Rock steady
A special report on coal demand
From The Economist Intelligence Unit, May 2013
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Editor’s note

Coal, once dubbed the “mundane mineral”, is proving a surprisingly dynamic commodity. The rise of Asian economies—especially China, by far the biggest coal consumer—has spurred a breakneck expansion in both coal demand and supply over the past decade. But as China’s economy has dropped down a gear, so has global coal consumption. Coal demand from the power sector is also buffeted by the shale-gas bonanza in North America, traditionally a mainstay of the coal industry. Tightening regulations on emissions, a theme from the US to Australia, further dampens the appetite for coal.

Yet coal remains resilient. This report, presenting a snapshot of the Economist Intelligence Unit’s forecasts for the largest coal-consuming countries (accounting for some 90% of global coal demand), shows that governments’ high-minded efforts will slow coal’s progress but not reverse it. A telling example is the failure of the EU, the aspiring leader of the campaign against climate change, to set a steep enough price on carbon-emission credits to dissuade utilities from burning coal. In fact, European coal use grew in both 2011 and 2012, fuelled in part by imports from the US.

As in most other energy markets, coal’s prospects will be determined largely by demand in Asia, particularly China and India. Although these economies are settling into a slower growth trajectory than before—thereby reducing their appetite for coal—they will remain the main market for new coal supplies. As a result, it is in these coal-dependent countries where pollution from burning the fuel will have the most immediate impact.

Martin Adams
Energy Editor
Hong Kong, May 2013
China

“China is coal. Coal is China.” This is how the International Energy Agency (IEA) put it in a recent report. Indeed, the country is the largest user and producer of the fuel, accounting for over 45% of global consumption and production. Its appetite continues to grow—consumption expanded by nearly 10% in 2011, as China displaced Japan as the largest coal importer.

A combination of forces is reducing Chinese demand for coal, which we estimate grew at a more pedestrian 4% in 2012. Most importantly, economic growth will be slower in this decade than during the previous one, a product of China’s maturing economy and changing demographics. This will feed into more modest demand for energy, including coal, which accounts for about two-thirds of China’s energy consumption and three-quarters of its electricity generation.

Coal consumption will be curtailed by two further factors: efficiency gains, driven in part by policymakers’ concerns about severe pollution; and a push to substitute coal with cleaner alternatives, such as natural gas. The recent endorsement by the state council (China’s cabinet) of a plan to cap coal use at 4bn tonnes per year by 2015 is just one of many signs of Beijing’s determination to shrink coal’s share of the energy mix.

We expect China’s consumption of coal to grow by 18% during 2011-15, down from 46% in 2006-10. For foreign coal miners with businesses built on Chinese demand, this is not heartening news. Yet from another perspective—namely, those worried about climate change—China’s coal consumption will remain uncomfortably high. By 2020, China will release roughly 40% more carbon dioxide into the atmosphere by burning fuel than it did in 2010, when it was already the world’s largest carbon emitter by some distance.

Government efforts to date have focussed on countering the adverse impacts on human health of burning coal, via widespread installations of sulphur dioxide scrubbers, for example. New coal-fired plants in China are world leaders in efficiency, and for every one a power company builds, an old one must first be knocked down (or, in some cases, blown up).

In order to tackle China’s expanding carbon emissions quickly, tougher measures will be needed—a carbon tax or carbon trading, for instance, coupled with carbon capture and storage (CCS) techniques. But powerful vested interests are likely to resist deploying such measures, while CCS is anyway expensive and immature, needing years to achieve meaningful scale. And although the government has shown signs that it wants to reform regulated energy prices, it will be anxious not to harm economic growth by lifting them too swiftly.

On the supply side, meanwhile, talk of bottlenecks in the provision of Chinese coal looks overblown. Forced consolidation of the domestic industry has put the brakes on production, but China is importing the balance of its needs.

Reserves are concentrated in the far-flung north and west of the country, while the weight of demand lies in the more heavily populated east. This strains China’s railway infrastructure, with coal...
accounting for over half of all cargo hauled by rail in 2010, according to the IEA. But the situation is improving, as new lines are built to service mines and high-speed lines mop up passenger demand in order to free up other parts of the network for freight. Increasingly, coal will be converted to electricity in less populated areas and delivered via ultra-high voltage cables to where it is needed.

A plethora of new power plants are planned in coal-rich regions, with enthusiasm for construction strongest in Inner Mongolia. This is a big reason why, megawatt for megawatt, China accounts for 40% of coal-fired plants planned globally, according to the World Resources Institute, a non-governmental organisation.

Coal is cheap and China happens to be home to the world’s third-largest reserves. By 2020, the fuel will still provide more than half China’s energy. In absolute terms, growth will be too slow for the liking of many local producers and foreign exporters, but not slow enough for the planet.

<table>
<thead>
<tr>
<th>China: Coal consumption (m tonnes)</th>
<th>2011</th>
<th>2013</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal consumption</td>
<td>3,678</td>
<td>3,975</td>
<td>4,324</td>
</tr>
</tbody>
</table>

Sources: Energy Information Administration; The Economist Intelligence Unit.

<table>
<thead>
<tr>
<th>China: Energy mix (Coal’s share of gross domestic energy consumption, %)</th>
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</thead>
<tbody>
<tr>
<td>2010: Coal 66%</td>
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<tr>
<td>2020: Coal 55%</td>
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</table>

Source: The Economist Intelligence Unit.
Coal, as cheap as it is dirty, is the mainstay of America’s electricity supply. The world’s biggest economy has the world’s largest reserves of the mineral, and is the world’s second-largest burner of it. Yet coal demand is set to dip in the face of what, for the country’s historically mighty coal industry, are two escalating threats. Burgeoning output of natural gas from shale rock has driven down gas prices to a third of their 2008 peak, eroding coal’s cost advantage. At the same time, stricter environmental rules are slowly strangling demand from the power sector.

In his first term as president, Barack Obama oversaw a two-pronged assault on coal-fired electricity plants by the Environmental Protection Agency (EPA). Older plants are being targeted by the Mercury and Air Toxics Standards. Utilities plan to shut 40,000 megawatts (MW) of capacity ahead of the April 2015 deadline for compliance with the new rules (although since these plants typically operate well below full capacity, the blow will be less severe in practice). Meanwhile, the proposed New Source Performance Standards aim to curb greenhouse gas emissions at new facilities. There may not be any of these: unless fitted with largely unproven and costly carbon capture and storage technology, new coal-fired plants will fail to meet the stricter standards. The coal industry is still hoping for a reprieve. After coming under intense pressure to tone down its plans, which might help them survive legal challenges, the EPA missed its April 13th 2013 deadline to finalise its new rules.

Nonetheless, Mr Obama pledges to step up action on climate change in his second term and the EPA is poised to tighten its reins on the coal industry. Yet more proposed regulations take aim at plants’ water use and the disposal of coal ash.

Utilities will increasingly favour the construction of cheaper gas-fired plants to cash in on the shale-gas bonanza. Already, coal’s share of electricity generation has fallen from around 50% at the beginning of the century to 37% in 2012, while cleaner-burning natural gas has carved out a 30% share. Largely as a result of this shift, US carbon emissions have fallen to their lowest level since 1994. Coal use picked up at the end of 2012 as gas prices rose moderately, but will not rebound far. As the electricity sector curtails its use of coal, by 2015 the US will burn nearly 20% less of it than was the case in 2010.

These are black tidings for US coal firms. Harried by their government and undercut by shale gas, they are forced to find new sources of demand abroad—with some notable successes. Shipments reached 114m tonnes in 2012, double the amount in 2009. Much of the coal went to an unlikely destination: Europe, which styles itself as a green champion. But US coal companies cannot count on European demand in the long run. They must therefore find more durable sources of demand. The fast-growing markets of India and China stand out: these two countries will fuel the vast majority of global coal consumption growth in the next few years.

Exporting significant volumes of American coal to Asia will not be straightforward. New port infrastructure will be needed on the US West coast (sending shipments from Vancouver in Canada is a
possible alternative). And although of good quality, American coal costs more than Indonesia’s lower-quality wares; Australia’s is also effectively cheaper once the shorter distance it must travel to Asian markets is taken into account.

Despite these hurdles, miners in the US will continue to target overseas markets, since using coal at home is no longer as cost-effective as it once was. From a global perspective, if coal from the US is merely shipped to be burnt abroad, rather than at home, the climate gains that stem from the EPA’s domestic anti-coal crusade may go up in smoke.

### United States: Coal consumption

<table>
<thead>
<tr>
<th>(m tonnes)</th>
<th>2011</th>
<th>2013</th>
<th>2015</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>906</td>
<td>828</td>
<td>771</td>
</tr>
</tbody>
</table>

Sources: Energy Information Administration; The Economist Intelligence Unit.

### United States: Energy mix

(Coal’s share of gross domestic energy consumption, %)

2010: 23%

2020: 17%

Source: The Economist Intelligence Unit.
On paper, the dirtiest of fossil fuels is anathema to the European Union. The bloc has adopted wide-ranging policies designed to clean up energy use in member states, at the heart of which lies an emissions-trading system. Putting a price on carbon is designed, in part, to discourage companies from burning coal. And so it did, at first, following the trading scheme’s launch in 2005.

Coal consumption plunged by almost 15% at around the time of the 2008 financial crisis. Although economic tempests caused much of the fall, a robust carbon price of €20-30/tonne provided another powerful disincentive to burn the fuel. From a climate-policy perspective, little has gone to plan since.

Europe’s economy is still struggling, but coal use is now stubbornly creeping up. By our estimates, coal consumption in the EU grew by 2% in 2012. This masks astonishing growth in certain key countries: coal consumption in the UK, France and Spain rose ten times as fast as the overall EU average. Despite a rapid expansion of renewable-energy supply in Europe’s biggest economy (and largest coal user), consumption in Germany rose by an estimated 3% in 2012. As a result, coal mines there, as well as those in Europe’s other major coal producer (and consumer), Poland, are ramping up production.

What caused this unexpected rebound? Mainly, coal’s cheapness compared with its main competitor in Europe, natural gas. Despite some liberalisation of European gas prices, most contracts remain linked to oil prices, which are currently high. On top of this, liquefied natural gas (LNG) cargoes are heading to Asia in search of even higher prices, making LNG relatively scarce in Europe.

Gas is only half of the story, however. Depressed freight prices have cut the cost of coal imports to Europe. At the same time, supplies from the US are increasingly plentiful on world markets as American utilities turn enthusiastically to gas. Most importantly, perhaps, EU carbon prices languish at record lows, having fallen from over €20/tonne in April 2011 to around €3 in April 2013.

Slumping carbon prices are partly a function of weak economic activity. Lower growth, especially in industry, has meant that firms need fewer permits, driving down the price of carbon offsets. But even without the downturn, the quota of permits awarded was too generous to keep carbon prices high enough to persuade firms to cut emissions.

Fixing this design failure is proving extremely hard, if not impossible. The European Commission (EC) attempted recently to force up prices, and thus discourage coal use, by delaying the sale of millions of carbon permits. But in mid-April 2013 the European Parliament blocked this scheme, giving carbon prices an added push on their downwards tumble. The EC proposal is not completely dead: member states could, in theory, unite to force the Parliament to overturn its decision. But as the balance of politicians’ concerns tilts more towards growth than greenery, a fundamental rethink appears unlikely for now.

Carbon prices will remain low for some time. Adding to the momentum behind coal, gas prices look set to stay at elevated levels. For these reasons, coal consumption will climb again in 2013. Assuming that in 2014 there is a slight pick up-in the European economy, it could increase again slightly in that
year. After that, however, a rebounding economy should force up carbon prices, and coal use will slip back in 2015.

The greatest risk to our forecast is that the EU takes concerted action to lift carbon prices. Right now, that does not look like much of a danger. Far from diminishing in importance, we expect coal’s role in the EU energy mix to show only modest decline by 2020. Hardly a resounding victory for the EU’s once-vaunted environmental policy.

### European Union: Coal consumption

( m tonnes)

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<thead>
<tr>
<th></th>
<th>2011</th>
<th>2013</th>
<th>2015</th>
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<tbody>
<tr>
<td>Coal</td>
<td>767</td>
<td>786</td>
<td>774</td>
</tr>
</tbody>
</table>

Sources: Energy Information Administration; The Economist Intelligence Unit.

### European Union: Energy mix*

(Coal’s share of gross domestic energy consumption, %)

- **2010**: Coal 16%
- **2020**: Coal 15%

* 20 EU countries covered by The Economist Intelligence Unit’s Energy Briefing service.
Source: The Economist Intelligence Unit.
Bringing electricity to India’s masses, many of whom lack a reliable connection to the grid, is a major government priority. Since roughly 70% of India’s electricity comes from coal and the country sits on the world’s fifth-largest reserves of the mineral, this should foster greater demand for the fuel. And so it will, although a number of brakes will slow the speed of expansion somewhat.

Moderating economic growth is already taking a toll on coal consumption, primarily via lower power demand (which slowed from over 9% growth in 2011 to less than 5% in 2012). Coal consumption will recover as economic growth picks up in 2013 and beyond. But unless India can overcome several daunting hurdles, notably a shortage of adequate infrastructure, its economy will not be able to recapture the momentum of recent years. This will hold back coal demand.

In the long run, the need for coal to feed India’s power plants will not soar as much as official plans suggest. Enthusiasm among utility companies for building new power plants usually falls well short of official hopes. During the eleventh five-year plan (2007-12), for example, India achieved just two-thirds of its aims in this regard.

There are few signs this pattern will change. The rampant problems in the electricity sector were illustrated dramatically in July 2012 when half of India suffered outages. Due to political pressure, end-suppliers of electricity do not charge enough to recoup costs and generating companies are thus trapped in contracts to supply electricity at uneconomic rates. Would-be investors in an envisaged fleet of efficient but expensive “ultra mega” power plants (each with at least 4,000 MW of capacity) thus lack sufficient incentives to build them.

The other main reason why India will consume less coal than it could is that it cannot get enough of it at prices firms are willing to pay. The country’s chief coal deposits are geologically complex and concentrated in eastern states where mining is prone to disruption by violent Naxalite insurgents. They also lie far from where the fuel is needed, putting mines at the mercy of India’s creaking railway system. State-owned Coal India, which is responsible for about four-fifths of India’s coal output, similarly has a reputation for inefficiency.

At the same time, private investors are deterred by red tape and the strict restraints placed on their activities. The “Coalgate” controversy is further harming their cause: a report by India’s federal audit authority in August 2012 found that the government’s failure to follow a process of competitive bidding may have cost the exchequer US$34bn in fees. Following an inquiry, several licences have been cancelled.

All this explains why India’s costly addiction to coal imports quickened much more—imports grew 20% in 2012—than its overall appetite for coal. A newly beefed-up tax on imports of thermal coal (used in power generation) will make buyers think twice about purchasing as much from abroad in the future. Yet balancing this is the fact that domestic coal production will fail to live up to bullish official
forecasts. India’s need to buy in sizeable sums of coal will therefore continue. Overall, demand for coal will grow in the coming years, while its share in the energy mix will swell slightly over the course of the decade.

**India: Coal consumption**

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<tr>
<th></th>
<th>2011</th>
<th>2013</th>
<th>2015</th>
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</thead>
<tbody>
<tr>
<td>(in tonnes)</td>
<td>715</td>
<td>785</td>
<td>880</td>
</tr>
</tbody>
</table>

Sources: Energy Information Administration; The Economist Intelligence Unit.

**India: Energy mix**

(Coal’s share of gross domestic energy consumption, %)

2010: Coal 42%

2020: Coal 46%

Source: The Economist Intelligence Unit.
Russia

In energy policy, as in so many things, Russia is determined to go its own way. While a host of other countries are trying to rely less on coal, Moscow is bent on using more of it. Despite sitting on the world’s second-largest reserves of the fuel, Russia currently meets only around 16% of its energy needs from it; steadily rising production since the 1990s has been increasingly funnelled into exports. By boosting coal-fired power generation at home, Russia could free up more of its prodigious gas resources for lucrative sale abroad.

Russia’s coal ambitions are unlikely to be reflected in reality. Subsidies keep natural gas prices artificially low, although partial liberalisation of the market has eroded gas’s cost advantage over coal; full liberalisation will not take place before 2017 at the earliest. Even then, the cost of transporting coal from mines in eastern Siberia to the country’s industrialised west will remain a drag on greater coal use.

Coal’s share in Russia’s domestic power generation drifted down from a peak of 20% in 2000 to around 16% in 2010. This trend is now reversing, but growth in coal’s share of Russia’s domestic energy mix will be modest. Russian coal exports, meanwhile, have increased sevenfold since 2000. China, not western Russia, is the most likely destination for any new production emerging from Siberia.

### Russia: Coal consumption

<table>
<thead>
<tr>
<th>(m tonnes)</th>
<th>2011</th>
<th>2013</th>
<th>2015</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>237</td>
<td>247</td>
<td>259</td>
</tr>
</tbody>
</table>

Sources: Energy Information Administration; The Economist Intelligence Unit.

### Russia: Energy mix

<table>
<thead>
<tr>
<th>(Coal’s share of gross domestic energy consumption, %)</th>
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<tbody>
<tr>
<td>2010: Coal 16%</td>
</tr>
<tr>
<td>2020: Coal 17%</td>
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</table>

Source: The Economist Intelligence Unit.
To make up for the loss of nuclear reactors following the earthquake of March 2011, Japanese power utilities have been desperately seeking alternative sources of fuel. LNG imports surged in the wake of the catastrophe. Yet it took until 2012 for coal imports to jump, and even then the rise was only around 6%; coal plants and port facilities devastated by the quake came back online gradually.

The coming years will not bring similar spurts in consumption, thanks mainly to Japan’s painfully slow economic expansion. Other factors will also weigh on coal demand, such as rising concern about its environmental impact and the restarting of mothballed nuclear reactors. And yet in the long run coal’s share in Japan’s energy mix will prove hard to erode. Coking coal is needed for steel production, a pillar of Japanese industry. For energy-security reasons, thermal coal is seen as an alternative to oil in the power sector, which accounts for the bulk of Japan’s coal consumption.

Japan may not do much to spur global growth in demand for the fuel, but neither will it kick its coal habit.

<table>
<thead>
<tr>
<th>Japan: Coal consumption</th>
<th>Japan: Energy mix</th>
</tr>
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<tbody>
<tr>
<td>(in tonnes)</td>
<td>(Coal’s share of gross domestic energy consumption, %)</td>
</tr>
<tr>
<td>2011: 183</td>
<td>2010: Coal 23%</td>
</tr>
<tr>
<td>2013: 199</td>
<td></td>
</tr>
<tr>
<td>2015: 203</td>
<td>2020: Coal 21%</td>
</tr>
</tbody>
</table>

Sources: Energy Information Administration; The Economist Intelligence Unit.
Africa’s largest economy is not just an important consumer of coal: it is also a large supplier. Exports via the unparalleled Richards Bay Coal Terminal are surging. Johannesburg-based Sasol is the world leader in coal-to-liquid technology, running the massive Secunda coal-to-liquids refinery. But there are reasons to doubt that the boom will continue. One is the country’s underdeveloped rail network, which has failed to keep pace with port expansions. Output, too, faces countless obstacles, from regulatory impasses to labour strife.

The outlook for domestic consumption is a crucial support for South Africa’s internationally-active coal industry. The country’s prodigious coal reserves will fuel domestic electricity production for several decades to come. But if all goes according to plan, the relative contribution of cleaner fuel sources—particularly wind and solar—will grow as a share of the country’s energy mix. Yet coal will still satisfy more than two-thirds of South Africa’s energy needs in 2020.
Abundant reserves of coal in Australia’s eastern states fuel the power needs of the vast majority of the population, which is concentrated nearby. But thanks to environmentally-friendly government policies this setup is due to change. A carbon tax introduced in 2012 is causing the closure of coal-fired power stations and discouraging the building of new ones. Furthermore, the government aims to make sure that 20% of electricity comes from renewable sources by 2020, from around 13% today. Growth in domestic gas production will drive an increase in gas-fired power generation, reducing coal’s share even more.

Australian coal consumption is expected to remain flat in the short term, but as the impact of national policies hits home, we expect demand to begin to cool down. For its part, the government foresees the contribution of coal in electricity generation declining from 60% in fiscal year 2012/13 to 32% in 2034/35.

Australia is the second-largest coal exporter in the world, sending the bulk of shipments to Japan, China and elsewhere in Asia. The future of its coal industry will rely increasingly on tapping growth in these export markets.

<table>
<thead>
<tr>
<th>Australia: Coal consumption (in tonnes)</th>
<th>2011</th>
<th>2013</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>129</td>
<td>131</td>
<td>131</td>
</tr>
</tbody>
</table>

Sources: Energy Information Administration; The Economist Intelligence Unit.

<table>
<thead>
<tr>
<th>Australia: Energy mix (Coal’s share of gross domestic energy consumption, %)</th>
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</thead>
<tbody>
<tr>
<td>2010: Coal 41%</td>
</tr>
<tr>
<td>2020: Coal 32%</td>
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</table>

Source: The Economist Intelligence Unit.
Coal is coming back in fashion in Turkey. Use of the fuel for generating electricity had been in long-term decline as the country turned to natural gas, but it is now enjoying a renaissance. In 2011, coal consumption was more than 20% higher than five years earlier, a trend that is set to continue.

Consumption will receive an added boost as the government seeks to slow the alarming escalation of its current-account deficit, caused in part by expensive imports of oil and natural gas. Western sanctions on Iran, one of Turkey’s main suppliers of natural gas, add momentum to the shift to coal in the power sector. International power companies like Taqa of the UAE and GDF Suez of France recently unveiled plans to build new coal-fired plants in Turkey.

To fuel both new and existing generation capacity, Turkish officials are keen on domestic coal, most of which is low-calorie lignite; for hard coal, Turkey must turn to imports, mainly from Russia, Australia and the US. Since its domestic coal reserves are too small to meet the country’s expanding energy needs, Turkey will not escape its reliance on energy imports.

### Turkey: Coal consumption

(m tonnes)

<table>
<thead>
<tr>
<th></th>
<th>2011</th>
<th>2013</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal</td>
<td>104</td>
<td>109</td>
<td>116</td>
</tr>
</tbody>
</table>

Sources: Energy Information Administration; The Economist Intelligence Unit.

### Turkey: Energy mix

(Coal’s share of gross domestic energy consumption, %)

- **2010**: Coal 30%
- **2020**: Coal 34%

Source: The Economist Intelligence Unit.
South Korea

South Korea, the world’s third-largest importer of coal after China and Japan, has a growing appetite for the fuel. Consumption grew by more than 40% in the five years to 2011. Hefty quantities of coking coal feed the country’s large steel sector, but electricity is the main source of demand. More than three-quarters of coal imports in 2011 were thermal coal, used to make power.

Construction of new coal power plants will continue to drive demand as utilities seek to meet a rapidly growing need for electricity. In January 2013, the government announced plans to award 8,000 MW of additional coal-fired capacity to be built by 2027. Admittedly, a “green growth” strategy launched in 2008, encompassing an emissions-trading scheme, will work against coal demand (and support big plans for expansion in nuclear and renewables generating capacity). But given the energy intensity of South Korea’s export-oriented economy, its need for coal will continue to speed ahead for the remainder of the decade.

South Korea: Coal consumption

<table>
<thead>
<tr>
<th>Year</th>
<th>Consumption (m tonnes)</th>
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<tbody>
<tr>
<td>2011</td>
<td>119</td>
</tr>
<tr>
<td>2013</td>
<td>130</td>
</tr>
<tr>
<td>2015</td>
<td>139</td>
</tr>
</tbody>
</table>

Sources: Energy Information Administration; The Economist Intelligence Unit.

South Korea: Energy mix

- 2010: Coal 29%
- 2020: Coal 27%

Source: The Economist Intelligence Unit.
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