

# Report by EURACOAL on the formation of coal prices in market-based economies: the case of Ukraine

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Submitted to the National Energy and Utilities Regulatory Commission of Ukraine by:

## **EURACOAL**

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## Executive Summary

EURACOAL has been asked by the National Energy and Utilities Regulatory Commission of Ukraine (NEURC) to give its opinion on an official coal-pricing methodology introduced in 2016. The calculated steam coal price is used when setting regulated electricity tariffs in Ukraine on the assumption that owners of thermal power plants will then receive enough income to purchase their coal needs, some of which must be imported.

Historically, Ukraine has been able to meet most or all of its own steam coal demand and has even enjoyed short periods when it was a net exporter of steam coal. More recently, the country has had to rely on imported steam coal, following the loss of coal mines due to the ongoing conflict in eastern Ukraine.

This report provides a background to price formation on the international steam coal market, based, as it is, on the balancing of supply and demand at a market price. It shows that Ukraine is a small player in the huge international coal market and is therefore a price taker. For any free-market economy that is a net importer of coal, the price of imported coal from the international market, including shipping costs, sets the national price for coal producers. For countries that are net exporters of coal, this is also true, but without the cost of international shipping.

To establish a transparent benchmark price for imported steam coal, NEURC chose the API 2 coal price index, this being a combination of the prices reported independently by two commercial providers of coal-market information in the *Argus/McCloskey Coal Price Index Report*. Specifically, API 2 reflects the price of steam coal imported into northwest Europe at three major ports: Amsterdam, Rotterdam and Antwerp (ARA). This choice of marker price is entirely correct. The collection and reporting of the underlying price data is trusted by market participants around the world and the methodology used is fully specified and properly scrutinised.<sup>1</sup>

The cost of shipping coal to Ukrainian ports is higher than to the ARA ports. EURACOAL has taken advice from market experts and believes that the cost delta was up to US\$9/t in November 2017, depending on the origin of a particular shipment and vessel size. However, there is very little trade upon which to confirm cost estimates. The estimates of the shipping cost deltas used by NEURC ranged from US\$6.5/t to US\$14.5/t between January 2016 and June 2018. We conclude that the assumed shipping cost deltas used by NEURC are of the correct magnitude.

Ukraine's coal import needs are slightly complicated by the requirement for low-volatile coal, such as anthracite, at some Ukrainian power stations. The international market for such coal is shallow, with few marker prices. The conversion of some power stations to burn widely traded steam coal has alleviated this complication. Also, the price of low-volatile coal can be similar to that of steam coal for power generation, depending on demand from the steel industry where low-volatile coal commands a higher price.

In conclusion, the choice of marker price is correct – the API 2 is a transparent and appropriate measure of the import parity price in Ukraine. The transport cost add-on in the so-called Rotterdam+ price formula is an approximation and may not reflect the actual cost of delivering coal to Ukrainian ports. However, like the API 2 marker price itself, the transport cost delta must be estimated transparently. Adding a transport cost delta to the agreed, indexed coal price to arrive at an import parity price means that future variations in coal *and* transport costs can be captured.

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<sup>1</sup> *Thermal Coal and Petcoke Marker Price Methodology and Specifications*, IHS Markit Ltd., July 2018 and *Methodology and Specifications Guide*, ARGUS Coal Daily International, Argus Media Group, August 2018.

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## 1. Introduction

This report offers an analysis of world coal markets and best practice for coal producers and importers to remain competitive. It is prepared in response to a request dated 18 July 2018 from the National Energy and Utilities Regulatory Commission of Ukraine to give our opinion on a coal pricing methodology introduced in 2016.

The report begins with an introduction to EURACOAL and the association's position on markets and subsidies. Some basic economic terms are introduced to explain the formation of steam coal prices on the international market. Then, the coal supply situation in Ukraine is examined before explaining the pricing methodology introduced by the Ukrainian government in 2016.

Subsequent sections of the report assess this pricing methodology from a purely objective viewpoint. We offer no opinion on any political decisions. An overview of world coal production (supply) and consumption (demand) in Section 2 aims to show the Ukrainian coal industry in the broader context of an enormous, global coal industry that is set to grow even bigger. International coal pricing is then explored, with a history of price indices in Section 3 and their growing importance to coal trade. A review in Section 4 of coal pricing in seven countries offers insights into how governments have sought to balance a desire for more market liberalisation with the need to protect often large, indigenous coal industries.

In Section 5, the report turns to the situation in Ukraine where administrative coal pricing led ultimately to a crisis in the coal industry. This crisis became even more severe as coal mines were lost due to the conflict in the East and the consequent need to import coal to meet demand. Without enough income to pay for imported coal, electricity generators became "pig-in-the-middle" – without the financial resources to meet their commitments to supply. In response, to this crisis, the National Energy and Utilities Regulatory Commission of Ukraine proposed a new pricing methodology for coal. Adopted in 2016, this methodology provides owners of thermal power plants with a regulated electricity rate that should enable fair fuel costs (coal, oil and gas) to be passed through to electricity consumers. The methodology is based on an import parity price and is described and assessed in Section 5 of this report. This assessment feeds into the report's key findings presented in Section 6 and conclusions in Section 7.

### 1.1. EURACOAL – the voice of coal in Europe

In 1954, the "Comité d'étude des producteurs de charbon d'Europe occidentale" (CEPCEO or the "Western European Coal Producers' Association") was established. EURACOAL itself was established in 2002 as a successor association to the "Comité européen des combustibles solides" (CECSO or the "European Solid Fuels Association") which itself succeeded CEPCEO in 1996. Today, EURACOAL represents twenty-six members from fifteen countries.

### 1.2. EURACOAL on markets and subsidies

In the preamble to the EURACOAL statutes, the European coal and lignite industry states that it wishes *"to continue to participate actively in the development of Europe's energy market by joining forces with other central organisations within the energy sector and with the institutions of the European Union"*.

This belief in markets and market-based solutions has underpinned EURACOAL activities since 2002. That does not mean that EURACOAL is fundamentally against subsidies. These are paid in some EU member states and elsewhere for a variety of reasons, such as to support renewable energy sources.

EURACOAL is against the payment of subsidies which disrupt market outcomes. So, for example, hard coal mining in Germany has received generous subsidies over the years to mitigate the social consequences of the long-term decline of a large industry. Despite these subsidies, a competitive coal market continues to exist in Germany, because the subsidy mechanism pushes indigenous producers to sell their coal at an import parity price (see Box 1). Conversely, the payment of generous renewable feed-in tariffs in many EU member states, including most notably Germany, has depressed wholesale electricity prices to levels that damage competing sources of electricity.

### Box 1 – Selling price of subsidised coal in Germany

German hard coal production is structurally uncompetitive, with high production costs reflecting the high German social and environmental standards and especially the great depth (up to 1 500 metres) from which coal has been recovered by the country's only hard coal mining company, RAG AG. In 2011, the European Commission agreed the German government's plan to close all the remaining hard coal mines step by step until 31 December 2018. This plan includes the payment of substantial State aid (paid mainly by the Federal government and partially by the regional government of North Rhine-Westphalia), including aid of almost €12.2 billion to cover current production costs and the inherited liabilities of previously closed mines over the eight-year period 2011-2018 (i.e. around €100/tonne on average).

In order to determine the amount of State aid a coal undertaking is entitled to, Germany has issued a special implementing legislation, the so-called "coal guidelines" of the Ministry for Economy and Energy in accordance with the Coal Financing Act (*Steinkohlefinanzierungsgesetz resp. Gesetz zur Finanzierung der Beendigung des subventionierten Steinkohlenbergbaus zum Jahr 2018, Bundesanzeiger* of 27.12.2007, p.3086), which define how State aid for the German coal industry is calculated. This calculation is carried out by the Federal Office of Economics and Export Control (BAFA).

According to the German BAFA price system, aid may only be granted up to a maximum made out of the difference between revenues and costs for steam coal (*Verstromungskohle*) and coking coal (*Kokskohle*). These payments are however limited by the average sales price of imported hard coal, the BAFA reference price. Thus, there are two possible situations (see also Figure 1):

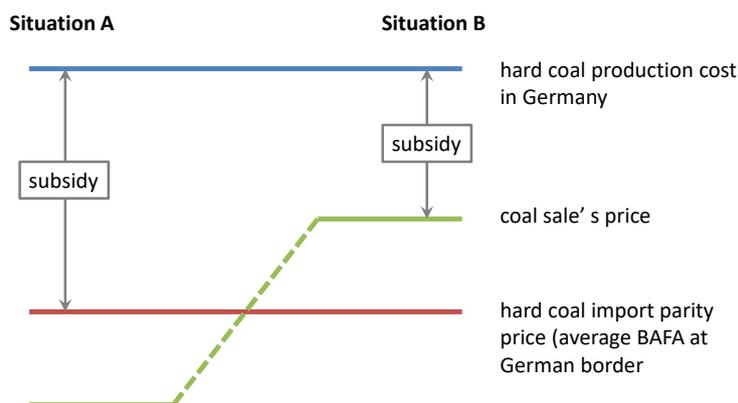
**Situation A:** If the sales price for German hard coal is lower than the average sales price for imported hard coal, cost compensation by BAFA can only cover the difference between a hard coal mine's production costs and the average sales price for hard coal imported from third countries.

**Situation B:** Should the average sales price for German hard coal be higher than the average sales price for imported hard coal, then only the difference between the production costs and the average sales price for German hard coal may be compensated by BAFA.

The price calculated by BAFA for hard coal imported from third countries reflects the world market price for hard coal. To perform this calculation, BAFA collects the monthly prices (free delivery to the German border) of imported steam coal, coking coal and pulverised coal injection (PCI) coal.

Source: European Commission Decision C(2011) 8882 of 07.12.2011 on State aids SA.24642 (N 708/2007) for the closure of hard coal mines in Germany and SA.33766 (11/N) notification of aid to coal for 2011 published on 20.09.2012 (OJ 2012/C 284/02 pp.6-10).

**Figure 1 – German hard coal subsidies are capped so that coal does not appear on the market at prices below (or above) the import parity price**



The only producer of hard coal in Germany is RAG AG. The company would make a loss if it dumped coal on the market because the subsidy payment is linked to the import parity price. If coal is sold at above the market price, then the subsidy is reduced as the power generators effectively then subsidise the coal producer. Neither situation A nor situation B is therefore likely – RAG AG will try to sell coal at a market price equal to the import parity price.

### 1.3. Coal market economics 101

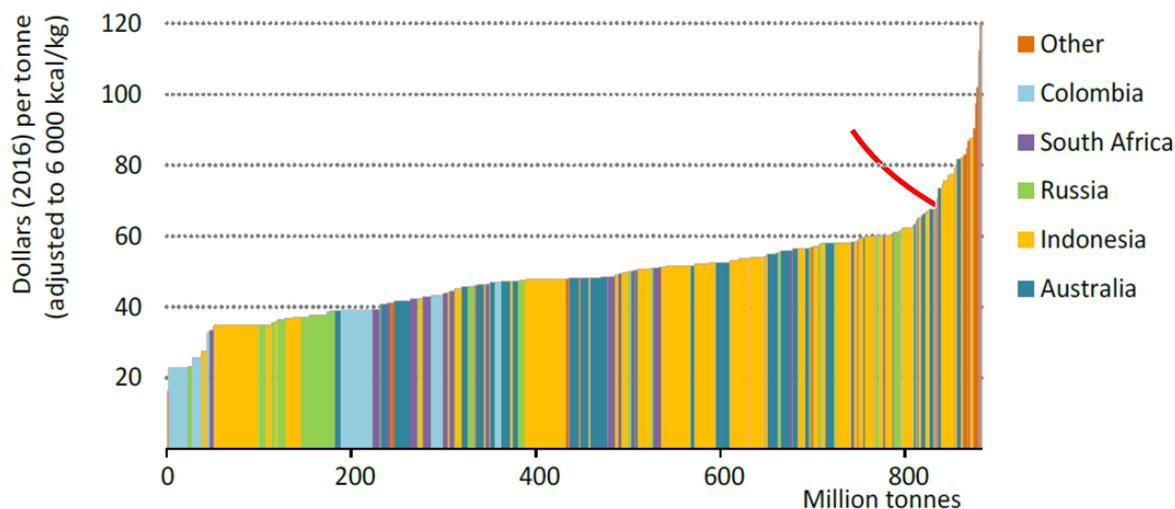
In a free-market economy (*freie Marktwirtschaft*), the equilibrium price is generally set by the variable cost (or long-run marginal cost or cash cost) of the last producer that is needed to meet demand. Every producer then receives this price. An illustrative cost curve for the international steam coal market is shown in Figure 2 with a presumed demand curve that intersects at a price close to the average in 2016.

Some people might question why producers with lower costs do not sell at lower prices for the benefit of society as a whole – those on the left, such as in Colombia. Their costs are low because they are more productive, reflecting a significant capital investment in coal mine projects (*e.g.* deposit exploration, acquisition of mineral rights, acquisition of land or access rights, mine development, automated machinery, transport infrastructure and facilities for workers). Coal producers also face land restoration costs and other liabilities, such as subsidence damage. It is the difference between selling price and variable cost that allows full cost recovery and encourages investment. Without this incentive, there would be no investment and no productivity gains; costs (and prices) would be higher and consumers would be worse off.

Coal mining costs might also be low because a particular coal resource is easily accessible. This is the case at some large surface mines with shallow, but thick seams, for example in the Powder River Basin in the USA. In all mining projects, the question of valuing mineral rights arises. These are often state owned and mine owners pay a royalty, either a fixed, tonnage-based levy or an individually negotiated rate. These payments, as well as the many taxes paid (on value added, property, employment and profit), mean that coal mining operations make a wider contribution to society.

In a planned economy (*Planwirtschaft*) or command economy (*Befehlswirtschaft*), the state allocates capital and sets prices which may be lower or higher than a free-market price. In this situation, there is no incentive and no liberty to invest privately, because all investments are state planned; natural resources and the means of production are state owned. Political decisions may allow consumers to benefit from low prices, but businesses may then not be economically sustainable. Problems arise at the interfaces between command economies and the international market place (*e.g.* coal import-export restrictions imposed by China which has a mixed economy, being partly planned).

**Figure 2 – Supply and demand curves for international steam coal market: FOB cash costs for global seaborne steam coal trade and a presumed demand curve in 2016**



Source: *World Energy Outlook* (IEA, 2017) using data from CRU Thermal Coal Cost Model and demand curve estimated by EURACOAL

#### 1.4. Coal pricing in Ukraine

In Ukraine, a discussion is taking place on the correct price for coal. From the foregoing, it is clear that, as a net coal importer, the “correct” market price from an economic perspective is an import parity price. The National Energy and Utilities Regulatory Commission of Ukraine therefore proceeded to establish a methodology to calculate the import parity price for coal (see Box 2) and now includes this coal price in the cost base when setting electricity tariffs in Ukraine.

This report explores the options for setting an import parity price and offers a critique of the method chosen by the NEURC.

##### **Box 2 – Description of NEURC formula for establishing an import parity price for coal in Ukraine**

An English translation of the Ukraine government Decree No. 289 of 3 March 2016 that establishes a methodology for calculating the import parity price of coal can be found at Annex 1. In summary, the methodology calculates a coal price at the Ukrainian border:

$$\text{Price at Ukrainian border} = \text{average API 2} + \text{average transport costs}$$

Where:

- “average API 2” is the average All Publications Index #2 for the last twelve months
- “average transport costs” is the average freight cost for the last twelve months plus the average cost of vessel unloading and inland rail transport to stockpiles at power stations

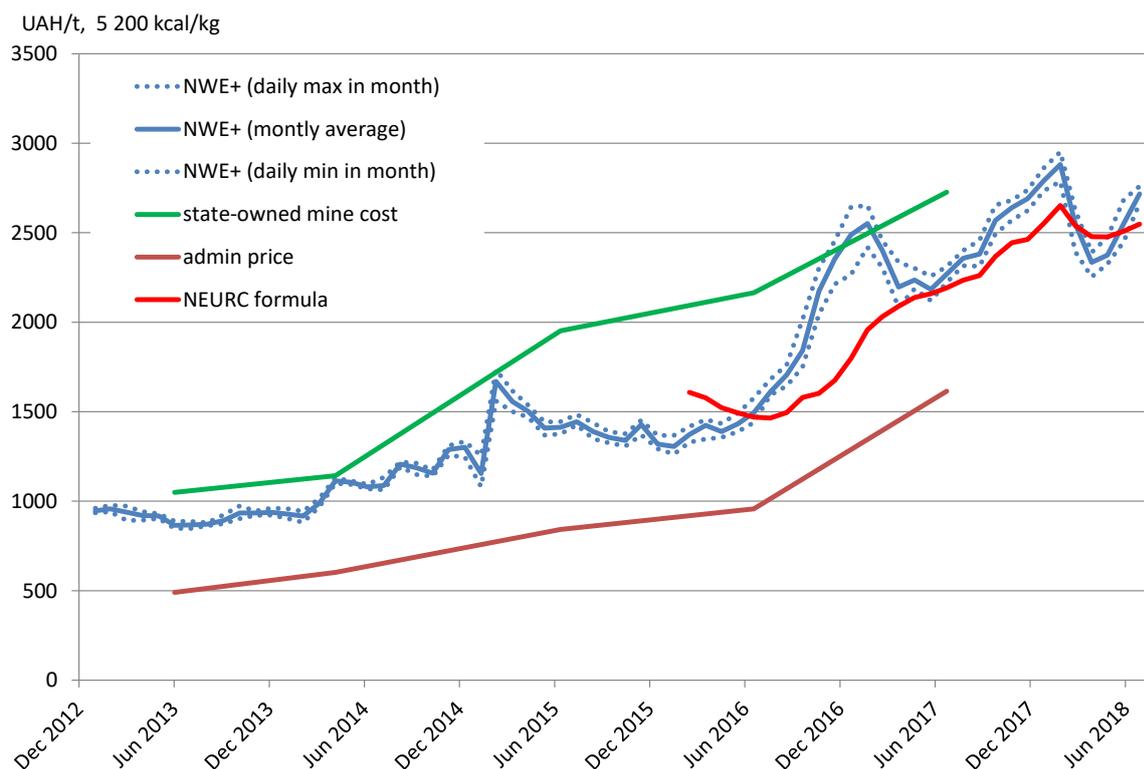
The stated aim of this NEURC formula is to provide a temporary market indicator for the transitional period leading to full liberalisation of the energy sector, in accordance with the coal industry liberalisation plan. The plan aims:

- To establish an indicative market price for the transitional period.
- To use close-to-market prices that allow coal mine owners to invest and improve performance.

- To create equal conditions for both domestic producers and importers (previously, the administrative price was lower than the price of imported coal).
- To develop healthy competition in the coal market.
- To improve and develop the coal industry.

To illustrate the smoothing effect of the twelve-month rolling average price formula, Figure 3 compares the calculated import parity price with import spot prices.

**Figure 3 – Comparison of steam coal import prices in northwest Europe (NWE), marginal mine production costs at state-owned mines in Ukraine, administrative coal price and NEURC formula**



Sources: EURACOAL analysis (NWE import price range and NEURC formula-based price); NEURC data (average production costs at state-owned mines for commercial-quality coal and administrative coal price). Shipping cost deltas (US\$6.5/t to US\$14.5/t) and port-handling charges (US\$6.75/t to US\$7.85/t) are as published in “Industrial Cargoes”, Metal-Courier, Metal-Expert LLC ([www.promgruz.com](http://www.promgruz.com)).

### 1.5.Coal industry structure in Ukraine

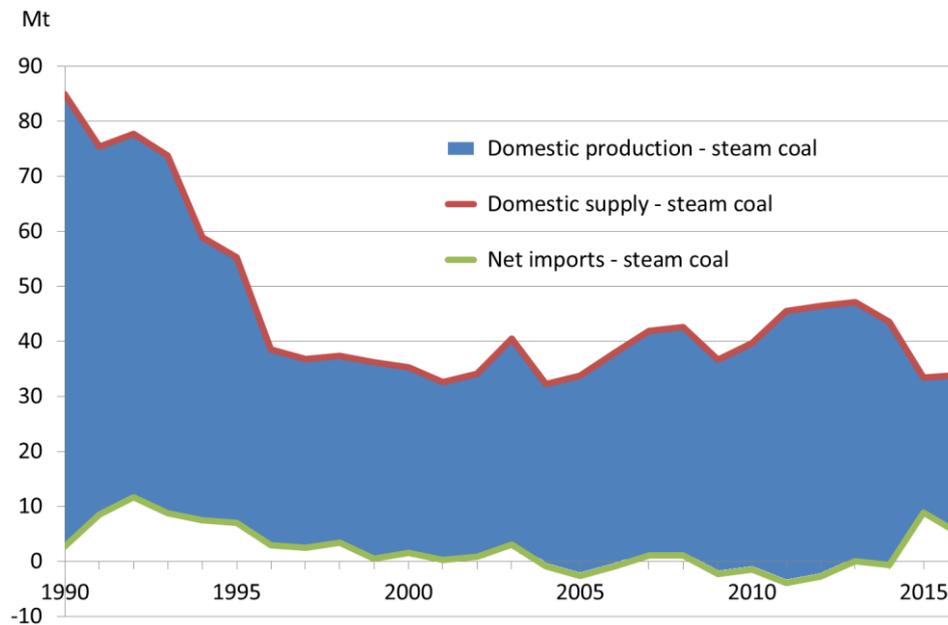
The EURACOAL publication *Coal industry across Europe* (6<sup>th</sup> edition and previous editions) offers an overview of the coal industry in Ukraine which comprises a mix of private and state-owned coal mines.

On the Ukrainian market, steam coal is divided in two groups: anthracite grades (A and P grades with the highest calorific values or heating values of all coal grades) and high-volatile steam coal (G and DG grades). Steam coal in Ukraine is mined in the Donetsk and Lviv-Volyn coal basins. Anthracite reserves are concentrated in Luhansk and Donetsk regions. Coal supplies from Luhansk and Donetsk have been temporarily suspended since March 2017 on account of the ongoing conflict in those regions. The loss of these anthracite resources drove power producers to re-equip power plants with steam coal burners. This increased the demand for steam coal, leading to shortages and import dependency.

This report focuses on steam coal only. It is noted here that the market for anthracite is much less developed. Anthracite is a premium product attracting higher prices, especially in the heating market, and therefore is less widely used for power generation.

Traditionally, Ukraine has produced enough indigenous coal to satisfy demand. As a result of the ongoing conflict in the East of the country, coal mines have been lost and production has fallen such that imports are now required to balance demand, as shown in Figure 4.

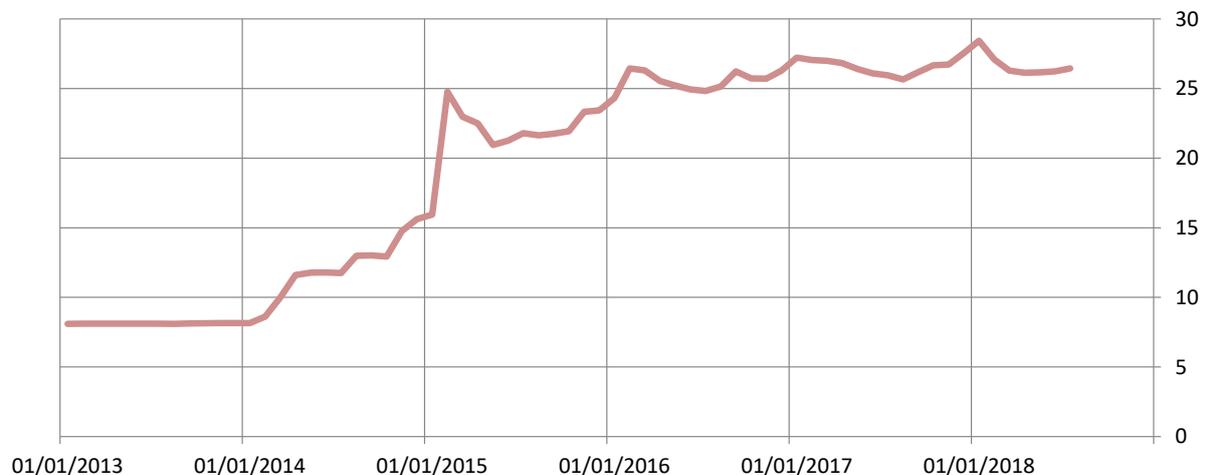
**Figure 4 – Steam coal production, net imports and supply in Ukraine, 1990 to 2016**



Source: IEA World Coal Supply database, OECD International Energy Agency, Paris, accessed 9 August 2018.

Given the massive drop in the value of the Ukrainian currency, the hryvnia (UAH), as a result of the conflict, the dollar cost of most privately owned Ukrainian coal production is internationally competitive (Figure 5). State-owned mines continue to be subsidised.

**Figure 5 – USD / UAH exchange rate**



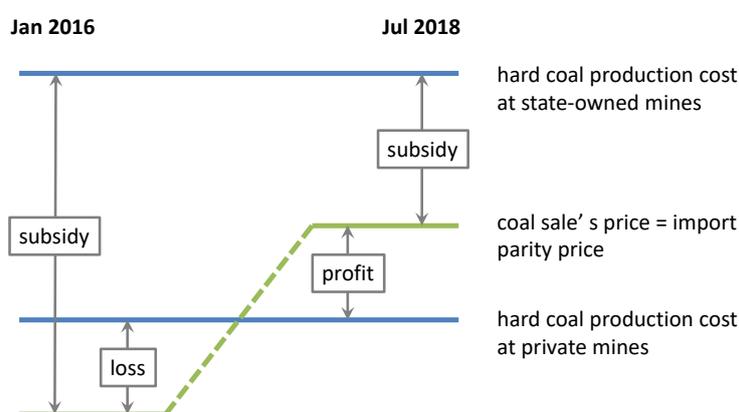
Source: National Bank of Ukraine (average weighted exchange rate in the interbank foreign exchange market of Ukraine)

## 1.6. Market price for coal in Ukraine

If we assume that market participants (buyers and sellers) act rationally, then coal prices in Ukraine would be set by the marginal cost of the last supplier. Today, that price would be set by a supplier of imported coal. In a free market, the state-owned mines would fail, but with subsidy they remain on the market and can sell at below their cost price.

Figure 6 illustrates two situations: one where indigenous producers meet all demand and another where imports are required. The market price is higher in the latter case, but subsidy payments to state-owned mines can be lower. With higher market prices, private coal mines earn higher profits and can invest to maintain their competitiveness against imports. If they fail to invest, then they risk becoming uncompetitive and failing as buyers switch to cheaper imports.

**Figure 6 – Examples of subsidised state-owned mines, loss-making private mines and profitable private mines in Ukraine**



The size of subsidy paid to state-owned coal mines reduces as the import parity price increases. At the same time, the profitability of private mines improves. If private mines are loss making for long periods, they will fail and close, so they must invest to maintain their productivity and hence competitiveness.

## 2. World coal supply and trade

This section examines the global steam coal market from a supply and demand perspective, and how coal trade leads to price formation in a liquid market.

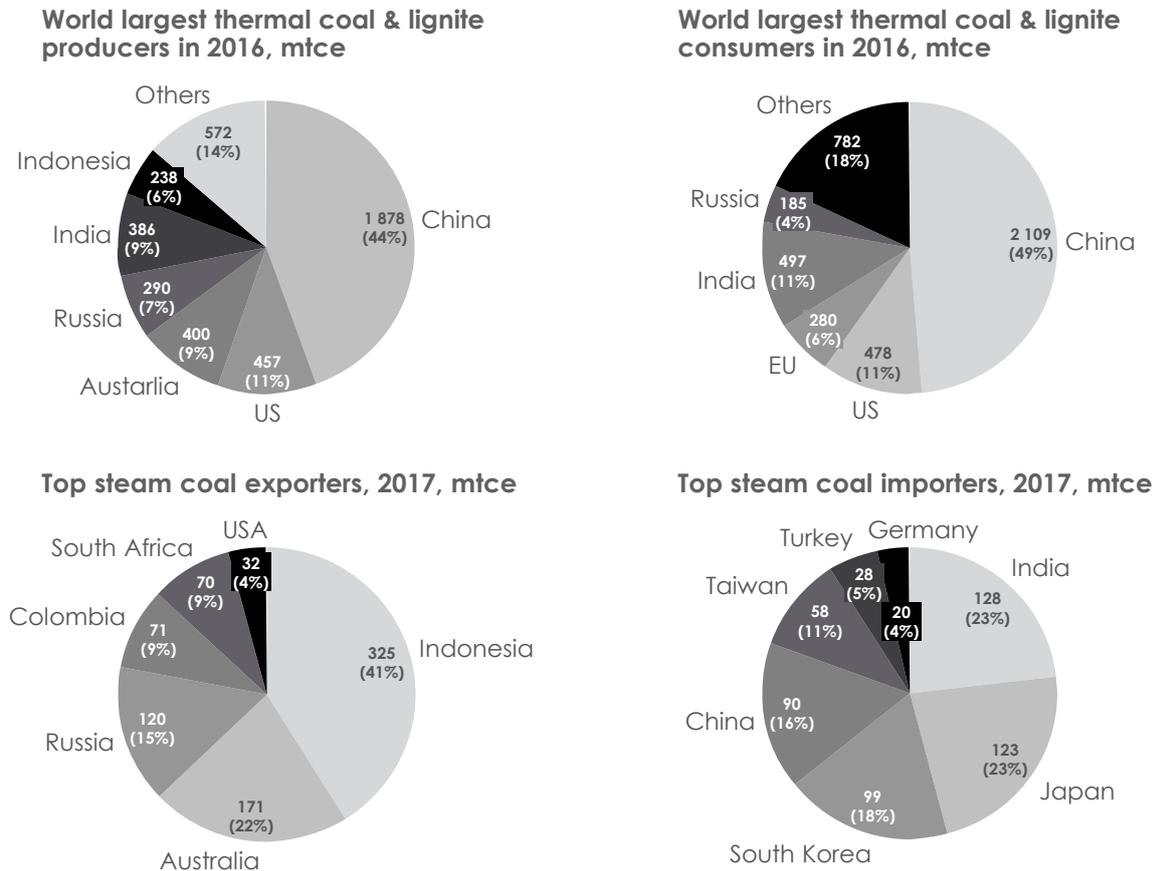
### 2.1. Overview of world coal supply and demand

The vast majority of the seven billion tonnes of the coal produced globally each year is consumed in the country in which it was produced. Coal is categorised by rank depending on its carbon content, and ranges from anthracite with a very high carbon content, through bituminous and sub-bituminous coals, to low-carbon lignite or brown coal. Of the total volume of coal produced an average of 5.5 billion tonnes (4.5 Btce) is made up of thermal coal and lignite.

Approximately one billion tonnes is exported, either by rail to neighbouring countries, or by sea. Of the seaborne trade, whilst some is metallurgical or coking coal used in the steel industry, the largest part is made up of thermal or steam coal. This is used primarily to produce heat, hence its name, and includes both bituminous and sub-bituminous coal. Lignite is rarely exported because its energy content is low, meaning the cost of transport makes it uneconomic to move any great distance. It is usually used very close to where it is mined.

The world's largest three producers of coal are China, the USA and India. Despite being the world's single largest coal producer, China is a net importer, selling only small quantities of coal overseas. The USA exported just over 10% of its production in 2017. India does not export, but is a major importer of thermal coal for its newly built coal-fired power stations, and of metallurgical coal for steelmaking.

**Figure 7 – World coal supply and demand**



Source: IHS McCloskey

## 2.2. World coal supply and demand projections

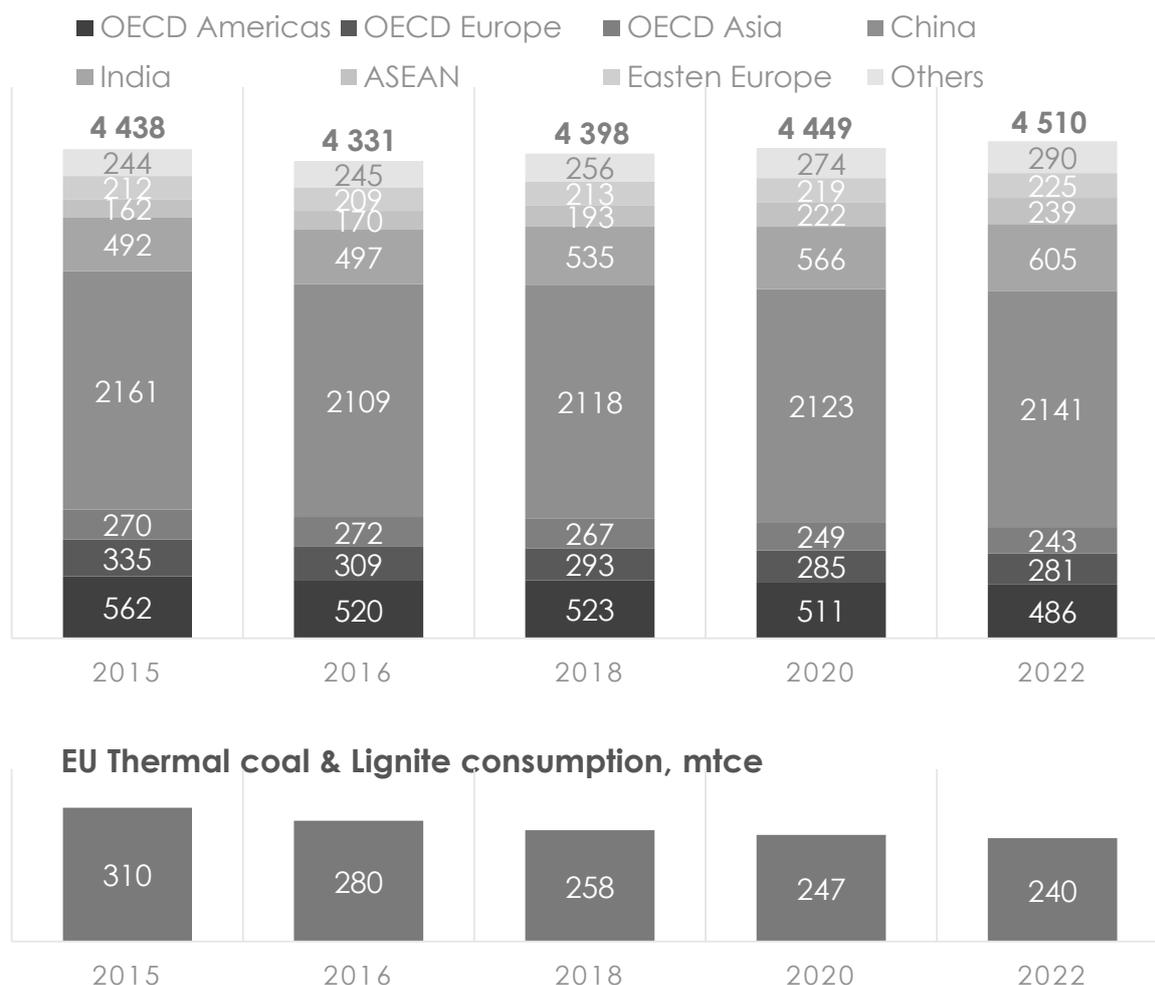
High oil and gas prices over the last three years have created confidence in the continuing growth of coal demand around the world.

A lack of sufficient gas import and supply infrastructure in such large, energy-consuming countries as India, China and the ASEAN countries, which mostly have accessible coal reserves, is expected to support an increase of coal demand in the future.

Electricity demand for coal in Europe is expected to decline due to a lower growth of energy consumption, in general, and extensive gas-trading infrastructure, both for pipeline gas and LNG, which allows coal to be easily substituted.

Additional factors supporting the expected curtailment of coal demand in Europe are the EU's stringent environmental regulations and the strong growth of subsidised renewables.

**Figure 8 – World steam coal demand projections, Mtce**



Source: IEA, Coal 2017 Analysis and forecasts to 2022

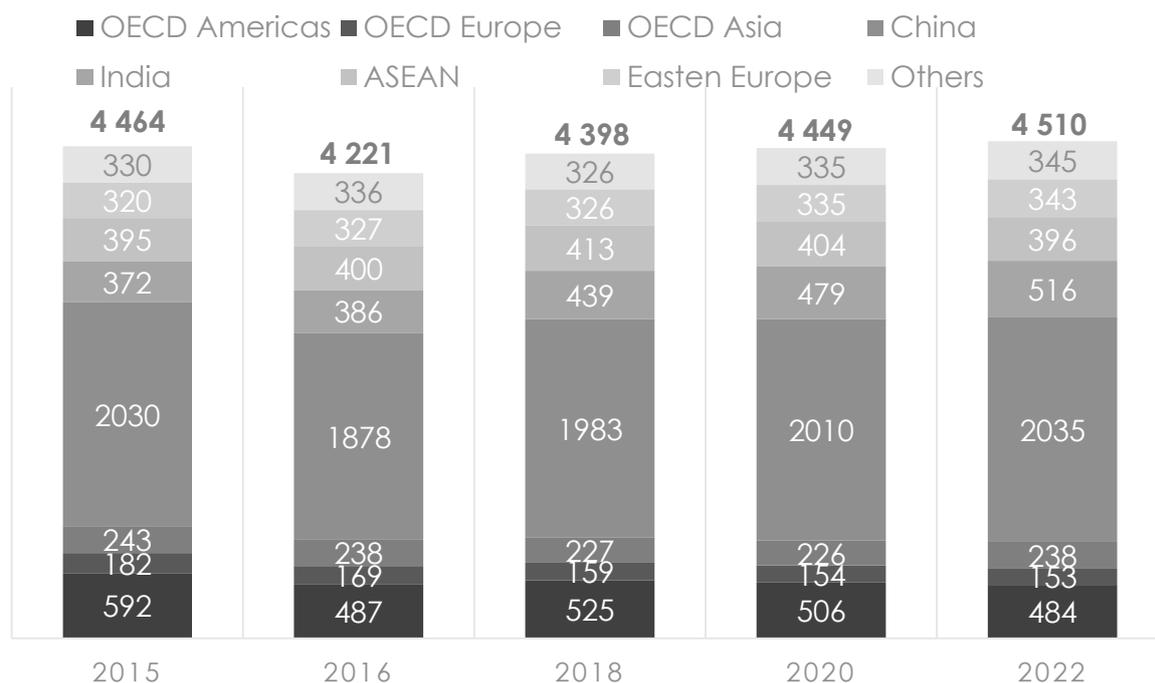
The expected growth in demand for coal should be met by an increase in production in such countries as China, India, Colombia and the Russian Federation. For Russia and Colombia, their coal industries constitute vital parts of their economies.

Developed countries are not expected to increase their production, except Australia. The coal industry in European countries is expected to gradually decline, thus reducing production volumes.

Among the largest factors leading to this decline in coal production in Europe are environmental obligations and the worsening economics of coal production from deep seams.

In contrast, due to higher production efficiency and its extensive use at European power plants, lignite production should continue.

**Figure 9 – World steam coal production projections, Mtce**



**EU Thermal coal & Lignite production, mtce**



Source: IEA, Coal 2017 Analysis and forecasts to 2022

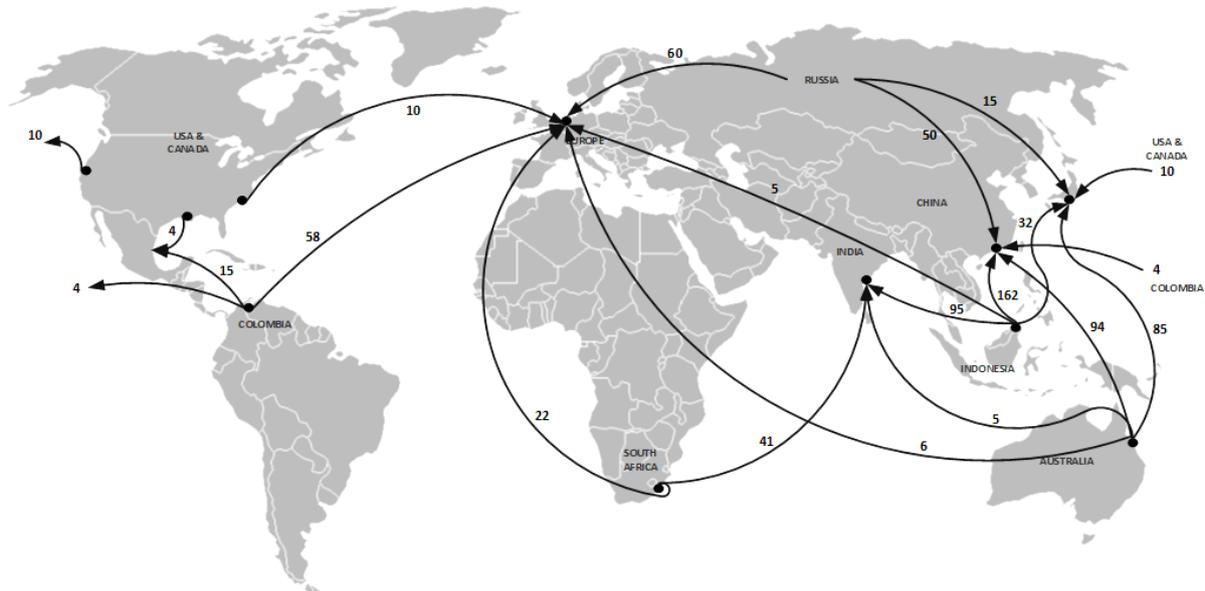
**2.3. World coal trade and prices**

Seaborne coal trade is based around two major basins: the Pacific and the Atlantic. The geographic locations of the major coal exporters determine the key markets for each country’s sales, although trade flows do extend beyond their immediate near neighbours. Major exporters, such as South Africa, are able to direct their attentions east or northwest according to where they see the best returns. As a result of increased competition in the European coal market, notably from Russia via Baltic ports and Colombia, there has been a marked shift in South African exports to the Indian sub-continent, in direct competition with Indonesia.

The largest importers in the Atlantic Basin at the present time are Turkey and Germany. However, the relative importance of European coal importers has declined with the growth in some countries of renewable energy sources such as wind and solar, the widespread availability of natural gas following the successful exploitation of shale gas in the USA and new fields in the North Sea, and the introduction of punitive measures to penalise electricity generation with high CO<sub>2</sub> emissions, *i.e.* generation from fossil fuels. Historically large importers of coal in the European market such as the UK have almost entirely closed their coal-fired fleet, and the few remaining coal-fired power stations

in the UK will be forcibly retired by 2025. In reality, they will be forced to close beforehand for economic reasons.

**Figure 10 – World seaborne steam coal trade in 2016**



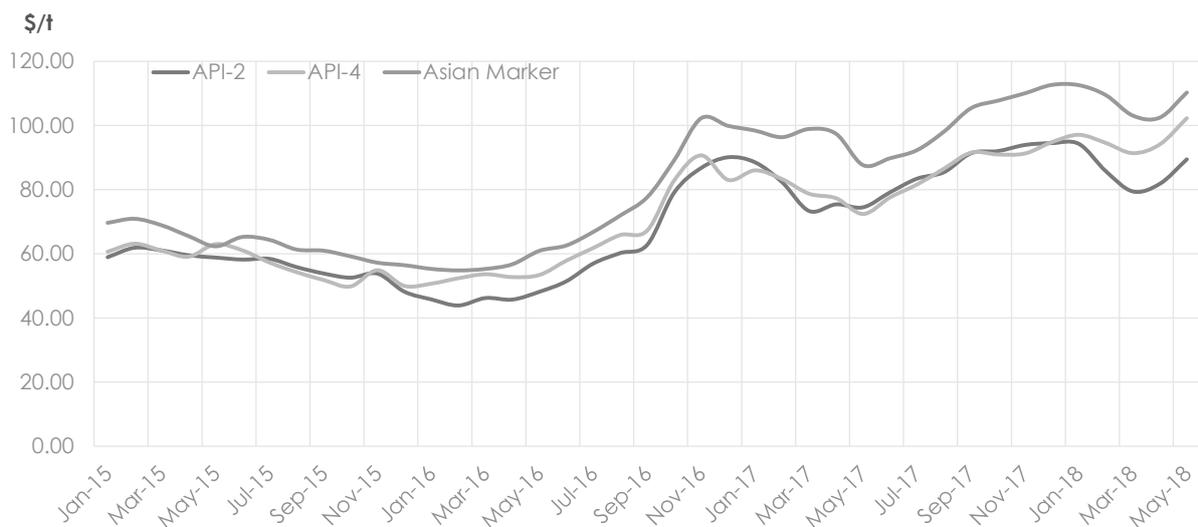
Source: IEA, Coal 2017 Analysis and forecasts to 2022

The global coal market consists of two main consumer markets: northwest Europe and the pan-Asian market.

These markets are the primary centres of price formation owing to the high demand for imports caused by insufficient domestic supply.

South African (and to some extent Russian) producers are able to balance their exports between these two markets to realise the best prices for their coal sales.

**Figure 11 – Regional col price trends**



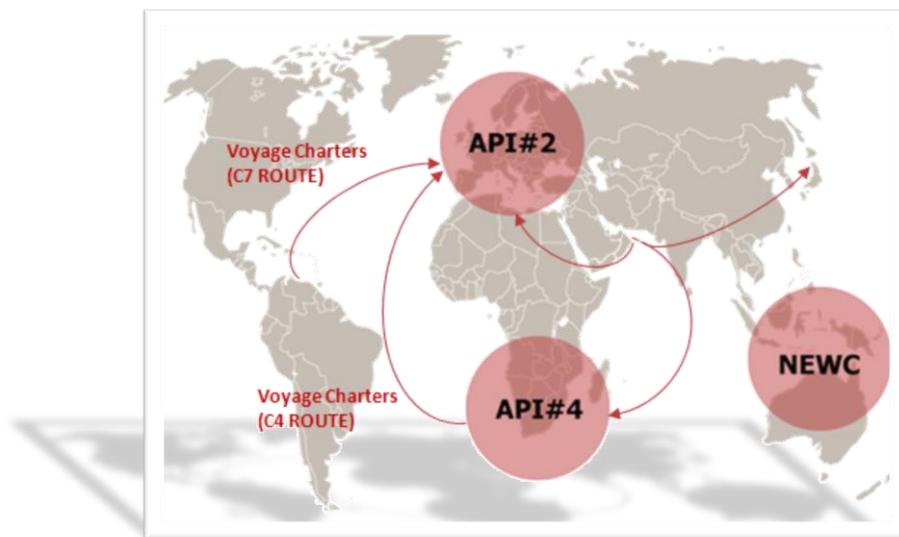
Source: IHS McCloskey Coal Report

### 3. Coal price indices – 1990s to the present day

The so-called “All Publications Indices” (API) are trusted and used by coal professionals around the globe, with more than 90% of the world’s traded coal derivatives using the API 2 and API 4 indexes.

- API 2: The industry standard reference price for coal imported into northwest Europe
- API 4: The price for all coal exported from Richards Bay Coal Terminal, South Africa
- API 5: The price of NAR 5 500 kcal/kg, high-ash coal exported from Australia
- API 6: The price of NAR 6 000 kcal/kg coal exported from Australia
- API 8: The price of NAR 5 500 kcal/kg coal delivered to south China
- API 10: The price of NAR 6 000 kcal/kg coal exported from Puerto Bolivar port, Colombia
- API 12: The price of NAR 5 500 kcal/kg coal delivered to east India

**Figure 12 – API 2 and API 4 dominate coal trade**



#### 3.1. The evolution of coal trading

Until the early years of this century most seaborne thermal coal was sold under bilateral arrangements between a producer and a consumer (power generation company). There were physical traders in the market, including multi-commodity trading houses such as Glencore and Phibro (later Noble) and smaller, coal-only traders such as Anker, SSM and Bulk Trading. These companies had traditionally enjoyed long-standing relationships with buyers, suppliers or both; some traded on a back-to-back basis, but some larger ones took market risk, looking to profit from their expertise, gradually competing more and more with producers. During the late 1990s, some larger trading houses started to invest in coal-producing assets to ensure their ongoing supply, while producers attempted to do more direct marketing and exclude traders. At this time, the role of a broker, a party that would bring together a buyer and a seller without taking any market risk at all, did not really exist in the seaborne coal market. Information about current market prices was therefore much less freely available and less transparent than it is today.

The European power sector had comprised a relatively small number of large, often state-owned or state-controlled, highly regulated power generation companies, usually operating within national boundaries, linked to a distribution system to ensure power reached consumers. Following the gradual liberalisation of the power markets, beginning in 1990 with the UK, the structure and ownership of power generation assets started to change. The development of CCGTs (combined-

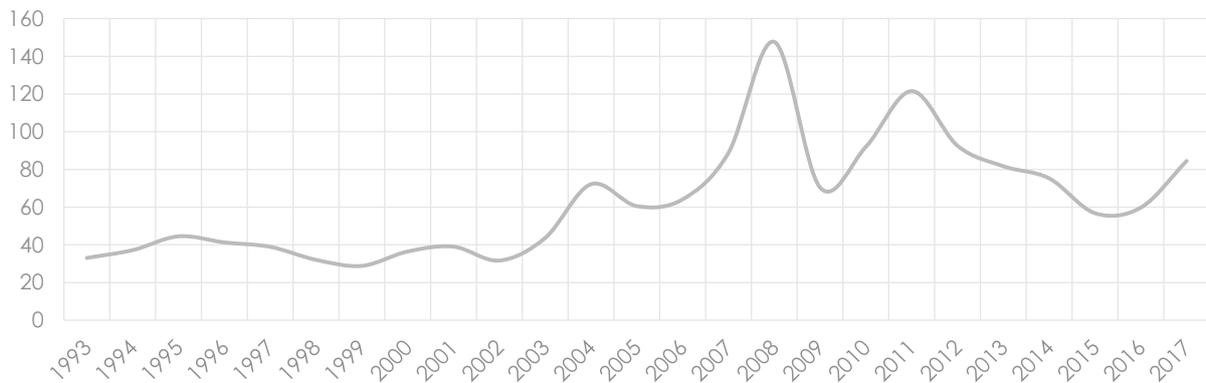
cycle gas turbines) led to an oversupply of generation capacity in some countries and, for the first time, coal buyers started to put economic competitiveness ahead of security of supply when considering their coal-purchasing strategies. Power stations that had previously run on a base-load regime were forced to compete simply to stay in the market.

With the change in emphasis away from security of supply and central generation in each country, towards competitively priced electricity for sale in free markets that stretched across national borders, came a change in behaviour and buying patterns among coal consumers. Although the Asian market was much slower to adopt the principles of market liberalisation, as described below in the section on Japan, European buyers quickly began to reject the notion of fixed price coal contracts that could hinder their competitiveness in the electricity market. If a power generator was still obliged to take delivery of coal at a high, fixed price when the spot price had fallen several dollars such that its competitors were able to buy coal more cheaply, then it would not be able to compete in the electricity market.

### 3.2. Background to implementing coal price indices

The chart in Figure 13 shows how relatively stable the coal price was in the early to mid-1990s, reflecting the fact that many coal contracts were still priced for medium- to long-term periods. As the growth of spot trades emerged and companies started to deal on shorter terms, more market-based activity took place and prices became more volatile. For example, between Q2 2003 and Q3 2004 the coal price more than doubled, something not seen in the previous decade.

Figure 13 – API 2 price dynamics, US\$/tonne



These developments led to the need for mechanisms to manage fuel-price risks. Previously, any increase in input costs such as a rise in coal prices could often be recovered through an increase in the electricity tariff, as it remained in any country's national interest to ensure that its electricity supply chain continued to function. The much more liberalised structure that began to emerge in several European countries meant that this old order no longer prevailed. A merchant power generation company had to be able to operate in a competitive environment, including competing against different fuels such as natural gas. It was this that led to the successful adoption and acceptance of the various coal price indices that several organisations had been trying to bring to the coal market for several years.

### 3.3. Indices and financial coal trading

The most significant change to take place in the last twenty years has been the successful introduction of financial coal trading. This developed as a direct result of competition in the electricity sector; if it is no longer possible to recover an increase in the cost of coal or gas in the

electricity tariff, then it becomes essential to have a mechanism by which the power generation company can ensure it is not exposed to a financial loss. For that reason the traditional practice of buying coal at a fixed price under long-term contracts was no longer suitable for power generators trying to sell electricity into a dynamic, competitive market.

The most essential element of a financial trading system is an independent, verifiable spot index against which the financial transactions are settled. It must reflect the value of the commodity in the current spot market, and the market must have confidence in its integrity and support it with liquidity. By using financial contracts, or swaps, commodity market participants can separate their physical risk from their financial risk and manage them individually.

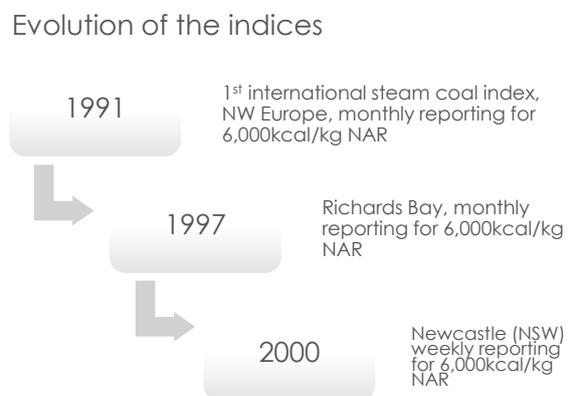
The index adopted by the European coal market was the API 2. API stands for All Publications Index, and the API 2 is the average of the daily price assessments by IHS McCloskey Coal and Argus Media for coal of a standard quality (6 000 kcal/kg NAR – net as-received) to be delivered in a certain (prompt) timeframe into northwest Europe. The daily assessments are averaged and published weekly on Fridays; the average of these weekly values becomes the monthly value and is used in the settlement of swaps.

The practice of linking physical deals to an observable index has spread since the birth of the API 2 in 2001. In South Africa, the API 4 is the price for a standard coal (6 000 kcal/kg NAR) loaded FOB at Richards Bay Coal Terminal (RBCT). API 8 is the price index for lower grade coal (5 500 kcal/kg NAR) CFR South China assessed by IHS McCloskey, Argus Media and Xinhua Infolink, whilst globalCOAL NEWC is the recognised price index for a standard coal (6 000 kcal/kg NAR) loaded FOB Newcastle, NSW in Australia.

Other indices have also developed, but not all have been successfully used as settlements for financial trading. In that sense, many of these other indices can be more accurately referred to as *marker prices*. Several different organisations, including brokerage firms and publishers of trade magazines, have launched their own marker prices and publish them, all hoping to have found the next API 2, but only the handful listed above have really taken off and have any liquidity behind them. For this reason, only those indices are typically used in coal contracts around the world. Clearly, both buyers and sellers want to know that the indices to which their purchasing and selling arrangements are going to be linked are widely used and cannot easily be manipulated. It would be unwise to agree a contract that was linked to an obscure coal price based on very few transactions between very few parties that were very hard to verify.

**Figure 14 – Coal price indices: historic milestones during the 1990s**

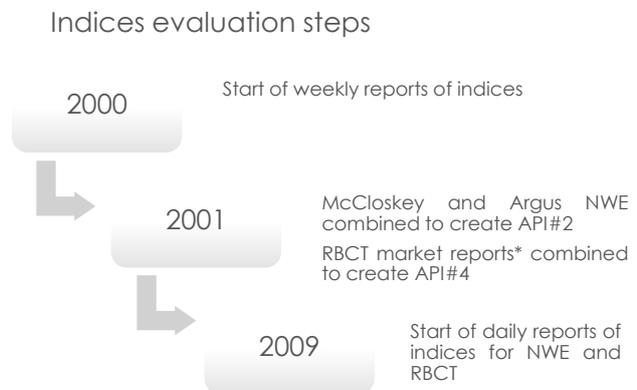
- Most coal contracted annually
- Spot market is around 20%
- Price negotiated annually, government regulation for internal markets
- Need for market prices and price indicators is growing
- Market deregulation is rising, share of spot contracts rising



In the United Kingdom, the privatisation and reorganisation of the energy sector became a major spur for the need to find market indicators for steam coal. At the same time, other European markets became more and more deregulated, increasing the volume of spot deals. As such, the need for market indicators grew rapidly

**Figure 15 – Coal price indices: historic milestones in the 2010s**

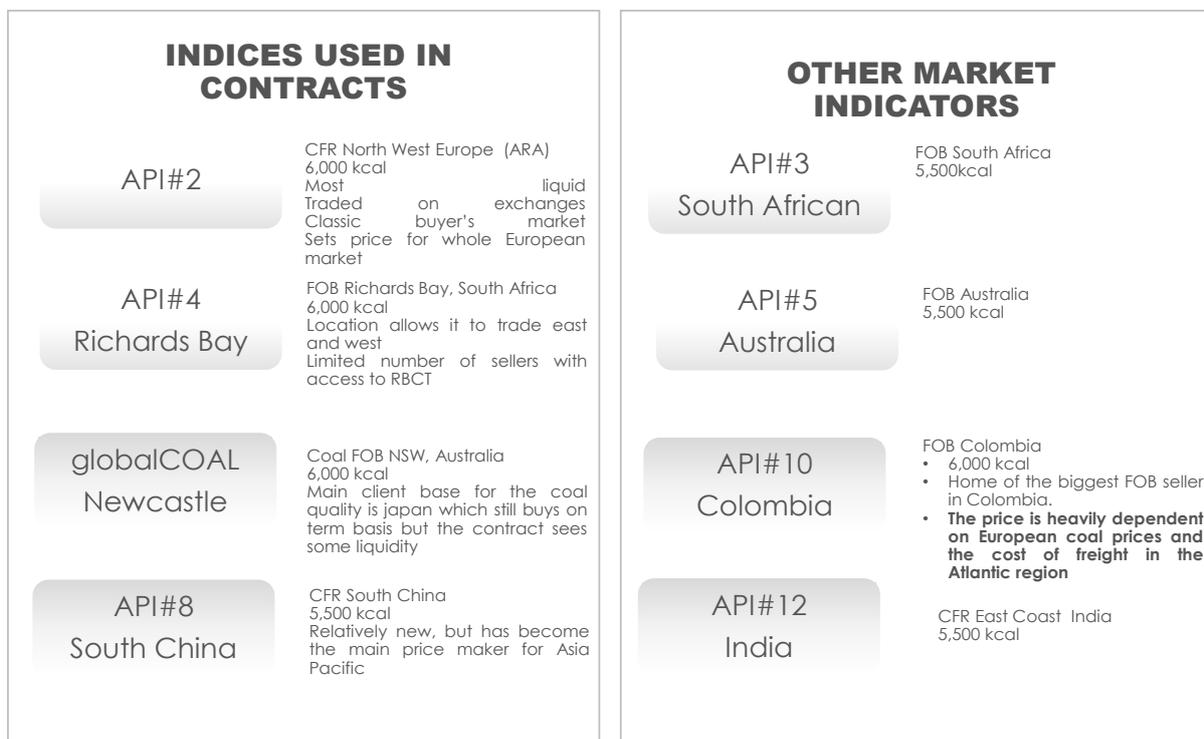
- First index calculation of NW Europe included collected prices for coal from the main supply indices with weighted average for each month
- Now, NW Europe and RBCT (Richards Bay Coal Terminal) indices are assessed on daily basis
- API#2 is the most traded index, 6,000kcal/kg NAR (net as received), <=1% sulphur



In summary:

- The introduction of market indices in the early 1990s was the forerunner of a significant development in coal trade. Financial coal trade volumes grew and eventually exceeded even the most optimistic expectations.
- API 2 became the most traded index within a few years of its implementation, leading to attempts to create new indices with similar impact.
- Today API 2 remains dominant, but API 4, globalCOAL NEWC and API 8 are also used.

**Figure 16 – Main coal price indices in use today**



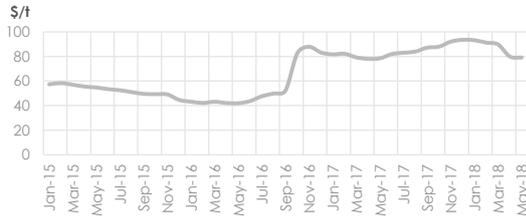
Source: Thermal Coal and Petcoke Marker Price Methodology and Specifications, May 2017 (IHS Markit)

**Figure 17 – Other steam coal price indices or “marker prices”**

**US East Coast**

**Current price: FOB \$79,11 (6,000 kcal, NAR)**

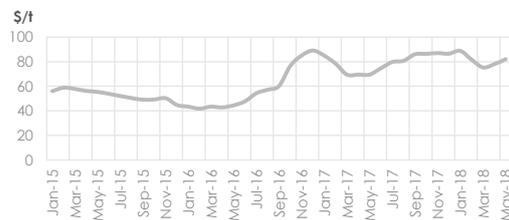
- The most active platform of the sea-borne coal trade in the USA.
- The main terminal for selling coal to Europe
- The prices are heavily dependent on the API-2 index



**Baltic RUSSIA**

**Current price: FOB \$82,03 (6,000 kcal, NAR)**

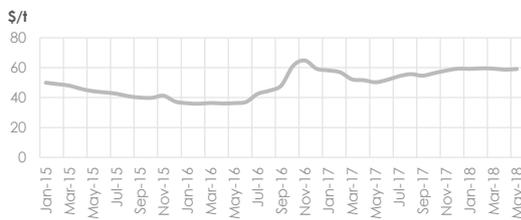
- The main loading ports for coal from Russia to the European market
- The prices on this site reflect the dynamics of the NW European markets, however with a small time lag



**US Gulf (high sulfur)**

**Current price: FOB \$59,07 (6,000 kcal, NAR)**

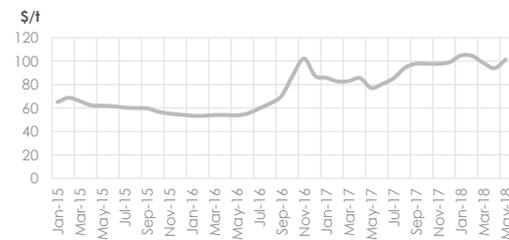
- A less liquid trading platform for coal with a high sulfur content
- Coal is not supplied to the European market
- The prices largely depend on the buyers in Latin America and producers from Colombia and Venezuela



**Indonesia, Banjarmasin**

**Current price: FOB \$101,38 (6,000 kcal)**

- One of several loading locations for Indonesian coal
- Substantial increase in volumes over the last 10 years
- Separate coal price index but very illiquid
- Most sales to China and India



Source: IHS McCloskey Coal Report

### 3.4. Advantages of index-based pricing

#### 3.4.1. Greater efficiency in the international coal trade

In 1990, most coal was sold on long-term contracts with annual price negotiations, and only 20% of the market was transacted through spot contracts. Privatisation and deregulation in the energy sector across most of Europe has brought greater flexibility through more dynamic pricing, with greater transparency. This has led to a more efficient market, because buyers and sellers can see how prices are being affected by events worldwide.

#### 3.4.2. Risk management: separation of physical and financial risks

With long-term contracts, the coal price was fixed against a fixed volume with little flexibility to vary the terms if circumstances changed. With index-based pricing, buyers and sellers can agree a floating price for their physical coal and simultaneously limit their exposure to uncertainty through hedging in the financial market. This can also assist with cash flow management.

#### 3.4.3. Certainty about forward prices

Indexation has brought about forward curves which give the market transparency. A transparent forward curve affords buyers and sellers a degree of certainty about future prices without obliging them to lock their physical coal sales into long-term price deals with individual counterparties, as was the case for most coal purchasing until the late-1990s/early-2000s. This means they can respond to movements in electricity prices, not previously necessary under the old, regulated market regimes. The shape of the forward curve is determined by the supply-demand balance; a

contango (higher prices in the future) generally signals a surplus, while backwardation (higher prices in the prompt) signals a deficit.

#### **3.4.4. Alignment with other globally traded energy products across the world**

The coal market has moved to the spot trading model with index-linked contracts, aligning it with other world energy commodity markets such as oil.

#### **3.4.5. Further deregulation of world coal market in a world of freely traded electricity**

70% of steam coal is used in electricity generation. In a world where electricity is increasingly becoming a freely traded commodity, it is right that coal is openly traded in a free and transparent market.

### **4. Global experience with coal-pricing systems**

Different countries have had different mechanisms for purchasing imported coal over the years, depending on a variety of features including the availability of alternatives (such as domestic coal) and the structure of their domestic energy markets. It is worth noting a few examples and observing how these have evolved over the years and will continue to evolve as the coal market becomes more integrated and competition takes hold in the electricity markets. Below, we present several examples of coal pricing for countries which became net importers of coal.

#### **4.1. Japan**

##### **– traditionally fixed-term contracts for imports on a free-market basis**

Japan's coal mining industry declined rapidly in the 1980s and was replaced by imported coal, primarily from Australia in the early years.

There are no price controls on coal in Japan, but the structure of the electricity supply industry is of interest. There are ten vertically integrated electricity utilities, known in Japan as EPCs (Electric Power Companies), each covering a different geographic region of Japan. There is also one large wholesale supplier, J-Power, and numerous other wholesale suppliers, municipal utilities and smaller generators.

Traditionally, coal was priced annually with the Australian producers in New South Wales (NSW) at what was known as the "reference price" or "benchmark price". This was negotiated annually between the producers and the consumers with the help of the trading houses. The price for the biggest volumes to be shipped over the next twelve months was agreed for the Japanese Financial Year (JFY) from April to March, but smaller volumes were also fixed at newly negotiated prices for the periods July to June, October to September and January to December.

With the very gradual introduction of a competitive pricing environment in the Japanese electricity sector, buyers started to reduce their dependence on Australian coal, and buy from the abundant production being exported from Indonesia, as well as from the growing export volumes from eastern Russian ports.

In addition, some JPUs started buying less of their Australian requirement on the traditional fixed-price arrangements and more on spot or short-term contracts. This has been made easier by the accessibility of transparent pricing on the globalCOAL trading platform, which we will discuss in more detail later in this paper.

As competition slowly starts to take effect, some of the more commercially aggressive generators, such as JERA, are buying from further afield, such as the USA, in an attempt to secure supplies at prices below the reference price. But Japan is an island, and its high degree of dependence on reliable supplies of consistent quality coal means that the prices the JPUs reach with the NSW exporters have to be sufficiently high to ensure those producers can continue in business. It will take many years in this very conservative country to move away fully from this model.

## 4.2. South Korea

### – free market

South Korea's power sector is also highly dependent on imported coal and is also one of the largest coal importers in the world. The power sector is dominated by KEPCO (Korea Electric Power Corporation) under which sit five thermal generating companies known as Gencos, and a nuclear generating company. The five Gencos are largely split by geography.

Korean Gencos issue tenders and buy coal of both high and lower qualities from Indonesia, Australia, Russia, South Africa, the USA, a little from China and increasingly from Colombia. With a diversified supply and power stations that are more flexible than Japan's, they tend to be much more price sensitive buyers than the JPUs.

In mid-2014, the South Korean government imposed a tax on coal imports of about US\$16.20/t for coal with less than 5 000 kcal/kg NAR and US\$18.10/t for coal with a higher CV. These taxes have been steadily increased in subsequent years.

Competitive tension exists between the generating companies, but they are very large buyers and tend ultimately to achieve highly competitive prices.

## 4.3. China

### – free market, but with protection of domestic producers

China is both the largest producer and largest consumer of thermal coal in the world. In 2017, it was the largest importer of steam coal. China only became a net importer in the last twenty years as a result of domestic coal shortages and the government's decision to increase export tariffs in the early 2000s.

China's approach to coal pricing has vacillated between free market and protectionism for its domestic industry, but has also been influenced by the need to clean up its poor air quality. It has also taken steps to improve the safety record at coal mines, admittedly from a very low base.

In May 2016, China introduced measures to improve productivity at coal mines, imposing a limit of 276 working days per year (previously 330 days). Unfortunately, this measure coincided with an increase in coal demand, so the tightening of domestic supply led to a rapid increase in imports.

By September 2016, in response to rising prices, the Chinese government reversed the working-time limit for some 800 mines to allow increased domestic coal production through the winter.

Later that year, the government facilitated annual term contract negotiations between the largest coal producers and generators with a benchmark price below the prevailing price of imported coal. The immediate impact was a sharp, although temporary, reversal in the apparently inexorable rise of international coal prices.

In this way, the government has effectively established a domestic pricing band of between 470 and 600 Yuan, with restrictions put on production if the price falls below 470 and incentives for

additional production if it reaches the upper limit. Ultimately, the Chinese policy is one of supporting its own industry and allowing imports to provide additional supplies when required. But by improving productivities whilst allowing a surplus of capacity to exist within the domestic coal mining industry, China is attempting to cut and restrict the importers' share of the market.

#### 4.4. UK

##### – free market

The UK's long history of coal mining led to a high dependence on coal-fired power generation until the liberalisation of its electricity market and the “dash for gas” of the 1990s challenged coal's dominance.

Even after the privatisation of the coal industry in 1994, 3-year contracts at fixed prices plus inflation were commonplace with the newly privatised power generators. Increasingly, however, the low international coal prices of the late 1990s and early 2000s, alongside SO<sub>2</sub> emission limits placed on power generators, led to a growth in imports which showed domestic coal to be uncompetitive.

As domestic coal-supply contracts lapsed, any that were renewed were shorter term and at prices linked to API 2. In some cases, the power generators only renewed contracts because UK ports and the rail links from the ports could not handle sufficient volume of coal to fully displace domestic suppliers.

Any residual domestic coal mining has virtually been killed off by the imposition of the carbon floor price mechanism of 2013 and subsequent changes to it. In 2017, a mere 3 million tonnes of coal were mined in the UK and only 8 million tonnes were imported, compared with 50 million tonnes in 2013. By the early 2020s, there will be no coal-fired power generation left in the UK.

#### 4.5. Germany

##### – free market, but with protection for domestic producers

Germany has been a large producer of both hard coal and lignite for decades, although domestic production of hard coal will finish at the end of 2018. In order for the domestic coal industry to remain competitive with imported coal, a subsidy known as the *Kohlepfennig* (coal penny) was introduced as part of the electricity tariff in 1975.

In 1995, this was scrapped and replaced by direct subsidies as part of the national budget by way of a compromise between the federal government, the state governments, RAG AG (the largest coal producer) and the trade unions. Subsidies in the form of operating aid have gradually been phased out and will cease when production of German hard coal ends.

The existence of these subsidies reflected the interdependence of the German coal mining industry and the power producers. Long-term contracts of up to 20 years known as the *Jahrhundertvertrag* (century contract) between coal producers and power generators were common, and the generators sold their power under long-term contracts. German coal producers were compensated for the difference between their production costs and the price of imported coal, so the system brought security of supply to the generators and price stability in the electricity price (see Box 1).

#### 4.6. Poland

##### – free market with cross subsidisation

Poland has a long tradition of mining coal and its entire energy system is highly dependent on coal. For many years, Polish exports of steam coal exceeded imports which only started about ten years

ago, in 2007. Imports have steadily grown whilst exports have fallen, and Poland is now a net importer of steam coal.

Since joining the EU in 2004, Poland has had a free-market approach to coal pricing. The mining region of Silesia is inland, close to the Czech border, meaning the growth of imports has been most noticeable at Poland's more northern power stations, in some cases owned by foreign companies such as EDF. Power stations closer to the Silesian mines have continued to burn local coal.

In February 2018, the European Commission granted its approval for the Polish government to subsidise Polish coal utility companies through a capacity mechanism, designed to maintain the *status quo* in the country's energy system.

API 2 was already a familiar concept to Polish coal companies engaged in export, as their coals had to compete with other coals delivered into northwest Europe at that price level. It has therefore become commonplace for Poland to accept API 2 as the basis for market-related pricing.

#### 4.7. Turkey

##### – free market, but with protection for domestic producers

Turkey has traditionally produced its own coal requirements, but imports have increased dramatically in recent years as newly built power stations have come online. Turkey has become the largest steam coal importer in the European Atlantic/Mediterranean basin, although quality restrictions have prevented some potential imports.

Recently, the Turkish government introduced an import tax which comes into effect if the ARA price (effectively API 2, but on ICE) falls below US\$70/mt, in order to support local coal miners. Power generators using domestic coal are also paid a subsidy directly from the Turkish government in order to support the local industry.

#### 4.8. Summary review of coal pricing systems

Seaborne coal has become a very openly traded commodity with almost full price transparency around the globe. This transparency has led to greater efficiency in the market as buyers and sellers all over the world can access the best pricing points. This is evidenced by recent developments such as Colombian coal sales to India and Korea.

Most contracts are now based on indices, with additional business done as spot trades.

Countries with domestic producers have had to respond to this market transparency. They have either forced the closure of their indigenous coal-mining industry by reducing state support (*e.g.* in the UK), making domestic coal producers uncompetitive with imports, or supported coal mining with direct subsidies or cross subsidies (*e.g.* Poland, Turkey and China). In all cases, they have not been able to ignore the price of imported coal.

European countries use international coal market indicators in pricing policy decisions. Countries that reduce production use subsidies to support local producers during the transitional period. Pricing systems are based on market principles. Market indicators cover all major markets around the world and reflect the balance of supply and demand in the market.

In the Asian market, traditional practices are slowly being eroded in response to changes in the market, with less volume being transacted on fixed-price terms. China's approach to coal pricing has vacillated between free market and protectionism for its domestic coal industry through price setting at a level designed to be largely competitive with imports.

Ukraine has become a net importer of low-volatile coal and needs to import this fuel. If it wishes to support its domestic mining at the same time, it needs to recognise the impact of coal imports and set the domestic coal price at least on a par with import prices (import parity price).

## 5. Coal pricing in Ukraine – advantages of market indicators

### 5.1. Summary

Until mid-2016, Ukraine used an administrative system to determine coal prices.

State-owned coal mines were partially reimbursed for their production costs, but no actions were taken to promote the development of coal mining and this led to a crisis in the coal industry.

Under the current situation, there is a deficit of domestic coal supply in Ukraine. Coal has to be imported to meet demand. The administrative pricing system is inappropriate for such circumstances as it fails to take due account of the international market price of coal.

The international market price is very transparent and there are several, well-known and reliable markers of relevant prices available in the market.

Other countries in similar situations either use or have used the import price as a starting point for domestic prices so that domestic producers are offered parity with imports. Examples include Turkey and China. Otherwise, the risk of domestic mines being forced into closure is unmanageable.

In mid-2016, the NEURC methodology was implemented to determine the price of coal delivered to power stations based on a marker price for imported coal. This formula-based approach is a temporary solution pending electricity market liberalisation.

After market liberalisation takes place in mid-2019, it is anticipated that a market pricing mechanism will be implemented. If the domestic coal mining sector is not then protected from coal importers offering market prices, it may become uncompetitive and fail.

**Figure 18 – 5.2. Administrative pricing: system and consequences**



## 5.2.Ukraine became import dependent

According to economic theory, the market price is determined by supply and demand curves. In the case of a market deficit, the price is determined by the seller, in the case of a surplus – by the buyer.

Currently, there is a coal deficit in Ukraine. During such a domestic commodity deficit, an import parity approach to pricing should be applied to ensure a level playing field exists for the domestic producers.

**Figure 19 – Steam coal deficit In Ukraine may reach 25-30%**



## 5.3.Analysis of the NEURC formula

Box 2 on page 7 summarises the rationale and methodology behind the NEURC formula.

All over the world, countries which import coal, whether they produce coal domestically or not, need to respond to international prices. China does this by moving its domestic price within a price band, depending on the import price (API 8). Turkey imposes an import tax if the NWE price falls below US\$70/mt.

In order to be consistent with international coal prices, the NEURC formula requires a reliable, transparent index for thermal coal at a location as close to Ukraine as possible.

Ukraine buys and burns both high-volatile and low-volatile thermal or steam coals. Since there is little depth in the low-volatile steam coal market, and few international producers, there is no reliable index for coal of this quality.

FOB (free on board) indices exist and have some liquidity (API 4, globalCOAL NEWC); other FOB marker prices exist (e.g. API 10 (FOB Puerto Bolivar, Colombia), US East Coast, US Gulf Coast, Russian Baltic) but are not widely used. All FOB prices are provided by fewer sellers than delivered CFR (cost and freight) prices and reflect the reported coal prices from only one region or even one location. API 10 is a case in point – only one seller (CMC) has access to this port.

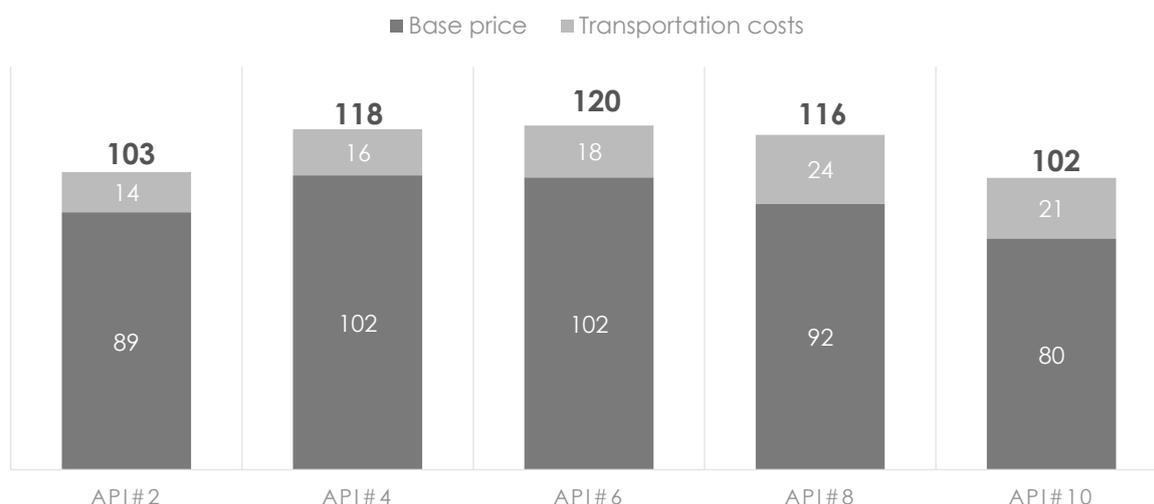
Using a FOB index or marker price would be a reflection of the price of coal from one location and would require freight rates from that location. These may not be readily available if there is only limited freight traffic from that location to Ukraine.

API 2 is a delivered (CFR) marker price, at which many price offers converge, because they would not be competitive if they did not. It captures price activity in all of northwest Europe, with many buyers and sellers. This is why the liquidity in API 2 exceeds that of the other indices.

API 2 reflects the price of coals from many sources delivered to ARA ports (Amsterdam, Rotterdam and Antwerp), so a freight adjustment is required to reflect the delivered cost in Ukraine. The same problem exists as with some FOB marker locations – there is too little freight traffic to determine a delivered price.

**Figure 20 – API 2 best alternative for Ukraine market indicator**

**Coal price indices 2017 with transportation costs to Ukraine, 6,000kcal, US\$/mt**



**API#2 offers the best alternative:**

- Most reliable and liquid index
- Best price because CFR not FOB
- Published daily
- Made up of prices from different locations with different qualities
- Atlantic/Mediterranean basin
- In line with other Europeans

**Table 1 – Assessment of NEURC formula based on API 2**

<b>Arguments in favour:</b>	<ul style="list-style-type: none"> <li>• The API 2 is transparent since it is openly traded and reported.</li> <li>• It puts Ukraine in line with other countries.</li> <li>• It provides a degree of certainty with a forward curve and availability of data.</li> <li>• It encourages productivity improvements at poorly performing mines.</li> </ul>
<b>Arguments against:</b>	<ul style="list-style-type: none"> <li>• Freight cost to Ukraine is only artificially transparent owing to a lack of coal freight on this route, therefore freight price estimates are applied.</li> </ul>
<b>Possible alternative:</b>	<ul style="list-style-type: none"> <li>• The API 2 could be used in conjunction with a fixed element to represent the additional freight and handling costs.</li> <li>• The fixed element would need to be reviewed periodically.</li> <li>• It would still reflect movement in the international market, but would also recognise the fact that Ukraine is not located in NW Europe.</li> </ul>

### 5.4. Market for low-volatile coal

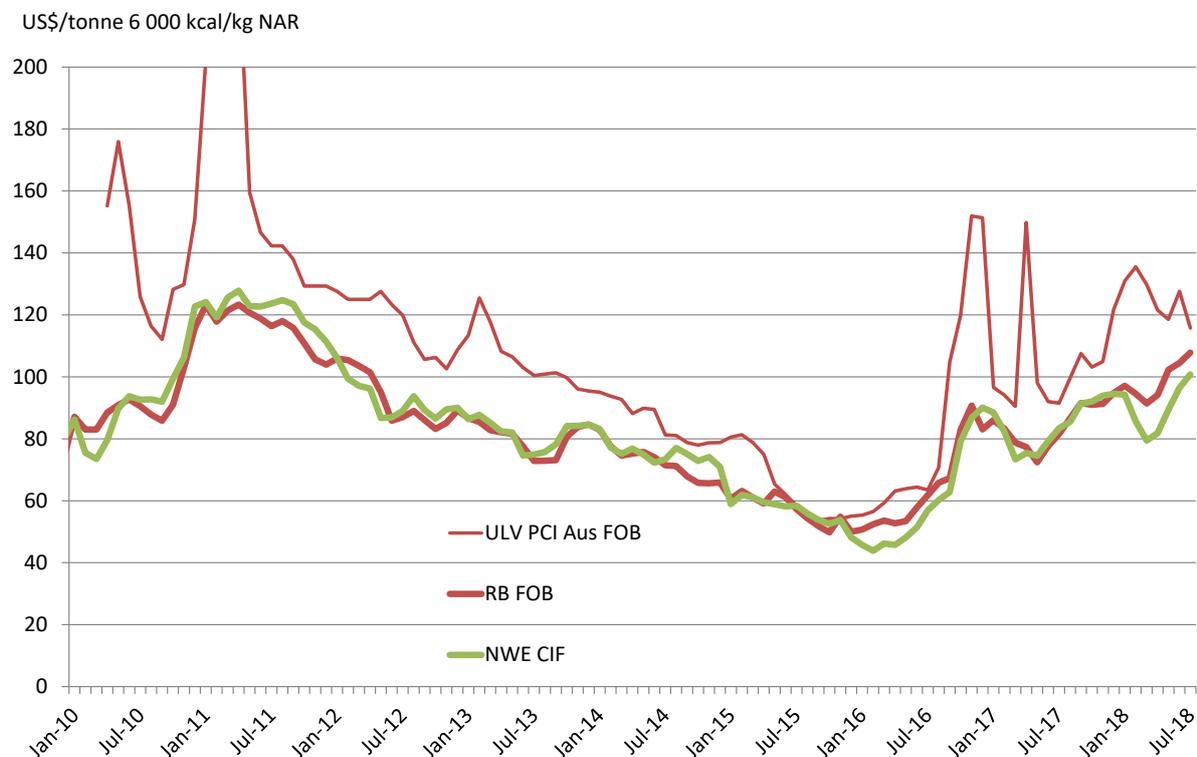
Some Ukrainian power plants require low-volatile coal, such as anthracite. This grade of coal is less widely traded on the international market and attracts a price premium because it can also be used for pulverised coal injection (PCI) in blast furnaces, reducing the need for even more expensive

coking coal. Given the higher cost of low-volatile coal, Ukrainian power plant owners have been retrofitting burners to allow less expensive steam coal to be used.

Figure 21 illustrates the relative prices of steam coal delivered to northwest Europe and loaded on a vessel in South Africa. Note that steam coal has, at times, been more expensive in South Africa than in Europe. This is because prices in the growing Asian market have been higher than in Europe where demand is declining. It implies negative freight rates on the once important Richards Bay to ARA route!

Also shown in Figure 21 is the loaded price of low-volatile steam coal in Australia. The price premium is clear, but so is the price volatility given erratic demand from the steel industry. At times, the premium for low-volatile coal falls to zero and this product has the same value as steam coal. Other suppliers of low-volatile coal on the international market are Vietnam, Russia and the USA.

**Figure 21 – Steam coal price (CIF) at ARA ports in northwest Europe, steam coal price (FOB) at Richards Bay Coal Terminal in South Africa and FOB price of ultra-low-volatile coal in Australia (corrected to 6 000 kcal/kg)**



Source: IHS Markit database

### 5.5. Transport costs to Ukraine

The choice of API 2 is justified, but reflects the costs of coal delivered to the ARA ports in northwest Europe, not to Ukrainian ports only one of which can unload Capesize vessels (see Table 2). Expert opinion obtained by EURACOAL agrees that shipping costs to Ukraine are higher depending on the origin of a particular shipment and vessel size – perhaps US\$9/t in the case of US coal. However, there is very little trade upon which to confirm cost estimates. The shipping cost deltas for coal delivered to Ukrainian ports, rather than ARA ports, ranges from US\$6.5/t to US\$14.5/t according to the NEURC methodology. Thus, the approximation of the shipping cost delta made by NEURC reflects the actual magnitude.

**Table 2 – Capacity of Ukrainian coal-handling ports**

Port	Max. ship size, kt	Import capacity, Mtpa	Export capacity, Mtpa
TIS – coal	75	3.7	28.0
Yuzhniy	180	2.8	17.0
Chernomorsk	75	2.4	15.0
Nikolaev	37.5	0.5	15.0
Mariupol (Sea of Azov)	20	1.4	11.0
Berdiansk (Sea of Azov)	20	0.8	10.0
<b>Total</b>		<b>11.6</b>	<b>96.0</b>

Note that using the API 2 price index plus a cost add-on for transport, the so-called Rotterdam+ price, does not imply that coal is or would ever be shipped from ARA ports to Ukraine. That would be ridiculous! Coal is shipped from producer countries such as Colombia, the USA or South Africa directly to Ukraine, but at a higher transport cost than the more popular routes to northwest Europe.

## 5.6.Sulphur content of coal

API 2 is based on the following quality: steam coal with 6 000 kcal/kg NAR (net as received), sulphur <=1% as received. Most of the coal from Ukrainian mines has a sulphur content >1%.

The formula price calculation does not include any discount for sulphur content for the following reasons:

- The Ukrainian government permits the sale and purchase of coal with sulphur content >1% for the power sector without any restrictions and/or discounts. TPPs pay a high ecological tax to the state for sulphur dioxide emissions (see Table 3). However, there is no regulatory framework to set a discount to the price of coal with a lower sulphur content.
- Ultimately, the largest proportion of coal imports to Ukraine do have a low sulphur content. The import parity price therefore provides an appropriate and correct indication of the price of alternative coal to Ukraine.
- Many countries with domestic coal production and a net import position use support mechanisms for local producers through subsidies, taxes and price regulation. The implementation of the coal price setting mechanism in Ukraine does not unduly penalise local producers for the inherent sulphur content of Ukrainian coal. Fundamental economics support this logic: there is no discrimination against local producers for uncontrollable quality factors (an element of protectionism), while the government receives long-term benefits through increasing local production and restricting the growth of imports.

**Table 3 – Ecological taxes on air pollutants from thermal power plants in Ukraine, UAH/tonne**

	2015	2016	2017	2018
SO <sub>2</sub>	1 165	1 969	2 205	2 452
NO <sub>x</sub>	1 165	1 969	2 205	2 452

The tax on SO<sub>2</sub> in 2018 was equivalent to a coal tax of 49 UAH/tonne (c.US\$1.80/tonne) per 1% sulphur.

## 6. Key findings

Coal is a widely and openly traded commodity with transparent prices for the main market hubs; therefore, assessing the current price of steam coal is a fairly simple task.

Most countries have moved towards market-based energy price setting, although Europe has generally moved further with this than Asian countries.

Most of the world trades coal on a free-market basis, largely spot-based contracts, but with some residual term (annual) business in Asia. Index-linked contracts are common, because they provide security of supply of a suitable product at a price that is always relevant to the current market price.

Almost all European coal business is transacted with a reference – direct or indirect – to API 2. This index is also widely used as the settlement basis for financial transactions, allowing participants to hedge their exposure to price risks.

Countries whose domestic coal production is in managed decline have used European benchmark prices as the best indicator of the relevant price for the equivalent commodity. If buyers of coal have the freedom to buy at the best possible price, then in times of low international prices domestic suppliers will be unable to compete without support mechanisms.

In Ukraine, price setting is regulated by the government using the NEURC methodology and relies on the NW European coal hub marker price – API 2 index

This is appropriate in the current European market as there are few, if any examples of European countries whose coal price is NOT assessed against API 2.

The API 2 is the best indicator for coal price changes for Ukraine for the following reasons:

- It is the most liquid index in the world.
- It is highly transparent.
- It is independently verifiable and includes a large number of prices provided by both buyers and sellers.
- It is a “delivered index” which inevitably produces more competitive pricing than FOB price indices which only reflect the pricing activity at one location.
- The most liquid FOB index is API 4 which is influenced by Asian trades as well as European, so is less relevant to Ukraine.
- Using an FOB index would limit the price methodology to coal from one location and would require freight assessments as well.
- Ukraine is part of Europe, so the location is in the appropriate trading basin (Atlantic/Mediterranean).

An alternative approach would be to include an element of fixed transport cost, subject to reassessment after pre-agreed time periods, to represent the “on-costs” from ARA, on top of the variable API 2.

## 7. Conclusions

It would be counter-intuitive and against the “direction of world travel” for Ukraine to move away from a market-based pricing system.

Coal importing countries all over the world are moving towards more dynamic pricing, and even very conservative societies such as Japan are reducing their dependence on long-term contracts and buying more coal at spot prices.

Ukraine’s other imported energy commodities, such as oil and gas, are priced in this way, and this approach has IMF backing.

In some countries, such as the UK, a refusal to accept import parity pricing led to the bankruptcy of the indigenous coal industry.

Of the alternatives available, the arguments in favour of the API 2 are compelling.

API 2 provides independence, consistency, reliability and a mechanism by which price risk can be managed through hedging.

It also provides transparency with a forward curve, offering investors a more stable environment.

If a market-based system is to be introduced when the electricity market is liberalised, then it is entirely consistent to continue with a market-based approach in the meantime.

### Version history:

rev.	date	comment
01	13.08.2018	first complete draft
03	15.08.2018	submitted final draft to EURACOAL members
06	17.08.2018	submitted to NEURC
07	21.09.2018	updated Box 1 – Germany, updated §4.4 – UK, spelling/grammar corrections

Annex 1 – English translation of NEURC Resolution No. 289  
on a Procedure for the Calculation of the Forecast  
Wholesale Market Price of Electricity

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