



A Critique of the Coal Divestment Campaign

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About the Author

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The Minerals Council of Australia represents Australia's exploration, mining and minerals processing industry, nationally and internationally, in its contribution to sustainable economic and social development.

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Executive summary/key points

The fossil fuel industry, in general, and the coal industry, in particular, has come under attack from environmental activists seeking to end Australian coal production and exports.

If the *goal* of the campaign is to end coal production, the *means* to that end is to persuade investors that coal has no economic future and to persuade them to 'divest' out of fossil fuel based industries.

The campaign rests, however, on false premises and unsubstantiated claims and may breach Australian law.

Taken at face value the logic of the claims is appealing and is scientifically and economically sophisticated. Upon close evaluation, however, the divestment logic is fragile and driven by the desired conclusions.

Despite lip-service being paid to a 2°C temperature target increase most governments are making little or no progress to achieving that target. Whether or not that target will be breached is a function both of CO₂ emissions and technology.

The divestment campaign logic ignores technological improvements that could vary the maximum amount of CO₂ emissions.

Importantly the divestment campaign assumes that investors do not understand the risk of the investments that they undertake. As such they are incapable of pricing the risk within their portfolios.

By contrast, the divestment campaign suggests that they are capable of understanding that risk and that the "solution" to the carbon risk problem is to divest portfolios of fossil fuel stocks. Yet the World Wildlife Fund has not divested its fossil fuel exposure, but rather hedged that risk. In this respect, the WWF is following the practice of ordinary investors, who are indeed pricing the risk of climate change, but just not as highly as the environmental movement would like.

Ultimately the divestment campaign is making a forecast as to future fossil fuel demand and is just one of many such forecasting exercises and should be seen and treated as such. Investors, and policy-makers, should rely on energy projections from a variety of independent minded forecasters, not those written by activists with an ideological axe to grind. The principal international energy forecasters – public and private – all suggest that coal will have a central role in energy generation for decades to come.

Finally, the campaign may contravene the letter or the spirit of the Corporations Act. While activists argue that wealth portfolios without fossil fuel stocks perform just as well as those with fossil fuel stocks, the reality is that failing to hold a well-diversified portfolio has substantial economic costs in the form of higher risk and lower returns. So if investors make valuation errors based on the divestment campaign and relinquish high-performing stocks, a breach of the Corporations Act may have occurred.

There is a potential role for the Australian Securities and Investment Commission to examine whether the stigmatisation of the fossil fuel sector via the divestment campaign is a breach of the Act.

The divestment campaign would amount to an unlawful secondary boycott if environmental activists were covered by those laws. They are seeking to restrict coal mining in Australia by targeting a critical supplier to the sector.

The bottom line is that the divestment campaign is environmental activism dressed up as investment advice. ■

Coal's strong future

International Energy Agency

"People have been wrong many times saying that the time of the coal is passed, is over."

Fatih Birol, Chief Economist
International Energy Agency

Australian Financial Review, 3 March 2014

Energy Information Administration (US)

"The *International Energy Outlook 2013 (IEO2013)* projects that world energy consumption will grow by 56 percent between 2010 and 2040... Coal use grows faster than petroleum and other liquid fuel use until after 2030, mostly because of increases in China's consumption of coal and tepid growth in liquids demand attributed to slow growth in the OECD regions and high sustained oil prices."

International Energy Outlook 2013,
25 July 2013

Institute of Energy Economics of Japan

"Despite increasing environmental opposition to the use of coal, coal still plays a crucial role in the global energy mix and will continue to do so for the foreseeable future. The importance of coal use will be all the more important in Asia."

Shoichi Itoh, Institute of
Energy Economics of Japan

Globe and Mail, 4 May 2014

Australian Bureau of Resources and Energy Economics

"Australia's thermal coal exports are projected to increase at an average 4.6 per cent a year to 244 million tonnes in 2018-19. Export earnings are projected to increase by 4.5 per cent a year to around \$21.2 billion (in 2013-14 dollar terms) in 2018-19."

"Australia's metallurgical coal export volumes in 2013-14 are expected to increase by 15 per cent to 177 million tonnes. Over the remainder of the outlook period, export volumes of metallurgical coal are projected to increase at an average annual rate of 1.8 per cent to reach 193 million tonnes in 2018-19. Higher export volumes and projected higher prices are expected to result in export values from metallurgical coal increasing to \$28 billion (in 2013-14 dollars) in 2018-19."

Resources and Energy Quarterly,
March 2014

Wood Mackenzie (independent energy consultancy)

"Global government policies to reduce carbon emissions will not prevent a hydrocarbon world as coal will surpass oil as the dominant fuel later this decade."

Wood Mackenzie

Wood Mackenzie Says Carbon Policies Unlikely to Prevent A Coal-Fuelled World,
Press Release, 14 October 2013

BP Energy Outlook 2035

"At the global level coal remains the largest source of power through 2035, although in the OECD coal is overtaken by gas."

BP Energy Outlook 2035, January 2014

Exxon Mobil

"The use of coal for power generation will likely continue to rise in many developing countries, such as India and much of Southeast Asia."

Exxon Mobil, *The Outlook for Energy: A View to 2040*, 2014

Ross Garnaut

"Australia is a global superpower in energy supply in the early twenty first century. It is the world's largest exporter of coal and uranium and probably soon and for a while the largest exporter of natural gas."

The 2014 John Freebairn Lecture in Public Policy: Resolving Energy Policy Dilemmas in an Age of Carbon Constraints, May 2014

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Introduction

Australians may be surprised to discover that the coal industry is a “rogue industry” that threatens our very global civilisation. Further, that it needs to be shut down as a matter of urgency. By contrast, public polling shows that Australians see coal as an important natural resource that has substantially contributed to our national prosperity. Unfortunately, however, the fossil fuel industry, and the coal industry in particular, is under attack from a well-organised, well-financed, and sophisticated network of international environment groups waging a divestment campaign.

The basis of the divestment campaign is a particular interpretation of scientific and economic arguments that “logically” results in the need for investors to divest from fossil fuel investments. At face value the arguments are sophisticated and consistent. In this report, however, I argue that the sophistication is apparent rather than real – the explicit and implicit assumptions underpinning the divestment argument make the whole edifice fragile.

Despite the fragility of the divestment

campaign argument, the risks the Australian economy faces are substantial. Australia is highly reliant on the resources and finance sectors – both these sectors face risks associated with the divestment campaign.

It is important that Australian decision makers recognise the fragility of the divestment campaign arguments, but also appreciate the risks they pose for Australia. It will be necessary for the Australian fossil fuel industry (and the finance industry) to invest more resources in maintaining and enhancing its reputation. At the same time, the divestment campaign has highlighted the policy-related costs of resource extraction in Australia and this suggests obvious reforms that government can undertake in repealing the carbon tax, the mining tax and cutting both green tape and red tape.

In section 2 I set out the logic underpinning the divestment campaign and the fragility of the assumptions that logic rests on. Section 3 sets out the potential costs of the divestment campaign and in section 4 I outline what can be done about the situation. A conclusion follows. ■

2 The logic of the coal divestment campaign

2.1 The basic idea

The scientific basis underpinning the divestment campaign can be traced to two letters to the editors of *Nature* in 2009 (Allen et al. and Meinshausen et al.). This scientific argument was popularised into a coal divestment campaign in a 2012 *Rolling Stone* article written by global warming activist Bill McKibben. He set out an arithmetic analysis purporting to demonstrate that large amounts of proven fossil fuel reserves could not be exploited without incurring massive environmental damage.

McKibben pointed to three numbers:

- A 2°C temperature constraint (or budget).
- 565 gigatons of carbon dioxide.
- 2,795 gigatons of carbon dioxide proven reserves.

The temperature constraint was agreed upon by the Copenhagen Accord as being the limit of any increase in temperature resulting from anthropogenic global warming. The 565 gigatons is an estimate of the additional amount of carbon dioxide that can be released into the atmosphere by 2050 that is consistent with limiting any temperature increase to 2°C. The proven fossil fuel reserves that already exist, however, are consistent with 2,795 gigatons of carbon dioxide emissions.

That is there are 4.95 times more carbon dioxide emissions in proven reserves than can be emitted into the atmosphere without breaching the 2°C constraint.

McKibben then argues that environmentalists have failed to convince individuals to modify their behaviour, and have failed to convince politicians to enact legislation to force individuals to modify their behaviour through prices or taxes on carbon, consequently:

... we need to view the fossil-fuel industry in a new light. It has become a rogue industry, reckless like no other force on Earth. It is Public Enemy Number One to the survival of our planetary civilization.

The “we” in this declaration is the environmental movement and McKibben calls for fossil fuel divestment while recognising that many sovereign nations own large fossil fuel reserves.

The notion of a “carbon bubble” is based on the logic McKibben had popularised. The idea of a carbon bubble was first proposed by a UK think tank Carbon Tracker Initiative in a 2011 report entitled, “*Unburnable Carbon – Are the world’s financial markets carrying a carbon bubble?*” This report made the argument: “that there are more

fossil fuels listed on the world's capital markets than we can afford to burn if we are to prevent dangerous climate change." It then went on to identify the top 200 global coal, and oil and gas companies ranked by fossil fuel reserves. The argument contained in this report and a subsequent 2013 report seems to be that the "excess" fossil fuel reserves that are currently proven and cannot be used without breaching the 2°C constraint are priced by capital markets as if they could be used. As such fossil fuel producers are over-valued by equity markets. In addition to that over-valuation any other expenditure to further develop fossil fuel reserves would be wasted.

In 2013 The Climate Institute published an Australia specific analysis of the Carbon Tracker Initiative's analysis. This report – "*Unburnable Carbon: Australia's carbon bubble*" – indicated that "Australian coal reserves owned by listed companies are equivalent to 51GtCO₂, which would be 15-25% of the global coal carbon budget to 2050". To the extent that a 2°C constraint was enforced, companies such as BHP Billiton and Rio Tinto could lose up to four to five per cent of their market capitalisation. For undiversified coal producers, however, the losses of market value could be much greater. In the case of oil and gas producers, The Climate Institute report points to potential losses of up to 40 to 60 per cent.

So the purported logic is simple: given a binding 2°C temperature increase constraint and a known relationship between carbon dioxide emissions and temperature increase, the amount of proven fossil fuel reserves that are currently available for future use cannot be brought into production. Stock market valuations predicated on those fossil fuel reserves being employed must result in over-valuation. Investors then should take those factors into consideration when making investment choices and regulators should require greater disclosure of risks associated with the carbon bubble.

Taken at face value, this logic is very

appealing. The argument appears scientific and economically sophisticated. The overall argument, however, is driven by the desired conclusions.

As McKibben has conceded, the environmental movement has failed to convince either individuals or governments as to the urgency of its beliefs regarding global warming. To be clear, this observation is not an argument against global warming *per se*, it is an observation relating to a lack of policy consistent with the threat of imminent climate catastrophe. There is a huge leap from an argument that equity markets may be pricing fossil fuel producers relative to known and foreseeable risks and labelling an industry as being "rogue" and "Public Enemy Number One".

McKibben calls for moral outrage and a campaign similar to the divestment campaign from apartheid South Africa in the 1980s. This approach is neatly captured by a 2011 document, leaked to the media, "*Stopping the Australian Coal Export Boom*", that sets out a six-point strategy:

1. Disrupt and delay key infrastructure

Challenge and delay key infrastructure developments (ports and rail) and 'mega mines'.

2. Constrain the space for mining

Build on the outrage created by coal seam gas to win federal and state based reforms to exclude mining from key areas, such as farmland, nature refuges, aquifers, and near homes. Landowners locking the gate.

3. Increase investor risk

Create uncertainty and a heightened perception of risk over coal investments.

4. Increase costs

Increasing the cost of coal is fundamental to the long-term global strategy to phase out the industry. We can start to remove the massive subsidies to the coal industry, and to internalize the 'externalized' costs of coal.

5. Withdraw the social license of the coal industry

Change the story of coal from being the backbone of our economy, to being a destructive industry that destroys the landscape and communities, corrupts our democracy, and threatens the global climate.

6. Build a powerful movement

Create stronger networks and alliances and build the power necessary to win larger victories over time.

While it is true that some participants in the debate – like Carbon Tracker Initiative and the Stranded Assets Programme at Oxford University – may simply be pointing to potential risks and problems that may arise, other participants, such as Bill McKibben and his 350.org organisation, are looking to create the very risks that may destroy corporate value for fossil fuel producers. Ultimately the divestment campaign that he proposes can only succeed if the potential for regime uncertainty (sovereign risk) becomes so great that investors believe that corporate value is at risk. In the meantime, environmental campaigners will attempt to withdraw social licences, increase investment risks and generally wage a destructive campaign against energy producers (and their financiers).

2.2 Challenging the assumptions

There are a number of explicit and implicit assumptions built into the basic idea behind the divestment campaign. The explicit assumptions include:

- The 2°C constraint is binding.
- The permissible amount of emissions.

Then there are implicit assumptions:

- The existence of a stock market bubble.
- The relationship between scientific discovery and stock market valuation.

There is no sign of concerted global action in meeting the 2°C target. The International Energy Agency (IEA) in a 2013 report indicated that: “The world is not on track to meet the target agreed by governments to limit the long term rise in the average global temperature to 2 degrees Celsius (°C).” In particular the IEA (2013) points out that “15% of global CO₂ emissions receive an incentive of \$110 per tonne in the form of fossil-fuel subsidies while only 8% are subject to a carbon price.” Given that Australia is very likely to abolish its carbon pricing mechanism after July 2014, the 8 per cent share is likely to decline. (Although it is important to note that Australia does not provide any fossil-fuel subsidies.) The fact that some governments are subsidising more fossil fuel consumption than pricing CO₂ emissions suggests that global action to meet a 2°C target is a long way off.

It isn't just the IEA that is pessimistic about meeting the 2°C target.

Germanwatch – a German non-government organisation – has developed an index that measures climate policy performance. The Climate Change Performance Index (CCPI) consists of some 15 indicators in four (originally three) categories ('emissions', 'efficiency', 'renewable energies' and 'climate policy'). CCPI data are available from 2005 to 2013. Germanwatch describes its project as follows (Burck, Marten and Bals 2013):

Getting a clear understanding of national and international climate policy is difficult, as

the numerous countries which need to be taken stock of, each have various initial positions and interests. To untangle the knot of differentiated responsibilities, as well as kept and broken promises, and to encourage steps towards an effective international climate policy, Germanwatch developed the Climate Change Performance Index (CCPI). The index compares those 58 countries that together

are responsible for more than 90 per cent of annual worldwide carbon dioxide emissions. Their climate change performance is evaluated according to uniform criteria and the results are ranked.

What is particularly interesting is its assessment of progress towards meeting the 2°C target – or indeed any meaningful target. The table below sets out Germanwatch’s assessment of efforts to meet the 2°C target.

Report	Comment
Climate Change Performance Index 2007	... the results illustrate that even if all countries engaged in the same manner current efforts would still be insufficient to prevent dangerous climate change.
Climate Change Performance Index 2008	If climate change protection was an Olympic discipline, no country would deserve to climb the winner’s victory podium.
Climate Change Performance Index 2009	... not a single country is to be judged as satisfactory with regard to protecting the climate. The specific criterion for this judgment is that, compared with 1990, no country is yet on the path that would be necessary to stay within the two degrees limit.
Climate Change Performance Index 2010	None of the countries analysed is contributing sufficiently on a practical level to the goal to avoid dangerous climate change and keep global warming notably below the 2 degrees limit.
Climate Change Performance Index 2011	Also like last year, no country has performed well enough to place into the first three ranks. These are reserved for countries which have reduced per capita emissions enough to meet the requirements to keep the increase in global temperature below to 2°C.
Climate Change Performance Index 2012	As in the years before, we still cannot reward any country with the rankings 1-3, as no country is doing enough to prevent dangerous climate change.
Climate Change Performance Index 2013	As in the years before, we still cannot reward any country with the rankings 1-3, as no country is doing enough to prevent dangerous climate change.
Climate Change Performance Index 2014	No single country is yet on track to prevent dangerous climate change.

Source: The Climate Change Performance Index Report (various issues)

Not only is there no concerted international action to meet the 2°C target, no one single nation is on target to meet that target or prevent dangerous climate change.

The permissible emissions is said to be 565 gigatons of carbon dioxide. This amount, however, is a function of current usage and technology. To be fair, the Carbon Tracker Initiative does incorporate some discussion of carbon capture and storage (CCS) technology in its reports. It points out, quite correctly, that at present CCS technology is undeveloped and not commercially viable. Yet it fails to point out that this situation may change quite rapidly and that alternatives to fossil fuel energy production are *also* underdeveloped and not commercially viable. To be sure renewable energy sources have made massive strides in previous years, and there is no reason to believe that CCS technology couldn't also make massive strides in the years to come. Overall, the technology assumption appears to be that there will be massive advances in renewable energy technology but no or few advances in CCS.

The CCS assumption is inconsistent with the cautious optimism displayed in the IEA (2014) Tracking Clean Energy Progress report. While acknowledging that CSS technology is not on track to meet the 2°C target, the IEA pointed to investment that is being made in CCS projects and, more importantly, the increased investment that is being made into CCS research, development and demonstration.

Similarly the divestment campaign ignores the fact that coal-fired power stations are improving over time. The IEA (2014) reported that 64 per cent of new coal-fired power plants under construction in 2013 were "supercritical or ultra-supercritical" – an increase from 50 per cent in 2012. According to the World Coal Association a modern coal-fired plant can emit up to 40 per cent less CO₂ emissions than the average installed coal-fired plant. Importantly the IEA (2014) indicated that China and India are substituting newer more efficient coal-fired plants for older less efficient plants. As yet this trend is not enough to be compatible with a 2°C target. The fact remains, however, that

technological progress is being made in CSS technology and cleaner coal-fired plants and this progress is totally discounted by the divestment campaign.

The implicit assumptions contained in the carbon bubble analysis all relates to the operation of equity markets. The notion of bubbles existing in equity markets is somewhat controversial. The idea being that asset prices deviate substantially from their true fundamental value for an extended period of time. At some point asset prices collapse to better represent their fundamental value. After the fact investors and regulators often point to bubbles as being explanations to justify massive increases in prices followed by sudden unexpected declines. The challenge all such arguments face is why prices deviated in the first instance, and why they didn't quickly return to fundamental value?

Andrei Shleifer – ranked as the world's leading economist by the St. Louis Federal Reserve – has a basic model that explains how bubbles occur. In order for a bubble to occur a large number of investors must follow a trading strategy known as positive feedback trading. Here investors buy after price increases and sell after price declines. In turn this gives rise to extrapolative expectations where investors base their expectations of future price rises on the fact that prices have risen already. In this type of scenario the arbitrage that would normally drive prices back to their fundamental values doesn't occur. In fact arbitrageurs add to the bubble as they buy in anticipation of investors following a positive feedback strategy.

The problem with carbon bubble hypothesis is that there is no evidence to support the notion that fossil fuel prices or the stock price of fossil fuel producers are subject to investors following positive feedback trading strategies. By contrast, McKibben's argument is that carbon has always been mispriced. The basis for this argument being that the fossil fuel industry's ability to "dump its main waste, carbon dioxide, for free" provides it with the opportunity to earn massive profits. In economic terms his argument is that a failure to internalise an externality has led to massive profits in the fossil fuel industry.

What is an externality?

EXTERNALITIES OCCUR when social costs and social benefits of an activity diverge in equilibrium. When social costs exceed social benefits, in equilibrium, a negative externality is said to have occurred. When social benefits exceed social costs, in equilibrium, a positive externality is said to have occurred.

It is important to recognise that the condition for a negative externality is that social costs exceed social benefits in equilibrium, not that social costs exceed zero. The social cost associated with fossil fuels is increased CO₂ emissions. That cost must be considered in relation to the benefit fossil fuel consumption generates via access to cheap and reliable energy. Ziggy Switkowski argues that the net social benefit of fossil fuel consumption is positive:

When fossil fuels such as coal, gas and petrol are burned, there are a number of by-products.

Particulate matter that is not filtered from exhausts and escapes from smokestacks is polluting and contributes to smog and serious respiratory and other community health problems, such as widely experienced in China with its many coal-fired power stations and old technology. Paradoxically, particle emissions contribute to global cooling but are definitely pollution.

...

Carbon dioxide, which is produced in great quantities also, but is colourless and normally benign, is not a pollutant. It is a greenhouse gas which, as its concentration increases in the atmosphere, contributes to the warming of the planet. It is a greenhouse gas, not a pollutant, in the context of climate change.

...

There is an argument that energy intensive industries helped supercharge our economy and standard of living through the decades. But they are now unfashionable because of the pollution label, and because of a political ideology that affordable energy will not be the basis of our modern economy. But is it right, fair or sensible that input electricity is demonised with the pollution brand?

Clearly Switkowski believes the social benefit of fossil fuel consumption outweighs the social cost – although he clearly indicates the social cost is greater than zero.

Ziggy Switkowski, 2011, "Respect the science and don't call CO₂ a pollutant", *The Australian*, 20 April 2011.

The difference between McKibben's actual argument and the bubble argument is not semantic quibbling. The fossil fuel divestment argument relies very heavily on stock markets not correctly pricing assets. His argument is that markets are not pricing an externality; but McKibben has presented that argument as markets being informationally inefficient. But markets not pricing an externality is a property rights issue; if property rights were different, prices would be different. That idea is hardly controversial. In essence McKibben's argument reduces to the proposition that a carbon bubble exists because environmentalists have (generally) failed to convince politicians to place a tax (or price) on carbon. This also leaves him in the embarrassing situation of having to explain whether carbon bubbles exist in those parts of the world – like Australia – where carbon taxes and pricing is in operation. This is a challenge that he is yet to take up.

The notion as to whether stock markets are informationally efficient is very different from the notion that externalities are not priced in a market.

The notion as to whether stock markets are informationally efficient is very different from the notion that externalities are not priced in a market. The economics of informationally efficient stock markets was the subject of the 2013 economics Nobel Prize. The idea underpinning the theory is that markets make good use of all available information when pricing assets. McKibben, however, is proposing the argument that markets are ignoring important environmental information when pricing fossil fuel producers. This is an empirical issue and the environmental movement has produced two types of argument to make this case. As I indicate below, however, the environmental movement

is making a Type III error – providing the correct answer to a different question.

First the environmental movement has argued that future demand for fossil fuels – especially coal – will be lower than that currently forecast by fossil fuel producers. Second the environmental movement has argued that stock portfolios without fossil fuel stocks perform just as well as those with fossil fuel stocks.

Ben Caldecott, James Tilbury and Yuge Ma have argued that Chinese demand for coal in future is likely to fall below current Australian producer expectations resulting in “coal assets under development becoming stranded, or operating mines only covering their marginal costs and subsequently failing to provide a sufficient return on investment”. To be fair to Caldecott et al. this is a very real risk that every business faces – that future demand conditions in the industry may result in losses given current business models and business strategies. The fossil fuel industry is not unique in this regard. Yet the Caldecott et al. analysis invites us to imagine that investors are somehow oblivious to that risk. It may well be the case that markets do not value that risk as much as Caldecott et al. would like, but to argue that markets are ignoring the risk is an unsubstantiated claim. In any event, the correct response to that particular (idiosyncratic) risk is for investors to hold a well-diversified portfolio. Alternatively if investors can easily isolate specific risks, they should be hedged.

By contrast the environmental movement is suggesting that investors should not hold well-diversified portfolios, but rather restrict their investment universe to not include fossil fuel stocks at all. To that end it has attempted to argue that the opportunity cost of such an investment restriction is negligible; while the benefits include a better future. In this sense the environmental movement is tapping into the broader Socially Responsible Investment (SRI) movement and proposing a new investment screen. Luc Renneboog, Jenke Ter Horst and Chendi Zhang (2008a) provide a comprehensive survey of the academic literature on SRI.

WWF has not divested

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In May 2014, he told *The Conversation*¹:

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

Despite that view, he does recognise the potential risk of stranded assets²:

... an opportunity exists in going short certain equities, such as coal and tar sands, which under the slow policy ramp for emissions prices still have significant valuations, but which will actually lose value when it becomes recognized that carbon emissions will soon be priced rationally.

Clearly Litterman is of the opinion that while the risk of assets being stranded is high, he does not support divestment per se.

At the World Wildlife Fund, where I chair the Investment Committee, we voted last May to use a simple total return swap as described above to hedge the stranded assets embedded in the funds in which we have investments, without otherwise disturbing the portfolio. Since then stranded assets have underperformed the market.

In contrast, the IEA concluded in June 2013 that, even under its most stringent climate change policy scenario, no oil or gas field currently in production would shut down prematurely and only the oldest and least-efficient coal mines would close. Of the power plants that are retired early, idled or retrofitted with carbon capture and storage, only 8 per cent (165 GW) would fail to recover their investment costs fully.³

¹ <https://theconversation.com/in-conversation-with-robert-litterman-divestment-is-a-blunt-weapon-in-the-climate-fight-27154>

² <http://ensia.com/voices/the-other-reason-for-divestment/>

³ International Energy Agency, *World Energy Outlook Special Report: Redrawing the Energy-Climate Map*, Paris, 10 June 2013, pp. 11, 83, 111.

In December 2013 MSCI ESG Research released an Issue Brief that investigated the return characteristics of MSCI All Country World Index Investible Market Index compared to the same index excluding a list of fossil fuel stocks provided by the California State Teachers Retirement System over a ten-year period June 2003 to May 2013. Over that period, the MSCI All Country World Index Investible Market Index out-

performed the ex-carbon index. Over shorter periods, however, the ex-carbon version of the MSCI All Country World Index Investible Market Index outperformed the entire index.

MSCI ESG Research also provided the risk-return characteristics of the MSCI All Country World Index Investible Market Index compared to its MSCI Global Climate Index over a shorter period June 2005 to August 2013.

	Annualised Returns			Annualised Standard Deviation			Sharpe Ratio		
	Holding period	3-year	5-year	Holding period	3-year	5-year	Holding period	3-year	5-year
MSCI World IMI	6.12	14.34	5.17	17.51	15.16	20.75	0.31	0.95	0.33
MSCI Global Climate	5.57	9.55	1.35	20.15	16.95	23.39	0.27	0.61	0.16

As can be seen the returns to the overall portfolio dominated the returns to the Global Climate portfolio. The risk associated with the MSCI Global Climate Index, as measured by standard deviation of returns, was higher than the overall index. The Sharpe ratio (a measure of return per unit of risk) shows that the overall index was a better investment than the MSCI Global Climate Index. Failing to hold a well-diversified portfolio has substantial economic costs in the form of higher risk and lower returns.

The Australia Institute has provided a similar, but much less detailed, analysis for Australia. It compared the performance of the S&P/ASX 200 to the same index excluding a sub-set of fossil fuel stocks, but then optimised that portfolio to minimise the tracking error to the index. It was able to show that its portfolio performed just as well on a risk-return basis as the overall portfolio. The problem with this analysis, however, is that it involves substantial look-back bias. The challenge for investment managers is to perform as well as the index going forward, not to determine if they could

have done as well as the index looking back. The two portfolios had similar risk-return characteristics but the tracking error of the optimised portfolio was 0.88. Given the look-back bias and the optimisation to minimise the historical tracking error it is very likely that any portfolio manager pursuing such a strategy going forward would incur a much larger tracking error.

An over-arching issue when performing this type of analysis (in addition to look-back bias) is that as the MSCI ESG states in its disclaimer: "You cannot invest in an index". Indices serve as valuable benchmarks for measuring performance, but actually replicating an index as an investment strategy would be a very costly exercise. For this reason Luc Renneboog, Jenke Ter Horst and Chendi Zhang (2008b) argued that these sorts of exercises should investigate the "actual asset allocation decisions of investors" and not hypothetical decisions that could have been made.

In a comprehensive analysis of the relative performance of SRI mutual funds compared to conventional funds Renneboog, Ter

Horst and Zhang examined the risk-return characteristics of 440 SRI funds to 16,036 conventional mutual funds across 17 countries over the period 1991 to 2003. After controlling for risk and fund characteristics they reported:

SRI funds on average significantly underperform the matched conventional funds, even after controlling for screening activities and other fund characteristics. The [risk-adjusted returns] of SRI funds are lower than those of matched conventional funds by 60 basis points per month, or 7% per annum (significant at the 1% level).

Some observers might find this result counter-intuitive. After all those companies that adopted good corporate social responsibility (CSR) strategies appeared to outperform those that did not. In their survey paper Renneboog, Ter Horst and Zhang (2008a) reported that a portfolio of high CSR stocks outperformed a portfolio of low CSR stocks by some 6 per cent per annum on a risk-adjusted basis. There is a difference, however, between a portfolio based on good CSR indicators and a portfolio that screens out particular types of stock based on a broad indicator. The environmental movement wants investors to divest fossil fuel stocks irrespective of whether they have good or bad CSR indicators.

For their Australian sample Renneboog, Ter Horst and Zhang reported no SRI under-performance. The difficulty with this particular result is that it isn't clear how many listed Australian companies would fall foul of the investment screens they tested.

Finally the McKibben argument suggests that the stock market does not take climate science into account when valuing assets. Recall that the scientific basis for the coal divestment campaign's argument is set out in two letters published in *Nature* in 2009. Paul Griffin, Rosa Dominguez-Faus, Amy Myers Jaffe and David Lont investigated whether US equity markets reacted to the news contained in those two *Nature* letters. The Griffin et al. paper provides a direct test of the notion that markets are not valuing

the probability that fossil fuel stocks have assets that can never be deployed.

Using an event study methodology Griffin et al. examined the stock market impact of the original *Nature* publication and subsequent mentions of the letters in the mass media on the stock prices of the 63 largest US oil and gas companies. In total they examined the original *Nature* publication and 88 stories from 59 print media outlets. They reported that stock prices in their sample of companies declined by about 2 per cent (US\$27 billion) after the initial *Nature* publication. The conclusion to be drawn from this result isn't that the stock market isn't valuing the environment and the risk of "unburnable carbon", but rather that the market isn't valuing this risk as much as the environmental movement would like. Griffin et al. also speculated as to other reasons why markets may not value the environment as much as environmentalists, for example CCS technology may be expected to be viable in the future, or governments might compensate companies for their unburnable carbon, and so on.

There is an additional reason why markets may not be pricing environmental carbon risks as much as the environmental movement would like. The stock of carbon that can be consumed might not be a binding constraint on the private sector. In its *Climate proofing your investments* report the Australia Institute sets out a table of the distribution of ownership and location of fossil fuel reserves. Australia, for example, has 28GtCO₂ of carbon reserves listed on the ASX and this amount comprises 3 per cent of the 2°C budget. According to the Australia Institute the share of the 2°C budget made up by the world's top ten countries is only 85 per cent of the total carbon budget. The remainder is all state-owned. In short, if the 2°C budget isn't a binding constraint on listed assets it is unlikely that markets would assign a high value to that constraint. In the Griffin et al. framework the argument could be that listed companies will be able to exploit most of their fossil fuel reserves and the market is pricing them accordingly. ■

3 Economic costs imposed by the divestment campaign

3.1 Company level costs

The economic consequences of a divestment campaign are set out in a 2013 report *Standed Assets* authored by Atif Ansar, Ben Caldecott and James Tilbury of Oxford University. Their view is that the direct consequences of a divestment campaign would be limited. In other words, even if all investors that took a strong view on the environment and fossil fuels were to divest their ownership stakes all that would happen is that investors who had neutral views on the environment would end up owning fossil fuel companies. This argument can be summarised in the expression “one clientele is as good as another”. In a financial sense, of course, this is entirely true; it isn’t clear, however, that this would be an ideal outcome for environmentally conscious investors. After all by maintaining their investment they would be able to ensure good corporate behaviour through the adoption, for example, of corporate social responsibility programs that enhance environmental outcomes.

It is the indirect consequences of a divestment campaign that would be more troubling. Here Ansar, Caldecott and Tilbury describe a process known as “stigmatisation”. Here the divestment campaign could inflict reputational damage on the fossil fuel industry that raises the costs of doing business, results in permanent devaluation of stock prices, and ultimately results in restrictive legislation. Here the environmental movement would be replicating strategies previously employed against apartheid South Africa and the tobacco industry.

The incidence of both the direct and indirect

consequences of a divestment campaign are likely to be unevenly distributed. Smaller fossil fuel producers and financial institutions are more likely to bear the brunt of a divestment campaign.

Ultimately the objective of a divestment campaign is to create an environment where there is a high level of “regime uncertainty”. Regime uncertainty is also often referred to as being “sovereign risk”. That term, however, tends to cause some confusion as it is popularly associated with government bond markets. The term “regime uncertainty” was coined by Robert Higgs in 1997 – as he explained in January 2014:

[R]egime uncertainty pertains above all to a pervasive uncertainty about the property-rights regime—about what private owners can reliably expect the government to do in its actions that affect private owners’ ability to control the use of their property, to reap the income it yields, and to transfer it to others on mutually acceptable terms. Will the government simply take over private property? Will it leave titles in private hands but strip the owners of real control and profitable use of their properties?

A process of stigmatisation lowers community resistance to adverse government intervention while legitimising a process whereby a particular form of business activity or industry is driven to economic failure. Stigmatisation makes it difficult for an industry to engage with its customers, attract employees, and more importantly access capital for investment purposes.

Sadok El Ghouli, Omrane Guedhami, Chuck Kwok and Dev Mishra investigated the impact of corporate social responsibility on the cost of equity capital for a sample of 12,915 firm-years over the period 1992 to 2007 in the United States. Generally the academic literature has provided mixed results on the relationship between CSR and firm value. If we believe that investment in CSR activities is an investment in an intangible asset such as improved reputation then there is likely to be a positive relationship between CSR and value (or a lower cost of capital). Conversely we might expect that CSR activities represent the management of companies using corporate resources to pursue their own preferences – if so, there would be a negative relationship between CSR activity and value. El Ghouli et al. found a statistically significant difference of 56 basis points in the cost of equity capital between companies with high and low CSR scores. Importantly for our purposes they investigated the cost of equity for “sin stocks” – those industries that faced some level of stigmatisation. These industries include alcohol, firearms, gambling, military, nuclear, and tobacco. Of those industries El Ghouli et al. found that the nuclear and tobacco industries had higher costs of equity everything else being equal. There can be no doubt that the tobacco industry has been stigmatised and it is no surprise that this industry faces the highest equity capital premium.

Allen Goss and Gordon Roberts provided a similar analysis to El Ghouli et al. looking at the cost of bank loans. They investigated 3,996 bank loans made to 1,265 companies over the period 1991 to 2006. Unlike El Ghouli et al. who examined six CSR categories, Goss and Roberts examined thirteen CSR categories (alcohol, community, corporate governance, diversity, employee relations, environment, firearms, gambling, human rights, military, nuclear power, product quality, and tobacco). The results they reported are quite nuanced – there was a statistically

significant, but economically modest, CSR effect of 7 to 18 basis points. For good quality borrowers CSR concerns are of a second order issue; however, for poor quality borrowers CSR concerns become important. The important contribution this research makes is that it demonstrates that banks (at least US banks) are able to differentiate between the quality of their clients and the CSR activities of their clients. On the other hand, in some of their results it does appear that the tobacco industry does pay higher interest rates than do companies in other industries everything else being equal.

Smaller fossil fuel producers and financial institutions are more likely to bear the brunt of a divestment campaign.

Overall, the cutting-edge research that tangentially investigated the relationship between stigmatisation and the cost of capital (equity and bank debt) suggested that there is some economic cost associated with stigmatisation. The cost to the tobacco industry appears to be larger than other stigmatised industries. These results are generated in the US with its highly liquid, highly competitive capital markets. It is an open question as to how those results would translate into the Australian market which is somewhat smaller and less liquid and competitive than the US market. Again the important issue would be the incidence of these economic costs – to the extent that they would manifest themselves in smaller firms it is very likely that Australian based and largely Australian owned companies would be adversely impacted by a stigmatisation campaign.

3.2 Economy level costs

Sinclair Davidson and Ashton de Silva (2011, 2013) have studied the size of the coal economy in Australia and also the impact of phasing out the Australian coal industry. In 2013 the Reserve Bank of Australia estimated the size of the “resource economy” to be some 18 per cent of gross value added. Using that technique Davidson and de Silva estimated that the Australian coal economy made up 3.1 to 4.2 per cent of gross value added. Given the concentrated nature of the Australian coal industry that 3.1 per cent is almost entirely located in just three states (New South Wales, Queensland and Victoria).

What is particularly important for Australia is the close relationship between coal mining and electricity generation. Access to cheap and reliable electricity forms the basis of Australian prosperity. Importantly the authors showed that for every \$1 million of coal mining output 3.2 jobs were created in the Australian economy.

The fossil fuel divestment campaign would have very similar results to the policy the Australian Greens took to the 2010 election: “oppose the establishment of new coal-fired power stations, new coal mines and the expansion of existing mines ...”. Davidson and de Silva investigated the impact that policy (and related policies) would have on the Australian economy. They reported:

We estimate the direct consequence of that policy [phasing out coal mining] would be to reduce GDP by between \$29 billion and \$36 billion per year. Then there are the indirect costs to consider. For each job lost in the coal mining industry 6.5 jobs will be lost in the economy as a whole. The employment consequences of the coal industry closing would be almost 200,000 jobs across the economy. The loss of corporate income tax and increase in welfare payments would constitute a negative \$6 billion impact on the federal budget. For every \$1 of

income lost in the coal mining industry, \$3.92 of income will be lost in the economy as a whole.

Davidson and de Silva also investigated the contribution coal exports made to the Australian economy, especially during the financial crisis in 2008-09. But for coal exports it is very likely that Australia would have experienced a severe recession at the time.

What is particularly important for Australia is the close relationship between coal mining and electricity generation. Access to cheap and reliable electricity forms the basis of Australian prosperity.

The overwhelming sentiment in the Davidson and de Silva research is that mining in general and coal mining in particular plays a very important role in securing Australian prosperity. The Caldecott, Tilbury and Ma *Stranded down under* report quoted Davidson and de Silva when stressing the importance of the coal industry to the Australian economy. As such it seems somewhat strange that a policy to deliberately stifle such an important industry would be acceptable to the Australian populace. Indeed, electoral support for the Greens has declined since 2010. It also seems strange that a policy that has been decisively rejected at the ballot box should be implemented through a campaign of foreign environmental non-government organisations.

An additional risk relates to stigmatisation of the Australian financial system. It is clear that the environmental movement is vigorously targeting banks that provide finance to fossil fuel companies. A 2011

	Output multiplier	Income multiplier	Employment multiplier
Coal mining	6.12	3.92	6.49
Finance	2.41	3.10	3.19

report by Heffa Schücking, Lydia Kroll, Yann Louvel and Regine Richter labelled those banks that financed coal mining as “Climate Killer Banks”. Five Australian banks were named as being “Climate Killer Banks”. Despite coal making up an important part of the Australian economy no Australian bank was ranked in the top 20 “Climate Killer Banks”. Nonetheless the risk to the Australian financial system is non-trivial. As it is Australian banks are highly reliant on foreign sourced capital – a stigmatisation campaign against “dirty” Australian banks has the potential to incur very real damage on the Australian economy.

To provide some perspective on the importance of the finance sector I show the output, income and employment multipliers of the coal mining sector and finance sector (captured from Davidson and de Silva).

In terms of output and income the finance sector has a similar impact on the Australian economy as does the coal sector. To the extent that the environmental movement targets Australian banks in the process of undermining the coal sector the Australian economy could suffer severe damage to overall output and income levels. ■

4 What can be done?

What we see is a pseudo-sophisticated argument for divestment from fossil fuel companies. The ultimate objective is to ensure that no or little fossil fuel consumption occurs. Having failed to secure that objective in the political arena, some elements of the environmental movement are pursuing that objective by employing economic arguments relating to portfolio choice. They are also engaged in social protest to stigmatise the fossil fuel industry.

In the first instance the argument is being made that the fossil fuel industry's business model may not be viable in future due to technological change and regime uncertainty. This is an argument for holding diversified portfolios but not for divestment. The argument that fossil fuel stocks may have more risk associated with them than do non-fossil fuel stocks is not a valid argument for divestment. In portfolio theory it is the interaction of risk within a portfolio that determines overall risk.

The question of activists engaging in social protest and stigmatisation of the fossil fuel industry is a complex problem. As Ansar, Caldecott and Tilbury warned:

Fossil fuel companies have to decide whether to play 'hardball' or to engage with the campaigners. Evidence suggests that hardball strategies intensify stigmatisation (sic), focusing attention on companies that are unrepentant about violating social norms.

It should not be necessary for individual companies to have to play "hardball". All that is required is that activists maintain their activities within the rule of law. Australia already has laws against secondary boycotts – unfortunately environmental groups are exempt from those laws. The Abbott government has announced plans to remove that exemption to provide a level playing field and hold environmental groups to the same standard as business.

In addition an explicit campaign to stigmatise the fossil fuel industry may fall foul of the Corporations Act 2001. In particular section 1041E states:

- (1) A person must not (whether in this jurisdiction or elsewhere) make a statement, or disseminate information, if:
 - (a) the statement or information is false in a material particular or is materially misleading; and
 - (b) the statement or information is likely:
 - (i) to induce persons in this jurisdiction to apply for financial products; or
 - (ii) to induce persons in this jurisdiction to dispose of or acquire financial products; or
 - (iii) to have the effect of increasing, reducing, maintaining or stabilising the price for trading in financial products on a financial market operated in this jurisdiction; and
 - (c) when the person makes the statement, or disseminates the information:
 - (i) the person does not care whether the statement or information is true or false; or
 - (ii) the person knows, or ought reasonably to have known, that the statement or information is false in a material particular or is materially misleading.

There is a world of difference between arguing, as do Ansar, Caldecott and Tilbury, that investors should be mindful of the risks they face and should carefully consider whether particular investment choices are wise, and deliberately setting out to destroy an industry business model. To the extent that stigmatisation deliberately causes

investors to make valuation errors and consequently rebalance their portfolios away from fossil fuel stocks, a violation of the Corporations Act has occurred. Enforcing that Act and ensuring that Australian capital markets are “fair and transparent” is the primary function of the Australian Securities and Investments Commission.

To the extent that stigmatisation deliberately causes investors to make valuation errors and consequently rebalance their portfolios away from fossil fuel stocks, a violation of the Corporations Act has occurred.

Stigmatisation is an assault on property rights and a legitimate function of government is to protect property rights directly and to create an environment where property rights can be protected by their owners.

Finally, there is some role for direct government policy. As Caldecott et al. demonstrated the costs of coal production in Australia are very high when compared to South Africa, Indonesia, Columbia and the United States. To the extent that future international coal prices do fall it is likely that Australian producers will be adversely impacted (Australia is largely an exporter of coal) relative to coal producers in those countries. Caldecott et al. pointed to some policy relevant reasons for that cost differential – “increased infrastructure costs to pay for increased investment, the introduction of a carbon tax and increased royalty rates.” Ironically they also pointed

to the high value of the dollar – other parts of the economy blame the mining boom for the high dollar.

The increased royalty rates that coal producers face are due to the mining tax – if and when the mining tax is repealed Australian states will find themselves having to compete on royalties. There are other costs too – those associated with red tape and green tape that need to be addressed. Davidson and de Silva have discussed the relative decline of the Australian industry over the past ten years.

For example, in the areas of environmental regulation and uncertainty about parks and wilderness areas, the perceptions of miners are now much more adverse than they were ten years ago. Similarly in the areas of taxation and labour regulation perceptions are much more adverse now than they were ten years ago.

A concerted effort by government to deregulate the industry and provide greater business certainty would go a long way to alleviate the risk of stranded assets that so concerns Caldecott et al. ■

5 Conclusion

In this report I have argued that the case for divestment against fossil fuel producers is overstated. It is an argument dressed up in scientific and economic sophistication, but in essence is simply a call for a secondary boycott of fossil fuel companies.

The divestment campaign aims to create the very risks it warns of, and undermine investor confidence in order to deprive fossil fuel producers of the finance necessary to operate their businesses. As such it is a continuation of a political campaign already rejected at the ballot box by alternative means.

The argument that businesses face the risk of changing market conditions and technology undermining their business model is not unique to any particular industry. Forecasts by some environmental groups that future coal prices might decline should be treated with the same caution that all analyst reports attract. Their views and opinions are as valid as any other – and there are many other opinions.

The argument that the environment places severe constraints on economic activity is not new either. Thomas Malthus (1766–1834) is the most famous economist to

make this argument and more recently the Club of Rome has been making this same argument since 1968. Of course, McKibben & co. could argue that “this time it’s different” – but we’ve heard that argument before too.

The lack of originality in the arguments, however, does not imply that they can be ignored. What is new is the apparent sophistication of the arguments against fossil fuels and pseudo-economic justification for divestment. The concerted, well financed, and internationally coordinated campaign against fossil fuel producers carries with it great dangers and the potential to impose huge costs on the Australian economy.

To the extent that economic resources are redirected from productive use to counter this risk the environmental movement has already succeeded in raising the cost of doing business. The targets of the divestment campaign – the coal industry, the finance industry and the Australian economy in general – will have to increase expenditure on maintaining and enhancing their corporate reputations and promoting Australia as an investment destination. ■

Bibliography

- Myles R. Allen, David Frame, Chris Huntingford, Chris D. Jones, Jason Lowe, Malte Meinshausen and Nicolai Meinshausen, 2009, "Warming caused by cumulative carbon emissions towards the trillionth tonne", *Nature*, 458, 1163 – 1166. (30 April 2009).
- Atif Ansar, Ben Caldecott and James Tilbury, 2013, "Stranded assets and the fossil fuel divestment campaign: what does divestment mean for the valuation of fossil fuel assets?", Smith School of Enterprise and the Environment, Oxford University.
- Australia Institute, 2014, "Climate proofing your investments: Moving funds out of fossil fuels", The Australia Institute.
- Jan Burck, Lukas Hermwille, Christoph Bals, 2013, "The Climate Change Performance Index: Background and Methodology", www.germanwatch.org/en/ccpi_bame.
- Ben Caldecott, James Tilbury and Yuge Ma, 2013, "Stranded Down Under? Environment-related factors changing China's demand for coal and what this means for Australian coal assets", Smith School of Enterprise and the Environment, Oxford University.
- Sinclair Davidson and Ashton de Silva, 2011, "Costing of The Greens' economic policies: Mining", Minerals Council of Australia.
- Sinclair Davidson and Ashton de Silva., 2013, "The Australian coal industry – adding value to the Australian economy", Minerals Council of Australia (then Australian Coal Association).
- Clara Deser, Reto Knutti, Susan Solomon and Adam Phillips 2012, "Communication of the role of natural variability in future North American climate", *Nature Climate Change* 2, 775 – 779.
- Sadok El Ghouli, Omrane Guedhami, Chuck Kwok and Dev Mishra, 2011, "Does corporate social responsibility affect the cost of capital?", *Journal of Banking and Finance*, 35, 2388 – 2406.
- John Fyfe, Nathan Gillett and Francis Zwiers, 2013, "Overestimated global warming over the past 20 years", *Nature Climate Change*, 3: 767 – 769.
- Allen Goss and Gordon Roberts, 2011, "The impact of corporate social responsibility on the cost of bank loans", *Journal of Banking and Finance*, 35, 1794 – 1810.
- Paul Griffin, Rosa Dominguez-Faus, Amy Myers Jaffe and David Lont, 2014, "Science and the stock market: Investors' recognition of unburnable carbon", SSRN Working Paper.
- John Hepburn, Bob Burton and Sam Hardy, 2011, "Stopping the Australian Coal Export Boom: Funding proposal for the Australian anti-coal movement".
- Robert Higgs, 2014, "Regime Uncertainty, Then and Now", *The Freeman*, January/February 2012.
- International Energy Agency, 2013, "Redrawing the Energy-Climate Map", <http://www.worldenergyoutlook.org/media/weowebiste/2013/energyclimatemap/RedrawingEnergyClimateMap.pdf>.
- International Energy Agency, 2014, "Tracking Clean Energy Progress 2014", http://www.iea.org/publications/freepublications/publication/Tracking_clean_energy_progress_2014.pdf
- James Leaton, 2011, "Unburnable Carbon – Are the world's financial markets carrying a carbon bubble?", The Carbon Tracker Initiative.
- James Leaton, Nicola Ranger, Bob Ward, Luke Sussams, and Meg Brown, 2013, "Unburnable Carbon 2013: Wasted capital and stranded assets", The Carbon Tracker Initiative and The Grantham Research Institute.
- Johannes Lehmann and Matthias Rillig, 2014, "Distinguishing variability from uncertainty", *Nature Climate Change* 4, 153.
- Nicholas Lewis and Marcel Crok, 2013, "Oversensitive: How the IPCC hid the good news on global warming", The Global Warming Policy Foundation, GWPF Report 12
- Bill McKibben, 2012, "Global Warming's Terrifying New Math: Three simple numbers that add up to global catastrophe - and that make clear who the real enemy is", *Rolling Stone*, August 2, 2012.

Malte Meinshausen, Nicolai Meinshausen, William Hare, Sarah Raper, Katja Frieler, Reto Knutti, David J. Frame and Myles Allen, 2009, "Greenhouse-gas emission targets for limiting global warming to 2C", *Nature*, 458, 1158 – 1162 (30 April 2009).

MSCI ESG Research, 2013, "Responding to the Call for Fossil-fuel Free Portfolios". MSCI ESG Research Issue Brief.

Luc Renneboog, Jenke Ter Horst and Chendi Zhang, 2008a, "Socially responsible investments: Institutional aspects, performance, and investor behaviour", *Journal of Banking and Finance*, 32, 1723 – 1742.

Luc Renneboog, Jenke Ter Horst and Chendi Zhang, 2008b, "The price of ethics and stakeholder governance: The performance of socially responsible mutual funds", *Journal of Corporate Finance*, 14, 302 – 322.

Heffa Schücking, Lydia Kroll, Yann Louvel and Regine Richter, 2011, "Bankrolling climate change", *Earthlife*.

Andrei Shleifer, 2000, *Inefficient markets: An introduction to behavioral finance*, Oxford University Press.

Luke Sussams, James Leaton, Julian Poulter and Fiona Skewes, 2013, "Unburnable Carbon: Australia's carbon bubble", Carbon Tracker Initiative and The Climate Institute.

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A Critique of the Coal Divestment Campaign

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