THE ANTI-DEVELOPMENT BANK

The World Bank's regressive energy policies

Rupert Darwall

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Foreword

By Professor Deepal Lal

The best way for me to introduce this paper is by outlining how the World Bank (WB) turned into the Anti-Development Bank, as suggested by its title.

In the mid-to-late 1980s, I was the research administrator at the WB. Towards the end of my tenure, during the annual meetings between the bank and the International Monetary Fund, green activists were abseiling down the bank's Washington headquarters protesting against its purportedly anti-green activities. This pressure seemed an emergent threat to the bank's mission to alleviate poverty through efficient growth and so, with the support of the Vice President for Economics and Research, Anne Krueger, I responded by proposing a *World Development Report* on the environment, now the WB's flagship publication.

The report was published in 1993, well after I had left the bank. The authors included two of my former colleagues at University College London, Wilfrid Beckerman and David Pearce. It was a balanced report which, as the WB's president Lewis Preston said in his foreword, argued for

> …a careful assessment of the costs and benefits of alternative policies, taking account of uncertainties and irreversibilities that maybe associated with ecological processes. Some would prefer a more absolute approach to protection, but for policy-makers with scarce resources seeking to raise the well-being of their citizens in an environmentally responsible manner, it is essential that tradeoffs be clarified in a rational manner and cost-effective policies designed.[1]

This paper shows in detail how this injunction is no longer adhered to by the current WB President Dr Jim Young Kim. He has overruled the cost–benefit estimates of the superiority of coal-based over solar- and wind-based power generation produced by his own economic staff, justifying this by reference to a wish to cut global emissions of greenhouse gases. In 2013 the bank adopted anti-coal funding policies, which, as the paper shows, prioritises the green environmental agenda over its core developmental mission of poverty reduction.

How has this come to pass? The turning point came when, in the mid 1990s, with the opening up of world capital markets to most developing countries outside Africa, the bank had three choices, as noted by Anne Krueger:[2]

- to downsize and concentrate only on the countries that are truly poor, and phase out activities in middle income countries
- continue to operate in all countries, focusing on the 'soft issues' of development, such as the environment, women's rights, labour rights and the encouragement of NGOs
- to shut down.

The new President James Wolfensohn chose the second option. I argued in my *Reviving the Invisible Hand*[3] for the third. The arguments of this paper provide further support for my position.

I commend this paper to all those who are sincerely concerned with alleviating poverty – particularly in Africa, since China and India no longer need World Bank money or advice – and who are not seduced by the siren voices of the eco-fundamentalists.[4]

Deepak Lal is a British development economist of Indian origin who has held academic posts at Oxford, University College London and the University of California. He was a member of the Indian Foreign Service and a former Research Administrator at the World Bank. He is currently James S. Coleman Professor of International Development Studies at UCLA. He is a member of the GWPF's Academic Advisory Council.

Notes

1. World Bank (1993) *World Development Report 1992: Development and the environment*. World Bank Group, p. iii. http://documents.worldbank.org/curated/en/995041468323374213/World-development-report-1992-development-and-the-environment.
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3. D. Lal (2006) *Reviving the Invisible Hand*, Princeton University Press, pp. 147–149.
4. D. Lal (1995) Eco-fundamentalism. *International Affairs*; 71(3): 515–528.

About the author

Rupert Darwall is a strategy consultant and policy analyst. After reading economics and history at Cambridge University, he worked in the City of London as an investment analyst and in corporate finance before becoming a special adviser to the then Chancellor of the Exchequer, Norman Lamont. He has written extensively for publications on both sides of the Atlantic, including the *Wall Street Journal*, *National Review*, the *Daily Telegraph* and *The Spectator* and is the author of the widely-praised *The Age of Global Warming: A History* (2013) and *Green Tyranny: Exposing the Totalitarian Roots of the Climate Industrial Complex* (2017). He has written reports on UK energy policy for Reform ('How to Run a Country: Energy Policy and the Return of the State', Nov 2014) and the Centre for Policy Studies ('Central Planning with Market Features: How renewable subsidies destroyed the UK electricity market', March 2015) as well as an analysis for the Centre for Policy Studies on reforming tax credits ('A Better Way to Help the Low Paid: US lessons for the UK tax credit system', 2006) and on energy and industrial policy for Civitas ('Going Through the Motions: The industrial strategy green paper').

Summary

Providing universal access to cheap, reliable grid power constitutes the single most powerful boost to economic development and transforming the quality of life of the world's poor. The World Bank's stated mission is to alleviate poverty. It aims to do this through the provision of intelligent finance that boosts developing nations' economic and social development.

Under its president, Dr Jim Yong Kim, appointed by President Obama in 2012, the World Bank abandoned its core development mission. It did this by prioritising environmental sustainability over poverty reduction. In 2013, it adopted anti-coal funding policies, effectively blocking investment in what, for many developing nations, is likely to be the cheapest and most reliable generating capacity. The World Bank's near categoric refusal to finance coal-fired capacity is worsened by it favouring high-cost, unreliable wind and solar technologies. This amounts to an inhumane and senseless attempt to try to save the planet on the backs of the world's poor.

In rich countries, wind and solar are pushing up costs, wrecking incentives to invest in power station capacity needed to keep the lights on and weakening the security of the grid. These countries have already built out their grids. They have the resources to throw at the problems created by intermittent wind and solar. Less well-off countries do not. It is irresponsible for a multilateral development bank to push high-cost, operationally defective technologies onto nations where they will retard development and make electrification vastly more expensive.

Asia, excluding China, and Africa currently derive the bulk of their electricity from hydrocarbons. Wind and solar contributed negligible amounts of power (respectively 1.8% and 0.9%) in 2014. However, introducing large amounts of weather-dependent capacity on immature, fragile electricity grids will damage them and require extra investment to stabilise them. The selling of electricity below the cost of producing it – endemic in many developing nations – can only be worsened with high-fixed-cost, zero marginal cost generation, making it even more challenging to attract investment in the capacity needed to keep the lights on.

The World Bank justifies their policy by reference to the wish to cut global emissions of greenhouse gases. But poor people in developing countries consume very little power. Their per capita consumption of coal can be measured in kilograms and pounds (in the case of Bangladesh, in ounces). By its own admission, the World Bank acknowledges that the incremental greenhouse gas emissions from extending access to the grid to the world's poor 'will not make a material difference'. That being the case, the World Bank's anti-coal/pro-renewable policy is morally and economically indefensible'. For those worried by the prospect of anthropogenic global warming, bringing electricity to the energy-starved in the world's developing nations is genuinely not a problem.

The World Bank's own analysis highlights the extra costs caused by the variabil-

ity of wind and solar output and the extra grid infrastructure they need. In spite of this analysis, the World Bank decided to form a 'unique partnership' with the then UN Secretary-General Ban Ki-moon in the 2011 Sustainable Energy For All initiative (SE4ALL). This sets an arbitrary target of doubling renewables' contribution to the global energy mix by 2030. In doing so, the World Bank made a colossal blunder. According to Ban's own numbers, universal energy access has a price tag of $50 billion a year. Renewable energy costs $500 billion a year and there is a further $500 billion a year for energy efficiency. To any objective analyst, these numbers should have settled the matter.

The World Bank's betrayal of its core development mission cannot be blamed exclusively on pressure from its shareholders and clients. In supporting Mr Ban's aim of doubling renewables' share in the energy mix, the World Bank went much further than the UN General Assembly, which in a March 2013 resolution noted that renewable technologies had yet to achieve economic viability. The 2030 Sustainable Development Goals, agreed in September 2015, also watered down SE4ALL's renewable energy target. When the governments of the world finalised the text of the December 2015 Paris Agreement, they removed references to renewable energy from the draft circulated by the French conference president.

Leaders in the developing world blast the developed nations' apparent hypocrisy in seeking to deny them the energy that made the West rich. Using some forthright words on the World Bank and the IMF, Nigeria's finance minister, Mrs Kemi Adeosun, said in October 2016:

> We in Nigeria have coal but we have a power problem, yet we've been blocked because it is not green, there is some hypocrisy because we have the entire western industrialization built on coal energy, that is the competitive advantage that they have been using, now Africa wants to use coal and suddenly they are saying oh! You have to use solar and the wind (renewable energy) which are the most expensive, after polluting the environment for hundreds of years and now that Africa wants to use coal they deny us.[1]

The United States is now seeking to rein in the World Bank so it focuses on its mission to alleviate world poverty, especially where the poor are very numerous. It wants countries to access and use fossil fuels more efficiently. To maximise development potential and poverty reduction, shareholders should go further and insist the World Bank withdraw from the anti-development SE4ALL initiative, abandon renewable energy targets and ensure that any renewable energy projects that it supports do not undermine the economics of the grid and increase costs.

Game of Thrones reminded me very much of the World Bank – people turning on each other, the different factions. The World Bank was a very good idea when it was set up, no question about it, because developing countries didn't have access to markets. When [James] Wolfensohn came, and he then converted it to essentially a gigantic NGO. I think it has to be shut down. It has no role any more.

Deepak Lal[2]

The world must acknowledge that India's demand for commercial energy is surging. Given the country's many technical, economic, and political constraints, for the next few decades this demand will be met by fossil fuels.

Charles Ebinger, Director of the Energy Security Initiative at the Brookings Institution[3]

Achieving universal access to modern energy is critical to Africa's transformation. As our report clearly states, the costs of transitioning to renewables may be prohibitively high in the short term – especially for countries that use their sizeable endowments of coal and other fossil fuels to generate energy. What we are advocating is that African governments harness every available energy option, so that no one is left behind. Each country needs to decide on the most cost-effective, technologically efficient energy mix that works best for its own needs.

Kofi Annan, launching the Africa Progress Panel report *Lights, Power Action: Electrifying Africa*[4]

1 Energy and development

On 31 July 2012, the northern half of India experienced the world's largest blackout. 670 million Indians were left without lights, air conditioning and refrigeration – more than the number of people living in the US, Canada, Mexico and Japan combined. Roads were gridlocked; New Delhi's metro shut down; hundreds of trains stalled in the sweltering heat; even crematorium furnaces shut down, leaving bodies half burned. 'There is no water, no idea when electricity will return', a housewife from the eastern city of Patna told the *New York Times*.[5]

Universal access to cheap, reliable electrical power is a defining feature of modernity. In the West, it distinguished the 19th and 20th centuries. For the emerging economies of the 21st century, reliable power is essential for economic development. As the World Bank noted in 2013, there are 1.2 billion people without access to electricity and 2.8 billion are without modern cooking facilities. 'Economic growth, which is essential for poverty reduction, is not possible without adequate energy', the World Bank states.[6]

- In surveys of tens of thousands of firms, more cited electricity as a major constraint to doing business than any other factor in nearly four out of every ten client countries of the World Bank Group.[7]
- Household air pollution from solid fuels is estimated to have killed 3.5 million people in 2010 and to have caused many more cases of respiratory, cardiovascular and other illnesses.[8]
- Of the 125 developing countries that reported on power outages in the Enterprise Surveys, one in three experienced at least 20 hours of outages a month.[9]
- In India, self-supply of power, often through diesel generators, is estimated to account for almost 17% of installed capacity.[10]
- Across sub-Saharan Africa, some 30 countries suffer from regular blackouts and brownouts (reductions in voltage that dim lights and risks damage to electrical appliances), with associated economic losses estimated in some cases in excess of five percentage points of gross domestic product (GDP).[11]
- Many countries in sub-Saharan Africa face electricity costs as high as US$0.20–0.50/kWh compared to a global average of closer to US$0.10/kWh.[12]

High energy costs, the World Bank says, raise the prices of goods and services for everyone and render businesses in tradable sectors uncompetitive. 'Stories abound of households struggling to pay for heating or reverting to traditional biomass amidst rising fuel prices'.[13]

The foregoing amounts to a compelling economic, social and moral case for the World Bank to target development funding at investment in the lowest-cost path to universal access to cheap, reliable electricity. The World Bank acknowledges that even

though the costs of onshore wind and solar costs have fallen, 'both are still costlier than other technologies for similar supply characteristics' – a formulation that glosses over the markedly inferior supply characteristics of weather-dependent energy generation.[14]

The World Bank should therefore support the lowest-cost path to electrification as a matter of principle. However, it does not; it will only help client countries find 'affordable' (that is, more expensive) alternatives to coal power. For example, support for greenfield coal generation will only be provided in:

> …rare circumstances. Considerations such as meeting basic energy needs in countries with no feasible alternatives to coal and a lack of financing for coal power would define such rare cases.[15]

To date, the only coal project considered by the World Bank since adoption of these criteria in 2013 is a 600-MW lignite power station in Kosovo, for which it is providing $40m that is deemed crucial to the underwriting of the $2 billion financing cost of the project. The project was the very last coal plant in the World Bank's pipeline; the Kosovo government has spent more than a decade trying to build it.[16]

Instead the World Bank is prioritising green energy. 'Climate change is a threat to the core mission of the World Bank Group', its 2016 Climate Change Action Plan states.[17] It aims to use its financing to shape national investment plans and aims to add 20 GW of renewable energy by 2020 and to 'green' power grids to enable the addition of a further 10 GW of wind and solar.[18] Stating that renewable energy is critical to stabilising climate change, the Climate Change Action Plan goes on to talk of the 'significant decreases in the price of renewable energy'.[19] Yet three years earlier, the World Bank was arguing that levelised cost comparisons, customarily used to flatter wind and solar, ignore the 'variation patterns' of intermittent renewables:

> Ensuring supply adequacy with solar and wind power would require significant regional diversification and large-scale transmission network expansion to connect these sources, a challenge even in developed countries.[20]

There has been no technological breakthrough in the intervening period that has solved the inherent unreliability and cost disadvantages of wind and solar. Rather, what changed was the World Bank's decision to subordinate the needs of today's poor to green ideology. As the earlier paper tacitly concedes, there is a tension between improving equity within generations (poverty) and across generations (sustainability).[21] The bank's ability to act in a remotely objective manner is compromised by its aim to have a more active role in global advocacy, as highlighted by its call for all countries to 'seek opportunities for adoption of renewable energy'.[22]

The World Bank says it acknowledges 'the global challenge of balancing energy for development with its impact on climate change'.[23] But it misstates the dilemma: it is not a challenge; it is a choice. Forcing decarbonisation on societies that have yet to

carbonise means less development. Resources are not costless. More sustainability means less poverty reduction.

The World Bank's mission has been subverted by green ideologues who assert that a low-carbon world benefits the world's poor but fail to acknowledge that making energy much more costly increases poverty. The World Bank tags itself as 'working for a world free of poverty'. Its prioritisation of renewable investment and its embargo on coal investments demonstrate this is no longer the case. In making its choice between development and sustainability, the World Bank has decided it is going to try and save the planet on the backs of the poor.

The aim of this paper is to show how this has come about and what to do about it:

- Section 2 compares the energy consumption of India and the other countries of the Indian sub-continent with sub-Saharan Africa. Although they are on different growth trajectories, this shows the similarity of their levels of energy consumption, and the gap between them and China and the West.
- Drawing on an MIT report cited by the IMF, Section 3 reviews the evidence of how wind and solar damage grid reliability and increase grid costs. Wealthy countries suffer indigestion from over-investment in wind and solar, but the impact on vulnerable developing nations is toxic.
- Section 4 reviews some of the multi-billion dollar renewable energy projects backed by the World Bank, despite the extra developmental burden they represent.
- Section 5 examines the disconnect between the World Bank's recognition of the shortcomings of wind and solar and its overall policy stance, which is subordinated to the UN's goal of doubling the share of renewable energy in the global energy mix by 2030.
- Section 6 shows that this goal was foisted on the World Bank by Ban Ki-moon, the previous UN Secretary-General, when Mr Ban invited World Bank president Dr Kim to be co-chairman of the advisory board of the UN's 'Sustainable Energy For All' (SE4ALL) initiative.
- As examined in Section 7, low-carbon energy is extremely materials intensive. The resource inefficiency of renewables means the huge wind and solar build-out has major implications for the global supply and prices of raw materials. The resource-intensity of renewables also poses major disposal challenges.
- Section 8 summarises the development case against wind and solar energy and notes the realism of the UN General Assembly's position.
- Section 9 places the World Bank's anti-coal, pro-renewable policies in a strategic context. Significantly, China's New Silk Fund and the BRICS New Development

Bank are far less antagonistic towards coal than the World Bank in Washington, DC.

- The World Bank tags itself as 'working for a world free of poverty'. By prioritising renewable energy over the lowest cost path to universal access, it is betraying what it was set up to do. Section 10 outlines the steps the World Bank should take to revert to its core development mission.

2 Coal and energy consumption in perspective

The world's poor consume little electricity. In 2014, the world generated 23,844 TWh of electricity. Of this total, 4,521 TWh (19.0%) were generated in Asia Pacific excluding China, i.e. the most populous region of the world, and only 764.9 TWh (3.2%) were generated in Africa (see Table 1).[24]

Table 1: Global electricity generation in 2014.

Region	TWh	%
North America	5,315	22.3
South and Central America	1,277	5.4
Europe and Eurasia	5,269	22.1
Middle East	1,047	4.4
Africa	765	3.2
China	5,650	23.7
Asia-Pacific (ex-China)	4,521	19.0
Total	23,844	100.0

Source: *BP Statistical Review of World Energy 2017*, p. 46.

In both regions, thermal power stations generated the bulk of electricity. In 2014, Asia excluding China generated 53% of its electricity from coal and a further 22% from gas, with hydro-electricity the next largest contributor, at 12%. In Africa, the ranking is reversed: 37% of the continent's electricity was generated from gas and 34% from coal, with hydro contributing 17%. As shown in Table 2, in both regions, wind and solar made negligible contributions, totalling 1.8% in Asia-Pacific (ex-China) and 0.9% in Africa.

Often twinned as the world's two largest emerging economies, India and China are at very different stages of economic development in terms of energy consumption. In 2014, per capita electricity consumption in China was 3,937 kWh, nearly five times higher than India's 806 kWh. As shown in Figure 1, India's 2014 per capita electricity consumption is closer to that of North Korea than to China's. Whilst EU per

Table 2: Share of total electricity generated by wind and solar (2014).

	Asia-Pacific ex-China	Africa
Wind	1.5	0.7
Solar PV	0.3	0.2
Total	1.8	0.9

Source: IEA Statistics Portal.

capita electricity consumption is 50% higher than China's, South Korea's per capita electricity consumption is 78% higher than the EU's.[25]

However, the other countries of the Indian sub-continent in 2014 consumed less electricity per person than North Korea, as did sub-Saharan Africa (excluding South Africa). These can all be described as 'energy-starved' economies. This distinction needs to be made by those tabling energy policies so those countries where low energy consumption is an indicator of lack of development are not trapped by policies that suppress energy consumption.

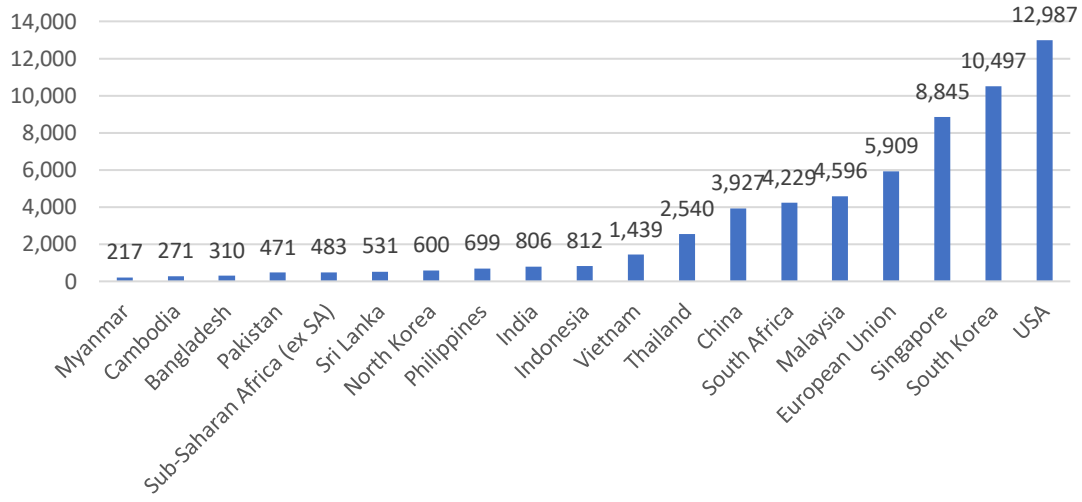

Figure 1: Per capita electricity consumption in 2014.

(kWh). Sources: *BP Statistical Review of World Energy* June 2015, p. 33; *IEA Atlas of Energy* portal; World Bank population data portal.

The nature of energy poverty can be seen from Figure 2, which compares coal consumption for electricity production for India, Pakistan, Bangladesh and other selected countries (data is more limited than for overall electricity consumption). In 2014, China consumed 1.125 tonnes of hard coal (1.24 US tons) per person in its power stations, just over four times more per person than India (0.27 tonnes, 0.30 US tons). Meanwhile, Pakistan consumed 1.2 kg (2.6 lbs) of hard coal per person and Bangladesh consumed 300 g (10.5 oz) of coal per person.[26]

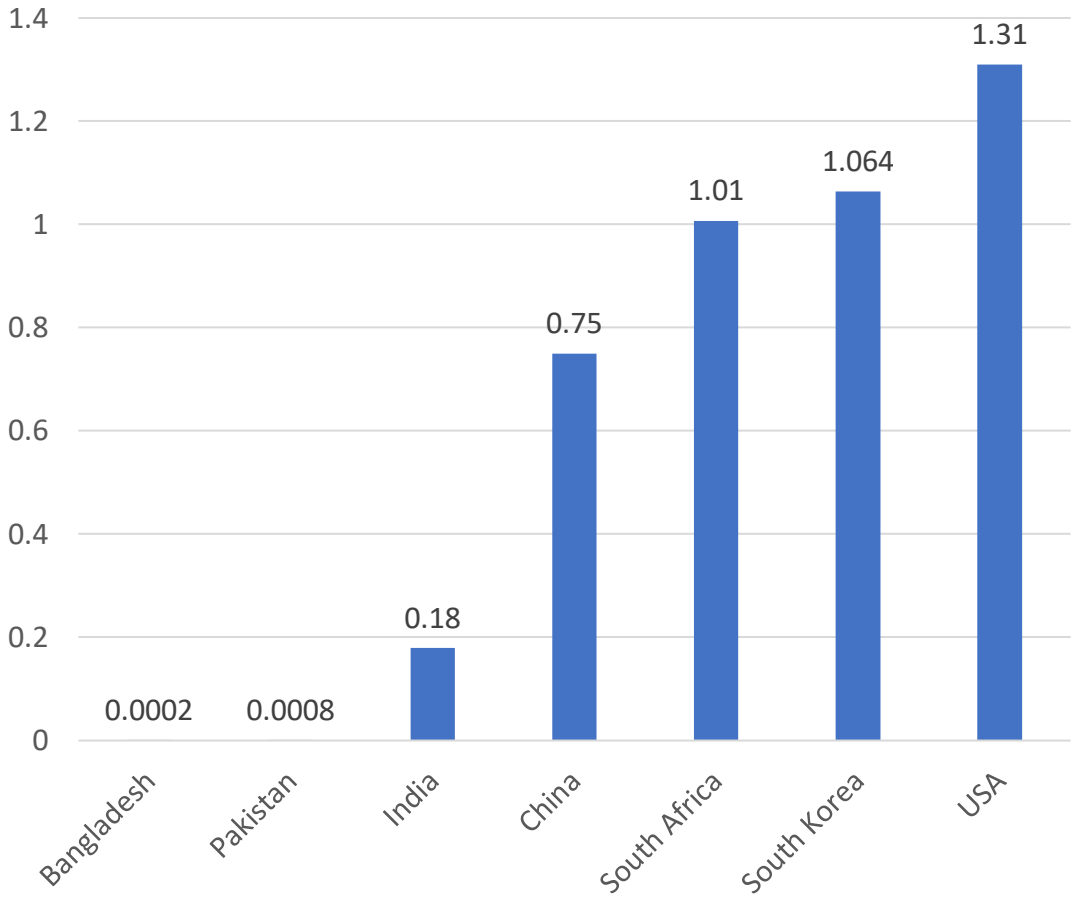

Figure 2: Coal consumption for electricity production per capita, 2014

(Tonnes of oil equivalent). Source: *BP Statistical Review of World Energy* June 2015, p. 33; *IEA Atlas of Energy* portal; World Bank population data portal.

The charts also show the relatively high level of South Africa's per capita electricity consumption. Owing to its past, South Africa has some economic features of a high-income country. Ninety percent of its electricity is generated from coal and it has coal reserves estimated at 66.7 billion tons.[27] Nonetheless, in 2014 *The Economist*

reported that South Africans were experiencing rolling blackouts due to maintenance backlogs and delays to completion of the 4,674 MW Medupi coal-fired power station in Limpopo province. According to President Zuma, South Africa's energy system had been built to funnel power to white homes, arguing that 'energy was structured racially to serve a particular race, not the majority'.[28]

South Africa's energy problems are ones the rest of Africa would be fortunate to have. In 2014, South Africa accounted for 90.7% of Africa's coal consumption. Excluding South Africa, the rest of the continent consumed 13.8 million tonnes (15.2 m US tons) of coal. With a population of approximately 1,150 million, this works out at an average of 12 kg (26.5 lbs) of coal per head a year, less than one twentieth the per capita amount of coal used in India's power stations (270 kg per person) a year.

Africa's rapid urbanisation is putting additional strain on its energy infrastructure. With a population of over 20 million, Lagos has overtaken Cairo as Africa's largest city. As the *New York Times* reported in 2015, Nigeria's electrical grid churns out so little power that sub-Saharan Africa's largest economy runs mostly on private generators.[29] Nigeria's National Electric Power Authority (NEPA) is nicknamed 'Never Expect Power Always, Please Light a Candle'. In Lagos, power cuts occur daily and residents rely on mini-generators, rechargeable torches and the lights from their mobile phones. Nigeria's mobile phone company MTN, with 62 million subscribers, spends 70% of its operating expenditure on diesel to keep its network powered up, demonstrating how having an unreliable grid raises costs throughout the economy.[30]

In his first post 9/11 speech, Tony Blair famously described the state of Africa as 'a scar on the conscience of the world'.[31] After leaving office, Blair established the Africa Governance Initiative. In 2015, he explained why his foundation was making electricity a major focus of its activities and how access to electricity was 'the single most important precondition for a country's success'.[32] As well as backing solar projects in Rwanda, Blair's foundation works closely with President Obama's Power Africa initiative, launched in 2013, which also promotes a host of renewable energy projects.[33] To date, progress has been slow. Power Africa is a 'well-intentioned effort with a lot of smart people', according to a senior General Electric executive. 'But if you look today at the number of megawatts that are actually on the grid directly related to the Power Africa initiative, it is very little'.[34]

Although the Power Africa initiative also backs oil and gas, what for many African countries would be the lowest-cost path to ubiquitous electrical power – coal – is rejected. Yet the impact on global coal use and on greenhouse gas emissions if energy-starved countries consumed more coal would be negligible. In 2014, India's consumption of coal for the power sector amounted to 6.1% of global demand.

Doubling India's power consumption from its 2014 level would be the equivalent to five and a half years' historic growth in Chinese coal demand. South Africa could triple its demand for coal-fired power and it would be the equivalent of two and a half

years of China's historic growth. As for the rest of Africa, its coal consumption could increase tenfold and it would only be the equivalent of two and a quarter years of recent Chinese growth. Those who are worried about anthropogenic global warming must understand that enabling Africans to have more coal-fired electricity is genuinely not a problem.

Leaders in the developing world recognise the realities of the energy requirements of their development ambitions. Increasingly they voice frustration at pressure from the West to bar them from having the cheap energy that powered the Industrial Revolution. Moreover, some of the World Bank's clients are expressing their opposition to its anti-coal stance (Table 3).

Table 3: The West and coal: Comments from Nigeria, India and Bangladesh

Nigeria: Kemi Adeosun, Minister of Finance

'We want to build a coal power plant because we are a country blessed with coal, yet we have a power problem. So it doesn't take a genius to work out that it will make sense to build a coal power plant.

'However, we are being blocked from doing so, because it is not green. This is not fair because they have an entire western industrialisation that was built on coal-fired energy.'

'This is the competitive advantage that was used to develop Europe, yet now that Nigeria wants to do it, they say it's not green, so we cannot'.[35]

India – Piyush Goyal, Minister of Railways and Coal

'We will be expanding our coal-based thermal power. That is our baseload power. All renewables are intermittent. Renewables have not provided baseload power for anyone in the world. After all, solar works when the sun is shining, wind works when the wind is blowing, hydro works when there is water in the rivers. You must have coal.

'The people of India want a certain way of life. They want jobs for their children, schools and colleges, hospitals with uninterrupted power. This needs a very large amount of baseload power and this can only come from coal.

'I do wish people would reflect on the justice of the situation. Europe and America and Australia have messed up the world and the planet, and they're saying to us, we're sorry but you Indians can only have power for eight hours a day. The rest of the time you must live in darkness'.[36]

Bangladesh: an open letter to Al Gore from Annisul Huq, mayor of Dhaka, having watched a session at Davos between Gore and the prime minister of Bangladesh, Sheikh Hasina, criticising the Rampal coal-fired station project

> 'While the biggest emitters of carbon happen to be the developed world, quite ironically, Bangladesh, with a coal-based power plant in Rampal, has come under fire from a celebrity like you, oblivious to the dire straits that we are in.
>
> 'The answer to sustainable development must be based on fairness and objectivity. Considering the position of Bangladesh as a low emitter of carbon, there should not be any doubt about Rampal being the answer to Bangladesh's energy needs'.[37]

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3 Intermittent energy and the grid

By contrast with gas and coal, wind and solar have inherent cost and reliability problems. The shortcomings of weather-dependent sources of electricity are known to both the World Bank and to the IMF. A May 2017 IMF working paper notes objections to solar and wind on the basis of their capital costs and their intermittency, going on to cite a 318-page MIT study on solar energy that examined the economics of solar electricity generation in the USA (see Table 4).[38] Although the MIT report suggested that solar could have a very large role to play in meeting the challenge of global warming – these sorts of studies tend to say that – it then qualified that conclusion by stating that solar had to overcome several major hurdles with respect to cost, the availability of technology and materials to support large-scale expansion, and successful integration into existing electric systems:

> Without government policies to help overcome these challenges, it is likely to supply only a small percentage of world electricity needs and that the cost of reducing carbon emissions will be higher than it could be.[39]

As yet, wind and solar are not economically viable at scale, a point that, as we shall see, has been recognised by the UN General Assembly. It might make sense for developed countries to bear the learning costs of large-scale renewable deployment and run the risk of a huge policy failure. But it is irresponsible for multilateral aid providers to induce vulnerable countries to stake their development on energy technologies that are technologically mature but still not economically viable and which remain manifestly inferior in both cost and performance to gas and coal.

Table 4: Solar energy issues identified in the MIT solar energy study (2015)

Issue	Ref	Developmental learning
Cost per peak watt 80% higher for residential than utility-scale PV plant	p. xv	Small-scale PV only makes sense if no prospect of being connected to the grid
Difficulty in interpreting reported declines in PV prices which have been driven down by Chinese overproduction, ensuing bankruptcies and bail-outs by Chinese authorities, leading to US-China dispute over trade practices	p. 80	Reported declines in PV prices are not a sound basis for assessing the competitiveness of solar against other generating technologies
Cost of PV modules now a smaller proportion of PV installation costs, utility-scale non-module costs rising from 41% in 2008 to 64% in 2014	p. 82	
Reducing the cost of PV modules by 50% only reduces estimated plant-level costs for utility-scale projects by 15%	p. 118	
Value factor of PV output declines dramatically with higher penetration	p. 106	The economics of solar PV deteriorate with scale
Even on a levelised cost basis (which ignores the systems cost of intermittency), natural gas is 36.6% cheaper than PV in Southern California. Even with a $38/tonne carbon tax, gas is 23% cheaper	p. 109	If there is no economic case for grid-scale PV deployment in California, why are aid agencies pushing PV on developing nations?
Residential solar and net metering involve cost shifting, producing political conflict	p. xviii	Mispricing of electricity endemic in many developing nations, constituting a major barrier to investment in grid infrastructure and generating capacity which wind and solar energy worsens
Research needed to design pricing systems to better allocate network costs to the entities that cause them	p. xviii	

Issue	Ref	Developmental learning
At high levels of PV penetration, production subsidies lead to short-term inefficiencies in system operation and changes in generating mix.	p. 197	Wind and solar at scale makes provision of non-intermittent power more costly and raises electricity prices
As cycling of thermal plant intensifies in response to more solar, the need to recover increased costs will push up electricity prices.	p. 181	
Without pump storage capacity, going beyond moderate levels of solar penetration with summer peak loads does not reduce the system's overall capacity requirements	p. 178	Adding wind and solar meant effectively paying twice over for generating capacity – once for the wind and solar and again for the thermal generating capacity
The larger the solar PV presence, the larger the system's operating reserve requirements	p. 183	
More solar results in sharper, narrower demand and prices in excess of $300/MWh	p. 183	How are developing nations meant to solve the problems created by the extreme price volatility caused by wind and solar when developed nations have not?
In a system like Texas, when PV capacity reaches 35 GW, the number of hours with zero prices reaches 2927 hours (equivalent to 122 days a year)	p. 196	

Any fair-minded reading of the MIT solar study reveals the inherent problems caused by weather-dependent technologies and the significant and escalating economic penalties they incur. These are problems that developed countries, as yet, don't know how to solve without increasing already high costs still further.

The inherent problems caused by intermittent renewables came to the fore with last year's South Australian blackout. Whatever the precise trigger of the 28 September 2016 blackout, removing coal-fired power stations and having more wind and solar made South Australia's grid more fragile. In its report on the incident, the Australian Energy Market Operator (AEMO) noted the reduction in grid reliability provided by the synchronous inertia from thermal power stations:

> …a synchronous generator responds to disturbances by virtue of its physical characteristics (size, mass, rotational inertia) and by the action of its automatic

> voltage regulator. This provides fault ride-through capability and network voltage support.[40]

Having less synchronous generation reduces the robustness of the grid and its ability to cope with demand surges or sudden reductions in supply:

> The generation mix now includes increased amounts of non-synchronous and inverter-connected plant. This generation has different characteristics to conventional plant, and uses active control systems, or complex software, to ride through disturbances. With less synchronous generation online, the system is experiencing more periods with low inertia and low available fault levels, so AEMO is working with industry on ways to use the capability of these new types of power generation to build resilience to extreme events.[41]

An independent review chaired by the Australian government's chief scientist, Dr Alan Finkel, highlighted the need for thermal capacity on the grid when there are large amounts of wind and solar:

> The past few years has seen the retirement of significant coal-fired capacity from the NEM [National Electricity Market], while there has been no corresponding reinvestment in new dispatchable capacity…New variable renewable electricity (VRE) generation is being incentivised and brought forward by the Renewable Energy Target…, but other investment has been lacking.
>
> This is a problem because, at present, a certain amount of dispatchable capacity is required to maintain system reliability. Capacity is dispatchable if it can respond to electricity demand on call. Dispatchable capacity can be provided by a range of sources, including dispatchable generation (for example, coal, gas, hydro, solar thermal, and biomass), interconnectors, storage and demand response mechanisms. VRE generators, like wind and solar photovoltaic, have variable generation and so require complementary dispatchable capacity to maintain system reliability.
>
> If new dispatchable capacity is not brought forward soon, the reliability of the NEM will be compromised.[42]

Everything has a price. The need for shadow thermal capacity, to cover for the intermittency of wind and solar and provide the grid reliability that renewables cannot, has clear cost implications. According to a recent analysis by energy consultants CME, South Australia now has the world's most expensive electricity.[43] This has economy-wide impacts. As regulatory economist Alan Moran has written, the transition to intermittent generation 'translates into a deindustrialization process with profound consequences for all our living standards'.[44]

This has profound implications for developing countries struggling to raise their populations out of poverty and to find the energy policies best suited to their development needs. As a very rough approximation, every dollar of development aid that goes to fund variable renewable energy investment requires a second dollar to compensate for the damage it will do to the economics of the grid.

Even this could be an underestimate. In his November 2011 vision statement on sustainable energy for all, then UN Secretary-General Ban Ki-moon conceded that renewable energy and energy efficiency programmes would be much more costly. Access to modern universal energy could be achieved for less than $50 billion a year. But doubling the global share of renewable energy could cost $500 billion a year – ten times the cost of providing universal access to on-demand power – and energy efficiency costing a further $500 billion annually, according to Mr. Ban's own figures.[45]

4 World Bank support for renewable energy

Self-evidently, pouring development funding into renewable energy schemes represents extremely poor value for money and stunts recipients' development potential (see Table 5). It is in direct conflict with the World Bank's overarching aims of eliminating absolute poverty and sharing prosperity. This policy is particularly damaging because the World Bank's impact is greater than the loans it makes.

Although World Bank lending in 2012 represented only about 5% of aggregate private capital flows to developing countries, its support levers in other funding.[46] As we have seen, World Bank Group support for the Kosovo power station project was seen as essential in funding the project. In this case, the $40m World Bank Group commitment supported $1,960m of third-party financing.[47] As Martin Ravallion, formerly director of the World Bank's research department, writes in a 2016 article on the World Bank losing its way, private sector lending to low-income countries can be risky. There are problems of uninsured risk (including asymmetric information), externalities, and contract enforcement. The World Bank can address these problems by making loans directly, by giving the private sector a positive signal through its decision to make loans, and by providing trusted sources of information that give the private sector the ability to assess risk and to make loans.[48]

The World Bank's function in supplying the public good of development knowledge came to the fore in 1996 when its then president James Wolfensohn, articulated the vision of the World Bank as a 'knowledge bank', providing of state-of-the-art expertise on development. Where the World Bank leads, private sector flows would follow. If this strategy works, it implies that the World Bank's renewable footprint is considerably larger than the $21 billion it has ploughed into energy efficiency and renewable projects since 2010.[49] And, as Ravallion argues, being a knowledge bank explicitly committed to global poverty reduction requires the World Bank to commit to actually understanding the needs of its client countries and to be consistent advocates for well-informed pro-poor policies 'even when such policies are unpopular with the powers-that-be'.[50]

Table 5: Key World Bank Group renewable energy deals

Country	World Bank Group participation	Ref
International Solar Alliance	Collaboration to boost solar with goal of mobilizing $1 trillion in investments by 2030 across 121 countries.	[51]
India	$1 billion to support solar expansion in the World Bank's largest financing of solar for any country $625m Grid Connected Rooftop Solar Program to finance at least 400 MW of PV installations. Preparation of a $200m deal for Shared Infrastructure for Solar Parks Project. 'The World Bank Group will do all it can to help India meet its ambitious targets, especially around scaling up solar energy' – Jim Yong Kim.	[52]
Bangladesh	Rural Electrification and Renewable Energy Development in various tranches totalling $546.5m 2002–2015.	[53]
	In November 2014, Bangladesh suffered a nationwide blackout after a transmission from India failed, leading to a cascade of failures.	[54]
Ghana	Energy Development and Access project provides grants to developers of renewable energy generation projects – approved in 2007 with total project cost of $210.55m at July 2017	[55]
	The same year as the project gained approval, oil was discovered off the Ghanaian coast and the first commercial output from the Jubilee Field was pumped in 2010.	[56]
Mozambique	$55m financing package for a 40.5-MW PV plant – Mozambique's utility scale solar plant. 'Access to reliable energy is a prerequisite for development and this solar plant will be an important first step in increasing Mozambique's renewable power generation', Norfund, the plant's Norwegian developer, said in June 2017.	[57]
Morocco	$23.95m for 400 MW of grid-connected PV located at 16 different sites costing an estimated $158.31m (March 2015).	[58]

5 The UN's green takeover

In adopting a strong pro-renewable energy mandate, the World Bank did not, as Ravallion argued it should do, put the interests of the poor ahead of the presumptions of the 'powers that be'. The World Bank's capitulation to renewable fervour can, at least in part, be explained by external pressure, notably that exerted from the UN. In June 2009, Ban Ki-moon established an Advisory Group on Energy and Climate Change (AGECC). When it reported in April 2010, the advisory group recommended adoption of two goals: improving energy access and strengthening energy efficiency. Yet when Ban Ki-moon came to make his energy vision statement in November 2011, a third goal had been added: doubling the share of renewable energy in the global energy mix.

Although the AGECC made warm noises about renewables ('The impact of this increased energy consumption can be reduced through energy efficiency and a transition to a stronger reliance on cleaner sources of energy, including renewable energy and low-GHG-emitting fossil fuel technologies, such as a shift from coal to natural gas'), it was leavened with realism on the economics of wind and solar.[59] Renewable energy technologies were ideally suited to mini-grid and off-grid applications 'since they can be deployed more rapidly than grid solutions and do not require excess generation capacity' – recognition that wind and solar require far more capacity because of their intermittency – and went on to note that the cost of non-hydro, renewable-based sources were 'typically somewhat higher than fossil fuel-based technologies'.[60]

In the intervening period between the AGECC report and Ban Ki-moon's vision statement, the Paris–Nairobi Climate Initiative, launched by the French government in cooperation with the Kenyan government, produced a white paper on access to clean energy. The document, which was published in April 2011, added a third goal to the AGECC's two: a massive increase in local and renewable energy, with at least half new capacity in Africa being renewable.[61] Where France led on renewables, Ban Ki-moon followed.

'To defeat poverty and save the planet', Ban Ki-moon's vision statement begins, 'we can, and must achieve sustainable energy for all by the year 2030'.[62] This is a classic example of the error of ignoring the mathematical impossibility of simultaneously optimizing two independent characteristics of a system, in this case the two variables being minimised are cost and emissions of carbon dioxide.

Mr. Ban tries to overcome this by arguing that renewable energy is a leap frog technology, even though his own numbers show it is ten times more costly. 'Developing countries, many of them growing rapidly and at large scale, have the opportunity to leapfrog conventional energy options', the then UN Secretary-General declared.[63] This assertion was backed up by a false analogy with mobile telephony, where penetration had reached 70% in developing countries. 'A similar paradigm may emerge in distributed energy generation', he mused.[64]

The reason for the success of mobile telephony is in giving everything a user can get from a fixed line, *plus* personalisation (fixed-line phones tend to belong to households) and mobility, but *without* bearing the costs of fixed-line infrastructure. Mobile telephony's attractiveness would have been very different if it had all the constraints of a fixed-line phone and could not be used in the hours of darkness, when it was cloudy or when there wasn't enough wind, and if it cost a lot more. Whereas mobile telephony is a superior technology, renewables are an inferior one, as they are not capable of supplying reliable, on-demand power and still require all the transmission and generating infrastructure of the conventional grid.

In his list of barriers to be overcome, Ban Ki-moon omitted intermittency and the word is not mentioned at all in his vision statement. Instead there are bald assertions that we cannot 'burn our way to prosperity', even though increased fossil fuel usage is the only low-cost energy route to prosperity for poorer nations.[65] The unreality of Mr Ban's position is made clear with his admission that meeting the $500 billion per year cost of his renewable energy target is ten times that of providing universal energy access.

6 The World Bank's capitulation

Mr Ban's objectives became part of the United Nations' Sustainable Energy for All initiative (SE4ALL). He invited Dr Kim to become co-chair alongside him on SE4ALL's advisory board and the World Bank joined the UN in what is described a 'unique partnership' for both organisations. 'For both men and their institutions, the close collaboration underscores one thing they have in common; their strong belief that sustainable development must be pursued as a top priority for their administrations', the SEE4ALL website states.[66]

These objectives were in turn adopted by the World Bank in its July 2013 guidance paper *Toward a Sustainable Energy Future for All*.[6] Although the World Bank cost estimates are slightly lower than the $1 trillion dollars a year mentioned in Dr Ban's vision statement, they are still huge. Annual global investment in 2010 in the three areas covered by the UN is estimated at about $400 billion.

Against this figure, the annual investments required to achieve the three goals are calculated to be at least $600–800 billion *over and above* the current investments, entailing a doubling or tripling of the current financial flows. The bulk of those investments are associated with energy efficiency and renewable energy, with access-related expenditures representing a relatively small percentage of the incremental costs.[67]

The paper goes on to make an obvious point: 'Such an unprecedented increase in financing would require transformation of the energy market conditions, especially in developing countries, to enable massive infusion of capital from the private sector

and leveraging of scarce public funds through public-private partnerships'.[68] To set out these conditions is to acknowledge that they're not going to be met. It means sacrificing universal access for unrealisable green ideology. As the World Bank recognises, the incremental greenhouse gas emissions from extending access to the poor 'will not make a material difference'.[69]

7 Decarbonisation and materials intensification

Overcoming the intermittency of wind and solar requires more resources. 'Depleting our natural resources will deplete our chances of true prosperity', Mr Ban declared in his 2011 vision statement.[70] Entirely overlooked in the SE4ALL initiative is the impact of wind and solar on the demand and supply of the materials used to make them and the environmental implications of disposing of them at the end of their operating lives. Because they are so inefficient at generating electricity, they are extremely materials-intensive.

According to calculations by Professor Michael Kelly of Cambridge University, 300 tonnes of steel in a combined cycle gas turbine can use natural gas to produce a generator with a capacity of 600 MW. This is equivalent to 2 kW/kg of steel. The same kilogram of steel in the nacelle of a wind turbine contributes only 2 W of capacity.[71] The World Bank concurs, stating that it is not contentious to say that low-carbon energy systems are more likely to be more materials intensive:

In fact, all literature examining material and metals implications for supplying clean technologies agree strongly that building these technologies will result in considerably more material-intensive demand than would traditional fossil fuel mechanisms.[72] Despite this, the issue has been largely ignored:

> The vast majority of climate and carbon scenarios have paid little, if any, attention to the implications of the requirements for the material necessary to 'feed' the carbon-constrained future.[73]

The study reckons that relevant metals demand for wind and solar technologies roughly doubles, the largest increase being for battery storage technologies, with a rise of more than 1000% (see Table 6).[74] Demand for lithium has 'the potential to hold low carbon technology manufacturers to lithium suppliers' proclivities and capacities', the report says.[75] The report also acknowledges the risk of negative environmental impacts from the sharp increases in materials demand, creating, it says

> …a new suite of challenges for the sustainable development of minerals and resources. Simply put, a green technology future is materially intensive and, if not properly managed, could bely the efforts and policies of supplying countries to meet their objectives of meeting climate and related Sustainable Development Goals. It also carries potentially significant impacts for local ecosystems, water systems, and communities.[76]

The World Bank report only mentions the possible environmental impact of materials extraction in the manufacture of renewable technologies. It therefore ignores the environmental impact of disposing of wind, solar and battery technologies at the end of their useful lives. The Environmental Progress think tank points out that the amount of solar panel waste in Japan will rise from 10,000 tons a year to 800,000 tons a year but that it has made no plans for safely disposing of it. Neither does California. Outside Europe, solar waste ends up in the larger stream of electronic waste.

It is people living in poorer countries, where environmental protections are weakest or non-existent, who will be most affected by the growing volume of solar PV waste.

In countries like China, India, and Ghana, communities living near e-waste dumps often burn the waste in order to salvage the valuable copper wires for resale. Since this process requires burning off the plastic, the resulting smoke contains toxic fumes that are carcinogenic and teratogenic (birth defect-causing) when inhaled.[77]

8 The UN's development case against renewable energy

In summary, intermittent sources of energy incur operating and cost penalties that are not reflected in plant-level cost comparisons. Their materials intensity clearly conflicts with the UN's sustainability mantra. Lastly, they create huge and as yet untackled disposal problems. All these present substantial challenges to rich nations in their rush to adopt wind and solar. Grid stability is compromised, costs and prices spiral and the full extent of the solar PV disposal problem is still emerging. For poorer nations still in the process of extending the benefits of the twentieth century to all their people, providing incentives to adopt wind and solar would represent a development calamity.

There is no evidence from his vision statement that Mr Ban had thought about any of these problems before setting the global target of doubling the share of renewables in the energy mix. A UN General Assembly Resolution in February 2011 had declared 2012 the International Year of Sustainable Energy for All.[78] It was followed in March 2013 by a further resolution promoting renewables, declaring 2014–2024 the 'United Nations Decade of Sustainable Energy for All'. The resolution stressed 'the need to increase the share of new and renewable sources of energy in the global energy mix as an important contribution to achieving universal access to sustainable modern energy services'.[79] However, the General Assembly entered an important caveat in the resolution's next clause:

> Recognizes that the current share of new and renewable sources of energy in the global energy supply is still low owing to, among other factors, high costs

Table 6: World Bank estimate of mean cumulative metals demand, 2013–50, to meet 2°C limit as percentage of 2013 production.

% of 2013 production	Metals	Comment
$\leq$3	Aluminium, chromium, cobalt, copper, iron and steel, manganese, nickel	Incremental iron production for renewables estimated to be close to 2.5 billion tons. In 2015, China accounted for 55% world aluminium production. US aluminium output 5% of China's.
5	Lead	China accounted for 54% of world output in 2015.
5	Molybdenum	China world's largest producer (38% of 2015 output) followed by the US (21%).
5	Zinc	China the world's largest producer (37% of 2015 world production), possessing the largest reserves after Australia.
18	Neodymium	China accounted for 85% of world production of neodymium and other rare earths in 2015.
19	Silver	Depending on adoption of thin-film PV technology, could require 79% increase in annual silver production.
146	Indium	In 2015, China accounted for 49% of world production of 755 tonnes.
1480	Lithium	Between them, Australia and Chile accounted for 77% of 2015 world output Chile is reckoned to have around half of the world's lithium reserves. The Democratic Republic of Congo is estimated to have one million tonnes (cf. global reserves of 14m tonnes).

Source: World Bank Group, *The Growing Role of Minerals and Metals for a Low Carbon Future*, June 2017, Figs 2.6, 2.11, Tables 3.1–3.21.

> and lack of access to appropriate technologies, and calls for action to achieve economic viability of new and renewable sources of energy through enhanced research and development support along with appropriate policy initiatives and investments at the national and international levels.[80]

In other words, the General Assembly recognised what the then UN Secretary-General did not, namely that intermittent wind and solar are not economically viable. The leadership of the World Bank is all the more culpable for ignoring the UN General Assembly's caution and overruling the expertise of its staff, allowing its development mission to be hijacked by green ideologists.

9 Hydrocarbons, renewable energy and soft power

Speaking at the US Department of Energy on 29 June 2017, President Donald Trump remarked on America's energy abundance: nearly 100 years' worth of natural gas and more than 250 years of coal. Thanks to hydraulic fracturing, the US is the world's top producer of hydrocarbons.

> With these incredible resources, my administration will seek not only American energy independence that we've been looking for so long, but American energy dominance…We will export American energy all over the world.[81]

By contrast, the US does not have a comparative advantage in renewable energy. If any country does, it is China. According to the World Bank's material report, 'the most notable finding is the global dominance China enjoys on the metals – both base and rare earth – required to supply technologies in a carbon-constrained future'.[82]

The World Bank's refusal to back coal-fired projects (other than in the most stringent circumstances) denies developing countries what is likely to be their only opportunity to provide universal access to reliable energy. It is also contrary to the interests of the USA, a major coal producer, while boosting the interests of China.

China is in a stronger position as it can play both sides of the game. They had a helping hand from the Obama administration, which lobbied America's allies to boycott President Xi Jinping's Asian Infrastructure Investment Bank. According to an October 2014 *New York Times* article, the Obama administration viewed this new body as a political tool in a soft power play through which China would pull South-east Asian countries into its orbit. They therefore argued that the new bank would fail to meet environmental standards: 'How would the Asian Infrastructure Investment Bank be structured so that it doesn't undercut the standards with a race to the bottom?' an anonymous Obama administration official commented.

The position adopted by the Obama administration amounts to saying that the shareholders of multilateral development banks should decide where financing goes to meet their policy objectives and over-ride the development needs of the bank's

clients. By subordinating client needs to shareholder priorities, the Obama administration created an opening for China. A senior official at the Asian Development Bank, traditionally dominated by the US and Japan, was quoted in the article as saying 'Energy is one of the biggest needs of economic growth in Asia, and China will be able to promise projects without these hindrance'. In 2013, it noted, the US had already said it would oppose financing of coal-fired power plants by the Asian Development Bank.[83]

At this stage, it isn't clear whether the Asian Infrastructure Investment Bank will be financing coal projects. However, according to a June 2017 report in *Foreign Policy*,

> There are other pots of Chinese money underwriting big investments across southeast Asia and Central Asia, including the New Silk Road Fund and the New Development Bank (the so-called BRICS bank), and they don't seem to have the same environmental standards as AIIB. In Pakistan alone, Beijing plans to invest tens of billions of dollars in energy projects, including coal-fired power plants.[84]

What is clear is that between them, the Obama administration and the World Bank have given China a major opportunity to grow its influence across Asia by supporting energy projects that the World Bank bans itself from financing.

10 Recommendations

In September 2015, the 193 members of the UN agreed Agenda 2030. Number 7 of its seventeen Sustainable Development Goals is to 'ensure access to affordable, reliable, sustainable and modern energy for all'. The renewable energy target set out in the SE4ALL initiative of Ban Ki-moon and the World Bank appears in diluted form in SDG 7.2 ('By 2030, increase substantially the share of renewable energy in the global energy mix') and its energy-efficiency goal in SDG 7.3 ('By 2030, double the global rate of improvement in energy efficiency'.)[85]

SE4ALL's fingerprints can also be found in a draft of the 2015 Paris Agreement circulated by the president of the Conference of the Parties. The draft preamble acknowledged 'the need to promote universal access to sustainable energy in developing countries, in particular Africa, through the enhanced deployment of renewable energy'.[86] However, this was removed from the final text of the agreement, which does not contain any reference to renewables or to sustainable energy.

This excision, together with the February 2011 UN General Assembly resolution and the watering down of SE4ALL's goal of doubling renewables share in the energy mix in Agenda 2030, indicates that the World Bank, in adopting wholesale the SE4ALL goals, had gone considerably further than the international community had agreed. Indeed, in enthusiastically backing Ban Ki-moon's renewable energy target, the World Bank betrayed its core development mission. Rich countries are finding it hard enough to integrate growing amounts of wind and solar capacity into their

electricity grids. For poorer countries with underdeveloped grid infrastructure and inadequate thermal generating capacity, being force-fed renewable energy is a development calamity. Mr Ban's own numbers ($50 billion a year for universal access to electricity vs $500 billion a year for renewables) illustrate the colossal scale of the waste of resources in the drive to double renewables' share in the global energy mix.

Matters might be starting to change, as member governments start to rein in the bank. Under the Trump administration, the US Treasury Department has issued new guidance for the US to use its voice and vote for multilateral development banks to:

- promote universal access to affordable, reliable, sustainable and clean energy
- help countries access and use fossil fuels more cleanly and efficiently, and help deploy renewable and other clean energy sources
- support development of robust, efficient, competitive, and integrated global markets for energy.[87]

In view of the deleterious effects of intermittent sources of energy on the economics of the grid and the vast increase in the cost of providing universal access to reliable power, for the World Bank to return to its development mission, shareholders need to go much further. In addition to adopting the US proposals, they should require the World Bank to:

- withdraw from the UN SE4ALL initiative until the requirement of the March 2013 UN General Assembly resolution (67/215) on the economic viability of renewable energy is met
- abandon all targets to increase deployment of renewable energy
- develop strict criteria that, for the foreseeable future, financial support for intermittent renewable sources will only be forthcoming for use in remote locations where there is little prospect of grid connectivity within ten years.

Diverse voices such as those of Deepak Lal and Martin Ravallion have suggested that the institution they both worked for has lost its way. The misguided attempt by the Obama administration to get the World Bank and the Asian Investment Bank to prioritise combatting global warming over economic development created an opening for China to launch a rival development bank. The World Bank's capitulation to green ideology was formalised when it entered into the unique partnership with the UN to double renewables' share in the global energy mix by 2030. The World Bank needs to go back to what it was set up to do. That means taking the lowest-cost path to cheap, reliable power.

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