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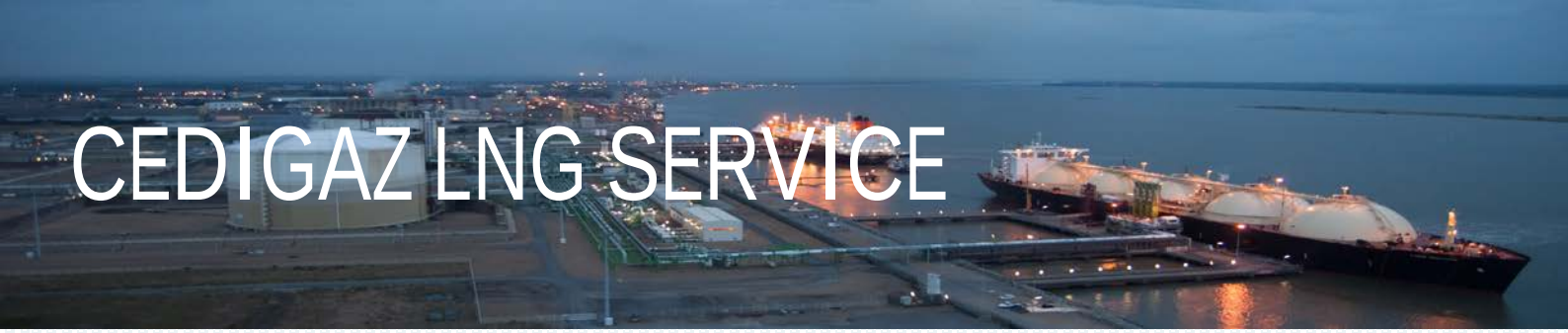
July 2017

The rise in coal prices:

Beijing policy drives EU coal-to-gas switching

Report prepared by Sylvie Cornot-Gandolphe for CEDIGAZ



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Sylvie Cornot-Gandolphe is an independent consultant on energy and raw materials, focusing on international issues. Since 2012, she has collaborated with CEDIGAZ, the international centre of information on natural gas of IFPEN. She also works with the Oxford Institute for Energy Studies (OIES) as a Research Fellow, with the Energy Centre of the French Institute of International Relations (IFRI) as a Research Associate, and with CyclOpe, the reference publication on commodities. Sylvie Cornot-Gandolphe has a long and proven experience in global gas and energy markets, gained during her past positions at IFPEN/CEDIGAZ, the UN/ECE, the IEA and ATIC Services. She is the author of several reference publications on energy markets. Her latest publications include reports on gas, coal and shale oil and gas: 'Indonesia's Electricity Demand and the Coal Sector: Export or meet domestic demand?' (OIES, February 2017), 'Post COP21 – What does the future hold for gas in Southeast Asia (CEDIGAZ, January 2017), 'Les exportations américaines de GNL: De nouvelles règles du jeu sur l'échiquier européen' (IFRI, June 2016), The Underground Gas Storage and LNG Storage Market in the World 2015-2035 (CEDIGAZ, May 2016), COP21, 'Haro sur le charbon' (IFRI, January 2016), Indian Steam Coal Imports: The Great Equation (OIES, February 2016), The European Gas Market Looking for its Golden Age? (IFRI, October 2015, co-author), China's Coal Market: Can Beijing Tame 'King Coal'? (OIES, December 2014), China's Gas Strategy (IFRI, November 2014), Gas and Coal Competition in the EU Power Sector (CEDIGAZ, June 2014), The impact of the US shale gas revolution on Europe's petrochemical industries (IFRI, November 2013).

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Executive summary

Despite a decline in global coal demand for the second consecutive year, international steam coal prices doubled in 2016. This massive rise may seem paradoxical; in fact, it responded to market fundamentals: a tightening of the international market due to an unexpected surge in Chinese coal imports and the inability of exporters to meet this sudden increase. The surge in Chinese imports was not due to increasing demand – Chinese coal consumption in 2016 fell for the third year in a row– but to domestic production restrictions mandated by the Chinese government from April 2016. To remove excessive and outdated capacities in the domestic coal sector, that weighed on domestic coal prices, the government required coal mining companies to cut operating days from 330 to 276 a year. The new regulation led to a fall in coal production, shortages of coal and a steep increase in domestic coal prices, forcing power utilities to turn to the international market. However, after five years of low prices and reductions in investment, exporters were not able to respond to this sudden demand and international prices increased to clear the market.

Higher international coal prices had a large impact on the European coal and energy market. It was less felt in Asia, where in many countries, coal (and gas) prices are regulated by governments, and do not necessarily follow international trends. As coal exporting countries were not able to ramp up their exports rapidly, increased prices displaced coal demand in the most price-sensitive markets: the power sector in Europe, and to a lesser extent, imports by India. Therefore, EU coal demand and imports fell significantly in 2016. Higher coal prices resulted in a loss of competitiveness of coal against gas in Europe, triggering coal-to-gas switching. Virtually all European countries reduced their coal consumption in 2016, though to varying degrees. The United Kingdom and Germany accounted for 60% of the decrease. In the United Kingdom, the carbon tax paid by power generating companies, on top of the price of CO_2 allowances, structurally advantages natural gas over coal. In Germany, natural gas-fired generation became competitive in peak hours and from August 2016 also in off-peak hours, although still less competitive than generating baseload electricity with coal. Coal-to-gas switching resulted in significant changes in the structure of the EU power mix, with the share of coal reduced to 21.6% in 2016, while the share of gas gained 3 percentage point to 18.6%. Going forward, coal-to-gas switching in Europe will continue to be influenced by the relative fuel prices, but also by European regulation on air quality and CO_2 emissions, as well as by national policies.

Due to its weight on the international coal market, China drives international coal prices. Hence, changes in energy and environmental policy in China are felt worldwide. The Chinese government intends carrying on with its supply reform, as domestic production capacity is still in surplus and the potential for increasing coal demand is limited as China moves to the new normal and fights against air pollution. The government, however, is closely monitoring the effect of the supply reform on domestic coal prices to avoid price volatility. It has defined a desired price range ($73-83/t) for domestic coal prices. Any variation above or below the range is likely to trigger policy intervention from the Chinese authorities. Since the second half of 2016 and the rise in Chinese imports, international prices have closely tracked Chinese domestic prices. But they also respond to regional market conditions (e.g. power plant outages, cold spells or hot temperatures) and are expected to remain volatile.

Today, the international coal market is precariously balanced at around $75/t. This relative balance means that small changes on the supply and demand side can easily move the market into tightness or oversupply. Going forward, one can expect price volatility coinciding with every unexpected shift in supply and demand.

Introduction

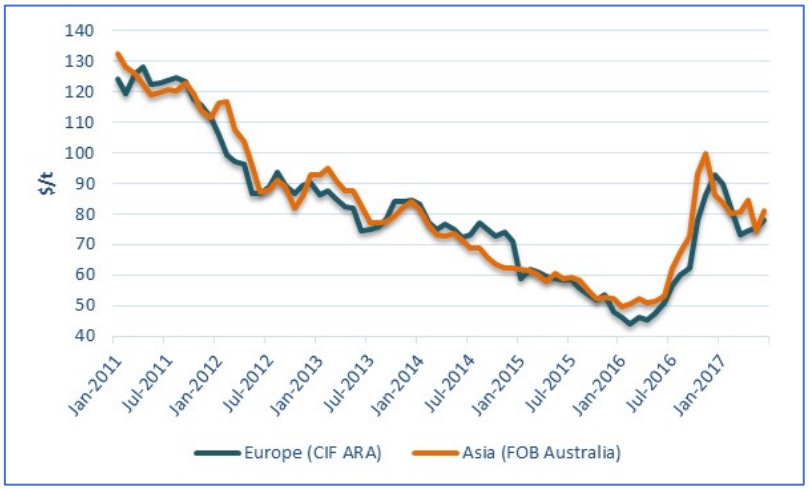
The relative level of coal and gas prices (and CO_2 prices in markets with carbon pricing) is a key determinant of the competition between gas and coal in the power sector and a driver of fuel switching. Understanding the price of coal and its main determining factors is therefore crucial to analyse the dynamics of gas demand in the sector. The objective of this paper is twofold:

- To explain the main reasons behind the dramatic increase in coal prices in 2016, and especially, the key role played by China.
- To review how gas and coal competition in the European power sector has evolved as a result of these higher coal prices.

1. After five consecutive years of decline, international steam coal prices doubled in 2016

International steam coal prices have fallen sharply over the period 2011-2015, from a peak of about $130/t (US dollars per metric tonne) in February 2011 to $50 in January 2016 (monthly average Free-on-Board [FOB] price of Australian steam coal). This decline was due to an oversupply on the international market caused by lower than expected import demand. But **from July 2016, steam coal prices soared** and reached $100 in November 2016. This massive rise may seem paradoxical as global coal consumption in 2016 fell for the second consecutive year.[1] In fact, it is responding to market fundamentals: a tightening of supply on the international market due to an unexpected surge in Chinese coal imports and the inability of exporters to meet this sudden increase.

Figure 1: International coal prices (January 2011 – June 2017)



Source: World Bank, GlobalCOAL

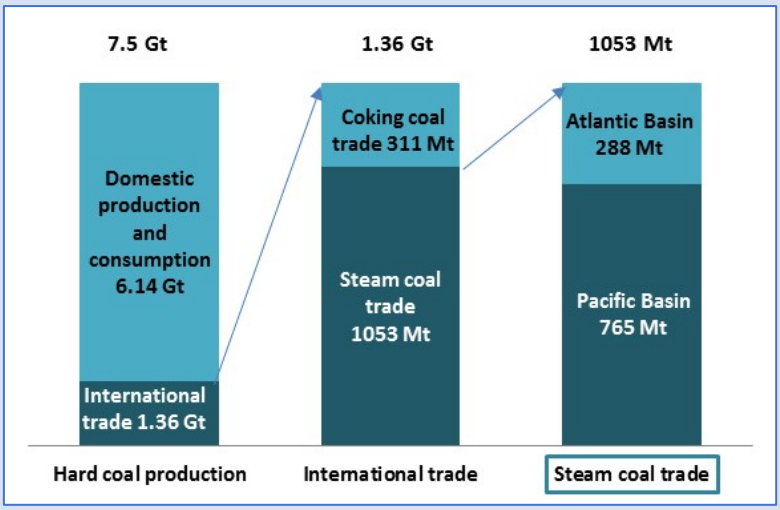
[1] In 2016, global coal demand fell by 1.7% year-on-year to 3,732 Mtoe. Rising demand in India and Southeast Asia was insufficient to offset falling consumption in China, the United States and Europe. This decline brought coal's share of total primary energy supply to 28.1%, its lowest share since 2004 (BP, 2017).

Box 1: Global coal trade represents a small share of total production

International hard coal[2] trade has grown over the past three decades driven by a sustained growth in steam coal trade. Total trade reached about 1,400 million tonnes (Mt) in 2014, including 1,100 Mt of steam coal and 300 Mt of coking coal[3]. After falling by almost 6% in 2015, international trade increased slightly in 2016. First estimates point to 1,364 Mt of steam and coking coal internationally traded in 2016 as against 1,347 Mt in 2015, an increase of 1.2%. International steam coal trade increased by only 0.5% to 1053 Mt, while coking coal trade increased by 4% to 311 Mt.

The international coal market is a narrow one. Despite its sustained growth, it accounts for 20% of hard coal production, a much lower share than oil (over 60%) and natural gas (30%). This is mainly due to the difficulties and costs associated with its inland transportation, which is often a bottleneck in the coal supply chain. The low share of international sales means that most coal is consumed in producing countries and its price may differ from international prices. In some countries, domestic coal prices are regulated by governments and do not follow the variations in international prices. For instance, in India, Coal India Limited (CIL), the state-owned company, sells nearly 85% of coal through regulated channel to power plants where prices are fixed annually. The remaining is sold through electronic auction where price follows international trend. In 2016, CIL increased its coal prices by 6.3% in May from an average INR 1,193/t (about $18.5/t) to INR 1,268/t ($19.7/t).

Figure 2: Global coal indicators in 2016



Gt: giga tonnes
Source: first estimates by SCG Consulting

Box 2: Steam coal imports are driven by Asia

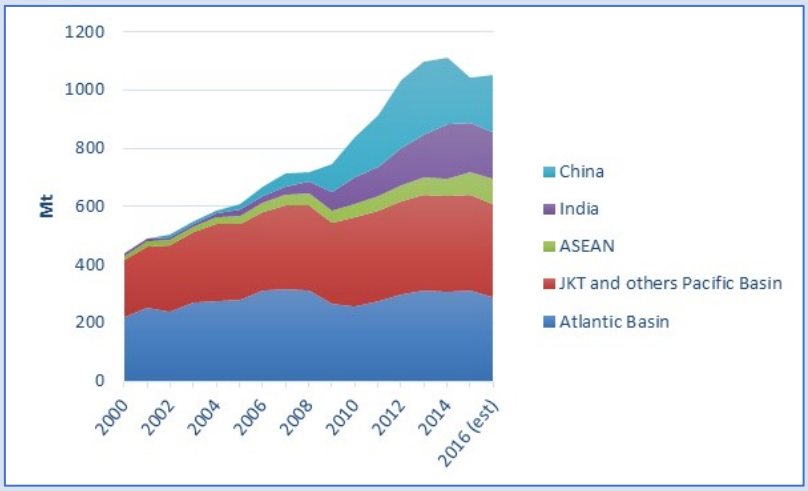
The steam coal market is split into two major markets, the Atlantic and the Pacific Basins. The Atlantic Basin is made up of utilities and traders from Europe (including the countries bordering the Mediterranean), the eastern seaboards of North, Central and South America, and the northern and western coasts of Africa. The Pacific Basin is made up of utilities from China, India, and three traditional buyers: Japan, South Korea, and Taiwan (JKT). Other smaller buyers include the west coast of South America and emerging buyers in Malaysia, Philippines, Thailand, and Vietnam.

[2] Hard coal consists of steam coal and coking coal. Steam coal is mainly used in power plants and by some industries (the cement industry for instance). Coking coal (or metallurgical coal) is used as raw material in the iron and steel industry.
[3] IEA, Coal Information 2016 (based on coal imports).

Steam coal imports has more than tripled since 1995, from 313 Mt in 1995 to a peak of 1,117 Mt in 2014, growing at an average annual growth rate of 7%. Seaborne trade accounts for roughly 90% of total steam coal trade, the reminder is made by overland trade between neighbouring countries, for instance exports between the United States and Canada. While Europe and Japan accounted for the bulk of demand until 2000, Asia has accounted for most of the growth over the last decade. **The surge of Asian imports since 1995 has shifted the centre of gravity in international coal trade to the Pacific Basin.** With steam coal imports of 765 Mt in 2016, the Pacific Basin has a leading position in the international market: it accounts for 73% of global imports, up from 47% in 1995. In the Atlantic Basin, although Europe is still a major player on the international coal scene, its role is shrinking from year to year. Today, it accounts for just 14% of global steam coal imports.

After falling by 6% in 2015, steam coal trade increased slightly in 2016 (+0.5% year-on-year to 1,053 Mt).[4] The growth was driven by import demand from China and Southeast Asia, while imports by other major importers (India and the European Union) fell. China and India remain leading actors, together accounting for a third of global steam coal imports. In recent years the two have alternated between the 'hero' and 'villain' roles in coal trade, with either firm import growth supporting volumes, or a decline stifling steam coal trade growth. India has surrendered its status as the world's top importer of coal back to China, with its steam coal imports in 2016 falling to 160 Mt, less than the 196 Mt imported by China.

Figure 3: Steam coal imports by Basin and major importing country (2000-2016)



Notes: includes cross-border over-land trade.
Source: IEA, EUROSTAT, 2016 estimated

On the supply side, Indonesia has become the dominant world supplier of steam coal, accounting for a third of global exports. Australia, Russia, Colombia, South Africa, and to a lesser extent, the United States, are the other major exporting countries. **Indonesian supplies account for 50% of the Pacific Basin imports.** It therefore plays a key role in rebalancing the Pacific market, together with Australia which account for about 30%. Russia, Colombia, South Africa and the United States are the traditional suppliers of the Atlantic Basin. But their coal exports are increasingly focussed on Asia.

[4] First estimates. The small rise may revert into a small decrease when final data are published.

Table 1: Global steam coal trade (2014-2016)

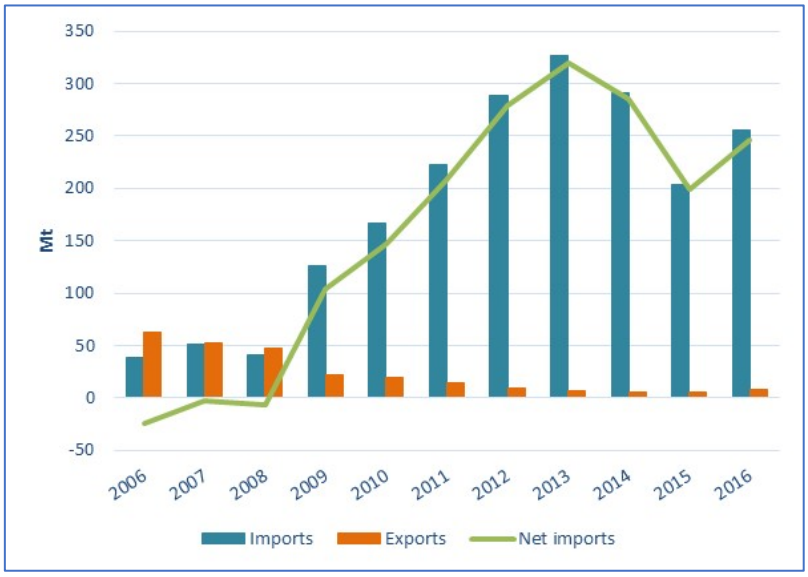
		2014	2015	2016 (est)	% 2016/2015
World		**1117**	**1048**	**1053**	**0.5%**
Exports					
of which	Australia	195	205	202	**-1.3%**
	Indonesia	408	367	369	**0.5%**
	South Africa	68	77	74	**-3.6%**
	Colombia	80	81	89	**9.9%**
	United States	34	25	16	**-38.6%**
	Russia	132	133	140	**5.3%**
Imports					
of which	Japan	137	141	140	**-0.7%**
	EU (excl. Intra-regional trade)	185	170	139	**-18.2%**
	China	229	156	196	**25.8%**
	South Korea	98	98	97	**-1.0%**
	India	185	171	160	**-6.4%**
	Taiwan	59	59	60	**1.7%**
	Southeast Asia	62	74	86	**16.0%**

Source: IEA, Australian Government, Department of Industry, Innovation and Science, 2016: first estimates

Steam coal prices soared in response to production restrictions in China…

The international price of steam coal responds to supply and demand balance on the international market, in which China plays a key role. Although its coal imports account for only 5% to 7% of its total coal supply, in the narrow international steam coal market, they represent between 15% and 20% of world imports. After two years of declining imports, combined with large production overcapacities and falling demand, Chinese imports were expected to further decline in 2016. Against all expectations, however, **Chinese imports sharply increased**. They surged by 51.5 Mt to 255.5 Mt in 2016, the largest annual gain since 2012.

Figure 4: Chinese coal imports (2006-2016)



Source: Chinese Customs, SCG Consulting

The increase was not due to increasing demand – Chinese coal consumption in 2016 fell for the third consecutive year – but to a **supply shock following the supply reform adopted by the Chinese government in early 2016**. To remove excessive and outdated capacities in the domestic coal sector,

the government required coal mining companies to cut operating days from 330 to 276 a year, from April 2016. The new regulation, combined with coal supply disruption due to heavy rains in Shanxi, one of the main producing regions, led to a steep fall in coal production—production fell by 14% in the second quarter of 2016, or more than 100 Mt. Increased demand by the power sector in the hot summer of 2016 resulted in a surge in the price of domestically produced coal. The Qinhuangdao[5] FOB spot price (5,550 kcal/kg) surged to $70/t in August 2016, compared with $56 in January 2016. **This surge re-opened the price arbitrage in favour of overseas coal and boosted demand for imported coal.** In turn, the sudden increase in Chinese imports has had the effect of **turning the international market from surplus to tightness**, causing international prices to rise.

Box 3: Chinese imports are driven by price arbitrage

As the world's largest coal producer, **China has become the 'swing *buyer*' of the coal market**, buying on the international market when international prices are lower than domestic prices and largely relying on domestic coal when imports are unattractive. China's domestic steam coal prices therefore set a price cap for international steam coal prices. Until mid-2014, Chinese imports had functioned as the main method of clearing supply growth in the steam coal market, as favourable price arbitrage drove the replacement of higher-cost Chinese domestic supply with cheaper overseas imports.[6] In 2014, however, this started to change and in 2014 and 2015, China's coal imports slumped, exacerbating the oversupply on the international coal market and the fall in coal prices. The sudden increase in Chinese coal imports in 2016 led to a surge in domestic prices and re-opened the arbitrage between domestic and imported coal, in favour of imports. Since then, imports have risen as Chinese coal prices have remained higher than international ones.

…and the inability of exporters to meet the sudden increase in demand

The supply of coal on the international market depends on export capacities and, consequently, investment in mines and in transport and port infrastructure in the major steam coal exporting countries. After five years of falling prices, these capacities have been reduced by mine closures, corporate bankruptcies in countries with the highest cost of production (the United States), and reductions in investment by mining companies around the world. Supply was also constrained in 2016 by meteorological disruptions – heavy rains in Indonesia in the first half of the year and in Australia in the third quarter – though their effect was less pronounced in the steam coal market, in contrast to the coking coal market.

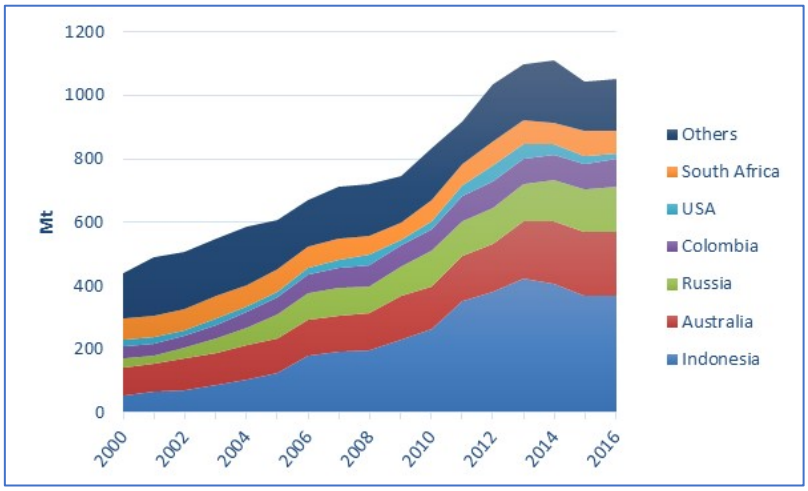
Only Colombia and Russia were able to increase their exports in 2016. With excess production and low-cost export capacities, Colombia managed to increase its exports from around 8 Mt to 89 Mt. But its exports to the European Union fell and it was Turkey and Asia that benefited from the exports rise. Whereas in 2015 Colombia had exported no coal to Asia, in 2016 it exported 7 Mt. In Russia, the depreciation of the rouble against the dollar made Russian coal competitive. In 2016, Russia increased its production by 3% (384 Mt) and its exports by 8% to 164 Mt, including 140 Mt of steam coal. The Pacific market benefitted from this increase, while exports to the EU declined.

The response to higher prices by Indonesia, Australia, South Africa and the United States was concentrated in the final months of the year, when prices reached a high enough level to allow re-opening of mines with higher costs. Therefore, on an annual basis, their exports stagnated in 2016 (Indonesia, Australia) or decreased (South Africa, the United States). In the United States, exports of steam coal fell sharply for the fourth consecutive year, down to only 16 Mt in 2016, a decrease of

[5] Qinhuangdao (or QHD) is the largest port in China used to transfer coal from the northeast to the south-eastern provinces.
[6] See OIES (2014) for a detailed analysis of the Chinese coal market.

39% from 2015. A slight recovery in exports occurred late in the year thanks to the increase in international prices and a tight European market.

Figure 5: Steam coal exports by major exporting country (2000-2016)

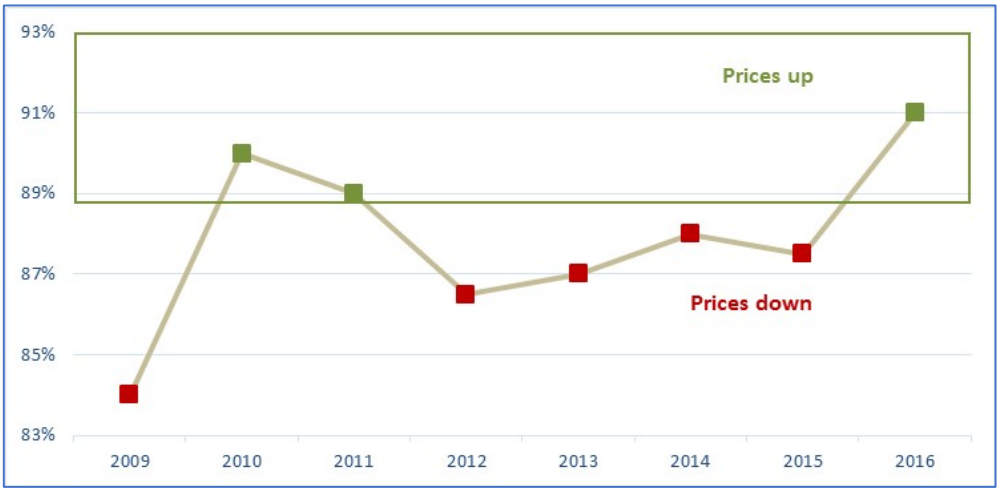


Source: IEA, 2016 estimated

After five years of oversupply, the global coal market tightened

Thus, **2016 was characterized by a scissors effect**: on the one hand, a sudden and unexpected increase in Chinese imports and, on the other, a subdued supply response. Constrained by reductions in investment, export capacities reached their limits and could not be expanded at short notice.

Figure 6: Utilization of global steam coal export capacities (2009-2016)

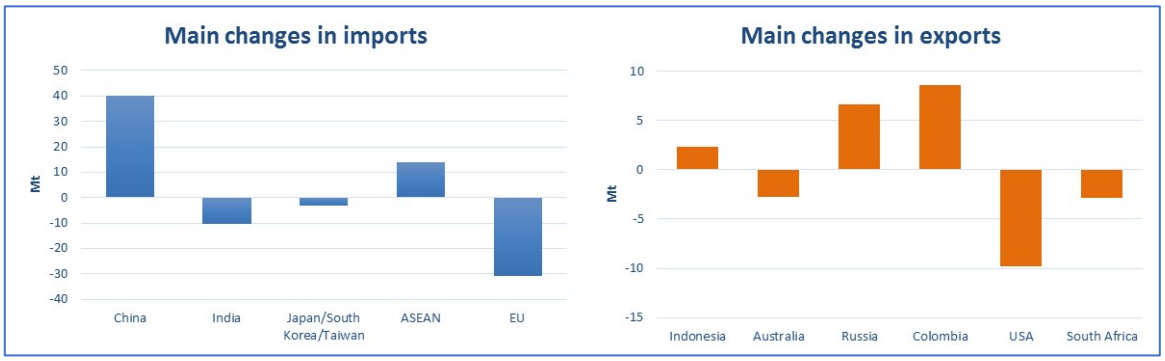


Source: Noble Group

As coal exporting countries were not able to ramp up their exports rapidly, **increased prices displaced coal demand in the most price-sensitive markets: the power sector in Europe**, and to a lesser extent, imports by India. Therefore, EU coal imports fell significantly, down 18% in 2016 (net imports). This situation is similar to the one observed on the LNG market after the Fukushima nuclear accident and the surge in LNG prices in 2011. At that time, it was lower gas demand in Europe, mostly caused by the financial crisis and the flexibility of a well-diversified power generation mix that

freed up the incremental LNG volumes needed by Japan.[7] In the coal market, diversions of cargoes are not common, but some producers (South Africa, Colombia, Russia) have the flexibility to export to both Asia and Europe. In 2016, their exports to Europe fell, while they increased deliveries to Asia.

Figure 7: Relative changes in steam coal imports and exports (2016 vs. 2015)

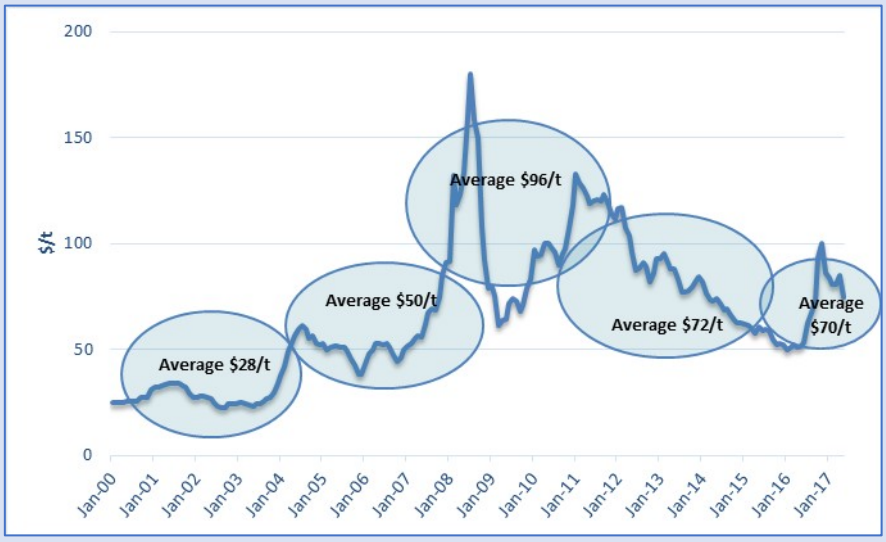


Source: SCG Consulting

Box 4: Coal prices: 'boom and bust' is the rule

Due to long lead times for the development of new coal mines, railways, and export capacity, **coal prices are cyclical on a long-term basis**. When supply is tight, prices can rise steeply, incentivizing investment in new infrastructure, while excess supply leads to falls in prices until the market rebalances. Figure 8 8 illustrates the long-term evolution of Australian FOB prices since 2000 and shows boom and bust cycles in coal prices.

Figure 8: FOB Australian steam coal prices on a long-term basis



Source: World Bank, SCG Consulting

In the short term, prices are volatile. Supply constraints (strikes at mines, flooding, cyclones) make coal vulnerable to sudden supply shocks and highly dependent on meteorological conditions. For instance, in 2011, flooding in Queensland, a major coal producing and exporting state in Australia, forced Australian miners to stop exports and declare force majeure. The shortage of coking coal on the international market caused a tripling in coking coal prices and was also felt on the steam coal

[7] IEA, Global Gas Security Review, 2016.

market. More recently, Cyclone Debbie, which struck Australia at the end of March 2017, disturbed coal deliveries as railways had to stop working for several days. Despite its limited impact on steam coal exports, Australian steam coal prices increased by $6/t in the first week of April to $88/t. On the demand side, lower electricity demand, high coal stocks may lead to a short-term fall in international coal prices. On the contrary, a sudden increase in coal imports may create a surge in coal prices.

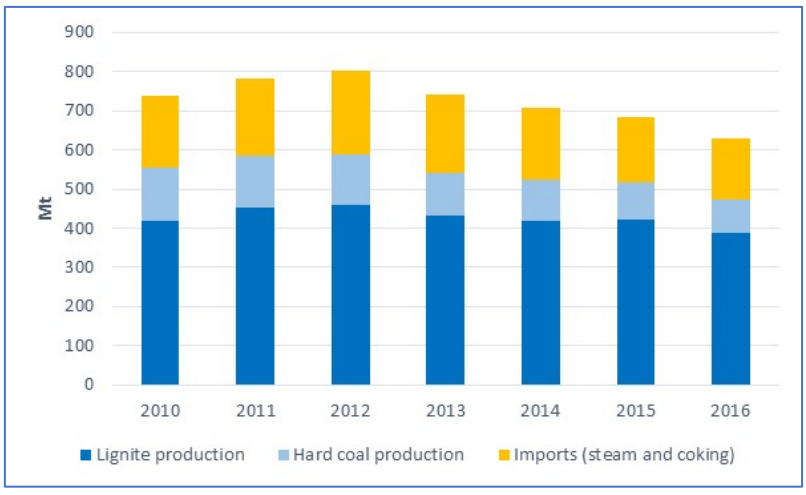
In contrast with natural gas, **the coal market is truly global**, and thanks to low maritime transportation costs, **international steam coal prices are similar in the Atlantic and Pacific Basins** (see Figure 1). Suppliers, such as Russia and South Africa, but also increasingly Colombia, are able to swing some of their exports between the Atlantic and Pacific markets and, in recent years, growing volumes of exports from these traditional suppliers of the Atlantic Basin have been sold to Asian buyers. This has reinforced the links between prices in the two Basins.

Despite this strong relationship, **in the short term, prices do react to regional events on each market**. In March 2011, when the Fukushima accident occurred and Germany announced the closure of seven nuclear reactors, European coal prices rose by $10/t to nearly $130/t, with the market anticipating a shortage of coal in Europe, although paradoxically European demand was weak. In contrast, prices on the Pacific market continued declining. Similarly, in December 2016 and January 2017, European prices were higher than Asian ones due to the tightness of the European market following nuclear outages and a very cold weather in January 2017.

Despite a fall in consumption and imports, European coal prices rose

In Europe, except from a recovery between 2010 and 2012, coal consumption has been in structural decline since 1990. The fall was pronounced in 2016, when coal consumption (all types of coal, including lignite) decreased by 8% to 631 Mt (even by 10% based on calorific value to 242 Mtoe). Both EU production and imports decreased sharply.

Figure 9: European coal demand (2010-2016)



Source: EUROSTAT

The sharp fall in steam coal consumption and imports in 2016 did not lead to lower prices. European prices are determined by Asian – and especially Chinese – prices in a global coal market, rather than by regional market prices. But spot prices also responded to specific European issues.

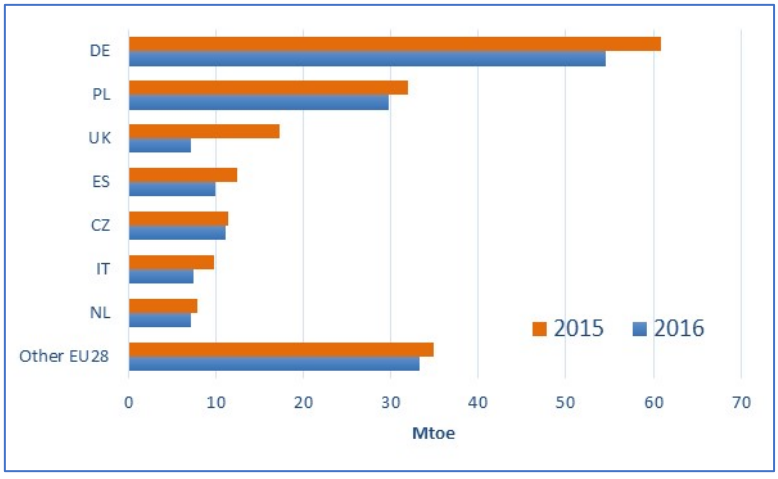
At the beginning of 2016, European import prices (CIF ARA price)[8] fell below $45/t in February 2016 in response to low European coal demand. But tightness in the international market drove European prices up in the second half of 2016. From $61 in August 2016, prices rose to $78 in October 2016. In December 2016 and January 2017, they rose above $90/t and were higher than Asian prices, reflecting tightness on the European market.

Coal lost its competitiveness in Europe

Higher coal prices have resulted in a loss of competitiveness of coal against gas in Europe, which has been reflected in a decline in coal demand in the EU power sector, whereas gas demand has risen significantly. In Asia, the coal-to-gas competition is less influenced by international prices. In many countries, coal prices are regulated at a much lower level than international prices (e.g. India, but also Indonesia for coal power plants at mine mouth) and higher international coal prices do not necessarily translate into higher domestic prices. Very often, gas prices are regulated too. In China, for instance, city-gate gas prices to the power sector amounted to $8.3/million British thermal units (MBtu) in 2016.[9] Despite the rise in coal prices, gas prices were too high to incentivize fuel switching. In Japan, where international prices apply for both coal and gas, the average price of LNG imported in the second half of 2016 was $6.9/MBtu, while the import price of coal CIF Japan was $90/t ($3.3/MBtu). Even taking into account the higher efficiency of CCGTs, the price of gas was still too high to incentivize coal-to-gas switching, especially as coal-fired power plants in Japan have high efficiencies.

In the EU, whereas coal had been more competitive than natural gas for the previous five years, in the summer of 2016 the situation reversed: electricity generation from natural gas became more profitable than coal-fired generation in many European markets. Therefore, EU coal power generation fell by 94 TWh in 2016, relative to 2015, while gas-fired generation increased by more than 100 TWh. Consequently, **coal demand by the power sector declined sharply, down 14% from 187 Mtoe in 2015 to 161 Mtoe in 2016**. Coal demand was also reduced by the closure of ageing coal-fired power stations. Virtually all European countries reduced their coal consumption in 2016, though to varying degrees.

Figure 10: Coal delivered to power plants in the EU (2016 vs. 2015)



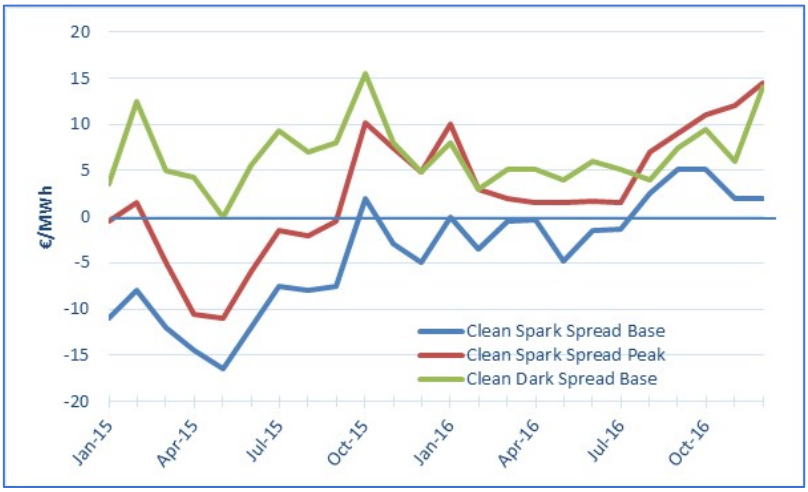
Source: EUROSTAT

[8] CIF ARA (Cost Insurance Freight, Amsterdam Rotterdam, Antwerp): coal delivered at the major coal ports in Northwest Europe.
[9] BEG/CEE (2017).

The United Kingdom and Germany accounted for 60% of the decrease. In the United Kingdom, the carbon tax paid by power generating companies, on top of the price of CO_2 allowances, structurally advantages natural gas over coal. UK coal consumption by the power sector fell by 59% and coal accounted for only 9% of UK electricity needs in 2016. In Germany, the decline in coal consumption was less pronounced, with coal and lignite still accounting for a high proportion of electricity generation, but this was down in 2016 (40.1% against 42.1% in 2015) in favour of natural gas (9.6% in 2015 and 12.1% in 2016).

Figure 11 shows the monthly average clean dark spread base as well as the clean spark spread base and peak for Germany for 2015 and 2016.[10] In 2016 natural gas-fired generation became competitive in peak hours and from August 2016 also in off-peak hours, although still less competitive than generating baseload electricity with coal.[11]

Figure 11: German monthly average CSD Base and CSS Base/Peak (January 2015-December 2016)



The clean dark spread is calculated on the average day-ahead base price, as coal plants usually act as base load power plants. The clean spark spread is calculated with day-ahead base prices as well as with the day-ahead peak prices, to show the difference in profitability of running a natural gas plant in baseload or in start-stop operation during peak hours.

Source: TenneT

Coal-to-gas switching in the power sector resulted in **significant changes in the structure of the power mix**, with the share of coal reduced to 21.6% in 2016, while the share of gas gained 3 percentage point to 18.6%.[12] The spike in coal prices last year also provided **a boost to European gas hub prices** as coal-to-gas switching drove up gas demand.

Going forward, coal-to-gas switching in Europe will continue to be influenced by the relative fuel prices. In the first half of 2017, coal prices decreased but remained high, above $70/t (and even close to $80 at the end of June 2017). Gas prices on the other hand have weakened as a result of warmer weather and robust LNG import volumes. These price trends have triggered some fuel-switching from inefficient coal power plants to efficient gas power plants, supporting gas demand. In the first

[10] The clean dark spread (CDS) and clean spark spread (CSS) allow to compare the profitability of generating electricity with a conventional coal or gas plant respectively, taking into account fuel and CO2 emission allowances costs.

[11] TenneT (2017).

[12] Agora Energiewende and Sandbag (2017).

four months of 2017 (latest available data), gas demand in the heat and power sector remained robust in the main gas consuming countries. It increased by 14% on average relative to the same period in 2016.[13] If LNG imports continue to rise, **power sector switching will be the primary mechanism that allows European hubs to absorb more gas**.[14]

In the future, coal-to-gas switching will also be impacted by the evolution of CO_2 prices (which so far have remained low at around €5/t in 2016), and the reform of the EU Emission Trading Scheme, but also by EU regulation on air quality and by national policies. **Six countries have plans to phase out coal in the next ten-fifteen years**. Among them, the UK is committed to phasing out unabated coal by 2025. Other countries that have pledged to end coal-fired generation are smaller coal users (France, Austria, Portugal, Finland, Denmark). In other countries coal generation is falling gradually, owing to market conditions or because of national and EU policies that mandate the promotion of renewables, cuts in emissions and compliance with the Industrial Emissions Directive (IED) on air quality. In Germany, the placement of retired lignite capacity (2.6 GW) into a reserve will reduce coal burning, while some coal plant units will be closed due to toughening market conditions. Steag GmbH, German fifth-biggest power producer, is considering retiring at least five of its 13 German coal stations before plan and in April 2017 closed the 2.2 GW Woerde coal power plant. Even in countries such as Poland where coal power is fully supported by government policy, coal generation is expected to only remain stable.

The EC Winter Package proposal to impose CO_2 limits on fossil fuel power plants (550 g/kWh) that are eligible to receive capacity market payments to remain operating, would further limit coal generation as it would make unabated coal-fired plants non-eligible.

Coal plants face these pressures at a time when the EU coal fleet is ageing: two-thirds of Europe's existing plants are over 30 years old. The case for building further coal capacity in Europe is weak. In April 2017, power utilities from 26 out of the 28 EU Member States pledged not to build any new coal-fired power plants after 2020. Only Poland and Greece stayed outside the initiative.

Coal capacity and generation in the EU overall can be expected to continue falling in the short to medium term. However, **the fall is likely to be gradual and not revolutionary as in the case of UK**. Germany and Poland accounted for half of EU coal demand in the power sector in 2016 and absent to radical changes in their national policies, coal is expected to remain a key part of their power mix for the years to come.

2. The key role of China

Due to its weight on the international coal market, China drives international coal prices. Hence, changes in energy and environmental policy in China are felt worldwide and are crucial to understanding the evolution of international coal prices.

China declared war on air pollution

China's coal demand and production increased very fast in the previous decade, driven by economic activity and surging power demand. During the period 2000-2013, China almost tripled its production and consumption. From a net coal exporter in 2008, China became the world's leading importer in 2011. In 2013, its coal imports reached 327 Mt, of which 252 Mt of steam coal, and Chinese imports accounted for about a quarter of global steam coal imports. But everything changed after the

[13] Jodi Gas (main markets: Belgium, France, Germany, Italy, Netherlands, Spain and the United Kingdom).
[14] Timera (2017).

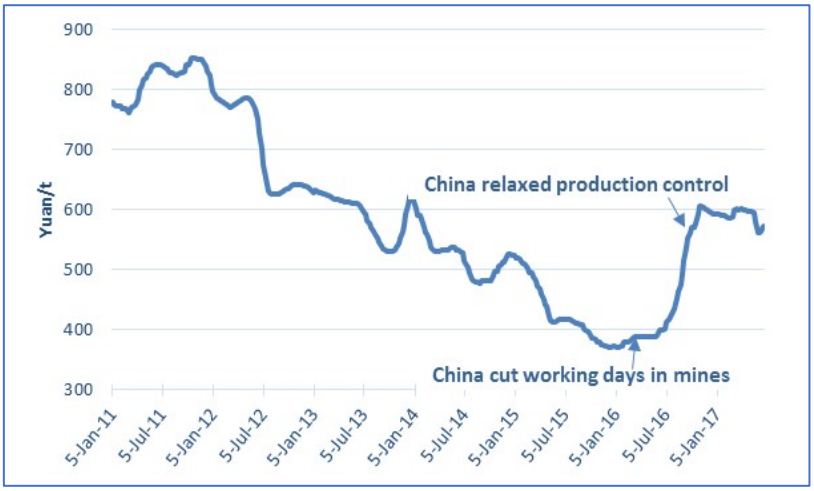
Chinese government declared war on air pollution that is poisoning the lives of Chinese citizens. In September 2013, the State Council released a **plan to curb air pollution mainly by capping coal consumption in the most polluted eastern regions**,[15] accelerating the development of low- or non-carbon energy sources, raising energy efficiency standards in key industrial sectors, and limiting the number of vehicles. The plan introduces stricter emission performance standards for coal-fired power plants and regulation to eliminate the use of small- and medium-scale coal boilers in the industrial and residential sectors. A dozen of provinces, mainly in the coastal regions of the east and south-east, have begun to reduce or cap their coal consumption by means of energy conservation measures and energy diversification. They increase power imports from other regions, natural gas supply, and the use of non-fossil fuels. Beijing city was the first to move away from coal and to replace its four coal-fired power plants by gas-fired ones. At central level, the government intends reducing the share of coal in China's energy mix to 58% by 2020 (62% in 2016), diversifying the energy mix by speeding up the development of nuclear power, renewable energy and natural gas, and reducing the energy intensity of the economy.

Coal overcapacity weighed on prices

In 2014, China's coal demand fell for the first time since 1998 – it again fell in 2015 and 2016. Falling demand combined with large imports and the expansion of coal production turned the **domestic market from tightness to oversupply and exerted downward pressure on domestic coal prices.**

Domestic prices at Qinhuangdao (QHD) fell from 811 yuan/t ($125.5) on average in 2011 to less than 400 yuan (around $56/t) at the beginning of 2016. Weak prices had a detrimental effect on the mining sector: **in 2014, over 70% of China's coal companies were reported to be making losses (80% in 2015)** and more than half of them to be having difficulties in paying worker wages. This led the government to intervene to resolve the oversupply situation.

Figure 12: China's domestic steam coal price at Qinhuangdao (January 2011-June 2017)



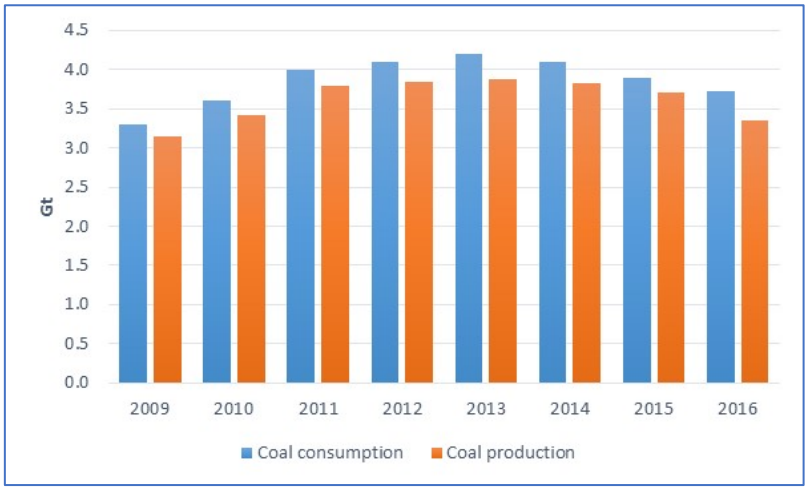
Source: cq.com, sxcoal.com

[15] Especially in the four major highly-polluted urban areas: the greater Beijing region, northeast China, the Yangtze River Delta around Shanghai and the Pearl River Delta in Guangdong province.

A structural supply reform to stabilize coal prices

To control production overcapacity (estimated at 1.5-2 Gt at the end of 2015), **the Chinese government has been pursuing a policy of restricting supply**, and to this end in 2014 and 2015 imposed stricter conditions for importing coal. Since 15 October 2014, China has reintroduced a duty on coal imports, which made domestic coal cheaper than international supplies. Furthermore, a ban on the production, imports, and sales of low-quality coal with high sulphur and high ash contents, became effective on 1 January 2015. These restrictions had reduced imports in 2014 and 2015, but the decline was insufficient to stabilize the Chinese market following the post-2014 decline in consumption. Since then, the government has introduced **structural reform of the domestic supply** to curb the collapse of domestic coal prices. In late 2015, the government imposed a three-year moratorium on the development of new mines. It also continued to close small mines and to consolidate the sector around fourteen major production bases. In February 2016, the government announced its intention to eliminate 550 million tonnes per annum (Mtpa) of surplus production capacity over the next three to five years, including 250 Mtpa in 2016 – actually, 290 Mtpa were closed in 2016. Furthermore—a taboo subject in China up until now—it announced job cuts in the coal and steel sectors (about 1.3 million jobs in the coal sector, some 20% of the total). But the most radical reform was introduced in April 2016, as mentioned previously, when the government imposed a reduction of the number of working days in the mines. This restriction resulted in a sharp and unprecedented decline in Chinese coal production to 3.36 Gt, down 9.4% in 2016 relative to 2015.

Figure 13: China's coal production and consumption (2009-2016)



Source: China National Bureau of Statistics (NBS)

The government stepped in to avoid coal market overheating

The supply reform has had the desired effect: domestic prices have risen and coal miners have returned to profitability: in the first 11 months of 2016, profits in the mining industry climbed by 157% compared to the same period in 2015, to 85 billion yuan ($12.23 billion). But prices have risen too fast, with the price at QHD port increasing by 63% between January and October 2016. Faced

with this rapid increase, which could affect the price of electricity[16] and drive inflation, in September 2016, the government stepped in and allowed some mines to increase production. But with prices continuing to rise in November, it temporarily relaxed its supply reform by allowing all certified 'safe' mines to produce on a 330-day-a-year basis until the end of winter 2016-17. This measure succeeded in stabilizing the Chinese price at around 600 yuan/t (around $87/t) during winter 2016-17. In turn, Australian export prices fell from their peak of $100/t in November 2016 to $80-85 in the remainder of winter 2016-17.

What next? A target price of $73-83/t

The Chinese government intends carrying on with its supply reform, but to closely monitor its effect on prices. Production capacity is still in surplus and the potential for increasing coal demand is limited, due to slower economic growth (hence slower demand for electricity), the shift towards a service economy, and the changing structure of the electric mix. China's apparent consumption fell sharply in 2016 (down 7.7%), although the decline in real consumption appears to be much less (an estimated fall of 4.7% based on tonnage and 1.7% based on calorific value) because of widespread destocking. 2016 was thus the third consecutive year of decline in demand, which peaked at 4.24 Gt in 2013. The 13th five-year plan (2016-20) for coal, published in December 2016, aims to limit coal consumption to a maximum of 4.1 Gt. Production is in turn capped at 3.9 Gt. The plan foresees the elimination of 800 Mtpa of overcapacity between 2016 and 2020, while at the same time it approves the addition of 500 Mtpa of 'advanced' new capacity. The number of coal mines operating in the country is targeted to be reduced from 9,700 at the end of 2015 to 6,000 by the end of 2020.

The government intends keeping domestic coal prices within a 'reasonable' range to avoid an increase in electricity production costs, while at the same time to ensure the solvability of the mining sector. At the end of 2016, it asked mining companies to sign **annual contracts with the major electricity producers at a price of 535 yuan/t (about $78) so as to curb price volatility**. In January 2017, the National Development and Reform Commission (NDRC) specified its targeted domestic steam coal price range which should be within 6% of the annual contract price (about $73-83/t FOB, 5,500 kcal/kg). Supply interventions now only appear likely if prices are out of this price range.

In March 2017, the Chinese government decided not to reinstitute its control on working days at mines. Instead, the NDRC requested provincial governments to decide whether to implement cutbacks at mines that are not considered 'advanced'. China plans to cut 150 Mtpa of coal production capacity in 2017. The lowered de-capacity target is mainly aimed at ensuring stable supply while continuing cutting surplus capacity. Since the beginning of 2017, domestic prices have stabilized at around 600 yuan/t at QHD as supplies remained sufficient. In the first five months of 2017, China's coal production increased by 4.7% to 1,407 Mt, while imports continued rising, up 23% to 112 Mt. Rising Chinese coal imports in 2017 – if it lasts – should not create a new supply shock on the international market, but should keep international coal prices at a high level.

[16] Coal still accounts for 68% of electricity generation.

Figure 14: Chinese monthly coal imports (January 2015-May 2017)

Source: Chinese customs

Despite the difficulty of controlling a market the size of the Chinese one, the monitoring of domestic prices put in place by the government and the discipline of coal miners are likely to **stabilize China's domestic coal prices in the range defined by the government ($73-83/t, 5500 kcal/kg)**. In June 2017, coal futures prices on Chinese stock exchanges rose to a record high as warm weather leading into the summer season raised investors' expectations for increased demand.[17] To avoid coal shortages and price surges as occurred in summer 2016, the NDRC authorized some mines to increase their production during the summer period. This intervention indicates the willingness of the government to keep domestic coal prices as stable as possible. If prices do climb again, or fall too low, the Chinese government will make policy adjustments to bring them within the acceptable range.

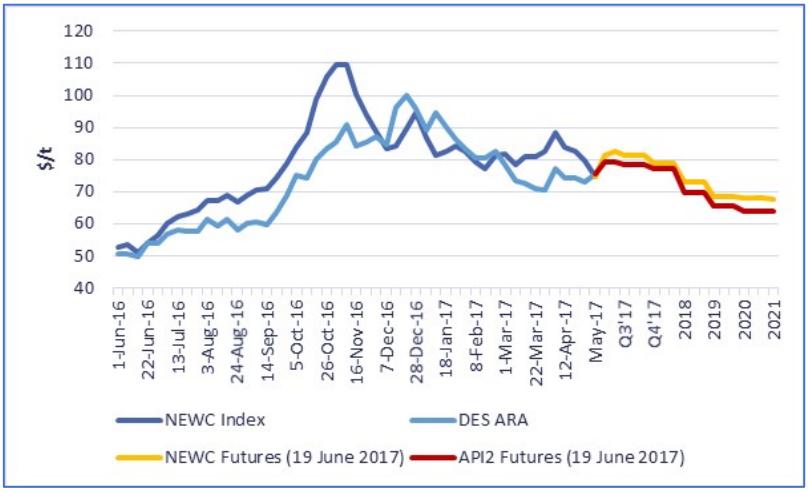
Conclusion: In turn, international coal prices should remain elevated

More than ever, international prices are determined by Chinese prices. Since the middle of 2016, international prices have closely tracked China's domestic coal prices. In June 2017, international prices increased as a result of market expectations for a tighter market in the summer, due to hot weather in Asia and Europe, and low hydro in China. On 30 June, European prices settled at U$79.8/t, up 3.2% month on month, while the Australian benchmark was 11% higher at $82.5/t.

The forward curve for coal prices (as of 19 June 2017) suggests continued firmness in coal prices in the second half of 2017 (at almost $80) before a return to much lower levels in 2018 ($70) and 2019 ($65). However, in the short and medium term, coal prices depend very much on the level of Chinese imports – among others – which is driven by economic, but also regulatory factors, and remains unpredictable.

[17] Reuters, 16 June 2017.

Figure 15: Coal futures prices on ICE (as of 19 June 2019)



Source: GlobalCOAL

Today, the international coal market is precariously balanced at around $75/t. This relative balance means that small changes on the supply and demand side can easily move the market into tightness or oversupply. Going forward, one can expect price volatility coinciding with every unexpected shift in supply and demand.

List of Tables, Figures and Boxes

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