like Delhi. CO<sub>2</sub> emissions from coal use grew by 83% since 1990 (IEA, 2006).

The Indian Institute of Technology has warned of the risk of an increase in acid rain due to the large dependence on traditional coal-fired power stations. Measurements already indicate lower Ph conditions in Delhi, Uttar Pradesh, Maharashtra, Madhya Pradesh and Tamil Nadu.

#### Costs of climate change fuelled by higher emissions:

The Stern Review on the Economic Costs of Climate Change published by the British government in 2006 found that the cost of the climate change resulting due to inaction will be equivalent to the cost of the Great Depression and World Wars I and II combined.

Reports on the impacts of climate change on China predict a 37% decline in wheat, rice and corn yields in the second half of the century. Rainfall may decline as much as 30% in three of China's seven major river basins. A rise in sea level of 1 meter will submerge an area the size of Portugal along China's eastern seaboard — home to more than half the country's population and 60 percent of its economic output.

India has seen a surge in heat waves over the past century and a rising death toll due to heat stress in more recent years. Serious floods in its northeastern states in July 2005 killed over a 1,000 people and economic losses amounted to more than US\$250 million.

#### Growing economic cost of coal:

The cost of electricity from coal is expected to double by 2030 to US\$40–55 (per mega-watt hour, MWh). The additional cost of using carbon capture and storage for coal may raise the price to US\$60–90 per MWh. (IEA 2005, 2006 / IPCC 2005) Even if there was no price on carbon, clean renewable technologies like baseload wind, geothermal power and solid biomass will be cost-competitive with conventional coal by 2030. If however, the true cost of coal was factored in to its price, these sustainable low-carbon technologies would be even cheaper than coal today.

#### The path to reducing the environmental costs of coal

Unless governments agree to clean up coal and promote clean alternatives, traditional coal will remain the fuel of choice, particularly in the emerging economies of Asia-Pacific and this will lead to higher emissions. It is not helpful to simply blame these countries for their use of coal – but governments and industry should acknowledge that there are high costs in the use of traditional coal use and actively reduce these costs by increasing their spending on the deployment of pollution reduction technologies.

All countries should put laws on their books to clean up the sector and reduce traditional coal use. WWF recommends some specific policies that can reduce the impact of coal:

1. Emerging economies need access to best-available-technologies including last-generation coal-fired power technology and support from G8 nations and the financial sector in deploying it.
2. OECD countries should not replace ageing power stations with traditional coal.
3. Demand-side management solutions should be considered before considering construction of new power stations. This will re-direct investment into cheaper energy-savings technology.
4. New power plants should use combined heat and power (CHP) and, where possible, cooling (tri-generation) technology. This will increase plant efficiency from 40-45% (coal) to over 80% (CHP).
5. Strict caps and/or standards are needed that mandate the construction of low-carbon and CCS power plants in the OECD as soon as possible. Emission standards should set gas-fired CHP as their benchmark.
6. All countries should set air pollution standards to protect the health of citizens and strengthen any existing caps to include all power stations. Technologies for low-carbon power stations can reduce conventional air emissions by as much as 90%.