

# COAL MATTERS

## Divestment & the future role of coal

The concepts of 'unburnable carbon', 'stranded assets' and a 'carbon bubble' have received growing attention over the past year, as divestment campaigns have increased their efforts and placed more pressure on investors and governments.

### What is 'unburnable carbon'?

The idea of unburnable carbon is based on the argument that the cumulative CO<sub>2</sub> emissions required to limit global temperature increases to a certain level, usually 2°C above pre-industrial levels, is less than the CO<sub>2</sub> that would be emitted from producing existing proven reserves of fossil fuels. This means that the potential emissions from proven reserves exceed the 'carbon budget' for the specified temperature rise and therefore need to remain unburnt. The argument continues that stock market valuations predicated on those fossil fuels reserves being employed must therefore result in over-valuation.

### Coal – fastest growing energy fuel

Calling for divestment from coal does not recognise the reality of growing energy demand, the continuing role of coal and the importance of technology in enabling coal use to be compatible with global efforts to reduce emissions.

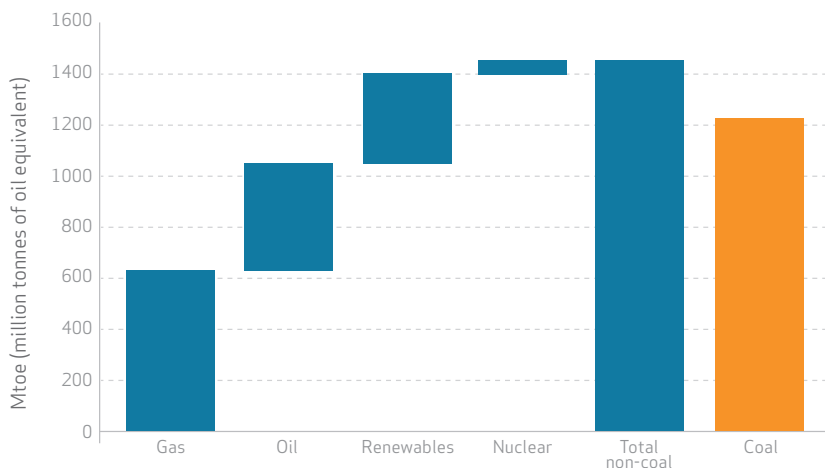
Coal has accounted for nearly half of the increase in global energy use over the past decade. In terms of energy, the 21st century so far has been built on coal. Coal's global contribution alone this century is comparable to the contribution of nuclear + renewables + oil + natural gas combined.

The latest figures from the BP Statistical Review of World Energy show that coal's share of global primary energy consumption in 2013 reached 30.1% – the highest since 1970. Coal was also the fastest growing fossil fuel, with coal consumption growing by 3%.

COAL'S SHARE OF  
GLOBAL PRIMARY  
ENERGY CONSUMPTION  
IN 2013 REACHED

**30.1%**

### Incremental world primary energy demand by fuel, 2000 – 2010

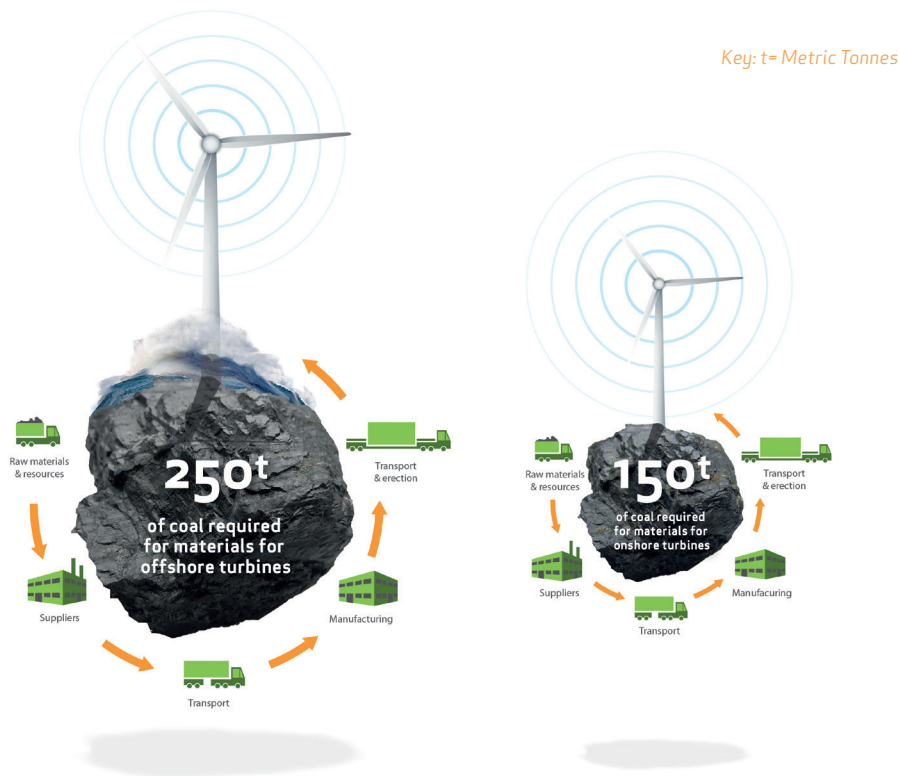


## Coal – building modern infrastructure

Alongside its vital role in electricity generation, coal is also an indispensable ingredient for building modern infrastructure, such as transport systems and equipment and high-rise buildings, to support urbanisation and economic development. The materials used in these projects – steel, cement, glass and aluminium – are highly energy intensive.

There are two main steel production routes; the integrated steelmaking route and the electric arc furnace route. Coal is an essential raw material and energy fuel in both of them. Energy intensive industries require the reliable baseload power that can only come from large-scale hydropower, nuclear, gas, or – in most countries – coal.

### Coal Used in a 3MW Wind Turbine



Source: Vestas 2012

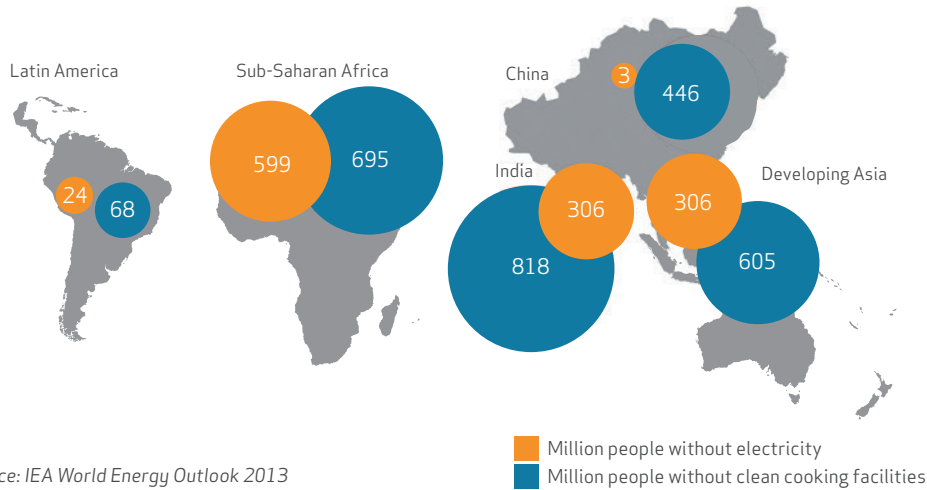
## Coal – meeting global energy demand

There are 1.3 billion people in the world today who live without access to electricity. 2.6 billion people rely on traditional fuels, such as dung and wood, for cooking. A life lived without access to modern energy is a life lived in poverty.

The International Energy Agency (IEA) has predicted that more than half of the on-grid electricity needed to meet their 'energy for all' scenario<sup>1</sup> would need to come from coal.

<sup>1</sup> The IEA defines 'energy for all' as up to five hours of electricity a day. This would be enough electricity in rural areas for the use of a floor fan, a mobile telephone and two compact fluorescent light bulbs. In urban areas, consumption might also include an efficient refrigerator, a second mobile telephone per household and another appliance, such as a small television. The 'energy for all' target excludes electricity for businesses, industry, hospitals, schools, public buildings etc.

### Global energy poverty



Source: IEA World Energy Outlook 2013

*“There’s never been a country that has developed with intermittent power.”*

Jim Yong Kim,  
World Bank President

A report by the World Resources Institute highlighted that 1199 coal plants (representing 1,401,278 megawatts (MW)) are anticipated across 59 countries. This is because coal is the most affordable, easily accessible and reliable source of power.

China provides an excellent example of an electrification strategy based on coal. Over the past three decades:

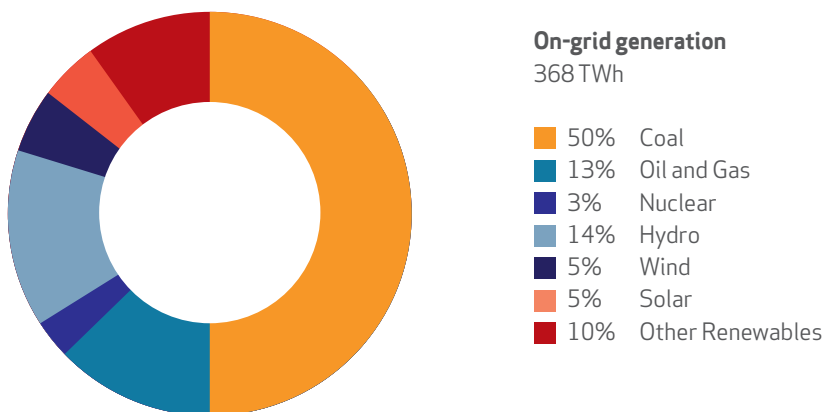
- China connected 99% of its population to the grid
- China’s steel production multiplied by 18
- China’s cement production multiplied by almost 14.

China’s electrification and industrialisation strategy was based on coal as the key energy fuel. In fact, since 1980 coal consumption in China grew by 400%. During this time 660 million people were lifted out of poverty in China – the most effective poverty alleviation campaign in history.

### DEFINITION

**Intermittent power** is not continuously available due to factors such as power storages or, in the case of renewables, the sun not shining or the wind not blowing. In comparison, baseload power sources are those plants that can generate dependable power to consistently meet demand over a 24-hour period – only coal, nuclear, gas and large-scale hydro can provide baseload power.

### Additional on-grid electricity generation by fuel in the ‘Energy for All’ scenario compared with the New Policies scenario, 2030



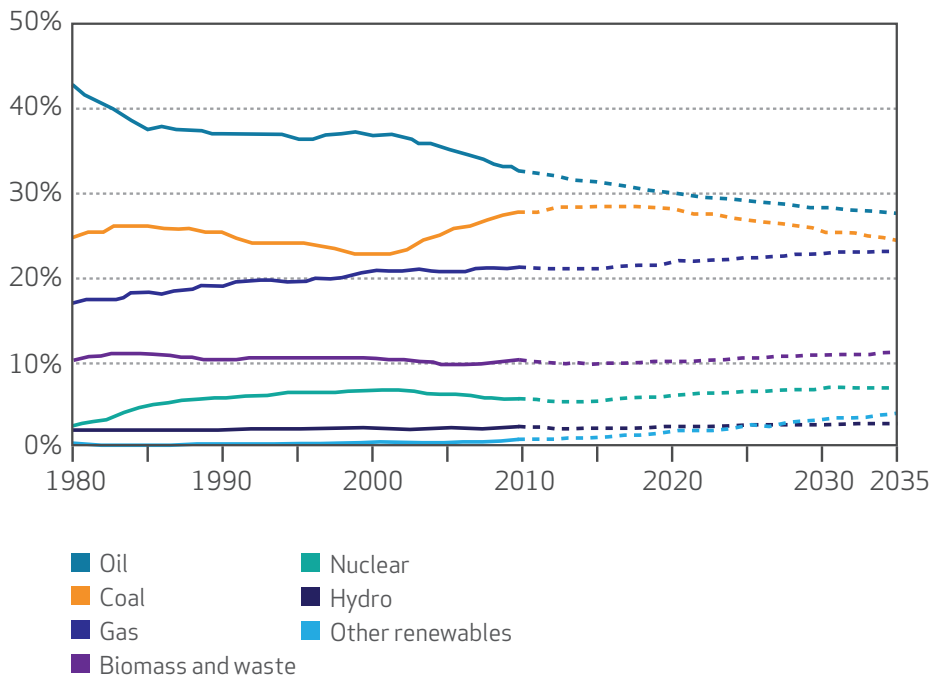
Source: IEA World Energy Outlook 2011

## Global coal demand – sustained growth in the foreseeable future

At the core of divestment campaigns are forecasts about future demand for fossil fuels. Investors and policymakers rely on energy projections from a variety of independent sources and these shape investment decisions. Leading energy forecasters – such as the IEA – all suggest that coal will have a central role to play in energy generation and in industries, such as steel production, for decades to come.

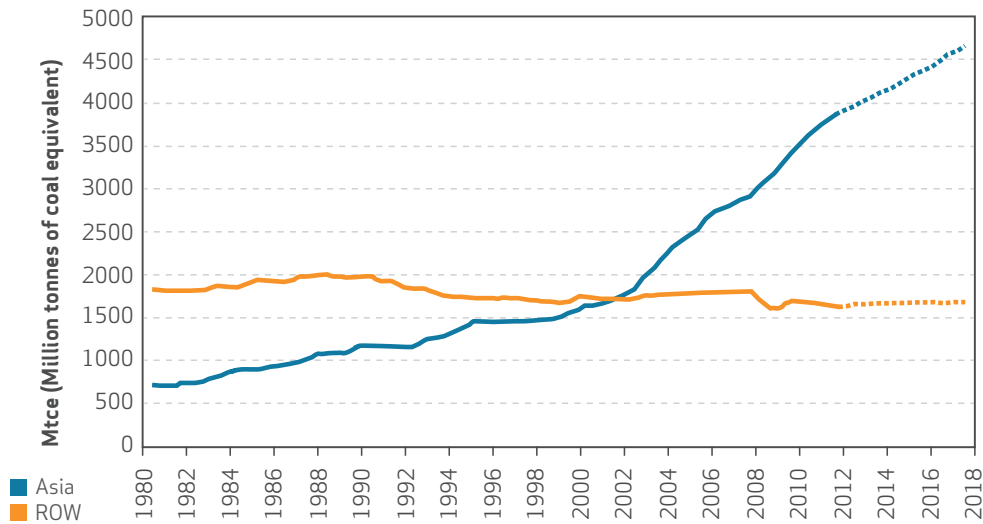
Coal has been the cornerstone of the world’s energy system and will remain so for the foreseeable future. Even under the IEA’s New Policy Scenario, which assumes all government promises on funding renewables and building nuclear power plants are implemented, coal consumption increases by around 17% through to 2035 and there is little change in the global energy mix. Coal remains about 25% or higher of primary energy demand – as it was in 1980, and as it has been for most of the past 30 years. This will also be 25% of an energy pie that will grow – according to the IEA – by 40% over the next quarter century.

Shares of energy sources in world primary energy demand in the New Policies Scenario



Source: IEA World Energy Outlook 2011

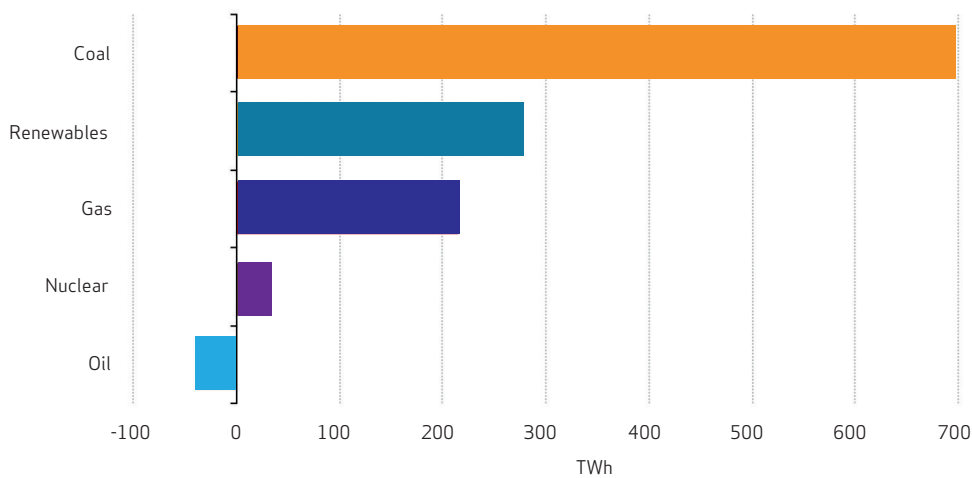
## Coal demand trends and projections



Source: IEA Medium Term Coal Market Report 2013

The graph above shows there is a dramatic increase in demand for coal in Asia, driven in part by China but also India and other growing Asian economies. In Southeast Asia, for example, the IEA forecasts that coal will grow by 4.8% a year through to 2035, accounting for nearly 30% of global growth in coal demand. In the rest of the world there is a slight easing off in coal demand but certainly not a slump.

## Southeast Asia incremental electricity generation by fuel, 2011-2035



Source: IEA World Energy Outlook Special Report 2013: Southeast Asia Energy Outlook

## Markets already managing risks

Divestment campaigns assume that investors do not understand the risk of the investments they undertake and, as such, they are incapable of pricing the risk within their portfolios.

There is a risk for every business that future demand conditions may result in losses given current business models and business strategies. The fossil fuel industry is not unique in this. However, divestment campaigns seem to be based on the argument that investors are somehow oblivious to the risks. Investors have known about climate change since at least 1992, when the United Nations Framework Convention on Climate Change (UNFCCC) was negotiated.

In fact, a University of California study<sup>2</sup> has refuted claims that the so-called 'carbon bubble' will soon burst. The study found that rational investor expectations of future cash flows derived from fossil fuel assets have already adjusted for the likelihood of global action to reduce CO<sub>2</sub> emissions.

Investors may not value the risks to the level that divestment campaigners would like, but it is an unsubstantiated claim that markets ignore these risks. An appropriate response to any risk is a well-diversified portfolio; alternatively, investors can also hedge against those risks.

## Divestment campaigns – threat to environmentally conscious investments

Divestment campaigns want investors to divest fossil fuel stocks irrespective of whether they have good or bad Corporate Social Responsibility (CSR) indicators. All fossil fuel companies are grouped together – no benefit is placed on companies with a good CSR performance.

However, environmentally conscious investors are able to ensure good corporate behaviour through the adoption, for example, of CSR programmes that enhance environmental outcomes. Stepping away from the fossil fuel industry does not mean that the demand for fossil fuels will go away – it just means that environmentally conscious investors lose any influence they had over the operation of those companies.

By definition, divestment requires a change in ownership of assets: institutes and individuals may sell their shares but can only do this if other institutes and individuals buy these same shares. In other words, divestment does nothing to affect the demand for or use of fossil fuels.

*“Divestment of all fossil fuels is a rather blunt, expensive and potentially risky response to the dangers of climate change. It rests on a false premise that all fossil fuel companies are somehow unethical or immoral!”*

*Robert Litterman,  
Head of the Investment  
Committee of the World  
Wildlife Fund*

<sup>2</sup>“Science and the Stock Market: Investors’ Recognition of Unburnable Carbon”, Rosa Dominguez-Faus, Paul Griffin, Amy Myers Jaffe, David Lont, Social Science Research Network, 2014

## The role of technology

The significant mitigation potential of cleaner coal technologies, including high-efficiency low-emission (HELE) coal plants and carbon capture use and storage (CCUS) invalidates the central argument of divestment campaigns. Coal can be, and in many cases already is, used in a sustainable way through the use of modern technologies.

Investing in cleaner coal technologies is often criticised as a means for the coal industry to “smuggle” its products into the low-carbon future. The reality is that cleaner coal technologies are needed because coal demand is going to continue and coal is part of our energy future.

Raising the global average efficiency of coal plants from 34% to 40% with off-the-shelf technology available today would save 2 Gigatonnes of CO<sub>2</sub>. This is more than the total annual CO<sub>2</sub> emissions of India – the third largest CO<sub>2</sub> emitter in the world.

# 2 Gt

RAISING THE AVERAGE GLOBAL EFFICIENCY OF COAL PLANTS TO 40% WOULD SAVE 2 Gt OF CO<sub>2</sub>

### Initiatives needed to cut 2 Gigatonnes of CO<sub>2</sub> emissions:

Run the EU Emissions Trading Scheme for 53 years

Run the Kyoto Protocol three times over

Multiply the world's current solar power capacity by 195

Increase the average global efficiency of coal plants to 40%

### Emission reductions by policies / actions, bn tonnes CO<sub>2</sub> equivalent

Policy / Action	Cumulative emissions	Period	Annual emissions*
Montreal protocol	135.0bn	1989-2013	5.6bn
Hydropower worldwide	2.8bn	2010	2.8bn
Nuclear power worldwide	2.2bn	2010	2.2bn
Increase average global efficiency of coal-fired power plants to 40%			2bn
China one-child policy	1.3bn	2005	1.3bn
Other renewables worldwide	600m	2010	600m
US vehicle emissions & fuel economy standards*	6.0bn	2012-2025	460m
Brazil forest preservation	3.2bn	2005-2013	400m
India land-use change	177m	2007	177m
Clean Development Mechanism	1.5bn	2004-2014	150m
US building & appliances codes	3.0bn	2008-2030	136m
China SOE efficiency targets	1.9bn	2005-2020	126m
Collapse of USSR	709m	1992-1998	118m
Global Environment Facility	2.3bn	1991-2014	100m
EU energy efficiency	230m	2008-2012	58m
US vehicle emissions & fuel economy standards*	270m	2014-2018	54m
EU renewables	117m	2008-2012	29m
US building codes (2013)	230m	2014-2030	10m
US appliances (2013)	158m	2014-2030	10m
Clean technology fund	1.7bn	project lifetime	na
EU vehicle emission standards	140m	2020	na

\* Annual emissions are cumulative emissions divided by the relevant period.

The estimate for the current emissions avoided under the Montreal protocol is eight billion tonnes of CO<sub>2</sub>e.

The annual figure for the collapse of the USSR refers to the years 1992-1998. \*Cars and light trucks \* Heavy trucks

Sources: *The Economist* 2014 and *International Energy Agency* 2013

In addition to the significant benefits from reducing CO<sub>2</sub> emissions, these modern, high efficiency plants can almost eliminate emissions of nitrogen oxides (NO<sub>x</sub>), sulphur dioxide (SO<sub>2</sub>) and particulate matter (PM).

Real solutions to climate change will only come through technological change and action on all low carbon options. CCUS will be a key technology to reduce CO<sub>2</sub> emissions, not only from coal, but also gas and industrial sources. The IEA has estimated that CCUS could deliver 14% of cumulative GHG emissions cuts through to 2050 and that climate change action will cost an additional US\$4.7 trillion without CCUS. However, in comparison to other low carbon technologies, CCUS is underfunded. The Global Subsidies Initiative has reported that nuclear and renewable energy projects (excluding hydroelectricity) receive US\$45 billion and US\$27 billion in public funds respectively every year. In comparison, in the decade since 2005, only US\$12.2 billion has been available to fund CCUS demonstration...*in total*.

## Action taken by the coal industry

The coal industry is already investing in technologies to help reduce emissions and improve its environmental performance. Examples of this include:

- FutureGen in the USA, a project supported by many coal companies that will upgrade a power plant with oxy-combustion technology to capture approximately 1.1 million tons of CO<sub>2</sub> each year - more than 90% of the plant's carbon emissions. Other emissions will be reduced to near-zero levels. Using safe and proven pipeline technology, the CO<sub>2</sub> will be transported and stored underground at a nearby storage site.
- In Australia, the COAL21 initiative represents a commitment by the coal industry to reducing GHG emissions from coal mines and coal use – and will spend more than A\$1 billion through the COAL21 Fund to reduce its carbon impact. The funds have come entirely from a voluntary levy from members of the Australian coal industry to develop low emission technologies for coal use, including CCUS.
- In China, the GreenGen project, an initiative supported by coal producers, is China's signature carbon initiative. At a full build of 650 MW, GreenGen will be the world's largest near-zero emissions coal plant with CCUS technology.

## World's first coal-fired CCUS project launched in Canada

In October 2014, the world's first and largest commercial-scale, coal-fired CCUS project was launched by SaskPower in Canada. The Boundary Dam CCUS project in Saskatchewan sees the integration of a rebuilt coal-fired generation unit with carbon capture technology, resulting in low-emission power generation.

The project transforms the aging Unit 3 at the Boundary Dam power station into a reliable, long-term producer of 110 MW of baseload electricity and reduces GHG emissions by one million tonnes of CO<sub>2</sub> each year – equivalent to taking more than 250,000 cars off Saskatchewan roads annually. Its goals are to demonstrate the economic, technical and environmental feasibility for coal-fired power generation with CCUS, reduce GHG emissions and support the development of industry-wide CCUS regulations and policies.

With the launch of the Boundary Dam CCUS plant, detractors can no longer argue that CCUS is a pipe dream. The plant's operators are sharing their experiences to help drive future deployment of CCUS and believe they can now achieve cost reductions in the next such project by as much as 30%. Boundary Dam is essential in providing a better understanding of the true costs and the full possibilities of CCUS.



## Coal – an important investment for development banks

The World Bank released its ‘Energy Sector Directions Paper’ in 2013, which clearly demonstrated the challenges we face in providing electricity to the more than 1.3 billion people who currently live without it. It showed the devastating impact that a reliance on traditional fuels, such as dung, has on the billions of people worldwide who still use these fuels. Yet, the World Bank’s answer to these huge challenges is to limit funding of coal projects to ‘rare circumstances’.

While this decision may have been lauded by environmental campaigners, it actually has serious environmental and energy access consequences. Without international support, less efficient, more polluting plants will be built. These plants will also not be CCUS ready. Countries with energy access challenges may have more difficulty eradicating poverty because they lack the necessary 24-hour baseload electricity that fuels economic development.

The IEA explained these risks in the 2014 World Energy Investment Outlook:

**“...policies deliberately adverse to coal may have unintended consequences. In the 450 Scenario, which limits the global average temperature increase to 2°C, world investment in coal-fired capacity totals \$1.9 trillion (25% higher than in the New Policies Scenario), of which \$800 billion is for plants fitted with carbon capture and storage. Coal-fired power plants become more expensive on average because, in most regions, more efficient technologies are deployed, as well as greater emphasis on CCS technologies. If development banks withhold financing for coal-fired power plants, countries that build new capacity will be less inclined to select the most efficient designs because they are more expensive, consequently raising CO<sub>2</sub> emissions and reducing the scope for the installation of CCS. In addition, many of the countries that build coal-fired capacity in the 450 Scenario need to provide electricity supply to those who are still without it, a problem that may be resolved less quickly if investment in coal-fired power plants cannot be financed. ”**

While the IEA was talking about development bank financing, the same argument applies to divesting from companies in the coal sector. Reduce investment in coal and investment in cleaner coal technologies comes under threat – a genuine problem when coal is the world’s fastest growing fossil fuel. Most importantly, according to the IEA and Intergovernmental Panel on Climate Change (IPCC), no climate change objective is achievable without the deployment of CCUS.

“The rising share of coal in power generation underscores the urgent need to deploy more efficient coal-fired power plants.”

Maria Van der Hoeven,  
Executive Director,  
International  
Energy Agency

## The importance of responsible investment decisions

Divestment campaigns aim to create the very risks they warn of in order to undermine investor confidence and deprive fossil fuel producers of the finance necessary to operate their businesses.

However, forecasts show that demand for coal will continue to grow. The priority should therefore be how we access the benefits of coal while minimising environmental impacts. For developing countries in need of energy, divestment campaigns can have serious consequences. Divestment will do nothing to address shared global priorities on economic development and reducing GHG emissions and will, instead, hinder efforts to alleviate energy poverty, particularly in developing countries where coal is fuelling economic development.

Technology, including efficiency improvements and CCUS, has a vital role to play in ensuring we can meet our future energy and infrastructure needs as cleanly and sustainably as possible. This requires responsible investment decisions and balanced energy policies.

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## Consequences of divestment decisions

In October 2014, the University of Glasgow became the first university in the UK to commit to fully divesting from fossil fuel companies (subject to reassurance that the financial impact for the University is acceptable). This decision means the reallocation of around £18 million of current investments over a 10-year period. A number of senior academics at the University responded to the decision.

### GLASGOW UNIVERSITY'S VACUOUS POSTURING

*"We write as senior academics at the University of Glasgow who actively research the decarbonisation of energy to deplore the decision of our university court to divest from fossil fuels. The court's position is vacuous posturing, since alternatives to fossil fuels are not yet available at scale for heat and transport, or for electricity production on demand. Indeed, our university has just committed itself to a new gas-fired campus heating system, not least because the only current renewable alternative (biomass) had a far poorer environmental profile. The skills and facilities of the hydrocarbons sector – many of whom are our alumni – are indispensable to the development of carbon capture and storage, without which the Intergovernmental Panel on Climate Change considers there is no chance of the world achieving emissions reduction targets. CCS also offers the only sizeable prospect for actively stripping greenhouse gases from the atmosphere.*

*Moreover, most food consumed in Europe today relies on nitrogen produced from hydrocarbons and they are also the raw materials for the vast array of plastics our society demands – many of which can lock up fossil carbon for centuries. Again, no alternatives yet exist at scale. To pretend otherwise is intellectually dishonest.*

*We trust that those academic colleagues who voted for this gesture have had the moral consistency to turn off the heating in their offices (entirely fossil-fuelled) and to switch off their computers and room lights for the 34.5% of the working day that fossil fuels provide electricity in Scotland."*

*Professor Paul Younger, Rankine Chair of Engineering and Professor of Energy Engineering  
Professor Colin McInnes, James Watt Chair and Professor of Engineering Science  
Professor Fin Stuart, Professor of Isotope Geosciences  
Professor Rob Ellam, Director, Scottish Universities Environmental Research Centre  
Professor Adrian Boyce, Professor of Applied Geology  
University of Glasgow*

*Originally published in The Guardian, 10 October 2014*

## The World Coal Association is a non-profit, non-governmental association

The World Coal Association is a global industry association formed of major international coal producers and stakeholders. The WCA works to demonstrate and gain acceptance for the fundamental role coal plays in achieving a sustainable and lower carbon energy future. Membership is open to companies and not-for-profit organisations with a stake in the future of coal from anywhere in the world, with member companies represented at Chief Executive or Chairman level.

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