

China slowly cleaning up its act

China's coal-driven economy has become the largest emitter of CO₂ in the world. This is not about to change any time soon, though high prices, blackouts, mine-accidents and pollution all contribute to a drive towards cleaner alternatives, including cleaner coal technologies.

| by Bert van Dijk

In Shanxi province, in the north of China, coal is so abundant that in large areas it covers the surface of the ground. The total production capacity of the thousands of mines in Shanxi is 600 million tons a year, about a quarter of all coal mined in China and 10% of global coal production. The roads are literally filled with thousands of purple, blue and red trucks which load and unload their stuff at dozens of coal-fired power plants, steel factories and aluminium smelters all over the country.

Because of the fast economic growth in China and the mandatory closing of unsafe mines before the Olympic Games in Beijing, prices for coal increased rapidly in the last year. Coal prices approximately tripled since 2002, estimates Arthur Kroeber from Dragonomics, an economic research agency in Beijing, although they have declined again by roughly 50% since the descent of the crude oil price set in. The high price led power plants and steel factories to cut production because government-set maximum retail prices for fuel made it impossible for them to turn in a profit. Some power plants even temporarily closed down to save money, leading to blackouts in large parts of the country. That has led some factory owners to build their own coal-powered power plants next to their factories. Although illegal, local governments often do very little about it. Growing the local economy and keeping factories going is more important.

Most polluted city |

The worldwide financial crisis has led to a temporary decrease in demand for products in China and ironically provides some relief, albeit raising huge new economic problems. Nevertheless, the

electricity market is still far from stable. China's power consumption is about 70-80% dependent on the burning of coal. One only has to travel to cities like Linfen in the south of Shanxi or to its capital city Taiyuan to understand what this means. The landscape is filled with dozens of coal-fired power plants, mines and chemical plants. Thick layers of smog cover large parts of the residential areas of these urban centres. The World Bank in 2006 named Linfen the most polluted city on the planet.

In exchange for a percentage of the profit local authorities ignore policies from Beijing

Still, things are getting a little better. Local residents say the air quality is better than it was a couple of years ago. Closure of the dirtiest factories and stricter enforcement of the mandatory installation of environmental protection equipment has had a visible effect. But as long as coal remains the main source for China's energy hunger, Linfen will remain an important industrial coal centre.

The huge demand for coal means that coal mine owners can earn a lot of money. In order to boost production as fast as possible, safety regulations in the mines are often ignored. China's coal mines are



among the deadliest in the world. About 80% of all mining deaths in the world occur in China. According to a Radio Free Asia comparison of official labour and energy data in China and the United States, China has 5.5 million coal miners, or over 14 times as many as in the US, but produces only a little more than twice as much coal. And China recorded 3,786 coal mining deaths in 2007, 111 times more than the US or 50 times more on the basis of each ton of coal mined.

Deadly month |

In a little suburban town near Taiyuan, a miner says that better working conditions and a higher salary are the most important

Coal is used by millions of Chinese for daily activities like cooking and heating

concerns for him. Although the price of coal has more than doubled in the last year, miners' salaries have only been increased by 15 to 20 percent. A miner typically earns somewhere between 24,000 to 72,000 yuan (2600 to 7800 euro) a year, compared to an average Chinese salary in urban areas of 24,000 yuan. In rural areas the average is a little over 6800 yuan (750 euro).

The high salaries carry a price. Around Taiyuan for example a well informed miner estimates the number of mines at 500 of which 60% are operating illegally. In exchange for a percentage of the profit local authorities ignore policies from Beijing. The result can be devastating. In September China's deadliest mine accident of the year occurred when one of the walls of an artificially built pond containing waste from the Tashan Iron Ore Mining Company in Linfen collapsed. The resulting mudslide of two kilometres long buried an entire village.

The local government initially tried to cover up the accident by stating that it was caused by heavy rainfall. Later it turned out that illegal dumping led to the collapse of the waste pond. An official

investigation by the State Council of China concluded that the pond was illegal, that too little was done to make a proper risk assessment of the construction, that no safety measures were put in place and that authorities from the local government had been too lax and ineffective. Until this day the number of reported deaths is being questioned. The official tally now stands at 276, but according to locals, backed by reports of some investigative Chinese journalists, between 2,000 and 3,000 people got killed.

Even before the Linfen-disaster, September had been a deadly month. In the first week of the month alone six mining accidents led to the death of 83 people. But things are changing here as well. Beijing started a crackdown on illegal mines. 'As a long-term measure to intensify work safety, companies with at least 10 deaths in one single accident will be put on the list (to be closed),' Huang Yi, a spokesman with the State Administration of Work Safety, told a press conference. According to official statistics, China already closed down 10,000 small coal mines between 2005 and 2007. There are now more than 14,000 small coal mines left. 2,510 of those will shut by the end of 2010, the Chinese government has announced. To stimulate safety, China wants to create, by the end of next year, 6 to 8 mega coal enterprise groups with yearly production of more than 100 million tonnes.

The situation has put local governments on edge. When visiting Linfen and talking to locals, I was followed all day by government officials. This kind of close and visible observation of foreign journalists is very rare nowadays in urban areas, although it still happens frequently in more rural areas.

Devastating effect |

China's dependence on coal not only challenges the government's efforts to create a safer working environment, it also puts a lot of pressure on the environment. Coal is used by millions of Chinese for daily activities like cooking and heating. In every city piles of coal briquettes can be found in the streets or on coal delivery bikes. Especially in winter the smell of coal is everywhere. Respiratory diseases from air pollution cause more than a million deaths a year, while more than 400,000 avoidable deaths are caused by



Photo s: Frans Schellekens



Clean coal in China

China is trying to find ways to burn coal more cleanly. Apart from developing its own technologies, China is keen to cooperate with foreign companies. According to Lilian Xiao, global communications manager at GE Energy, customers in China are especially looking for more reliable gasification technology. The US firm Peabody, the world's largest private coal company, participates in GreenGen, which it calls 'China's most important climate initiative'. The goal of GreenGen is to advance near-zero emissions coal-fueled generation through a combination of hydrogen production and carbon capture and storage. The \$1 billion project is being developed near Tianjin, southeast of Beijing.

China investing in state-of-the-art technologies may come as a surprise to some, but according to researchers at the Massachusetts Institute of Technology, it isn't that surprising. A detailed analysis of power plants in China by MIT researchers 'debunks the widespread notion that outmoded energy technology or the utter absence of government regulation is to blame for that country's notorious air pollution problems. The real issue involves complicated interactions between new market forces, new commercial pressures and new types of governmental regulation', according to the researchers.

After a survey at 85 power plants, the MIT-researchers found that in fact most of the new plants have been built to very high technical standards. The main problems have to do with the way that the energy infrastructure is operated and the types of coal being burned.

'New market pressures encourage plant managers to buy the cheapest, lowest quality and most-polluting coal available, while at the same time idling expensive-to-operate smokestack scrubbers or other cleanup technologies.' One of the most surprising findings was that the technology currently adopted in China is not cheap. 'They're not buying junk. They buy state-of-the-art technology.'

indoor air pollution that leads to illnesses such as lung cancer, weakened immune systems and chronic obstructive pulmonary disease, according to research by Junfeng Zhang and Kirk Smith in 2007.

The Chinese government acknowledges the challenges. 'China is a main energy consumer and, therefore, is also a big greenhouse gas emitter', premier Wen Jiabao recently said in a rare interview he gave to Science Magazine. 'We have established a goal that our GDP growth every year must be accompanied by a 4 percent decrease in energy consumption and a 2 percent reduction in COD (chemical oxygen demand) and sulfur dioxide emissions every year', he said.

According to Wen it is essential to adjust the country's economic structure and transform its mode of development to make it based more on science and technology and the quality of the work force. 'We have only been industrializing for several decades, while developed countries have been on this road for over 200 years', Wen said. 'But we will now begin to shoulder our responsibilities, namely the common but differentiated responsibilities set forth in the United Nations Framework Convention on Climate Change and the Kyoto Protocol.'

This is not going to be an easy task. 'The country still faces great difficulties in fulfilling its commitments, and the situation remains arduous', Deputy Director Xie Zhenhua from the National Development and Reform Commission (NDRC) recently said. Part of the problem is the complex governance structure for energy issues in China. Decision making is scattered among more than a dozen government agencies. Some experts have called for a Ministry of Energy, but so far China has shied away from that.

For years now China has stimulated the development of alternatives such as wind, solar, nuclear and hydro power. China wants 15 per cent of its energy to come from renewable sources by 2020. All over the country initiatives are starting up. In Gansu, a poor province in the northwest of China, local officials try to benefit from the natural geography. Large parts of the desert here are being transformed into huge windmill farms. In Jiuquan, a city until now best known as China's most important satellite launch centre, construction has been started on what local officials hope will be the biggest wind farm in the world. 'In 2015 we will have installed capacity here of 12.1 million kW', explains Wang Jianxin, director of the local Development Commission in charge of the project. 'That's about a quarter of the total installed capacity of China in 2015. We're building a Three Gorges Project on Land', he says, referring to the largest hydropower-project in the midwest of China.

And Jiuquan is not the only city with big green energy ambitions. All over China new wind farms can be spotted. The country has already increased its goals for wind power levels several times. Even in Shanxi, the coal centre, wind farms are appearing. Plans are underway now to build 19 wind parks in Shanxi by 2020.

This doesn't mean wind power will replace coal in the near future. New coal-powered plants are still being built every week to power China's economy. China's National Bureau of Statistics forecasts that total power consumption in China will hit 3.7 trillion kWh this year, up 14% from 2007. By 2010 consumption may soar to 4.5 trillion kWh. A large part of this power will be generated by the burning of coal. ■