The International Energy Agency (IEA), an autonomous agency, was established in November 1974. Its primary mandate was – and is – two-fold: to promote energy security amongst its member countries through collective response to physical disruptions in oil supply, and provide authoritative research and analysis on ways to ensure reliable, affordable and clean energy for its 29 member countries and beyond. The IEA carries out a comprehensive programme of energy co-operation among its member countries, each of which is obliged to hold oil stocks equivalent to 90 days of its net imports. The Agency’s aims include the following objectives:

- Secure member countries’ access to reliable and ample supplies of all forms of energy; in particular, through maintaining effective emergency response capabilities in case of oil supply disruptions.
- Promote sustainable energy policies that spur economic growth and environmental protection in a global context – particularly in terms of reducing greenhouse-gas emissions that contribute to climate change.
- Improve transparency of international markets through collection and analysis of energy data.
- Support global collaboration on energy technology to secure future energy supplies and mitigate their environmental impact, including through improved energy efficiency and development and deployment of low-carbon technologies.
- Find solutions to global energy challenges through engagement and dialogue with non-member countries, industry, international organisations and other stakeholders.

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- The European Commission also participates in the work of the IEA.
EXECUTIVE SUMMARY

Market Analysis and Forecasts to 2020
EXECUTIVE SUMMARY

Some sudden changes emerge in 2014

For the first time since the 1990s, global coal demand growth halted in 2014. This was the result of a combination of some structural and temporal factors, mostly in China, where half of global coal is used. In 2014, Chinese gross domestic product (GDP) grew 7.4%, while power demand grew 3.8% after a decade of an almost one-to-one relationship between GDP and electricity demand in China. The lower electricity intensity reflected the rebalancing of the Chinese economy, although whether such a low elasticity is sustainable remains to be seen. The diversification of the power sector away from coal has been going on for a number of years. More than 55 gigawatts (GW) of capacity in hydro, wind, solar and nuclear power were added in 2014, which also saw an unusually high level of rainfall that brought hydro generation to around 100 terawatt hours (TWh) higher than production with average precipitation. Growth in coal-intensive industries like steel and cement plummeted after two-digit growth on average since the beginning of this century. Preliminary data in the first ten months suggest the acceleration of these trends in 2015. Due to the combination of ageing coal capacity, weak power demand, and strong renewable and climate policies, OECD coal demand had a relentless decline of 47 million tonnes (Mt) in 2014. India and the Association of Southeast Asian Nations (ASEAN) region, the two remaining centres of significant coal growth, increased 112 Mt in 2014. Given the economic rebalancing in China and ongoing structural decline in OECD countries, even with the continuation of growth in India and ASEAN countries, a downward trend in global coal consumption in 2015 is likely.

Oil prices plummeted. In principle, oil and coal do not compete in the same markets. The main use of coal is power generation followed by steel production. Oil is used predominantly for transportation and chemicals. However, prices of gas, the main competitor of coal in power generation, are often linked to oil prices; hence, low oil prices mean that coal faces stronger competition from gas, which can lead to gas regaining market share from coal in some countries, like the United Kingdom. It is also important to note that oil is an important component of coal mining (through explosives and diesel, especially in open-pit mining) and transportation costs; thus, lower oil prices have an impact on coal prices.

Environmental pressure is mounting

Carbon dioxide (CO₂) reduction is imperative. When this report went to the printers, COP21 was taking place in Paris. Climate policy is more influential in longer-term coal demand than in the five-year outlook of this report. Coal is the most carbon-intensive fuel, and coal burning is the largest contributor to CO₂ emissions: current unabated burning is incompatible with climate stabilisation. While decisions regarding investment and decommissioning of coal power plants are affected by other factors as well, climate policy has emerged as a major driver for the future of coal in large parts of the world. Coal-based electrification provides low-cost energy access in the developing world, while, at the same time, it can conflict with CO₂ emissions reduction targets.

Air pollution also matters. Whereas modern coal-fired power plants can be fitted with environmental controls to tackle SO₂, NOₓ, mercury and particulate emissions, this often does not take place. In addition, coal burning in the industrial and residential sectors, which rarely are equipped with emission control equipment, is a major contributor to the local air pollution in some countries. Smog and acid rain have therefore emerged as key policy concerns shaping regulatory decisions, especially, but not
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only, in China. The Environmental Protection Agency (EPA) rules in the United States and the Large Combustion Plant Directive in Europe have led to a wave of decommissioning coal plants, some of which would have continued to operate with existing climate policies. Local communities have also resisted coal plant investments, which led to project cancellations in several countries.

Coal restricting policies are increasingly adopted worldwide. Renewable feed-in-tariffs, CO₂ pricing, coal taxes and other measures to reduce emissions together with the increasing competitiveness of renewables are causing coal to struggle to maintain its place in the power mix. In addition, some multilateral development banks, export credit agencies in some countries, and other international financial institutions have set policies that make financing coal plants overseas very difficult. Other institutions are discussing the possibility of imposing similar policies. Pension funds and others are also divesting from coal or from fossil fuels more broadly. Nevertheless, lack of access to financing has not yet emerged as a major constraint for coal investments.

The golden age of coal in China seems to be over

We revise our global demand forecast downward by over 500 million tonnes of coal-equivalent (Mtce). Coal demand will grow to 5814 Mtce through 2020, which is 0.8% per year on average. Half of the growth, 149 Mtce, will occur in India. The ASEAN region represents over one-quarter, i.e. 79 Mtce, with lower growth in other regions such as Other Asia. On the contrary, we expect a decline of 75 Mtce in the United States and a decline of 22 Mtce in OECD Europe. Coal power generation will drive demand growth, with global capacity growing over 200 GW by 2020. However, because power demand will grow even faster, the share of coal in power generation will fall from the current 41% to 37%. This forecast makes cautious assumptions on the rebalancing of the Chinese economy. As a result of the global slowdown, the share of coal – after two decades of increasing in the world’s energy mix – is now declining. We estimate that from 2014 to 2020 the share of coal will fall from 29% to 27% of total primary energy. If a deep restructuring in China leads to the peak coal case, there would be an even steeper decline to 26%.

With cautious assumptions on the rebalancing of its economy, Chinese coal demand levels off through 2020. This is driven by three factors: first, the economic growth forecast is weaker than last year. Second, structural reforms are also gathering momentum. Projections of energy-intensive industries reliant on coal, like steel and cement, have been revised downward and, in some cases, to a decline. Given that gas and oil power generation is very limited in China, coal competes with low variable-cost nuclear and renewables; consequently, lower electricity demand projections primarily affect coal demand. In addition, lower expected production of steel and cement is reflected in industrial coal use. Low oil and gas prices add to the well-known issues related to water and CO₂ emissions, making coal conversion, especially coal-to-gas, lose momentum in China. These three factors, together with China’s ongoing efforts to diversify away from coal to achieve a more energy-efficient economy and to address local pollution, lead to a levelling out of coal use. China is the largest renewable investor in the world economy; however, without structural change to cut the energy intensity of Chinese GDP growth, even large-scale renewable investments would succeed only in the slowing down of Chinese coal.

Accelerated structural reform and clean energy policies could lead to a downward trend in Chinese coal demand. For the first time since the Medium-Term Coal Market Report was first produced in 2011, a “peak coal scenario” in China is probable. The drivers of this peak would be an even
stronger rebalancing of the economy, with stagnating housing and infrastructure construction and lower-than-expected power demand, mainly from declining electricity use in heavy industry. A further acceleration of renewable investment is possible, but the key uncertainty is the macroeconomic structure. Whether consumed directly or through electricity, around one-third of the coal used in China is related to infrastructure and real estate. A stronger rebalancing, coupled with ongoing renewable and energy efficiency investments, can conceivably cut Chinese coal demand – a drop of 200 Mtce below 2013 levels. Chinese coal production declines less than demand, which cuts import needs. In fact, China turns into a net exporter of thermal seaborne coal. Despite this, thermal coal prices are only a few USD/t lower than in our forecast; a significant proportion of global mining capacity is already failing to recover its costs, so a further decline in demand will lead to mine closures. In this case, coal’s share in power generation globally would fall to 36%.

**Coal in advanced economies: The long sunset**

**The decline in US coal demand is inevitable.** Despite rejection of the mercury regulations by the US Supreme Court, we do not see upside risks in our demand forecast for the United States since existing coal capacity will be retired and no new coal plants are expected other than those few under construction. The share of coal in power generation will dip below 35% by 2020, the lowest share since the International Energy Agency (IEA) was created over 40 years ago. Abundant shale gas, increasing renewable generation and EPA environmental rules put pressure on coal, especially in the context of sluggish power demand and with the Clean Power Plan on the horizon.

**Slow and structural coal decline in Europe.** In Europe, existing coal plants remain competitive on a marginal cost basis despite the low Emissions Trading System (ETS)’s carbon price. However, as power demand stagnates or declines while renewables continue to grow, the forecast for coal is steady decline. In the European Union, we expect coal power generation to decline on average over 1.5% per year through 2020. With spare coal capacity, the main upside risks could come from higher-than-expected power demand or unexpected nuclear closures. On the other hand, gas generation costs have moved closer to coal, which poses some downside risks.

**India and ASEAN: the two remaining growth engines**

**India is the only major economy with strong coal growth.** The Indian government has ambitious plans to provide full electricity access to the 240 million people still without it and to expand the manufacturing sector, where coal is the lowest-cost base load option. While India has an ambitious and accelerating renewable investment programme, the scale of the electricity need is such that new coal investments and further growth in coal consumption are inevitable. Key ASEAN countries are in a very similar position: energy access and poverty reduction ambitions drive coal investments in Indonesia, Viet Nam and the Philippines.

**But India is not the new China.** As forecast in former editions of this report, India will become the second-largest coal consumer in the world, bypassing the United States, and the largest importer of thermal coal. However, India and China have different governance and growth models, with energy-intensive heavy industry playing a considerably smaller role in India. Indonesia and Viet Nam, while expected to significantly increase their coal power generation, are on a different scale than India. Malaysia, Philippines, and even Sri Lanka, will require increasing imports for coal generation. Growth in India and ASEAN countries will not compensate for the new trajectory of Chinese coal demand.
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Australia recovers the throne among coal exporters. Persistent low prices, dwindling Chinese imports, and growing domestic demand are affecting Indonesian exports, which will feel the bite much more than Australia, again the largest coal exporter. Most of the thermal trade growth comes from India, and this brings a great uncertainty because demand for imports is closely interlinked with the performance of Coal India, which has been successful in increasing output recently. Nevertheless, quality, location and low prices also play a role in determining import levels. Despite the export of increasingly high ash volumes, Australian exports are mostly coking and high-quality thermal coal mined in the traditional basins. Colombia increases exports over the period, based on its low cost.

End of commodity super-cycle or the start of a low coal price era?

Coal prices are now at their lowest since the financial crisis. Boom and bust cycles are common for commodities, but the series of factors pushing coal prices down has been astonishing: oversupply in China at the same time that main exporters expanded capacities; the increasing gas production in the United States; major cost reduction in the industry, sometimes by gaining scale and increasing production; take-or-pay infrastructure contracts in major exporters; currency depreciation of exporting countries; low oil prices; and, finally, the Chinese halt. These factors explain trends to the present, but given the dramatic fall in the cost of solar and wind generation and the stronger climate policies that are anticipated, the question is whether coal prices will ever recover. While a price forecast is not the aim of this publication, it is apparent that the continuous pressure from shale gas in the United States, stronger climate policies, and especially, the overcapacity and slowdown in China all contribute to the oversupply. This glut will be even more acute if a peak coal demand in China becomes real.

Mining and infrastructure investments are discouraged by low prices. In the current persistent low coking and thermal price environment, most investment decisions on mining and infrastructure capacity will be delayed or postponed and – if prices do not recover – eventually cancelled, meaning that coal will stay underground. On the other hand, such persistent low prices make coal very attractive for power generators. The current 1 900 GW of installed coal capacity globally will be expanded as capacity under development in Asia exceeds the likely retirements in Europe and the United States. While improving renewable technology can make new coal plant investments unattractive, once a coal power plant is constructed and operating, given low fuel generation costs, it is likely to run for a long time, especially in places with power shortages. Therefore, based only on variable costs, the utilisation of the existing coal fleet can be constrained only by very cheap gas, a sizeable CO₂ price, or a policy-driven renewable deployment that exceeds demand growth.

Technology is improving but there is a long way to go. Two-thirds of coal is used in power generation, so both future demand prospects as well as the environmental impact of coal are heavily influenced by the power sector. Some positive signs are emerging. The shift from inefficient subcritical to high-efficiency super or ultra-supercritical plants (SC/USC) is happening. More than two-thirds of coal capacity under construction is SC/USC, led by China, with India and the ASEAN region lagging behind. There is also progress on reducing air pollutant emissions from coal power plants. OECD countries have already been tackling this for a long time, and now China leads the efforts to reduce emissions from coal-fired plants. Other countries must progress dramatically in this regard. Last, but not least, carbon capture and storage (CCS) is no longer a theoretical possibility, with several CCS commercial-scale projects started or under construction in North America, Australia and possibly in China. Nevertheless, CCS deployment is still largely off track and needs to be accelerated by strong policies in order for coal to contribute to a carbon-constrained energy system.
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Although it has received less attention than the plunge in oil prices since mid-2014, the drop in coal prices has had a profound impact on global energy markets. Underpinning the weakness in coal prices is the decline in coal consumption in China for the first time this century, while pledges to reduce CO₂ emissions made by dozens of countries ahead of the UN climate negotiations in Paris in December 2015 are also providing negative sentiment for coal producers. Partly offsetting the gloom is demand from a few populous emerging economies in Asia – particularly India – and the high odds that coal will remain China’s top energy source for several years to come.

Market players are now wondering if coal prices have hit the bottom, how long producers can survive at these levels and when oversupply will be balanced. Whereas the low prices make coal producers struggle, they prove very attractive for power generators despite increasingly strong environmental policies, growing competitiveness of renewables and declining gas prices.

This year’s edition of the IEA Medium-Term Coal Market Report presents, for the first time, a Chinese “Peak Coal” case, which explores the factors that could cause coal use in China to enter a structural decline. It also studies the potential impact of such a peak on supply, prices and trade flows. As in past editions, the report analyses recent trends in coal supply, demand and trade; provides forecasts for the next five years, and gives insights on questions that concern industry and policy makers.