



# The life saving potential of coal

How Australian coal could help 82 million Indians access electricity

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## About the Author

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## Executive summary

According to the World Health Organisation, over 3 billion people around the world still cook and heat their homes by burning biomass (including wood, crop waste and dung), and over 1.2 billion people have no access to electricity.

In India, the number of people without access to electricity is estimated to be at least 300 million with around 815 million people relying on biomass for cooking.

The IPA has calculated that increasing the supply of Australian coal to India could allow at least 82 million Indian people each year to access a regular and reliable source of electricity.

However, while coal remains the world's cheapest and most reliable form of electricity, the coal industry is currently under attack from an international network of climate change activists currently operating under the Divestment Campaign banner.

This campaign seeks to use public pressure and intimidation to force companies to drop so-called 'immoral' investments.

If these activists are successful, they will deny many of these people their best opportunity to get out of energy poverty.

Coal is Australia's second most valuable export behind iron ore, the backbone of our own electricity networks, and has been responsible for improving the living standards of hundreds of millions of people in the developing world over the last 30 years.

Affordable electricity powers the increased production and safe storage of food, clean drinking water, the mass manufacture of clothing, the ability to heat and cool our homes and businesses, a better quantity and quality of housing, access to and safe storage of medicine, and the ability to transport ourselves around our local neighbourhoods, cities, countries and internationally.

While solar and wind power may very well have a place in future world energy supply, not even the most earnest activist can change the laws of physics and force solar power to work at night or in cloudy weather, wind power to work in calm conditions, or hydroelectric power to work in times of drought or in areas without large rivers or mountains.

Supplying coal to India would permanently improve the lives of millions of people - a goal worthy of public and policymaker support.

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## The Importance of Coal and Other Fossil Fuels

Coal is the world's cheapest and most reliable source of electricity.

It powered the Industrial Revolution and together with other fossil fuels such as oil and gas, has created an economic environment that has allowed billions of people throughout the world to achieve a better quality of life over the last 200 years.

The proportion of people living in extreme poverty has decreased from over 80 per cent of the world population in 1820 to only 14.5% in 2011, with the number of people living in extreme poverty halving between 1990 and 2011 alone.<sup>1</sup>

This significant achievement has been accompanied by commensurate improvements in other major quality of life indicators such as life expectancy, infant mortality and literacy.

Affordable electricity has powered the increased production and safe storage of food, clean drinking water, the mass manufacture of clothing, the ability to heat and cool our homes and businesses, a better quantity and quality of housing, access to and safe storage of medicine, and the ability to transport ourselves around our local neighbourhoods, cities, countries, and internationally.

The technological revolution, represented by billions of items of lighting, mobile phones, computers and other telecommunications infrastructure, relies on industrial-scale electricity.

Just within the last 25 years, world electricity demand almost doubled from 10,092 terawatt hours (TWh) in 1990 to 19,562 TWh in 2012. During this period coal, oil and gas was responsible for almost 70% of generated power, with coal-fired power generation more than doubling.<sup>2</sup>

In the last fifty years, total world consumption of coal (i.e. not just for the production of electricity) increased by 178% from 1,394 million tonnes of oil equivalent (Mtoe) per annum in 1965 to 3,881 Mtoe in 2014.<sup>3</sup>

In fact, the increase in global consumption of coal in the fourteen years from 2000 to 2014 (from 2369 Mtoe to 3881 Mtoe) was greater than the amount that the world consumed in 1965 with consumption increasing in this period almost as much as oil and gas combined and significantly more than all forms of renewable energy.<sup>4</sup>

Around 830 million people around the world gained access to electricity for the first time between 1990 and 2010 due to coal-fired generation, with significant progress made in sub-Saharan Africa and Asia.<sup>5</sup>

Two hundred years after the Industrial Revolution, coal is still responsible for over 40% of global power generation, with new coal-fired capacity added every year.<sup>6</sup>

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<sup>1</sup> [www.worldbank.org/en/publication/global-monitoring-report/report-card/twin-goals/ending-extreme-poverty](http://www.worldbank.org/en/publication/global-monitoring-report/report-card/twin-goals/ending-extreme-poverty) and Max Roser (2015) "World Poverty" published online at [ourworldindata.org](http://ourworldindata.org)

<sup>2</sup> International Energy Agency, World Energy Outlook 2014

<sup>3</sup> BP Statistical Review of World Energy Historical Data, [www.bp.com/en/global/corporate/about-bp/energy-economics/statistical-review-of-world-energy.html](http://www.bp.com/en/global/corporate/about-bp/energy-economics/statistical-review-of-world-energy.html)

<sup>4</sup> Ibid.

<sup>5</sup> Robert Bryce, "Not Beyond Coal", Manhattan Institute, October 2014

<sup>6</sup> International Energy Agency, [www.iea.org/topics/coal/](http://www.iea.org/topics/coal/) and World Energy Outlook 2014

## Current World Consumption and Forecasts

Notwithstanding the propaganda of renewable energy activists, world coal consumption is continuing to increase, a trend that is forecast to continue for at least the next 25 years.

Coal's share of global primary energy consumption has risen over recent years to 30.0% in 2014, gaining on oil (32.6%) and well ahead of natural gas (23.7%).<sup>7</sup>

The International Energy Agency predicted in December 2014 that global coal demand will increase to 9 billion tonnes per year in 2019<sup>8</sup> and will continue to rise to 2040 with India poised to overtake the USA as the world's second biggest coal consumer before 2020.<sup>9</sup>

China and India together accounted for 88% of the growth in the consumption of coal in 2013 and India experienced its largest ever increase by volume in 2014.<sup>10</sup>

While developing nations are increasing their own coal production where possible, the Australian Government's Office of the Chief Economist has also projected significant increases in the importation of metallurgical and thermal coal over the next five years:<sup>11</sup>

- China's imports of metallurgical and thermal coal are projected to increase to 77 million tonnes and 261 million tonnes per year respectively by 2020;
- India's imports of metallurgical and thermal coal are projected to increase to 57 million tonnes and 244 million tonnes per year respectively by 2020;
- South Korea's imports of metallurgical and thermal coal are projected to increase to 35 million tonnes and 113 million tonnes per year respectively by 2020;
- Japan's imports of thermal coal are projected to represent 127 million tonnes per year by 2020; and
- Even the European Union's imports of metallurgical coal are projected to increase to 47 million tonnes per year by 2020.

Although coal consumption is expected to decline in developed nations over the next twenty years due to environmental measures imposed by national governments, this foreshadowed reduction will be more than matched by demand from developing nations, especially in relation to thermal coal for the power sector.

Earlier this year, the Australian Government's Office of the Chief Economist cited research that there is currently over 350 gigawatts (GW) of coal fired electricity capacity under construction or approved throughout the world with China alone accounting for around 90 GW.<sup>12</sup>

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<sup>7</sup> BP Statistical Review of World Energy, June 2015

<sup>8</sup> International Energy Agency, [www.iea.org/newsroomandevents/pressreleases/2014/december/global-coal-demand-to-reach-9-billion-tonnes-per-year-by-2019.html](http://www.iea.org/newsroomandevents/pressreleases/2014/december/global-coal-demand-to-reach-9-billion-tonnes-per-year-by-2019.html)

<sup>9</sup> International Energy Agency, World Energy Outlook 2014

<sup>10</sup> BP Statistical Review of World Energy, June 2014 and June 2015

<sup>11</sup> "Resources and Energy Quarterly", Australian Government Department of Industry and Science, Office of the Chief Economist, March Quarter 2015

Other sources from 2014 claim that China alone plans either a further 400 GW of coal-fired capacity<sup>13</sup> or 450 GW of new coal fired capacity by 2040.<sup>14</sup>

Even Greenpeace has acknowledged that China added 39 GW of coal-fired generating capacity in 2014 alone and 36 GW in 2013.<sup>15</sup>

The International Energy Agency has projected that an extra 750 GW of coal-fired electricity capacity will be installed between 2014 and 2040 throughout the world, with 382 GW of coal-fired electricity capacity to be installed between 2014 and 2040 in China.<sup>16</sup>

Robert Bryce has also noted that China, India, Indonesia, Pakistan, Germany, Japan, Poland, Russia and South Korea are planning to add between them almost 550 GW of coal-fired electricity supply over the next twenty five years.<sup>17</sup>

To put that in perspective, the total installed capacity in Australia's National Electricity Market (including coal, gas, hydroelectric, wind and solar power) is 47 GW.<sup>18</sup>

China is also investing in the construction of more than 4,700 kilometres of transmission lines to connect its own Inner Mongolian coal mines and power plants with Shanghai and Beijing.<sup>19</sup>

While predictions of future demand for additional coal-fired electricity capacity vary, they share the common conclusion that coal demand will continue to increase significantly.

Another driver of increasing demand for electricity is the huge number of people in the developing world that are expected to move from rural to urban areas over the next 35 years.

The United Nations has predicted<sup>20</sup> that the world's urban population will increase from 3.9 billion people in 2014 to 6.4 billion people by 2050. Typically, as people move from rural to urban areas, they require a much higher standard of housing, heating, cooling, nutrition and transport.

India is expected to have an extra 404 million city dwellers in 2050, China 292 million and the African continent over 800 million.

For India alone, 404 million people in 36 years is equivalent to 11.2 million people per year, or 30,745 people per day or 1,281 people every hour moving to its cities.

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<sup>12</sup> "Resources and Energy Quarterly", Australian Government Department of Industry and Science, Office of the Chief Economist, March Quarter 2015

<sup>13</sup> Robert Bryce, "Not Beyond Coal", Manhattan Institute, October 2014

<sup>14</sup> Ian Plimer "Not for Greens", 2014

<sup>15</sup> Greenpeace Energydesk website, [energydesk.greenpeace.org/2015/02/23/comment-new-coal-power-plants-china-carbon-bubble-waiting-burst/](http://energydesk.greenpeace.org/2015/02/23/comment-new-coal-power-plants-china-carbon-bubble-waiting-burst/)

<sup>16</sup> International Energy Agency, World Energy Outlook 2014

<sup>17</sup> Robert Bryce, "Not Beyond Coal", Manhattan Institute, October 2014

<sup>18</sup> "State of the Energy Market 2014", Australian Energy Regulator, 2014

<sup>19</sup> "Resources and Energy Quarterly", Australian Government Department of Industry and Science, Office of the Chief Economist, March Quarter 2015

<sup>20</sup> UN Population Division 2014, [http://esa.un.org/unpd/wup/PressRelease/WUP2014\\_PressRelease.pdf](http://esa.un.org/unpd/wup/PressRelease/WUP2014_PressRelease.pdf)

## Power Consumption in India

The world's second largest nation by way of population, India, is currently undergoing a stunning electricity grid transformation that may yet emulate that of China.

As is typically the case in the developing world, it is coal that is making this possible.

India's total electricity consumption quadrupled from 215 TWh in 1990 to 869 TWh in 2012 and it is now one of the world's largest consumers of electricity behind China, the United States, the European Union and Japan.<sup>21</sup>

This improved performance has been underpinned by coal, with the amount of Indian electricity generated by coal more than quadrupling from 192TWh in 1990 to 838TWh in 2012.<sup>22</sup>

In terms of generating capacity, India's installed electricity capacity has also quadrupled from 63 GW in 1990<sup>23</sup> to over 272GW at the end of April 2015 with coal still responsible for more capacity than every other source combined.<sup>24</sup>

Like China, India is planning a significant increase in coal consumption and coal-fired electricity capacity in coming years.

India's domestic supply of coal is unable to keep pace with demand, with thermal coal imports increasing from 12 million tonnes in 2004 to 142 million tonnes in 2013. India has already overtaken Japan as the world's second largest importer of thermal coal.<sup>25</sup>

According to the International Energy Agency, India will overtake the United States as the world's second biggest coal consumer after China before 2020 and the world's largest coal importer by 2025.<sup>26</sup>

India has also pledged to increase the quality and breadth of electricity supply with newly elected Indian Prime Minister Narendra Modi pledging in 2014 that all Indian villages would have 24 hour access to electricity and power authorities pledging to tackle chronic supply shortages, transmission losses and electricity theft.

While renewable energy activists have made much of the Indian Government's stated intention to also encourage increased solar power capacity:

- In April 2015 only 3GW of Indian power capacity came from solar and 23GW from wind power out of a total capacity of 272GW;<sup>27</sup>

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<sup>21</sup> International Energy Agency, World Energy Outlook 2014

<sup>22</sup> Ibid.

<sup>23</sup> "Growth of Electricity Sector in India from 1947-2013", Government of India, Central Electricity Authority, [www.cea.nic.in/reports/planning/dmlf/growth.pdf](http://www.cea.nic.in/reports/planning/dmlf/growth.pdf)

<sup>24</sup> Government of India, Central Electricity Authority, [www.cea.nic.in/installed\\_capacity.html](http://www.cea.nic.in/installed_capacity.html)

<sup>25</sup> "Coal in India", Australian Government Department of Industry and Science, Office of the Chief Economist, June 2015

<sup>26</sup> International Energy Agency, World Energy Outlook 2014



- India's ten largest power stations are all coal-fired (three of these are over 4,000MW and five of them are larger than Australia's biggest power station, Eraring in NSW, at 2,880MW);<sup>28</sup>
- Coal represents over 87% of India's thermal power capacity;<sup>29</sup>
- Over 92% of the 2014 capacity increase of 22 GW alone was in thermal (coal, gas, diesel) electricity;<sup>30</sup>
- India is expected to add another 342 GW of coal-fired generation capacity between 2014 and 2040;<sup>31</sup> and
- The amount of Indian electricity generated by coal is projected to more than double to around 2,077 TWh by 2040 and it will overtake the United States to become the world's second largest coal-fired power producer behind China before 2030.<sup>32</sup>

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<sup>27</sup> Government of India, Central Electricity Authority, [www.cea.nic.in/installed\\_capacity.html](http://www.cea.nic.in/installed_capacity.html)

<sup>28</sup> [www.power-technology.com/features/feature-the-top-10-biggest-thermal-power-plants-in-india/](http://www.power-technology.com/features/feature-the-top-10-biggest-thermal-power-plants-in-india/)

<sup>29</sup> Government of India, Central Electricity Authority, [www.cea.nic.in/installed\\_capacity.html](http://www.cea.nic.in/installed_capacity.html)

<sup>30</sup> Indian Ministry of Power, 24 April 2015 Press Release, <http://powermin.nic.in/>

<sup>31</sup> International Energy Agency, World Energy Outlook 2014

<sup>32</sup> Ibid.

## Electricity Shortages Holding Indian People Back

According to the World Health Organisation, around 3 billion people throughout the world still cook and heat their homes by burning biomass (wood, crop waste, dung and other materials) in household stoves and fireplaces and over 1.2 billion people throughout the world have no access to electricity.<sup>33</sup>

Over 4 million people each year are estimated to die from the resulting pollution, with exposure to household air pollution almost doubling the risk of childhood pneumonia and responsible for over half of the deaths of children under 5 from respiratory infections.

Diseases associated with indoor air pollution include pneumonia, stroke, heart disease and lung disease.

In India, the number of people without access to electricity is estimated to be at least 300 million<sup>34</sup> with around 815 million people relying on biomass for cooking.<sup>35</sup>

India has historically been plagued by insufficient electricity capacity, poor infrastructure planning and delivery, and significant transmission losses, which has led to limited or zero electricity supply, and regular blackouts.

A blackout throughout India in mid-2012 was said to have affected over 700 million people<sup>36</sup> and as recently as May 2015 a serious heatwave in India, which was said to have caused over 2,000 deaths, and led to power shortages in some places due to extra load on a power system unable to cope.

As the ABC reported:

"The surge in demand for electricity from air conditioners led to power cuts in parts of Delhi, exacerbating the misery for residents of the capital.

Large queues formed outside the All India Institute of Medical Sciences, one of Delhi's largest government-run hospitals, where women clutched plastic water bottles and packets of mango juice.

Others tried to console crying babies, their heads wrapped in handkerchiefs against the blistering sun.

"Last night there was no electricity for nearly five hours," housewife Seema Sharma said as she waited in line outside the hospital with her four-year-old son.

"You can imagine what we must have gone through. He just couldn't sleep and kept on crying. Now he has fever as well," she said.<sup>37</sup>

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<sup>33</sup> World Health Organisation website, [www.who.int/mediacentre/factsheets/fs292/en/](http://www.who.int/mediacentre/factsheets/fs292/en/)

<sup>34</sup> World Bank website, [data.worldbank.org/indicator/EG.ELC.ACCS.ZS](http://data.worldbank.org/indicator/EG.ELC.ACCS.ZS)

<sup>35</sup> International Energy Agency, World Energy Outlook 2014

<sup>36</sup> [www.theguardian.com/world/2012/jul/31/india-blackout-electricity-power-cuts](http://www.theguardian.com/world/2012/jul/31/india-blackout-electricity-power-cuts)

<sup>37</sup> [www.abc.net.au/news/2015-05-28/hospitals-overwhelmed-as-india-heatwave-deaths-over-1700/6505302](http://www.abc.net.au/news/2015-05-28/hospitals-overwhelmed-as-india-heatwave-deaths-over-1700/6505302)

As noted earlier, a cheap and reliable supply of electricity allows a country to develop and sustain processes to produce and store clean food and drinking water, manufacture clothing, heat and cool local environments, build quality housing, improve access to medicine, and power a variety of transport options.

No electricity means that a family may not be able to cook a meal, or effectively heat or cool their home.

No electricity means no refrigeration, and no safe storage of milk, meat or medicine.

No electricity means a child is unable to read a book or do their homework at night.

According to the World Bank, yearly Indian electricity consumption in 1990 was 270kWh per capita, more than half that of China at 511kWh.<sup>38</sup>

Twenty one years later, while Indian electricity consumption per capita in 2011 had increased to 684kWh per capita, it had been left far behind by China which had increased sixfold to 3,298kWh per capita.

(By way of illustration, Australian electricity consumption went from 8,527kWh per capita in 1990 to 10,712kWh per capita in 2011.)

In terms of the size of its overall economy, whereas Chinese and Indian GDP (expressed in current US\$) was virtually identical in 1980 (\$189.4 billion in China vs \$189.5 billion in India), in the thirty three years to 2013 Chinese GDP increased to \$9.24 trillion but the Indian economy only grew to US\$1.87 trillion.<sup>39</sup>

According to the World Bank, the infant mortality rate (number of children that die before their first birthday per 1,000 births) in India in 2013 was still 41 compared to 11 in China (and only 3 in Australia).<sup>40</sup>

According to UNICEF:<sup>41</sup>

- the under 5 mortality rate (the number of children that die before their fifth birthday per 1,000 births) in China had dropped from 113 to 13 from 1970 to 2013 but in India over the same period only dropped from 213 to 53;
- 33% of the Indian population in 2013 earned under \$1.25 per day;
- only 74% of females aged between 15-24 are literate;
- less than 50% of females attend secondary school; and
- around 12% of Indian children are involved in child labour

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<sup>38</sup> World Bank website, [data.worldbank.org/indicator/EG.USE.ELEC.KH.PC/countries](http://data.worldbank.org/indicator/EG.USE.ELEC.KH.PC/countries)

<sup>39</sup> World Bank website, <http://data.worldbank.org/indicator/NY.GDP.MKTP.CD/countries?page=6>

<sup>40</sup> World Bank website, [data.worldbank.org/indicator/SP.DYN.IMRT.IN/countries](http://data.worldbank.org/indicator/SP.DYN.IMRT.IN/countries)

<sup>41</sup> UNICEF website, <http://www.unicef.org/statistics/>

The percentage of the Indian population aged between 0 and 14 years in 2013 was 29%<sup>42</sup> which out of a total population of 1.2 billion equates to 348 million children.

Or, using another measurement, according to UNICEF the number of Indians under 18 is 435 million and under 5 is 121 million.

If 300 million people in India (around 25% of the population) do not have access to electricity:

- Given that the percentage of the Indian population under the age of 15 is 29%, then a conservative estimate of the number of children in India (0-14) that do not have access to electricity (conservative given that people in rural areas tend to have more children) is at least 87 million; or
- 108 million Indians under the age of 18; or
- 30 million Indians under the age of 5.

Whichever way you calculate it, there is a significant number of Indian children that are growing up in a potentially unsafe home environment and whose prospects are not as bright as children in many other nations.

There is no doubt that India has been held back by its inability to supply electricity to its people.

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<sup>42</sup> World Bank website, <http://data.worldbank.org/indicator/SP.POP.0014.TO.ZS/countries>

## China and Coal

The transformation of the Chinese economy over the last 30 years is usually held out by commentators as one of the most remarkable in the history of the modern world.

China has understood that you cannot improve the living standards of your people, and create a modern industrial economy, without access to a reliable supply of power.

In 1980 as Deng Xiaoping began to open up China to the world, the following summarises some of that country's major quality of life indicators at the time: <sup>43</sup>

- GDP (expressed in current \$US), was worth around \$189 billion;
- GDP per capita (expressed in current \$US) was \$193;
- The proportion of people living on under \$1.25 per day was 69% (1984);
- The adult literacy rate was 66% (1982);
- The youth literacy rate was 89% (1982);
- Life Expectancy at birth was 66 (male) and 69 (female);
- Prevalence of child malnutrition (weight) was 18.7% (1987); and
- Infant mortality rate per 1,000 live births was 48.

Over the last 35 years, China has pursued a single minded approach to economic development, pursuing market reforms, modernising its agricultural sector, establishing an export-led economy and gradually bringing the living standards of its citizens towards western levels.

This transformation has been powered by a significant increase in electricity consumption, for which coal has been largely responsible.

Since 1990, Chinese electricity demand has increased from 558TWh (equal to around 5.5 per cent of world consumption) to 4,370TWh (equal to around 22 per cent of world consumption) in 2012. <sup>44</sup>

China consumed more electricity in 2012 than the USA (3,818 TWh), the rest of Asia (1,947 TWh), Africa (620TWh), Europe (3,188TWh), Latin America (948TWh), and the Middle East (753TWh). <sup>45</sup>

Coal was responsible for over 75% of China's power in 2012 and its 791 GW of installed coal capacity represented over 43% of world coal-fired capacity of 1,805 GW.

Total Chinese coal consumption has increased from 304 Mtoe in 1980 to 1962 Mtoe in 2014, passing that of the United States in 1987. It is now the world's largest producer, consumer and importer of coal and consumes more coal each year than every other country in the world combined. <sup>46 47</sup>

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<sup>43</sup> World Bank, [data.worldbank.org/indicator](http://data.worldbank.org/indicator)

<sup>44</sup> International Energy Agency, World Energy Outlook 2014

<sup>45</sup> Ibid.

<sup>46</sup> BP Statistical Review of World Energy Historical Data and "World Energy Resources, 2013 Survey", World Energy Council, 2013

<sup>47</sup> International Energy Agency, World Energy Outlook 2014



Taking another look at the aforementioned quality of life indicators in 2013 demonstrates the progress that China has made: <sup>48</sup>

- GDP (expressed in current \$US), was worth around \$9.24 trillion
- GDP per capita (expressed in current \$US) was \$6,807
- The proportion of people living on under \$1.25 per day was 6.3% (2011)
- The adult literacy rate was 95% (2010)
- The youth literacy rate was 100% (2010)
- Life Expectancy at birth was 74 (male) and 77 (female)
- Prevalence of child malnutrition (weight) was 3.4% (2010)
- Infant mortality rate per 1,000 live births was 11

According to Bjorn Lomborg, coal has been largely responsible for bringing 680 million Chinese people out of energy poverty over the last 30 years. <sup>49</sup>

The importance of both metallurgical coal as one of the key ingredients in making steel (together with iron ore), and of thermal coal as a cheap and reliable source of energy, can't be underestimated.

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<sup>48</sup> World Bank, [data.worldbank.org/indicator](http://data.worldbank.org/indicator)

<sup>49</sup> "The Poor Need Cheap Fossil Fuels", Bjorn Lomborg, New York Times, [www.nytimes.com/2013/12/04/opinion/the-poor-need-cheap-fossil-fuels.html](http://www.nytimes.com/2013/12/04/opinion/the-poor-need-cheap-fossil-fuels.html)

## Australia and Coal

While the metrics aren't as large as China, coal still plays a major role in Australia's economy.

Australia is the world's biggest exporter of metallurgical coal, selling \$23 billion worth last financial year, and the world's second biggest exporter of thermal coal behind Indonesia, selling \$17 billion worth in 2013-14.<sup>50</sup>

With a total export value of \$40 billion in 2013-14, coal is currently Australia's second largest export earner ranking only behind iron ore in terms of the most valuable single commodity<sup>51</sup> and significantly ahead of the third and fourth ranked commodities (natural gas worth \$16.3 billion and international education worth \$15.7 billion).<sup>52</sup>

The Minerals Council of Australia (MCA) has found that the coal industry directly employs around 50,000 people<sup>53</sup>, and that coal also provides indirect employment for over 150,000 Australians, mainly in rural and regional areas. The MCA has also estimated that Australia's coal economy represents 4.2 per cent of Gross Domestic Product, or almost \$60 billion, that State Governments would receive \$18.3 billion in royalties and the Federal Government would receive more than \$10 billion in tax revenue over a four year period from the Australian coal economy.<sup>54</sup>

Coal is also the backbone of Australia's electricity generation capabilities.

Overall electricity generation in Australia almost doubled between 1985 and 2014 from 123 TWh to 244TWh (though this is down from 257TWh in 2008)<sup>55</sup> and black and brown coal was still responsible for 74 per cent of electricity output in the National Electricity Market (which does not include Western Australia or the Northern Territory) in 2013-14.<sup>56</sup> This proportion is typically much higher in New South Wales and Victoria.

Australia currently has the world's fourth largest supply of proved coal reserves with an estimated 76,400 million tonnes, behind only the United States, the Russian Federation and China.<sup>57</sup> This equates to a further 110 years of production of black coal and 510 years of production of brown coal.<sup>58</sup>

Given that Australia has high land, transport and wages costs, a small internal market and is a long way away from many of our major trading partners, our access to the world's cheapest and most reliable form of energy is one of Australia's few areas of international competitive advantage.

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<sup>50</sup> "Energy in Australia 2014", Australian Government Bureau of Resources and Energy Economics, 2014

<sup>51</sup> Ibid.

<sup>52</sup> "Composition of Trade Australia, 2013-14" Australian Department of Foreign Affairs and Trade, December 2014

<sup>53</sup> Australians for Coal website, [www.australiansforcoal.com.au/](http://www.australiansforcoal.com.au/)

<sup>54</sup> Ibid.

<sup>55</sup> BP Statistical Review of World Energy Historical Data, [www.bp.com/en/global/corporate/about-bp/energy-economics/statistical-review-of-world-energy.html](http://www.bp.com/en/global/corporate/about-bp/energy-economics/statistical-review-of-world-energy.html)

<sup>56</sup> "State of the Energy Market 2014", Australian Energy Regulator, 2014

<sup>57</sup> "World Energy Resources, 2013 Survey", World Energy Council, 2013

<sup>58</sup> "Energy in Australia 2014", Australian Government Bureau of Resources and Energy Economics, 2014

## Australia's Galilee Basin Coal Potential

While Australian exports of thermal coal increased from 87 million tonnes in 2001 to 201 million tonnes in 2014, only 6.7 million tonnes of this was exported to India.<sup>59</sup>

However, this low figure is expected to increase.

As noted earlier, thermal coal supply in India is unable to keep up with increased demand, and from 2017, India is expected to be increasing its investment in newer, higher quality and lower-emission, “supercritical” coal-fired plants that are better suited to Australia’s better quality coal.

While in a free market it can be difficult to predict future sources of demand and supply and to single out any particular projects, Australia’s Galilee Basin in Queensland has been identified as having one of the world’s most promising, undeveloped coal deposits.

Queensland’s Department of State Development claims it has the potential to attract some \$28 billion worth of investment and provide 28,000 jobs.<sup>60</sup>

Two proposed Galilee Basin projects in particular have attracted significant Indian investment and demonstrate the future potential and demand for Australia to supply thermal coal to India and throughout the broader Asian region for many years to come.

GVK Hancock (a joint consortium between Indian conglomerate GVK and Australian company Hancock Prospecting) is proposing to develop three projects in the Galilee Basin with a potential total of at least 8 billion tonnes of thermal coal. The expected export total of the two major mines would be 60 million tonnes per annum.<sup>61</sup>

Adani’s Carmichael Project is another proposed multi-billion dollar project with the potential for 11 billion tonnes of thermal coal. The expected export total of this mine would be 60 million tonnes per annum.<sup>62</sup>

Just these two projects, if realised, could add an additional 120 million tonnes per annum to Australian thermal coal exports.

Other projects floated for the Basin would further increase this figure.

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<sup>59</sup> “Coal in India”, Australian Government Department of Industry and Science, Office of the Chief Economist, June 2015

<sup>60</sup> <http://statedevelopment.qld.gov.au/coordinator-general/galilee-basin-state-development-area.html>

<sup>61</sup> GVK Hancock Coal website, [www.gvkhancockcoal.com](http://www.gvkhancockcoal.com)

<sup>62</sup> Adani Australia website, [www.adaniaustralia.com.au](http://www.adaniaustralia.com.au)

## Opportunity for Australian Coal to Improve Indian Living Standards

India's plans to use more modern coal fired power plants will require higher quality coal that is not as readily available domestically or from its current major source of imports, Indonesia.

Australian coal, with its higher energy content (which means less is burnt to achieve the same heating output), and which typically emits less sulphur and ash than inferior coals, therefore stands ready to help raise the living standards of many tens of millions of Indians, including millions of Indian children, by fuelling affordable and reliable electricity, while displacing lower quality, higher emissions coal.

While coal power station efficiency depends on the requirements of the power station and the chemical composition of the coal, taking an average figure for high quality Australian coal used in a "supercritical" coal-fired power station (one step up from one utilising subcritical technology but one step down from a station using ultra-supercritical technology) around 441kg of Australian coal is needed to generate 1,000 kWh of electricity so one tonne of coal would generate 2,268kWh of electricity.<sup>63</sup>

It is therefore possible to estimate how many Indian people would be able to access electricity for the first time, and enjoy a regular and reliable supply, if Australia were to significantly increase its thermal coal exports.

While the average annual electricity consumption per capita in India was only 684kWh in 2011,<sup>64</sup> a more reasonable short-term aspiration would be to seek to equal the average Chinese consumption of 3,298kWh.

If 2,268kWh of power is generated per each tonne of coal, one million tonnes of coal would generate 2,268,000,000kWh (2.268 billion). Using an average consumption per capita of 3,298kWh, one million tonnes of coal would allow 687,689 people in India to access a reliable supply of electricity per year.

An extra 120 million tonnes of coal per year would allow 82,522,741 Indian people each year to have access to a regular and reliable supply of electricity.<sup>65</sup>

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<sup>63</sup> Based on a supercritical plant with 39% thermal efficiency using a middle grade Queensland black coal

<sup>64</sup> World Bank website, <http://data.worldbank.org/indicator/EG.USE.ELEC.KH.PC/countries>

<sup>65</sup> Note that this is an extremely conservative estimate. Using the current Indian consumption per capita figure 120 million tonnes would give a total of over 390 million Indians enjoying a stable supply of electricity per year. Even if a particular project does not make it to production or some or even all of its coal were to go to other markets the 82 million figure would stand with only 25 million tonnes of coal per annum at 684kWh per capita consumption.

## The Risk Posed by the Divestment Campaign

However, the potential for Australia to continue to enjoy the benefits of a strong and vibrant coal industry, and to play a role in helping India to build a safe, reliable and sustainable electricity supply capacity, is being put at risk by an international network of climate change activists, in co-operation with ‘the usual suspects’ in Australia, who loosely operate under the Divestment Campaign banner.

The divestment campaign is an international one and seeks to use public pressure and intimidation to force companies to drop so-called ‘immoral’ investments.

While this campaign has many faces (including the Greens, Market Forces and 350.org in Australia and Beyond Coal in the United States), its aim according to the Go Fossil Free website is for “institutional leaders to immediately freeze any new investment in fossil fuel companies, and divest from direct ownership.”<sup>66</sup>

Go Fossil Free ominously floats its future targets by highlighting that:

“[T]here are many more companies that contribute indirectly to climate change — the multinationals that build drilling equipment, lay oil pipelines, transport coal, and utilities that buy and trade electricity. But right now, we’re focused on these 200 (i.e. international coal, oil and gas) companies.”<sup>67</sup>

Unsurprisingly, the major domestic target of the movement at the present time is “Stopping the Galilee Coal mines of central Queensland”<sup>68</sup> where activists under the banner of 350.org.au are trying to coerce Australian and international banks into denying mining companies the funds to establish what would be a new, multi-decade and multi-billion dollar industry in that area.

The darker tactics of the wider movement were laid bare back in 2012 with the leaking of ‘*Stopping the Australian Coal Export Boom*,’ a document which set out a strategy to “disrupt and delay key projects and infrastructure while gradually eroding public and political support for the industry and continually building the power of the movement to win more.”<sup>69</sup>

In the document, the means by which the Stopping the Australian Coal Export Boom campaign sought to achieve its goals were by pledging to:

- 1) Disrupt and delay key infrastructure (i.e. legal and other challenges);
- 2) Constrain the space for mining (i.e. mass exclusion of land);
- 3) Increase investor risk (i.e. create financial uncertainty);
- 4) Increase costs;
- 5) Withdraw the social licence of the coal industry; and
- 6) Build a powerful movement (i.e. to “win larger victories over time”).

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<sup>66</sup> Go Fossil Free website, [gofossilfree.org/frequently-asked-questions](http://gofossilfree.org/frequently-asked-questions)

<sup>67</sup> Ibid.

<sup>68</sup> 350.org website, [350.org.au/campaigns/galilee-coal/](http://350.org.au/campaigns/galilee-coal/)

<sup>69</sup> [www.abc.net.au/mediawatch/transcripts/1206\\_greenpeace.pdf](http://www.abc.net.au/mediawatch/transcripts/1206_greenpeace.pdf)



The lengths to which the environmental movement is prepared to go in pursuit of its aims was also laid bare in a 2014 article in *The Monthly* about the purchase of the former Gunns woodchip mill by internet millionaire and environmentalist Graeme Wood and Kathmandu founder Jan Cameron<sup>70</sup> – a story that subsequently prompted a Tasmanian parliamentary enquiry.<sup>71</sup>

Mr Wood was also reported in the *Australian Financial Review* on 20 May 2015 as having helped to fund an Aboriginal group opposing the Galilee Basin projects<sup>72</sup> and was outed in 2011 as having made Australia's largest ever political donation – to the Greens.<sup>73</sup>

Even a passing glance at the Australian Greens' 2012 Policy Platform reveals their opposition to anything to do with mining, with this document alone:

- Calling for "legislation that recognises that mining is incompatible with all other land uses."
- Opposing "the establishment of new coal mines and the expansion of existing mines" and "the exploration for, and mining and export of, uranium" and "new coal seam, shale or tight gas developments."
- Wanting to ban mining activity "in residential areas, good quality agricultural land and terrestrial and marine nature conservation reserves, national parks, wilderness areas and other areas of high nature conservation value."<sup>74</sup>

During the March 2015 NSW State Election campaign, the Greens abandoned their 'nothing new' rhetoric, promising:

- An end to all coal exports by 2020;
- A ban on all new coal mines;
- A ban on all fossil fuel exploration;
- A phase out of existing coal mines (i.e. within three years); and
- Legislation to ensure no compensation is payable to coal mining and fossil fuel exploration companies.<sup>75</sup>

Clearly, while the warm and fuzzy public face of the divestment movement is earnest young university students standing in front of banks holding up hand-made protest signs, this public face masks a far darker, and more political, scorched earth agenda.

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<sup>70</sup> The Monthly website, [www.themonthly.com.au/issue/2014/july/1404136800/john-van-tiggelen/destruction-triabunna-mill-and-fall-tasmanias-woodchip](http://www.themonthly.com.au/issue/2014/july/1404136800/john-van-tiggelen/destruction-triabunna-mill-and-fall-tasmanias-woodchip)

<sup>71</sup> [www.parliament.tas.gov.au/ctee/House/HAComDev-Triabunna.htm](http://www.parliament.tas.gov.au/ctee/House/HAComDev-Triabunna.htm)

<sup>72</sup> [www.afr.com/news/politics/wotifcom-millionaire-graeme-wood-funds-aboriginal-anticoal-group-20150519-gh4umx?](http://www.afr.com/news/politics/wotifcom-millionaire-graeme-wood-funds-aboriginal-anticoal-group-20150519-gh4umx?)

<sup>73</sup> [www.theage.com.au/national/web-millionaire-bankrolled-greens-20110107-19iw9.html](http://www.theage.com.au/national/web-millionaire-bankrolled-greens-20110107-19iw9.html)

<sup>74</sup> Australian Greens website, [greens.org.au/policies/natural-resources-forests-mining-fisheries](http://greens.org.au/policies/natural-resources-forests-mining-fisheries)

<sup>75</sup> NSW Greens website, [nsw.greens.org.au/sites/nsw.greens.org.au/files/Phase%20out%20coal%20policy.pdf](http://nsw.greens.org.au/sites/nsw.greens.org.au/files/Phase%20out%20coal%20policy.pdf)

## A Moral Reason to Supply Coal to India

According to the Department of Foreign Affairs and Trade <sup>76</sup> Australia's 2013-14 coal exports to India were worth just under \$5 billion per year with thermal coal a small, but growing, component.

Australia has clearly established a benchmark upon which to make an even greater contribution to Indian electricity security.

While coal prices, like that of any other commodity, will rise and fall from time to time, and there are many international competitors, the interest of Indian companies in Australia demonstrates that there is clearly a strong demand for Australian coal.

If the GVK Hancock and the Adani projects in Queensland alone can be brought to production, Australia has the potential to increase its supply of thermal coal to India by at least 120 million tonnes per year.

An extra 120 million tonnes per year would allow over 82 million people in India to have access to a regular and reliable annual supply of electricity. This figure could easily be supplemented by Australian coal from other locations or by additional production.<sup>77</sup>

These and other coal export projects in the Galilee Basin will generate thousands of jobs in mine construction and operation, and provide tens of billions of dollars of export revenue for Australia.

These projects will also drive the development of new rail, road and port infrastructure in Australia's north.

While solar and wind power may very well have a place in future world energy supply, not even the most earnest activist can change the laws of physics and force solar power to work at night or in cloudy weather, wind power to work in calm conditions, or hydroelectric power to work in times of drought or in areas without large rivers or mountains.

In the absence of large scale battery power, the chances of renewables replacing fossil fuels in the near future are unlikely.

While there will be the occasional good days for wind and solar, and while we can be sure that renewable energy activists will pump up their occasional success,<sup>78 79</sup> electricity grids in industrial nations will continue to depend on fossil fuels, with those countries that have made significant investment in renewable systems still needing fossil fuels to back them up.

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<sup>76</sup> Composition of Trade Australia 2013-14, Department of Foreign Affairs and Trade, December 2014

<sup>77</sup> See also footnote 65

<sup>78</sup> [www.smh.com.au/comment/green-power-success-stories-take-the-wind-out-of-tony-abbott-20150526-gh9bd6](http://www.smh.com.au/comment/green-power-success-stories-take-the-wind-out-of-tony-abbott-20150526-gh9bd6)

<sup>79</sup> [www.abc.net.au/environment/articles/2014/06/26/4033893.htm](http://www.abc.net.au/environment/articles/2014/06/26/4033893.htm)

Even Germany, the current poster child for renewable energy, facing the dual problem of unreliable renewable energy facilities and closure of its nuclear facilities, is currently building new coal fired power stations.

Two metrics that don't currently get a lot of attention in the energy debate are system reliability, and the morality of ensuring that people in the developing world have the same opportunities for a secure and rewarding life that we enjoy in nations like Australia.

Alex Epstein has written of the role that fossil fuels have played in making the world a better place and improving life expectancy and living standards, by powering the machines that give people more control over their own environment.<sup>80</sup>

The things we take for granted in Australia – that our household heating and cooling works when we need it, that our meat and milk is properly refrigerated, that our stoves and ovens don't release polluted smoke into our kitchen, and even that our televisions and lights are always available for use and mobiles can always be charged – are just not the reality in many other countries.

It is just as important to people in India and the developing world as it is to people in Australia that their electricity system is reliable and affordable.

The morality of seeking to deny other countries the privileges that we enjoy here, when we have the ability to help out, is deeply suspect.

Electricity networks exist as a means to provide people with reliable and affordable power.

Coal-fired power stations typically have lower operations and maintenance costs and last at least twice as long as solar and wind farms.

However while the Indian Government, like the Chinese Government, is desperately trying to pursue policies to provide a higher standard of living for its people, coal activists in Australia, as they have done with increasing success in the United States, are working to choke off their supply of coal.

The danger of the current anti-fossil fuel campaign, given its underlying ideological motivation, is that this systemic need for electricity network reliability and affordability, will be permanently compromised.

If the activists' war against coal were to be won, then gas and oil companies, and the people whose lives depend on them, will be the next main target.

Australians should be standing up to this political intimidation, actively considering how we would like being denied energy reliability, and support the right of Australian mining companies to sell their product (and continue to pay significant taxes for doing so) thereby improving the lives of millions of people in developing nations.

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<sup>80</sup> "The Moral Case for Fossil Fuels", Alex Epstein, 2014