



priacademic network RIQUARTERLY

IN THIS ISSUE



POST COP 21 INVESTING COP 21/CM IN A LOW ARBON WORLD

The PRI Academic Research programme aims to engage and inform signatories and responsible investment practitioners with academic research that analyses current thinking and future trends, provides practical recommendations and is thought-provoking. **The RI Quarterly** extracts the essentials and distils key findings from research in a clear and concise manner for investment professionals. **EDITOR:** Adam Aljewicz is a communications specialist and a former financial and economic journalist and editor, most recently with Dow Jones and The Wall Street Journal in London and South Africa.

Follow the PRI Initiative on



Contact: <u>academic@unpri.org</u>

INTRODUCTION

To understand an issue as complex and important as redirecting the global economy to avoid dangerous climate change, the numbers matter. The reports in this month's RI Quarterly call on investors to heed the new climate change calculus of the Paris Agreement.

Six months ago, an agreement contemplating so rapid a low-carbon transition seemed out of reach to many, but the Paris Agreements will come into legal force once just 55 countries representing 55% of global emissions ratify the agreement in their national parliaments.

As a consequence of fulfilling the Paris Agreement, 80% of proven coal reserves may go unused, along with half of proven gas reserves and one third of proven oil reserves. This analysis is provided in the first report in this month's RI Quarterly by McGlade and Ekins. Although a low-carbon transition of this speed sounds drastic and potentially volatile, it is the lesser of two evils for investors according to the team at the Cambridge Institute for Sustainability Leadership, who provide our second report. Their research shows that unless significant and rapid emissions mitigation takes place, up to half the impact of the inevitable climate change and delayed transition may be unhedgeable through asset allocation decisions alone.

Investor exposure to low-carbon infrastructure is currently less than 1% of typical portfolios says Chris Kaminker at the OCED, asking important questions about current asset allocation strategies and the sustainability of historical risk/return benchmarks in this asset class. The same insights lead Caldecott and Rook from the Smith School at Oxford to pose the risk of so-called 'stranded advice' from asset consultants. They outline ways for investors to interpret whether their asset consulting advisor has properly considered the implications of a low-carbon transition.

While investing in the zone between too much global warming and rapid decarbonisation may seem like residing between a rock and a hard place, according to Andersson, Bolton and Samama, the news is not all bad. Their report finds that passive equity investors can enjoy a 'free option on carbon' through carbon-weighted indices, and as a result hedge much of the carbon risk present in passive equity portfolios through emissions reductions of up to 50%.

As our academic and investment practitioner readers will be well aware numbers do not lie. Following resolution of the Paris Agreement, it is time for investors to redo their sums.

Nathan Fabian Director of Policy and Research, PRI

BACK

WITHIN 2°C: WHERE WILL THE STRANDED ASSETS BE?



A study by Christophe McGlade and Paul Ekins demonstrates that in order to limit global warming to 2°C above pre-industrial levels, a third of oil reserves¹, half of gas reserves and over 80% of coal reserves should remain unused until at least 2050. The study also finds that the outcome is broadly similar even if Carbon Capture and Storage (CCS)² is widely deployed from 2025.

The data also breaks down where in the world it is most economically optimal to leave these untapped reserves, which could indicate to investors which particular fossil fuel companies and projects to invest in, divest from or engage with. The authors used an integrated assessment model containing estimates of the types, quantities and geographical locations of existing fossil fuel reserves and resources to map what should remain unused until at least 2050 if there is to be a reasonable chance of keeping within the 2°C limit.

The authors don't assume that other resources should automatically remain unused within the overall emissions limits, as they may be cheaper to produce than reserves and new resources may be developed at a particular time to maintain flow rates, without increasing the total amount used.



Regional distribution of unburnable reserves under the 2°C scenario, with and without CCS:

	2 °C with CCS						2 °C without CCS					
	Oil		Gas		Coal		Oil		Gas		Coal	
Country or region	Billions of barrels	%	Trillions of cubic metres	%	Gt	%	Billions of barrels	%	Trillions of cubic metres	%	Gt	%
Africa	23	21%	4.4	33%	28	85%	28	26%	4.4	34%	30	90%
Canada	39	74%	0.3	24%	5.0	75%	40	75%	0.3	24%	5.4	82%
China and India	9	25%	2.9	63%	180	66%	9	25%	2.5	53%	207	77%
FSU	27	18%	31	50%	203	94%	28	19%	36	59%	209	97%
CSA	58	39%	4.8	53%	8	51%	63	42%	5.0	56%	11	73%
Europe	5.0	20%	0.6	11%	65	78%	5.3	21%	0.3	6%	74	89%
Middle East	263	38%	46	61%	3.4	99%	264	38%	47	61%	3.4	99%
OECD Pacific	2.1	37%	2.2	56%	83	93%	2.7	46%	2.0	51%	85	95%
ODA	2.0	9%	2.2	24%	10	34%	2.8	12%	2.1	22%	17	60%
United States of America	2.8	6%	0.3	4%	235	92%	4.6	9%	0.5	6%	245	95%
Global	431	33%	95	49%	819	82%	449	35%	100	52%	887	88%

FSU, the former Soviet Union countries; CSA, Central and South America; ODA, Other developing Asian countries; OECD, the Organisation for Economic Co-operation and Development. A barrel of oil is 0.159 m³; %, Reserves unburnable before 2050 as a percentage of current reserves.

^{1.} Proven and probable reserves are the subset of total resources deemed to be recoverable under current economic conditions and that have a specific probability of being produced.

^{2.} Carbon capture and storage (CCS) is a technology that can capture up to 90% of the CO2 emitted by using fossil fuels, preventing it from entering the atmosphere.

CALCULATIONS

The authors calculated the economically-optimal fossil fuel use solution, based on the estimated production costs of each of the oil and gas resource categories within each country.

They used data from previous models that quantify the volumes of oil, gas and coal produced globally under a range of future emissions trajectories. The different greenhouse gas emissions profiles from each fuel were then converted to approximate temperature rise trajectories (using the MAGICC³ climate model) and mapped against cumulative production from 2010 to 2050. From over 1,000 scenarios, 379 resulted in a temperature rise less than 2°C.

To test assumptions, the authors constructed further sensitivity scenarios (using the TIAM-UCL⁴ integrated assessment model) spanning a broad range of assumptions on production costs, demand projections, technology availability, etc.

They then compared total production with the projections from their scenario that remain within 2°C. Other regional distributions of unburnable reserves are possible while still remaining within the 2°C limit, but would have a higher impact on social welfare.

RESULTS

Over 430 barrels of oil and 95 trillion cubic metres of gas currently classified as reserves should remain unburned until at least 2050 (even when CCS is available). The Middle East, although using over 60% of its oil reserves, carries over half of the unburnable oil globally, and would need to leave over 260 billion barrels in the ground. The Middle East also holds half of unburnable global gas reserves, with Former Soviet Union countries accounting for another third: they would only be able to use half their current reserves.

Coal is by far the least-used fossil fuel under the 2°C scenario, with 82% of global reserves remaining unburned before 2050. The USA and Former Soviet Union countries would each use less than 10% of their current reserves, meaning over 200 billion tonnes of coal reserves remaining unburned. Coal reserve use is 25% higher in China and India, but they still should also leave nearly 200Gt of their current coal reserves unburned.

For oil, in Canada, while in situ production of natural bitumen can continue, because it's a carbonintensive form of oil, the energy required to produce it must be rapidly and totally decarbonised. This occurs particularly through the use of CCS, so without CCS, all bitumen production ceases by 2040. Similar results are seen for Venezuelan extra-heavy oil, where 99% resources are deemed unburnable, even with CCS, meaning any increase in unconventional oil production at all is likely incommensurate with efforts to limit global warming to $2^{\circ}C$.

Due to the expense of CCS, its relatively late introduction (2025) and the assumed maximum rate at which it can be built, it has a modest effect in this model: burnable coal reserves are only 6% higher with CCS, and oil and gas just 2% higher.

In the Arctic Circle, the authors estimate there to be 100 billion barrels of oil and 35 trillion cubic metres of gas that were not being produced as of 2010. As neither scenario models using these resources as part of the most economically efficient global balance, the authors believe that all Arctic resources should be classified as unburnable.

^{3.} Model for the Assessment of Greenhouse Gas Induced Climate Change.

^{4.} The TIMES Integrated Assessment Model in University College London ("TIAM-UCL") models all primary energy sources from resource production and conversion to sectoral end-use. It maximises social welfare under a number of imposed constraints.

CLIMATE RISK: THE UNHEDGEABLE HALF



A Cambridge Institute for Sustainability Leadership (CISL) report shows that up to half of the losses from shifting market sentiment to climate change can be offset through asset allocation, but that the remaining half is unhedgeable at the investor level, leaving investors exposed unless system-wide action is taken.

The report also demonstrates that for the global economy overall, action to limit global warming to below 2°C will, despite a short-term negative impact, lead to higher long-term growth than if no action is taken.

THE MODEL: SCENARIOS AND SHOCKS

The research team modelled the impact of three climate change scenarios:

	TWO DEGREES	BASELINE (STATUS QUO)	NO MITIGATION
•	global warming remains within 2°C of pre-industrial levels reduced dependency	 governments fail to step-up actions on climate change fossil fuel energy production remains 	 no consideration for environmental challenges higher energy demand dominated
•	on fossil fuels no further investment and subsidies for fossil fuel	 fossil fuel energy investment remains unchanged 	 rapid technological progress in large- scale fossil fuel exploration and
•	rapid development in clean energy technologies		extraction expected temperature rise of
•	widespread adoption of carbon mitigation reduction targets		4°C degrees or more by 2100

Within each scenario, the impact of various "sentiment shocks" was modelled, caused by triggers such as disruptive technology, significant new climate-related policy, asset stranding and extreme weather events. The shocks were introduced into the model at Q1 2016, and their impact was mapped progressively over five years, along with the cumulative macroeconomic long-term impact at 2050. The magnitude of the most severe confidence shock is approximately half the size of the shock that led to the 2008 financial crisis.

PORTFOLIO IMPACT

The model was applied to four example portfolios, three representative of different types of pension funds (Conservative, Balanced and Aggressive) and one of insurance companies, containing a very high proportion of fixed income investments (High Fixed Income). The shocks introduced were based on varying levels of carbon taxation, energy investment, green investment, energy and food prices, energy demand, market confidence and housing prices.

FULL REPORT



<u>Unhedgeable Risk – How</u> <u>Climate Change Sentiment</u> <u>Impacts Investment</u>

AUTHORS

Prof. Douglas Crawford-Brown, Jennifer Copic, Dr Aideen Foley, Dr Scott Kelly, Dr Eugene Neduv, Prof. Daniel Ralph, Dr Farzad Saidi and Jaclyn Zhiyi Yeo. The study design and editorial process was led by Dr Jake Reynolds (Director, Sustainable Economy, CISL), Rob Lake (independent consultant) and Clarisse Simonek (Programme Manager, Investment Leaders Group, CISL).





The Aggressive portfolio performs worst of all the portfolios in the No Mitigation scenario, losing around 45% within the first year and never recovering. Under the Two Degrees scenario, however, the portfolio again suffers the largest initial loss, but recoups its losses by the end of year two and overtakes the Baseline scenario in year four. The authors then analysed sectors in developed and emerging markets to examine the hedging potential of cross-industry diversification and investment in sectors with low climate risk. Under the No Mitigation scenario, 47% of the negative impacts of climate change across industry can be hedged through industrial diversification and investment in industries that exhibit few climate-related risks. Similarly, shifting from an aggressive equity portfolio to one with a higher percentage of fixed-income assets makes it possible to hedge 49% of the risk associated with equities. The effects of each strategy are not cumulative, however, and no individual strategy offsets more than half the risk.

Macroeconomic impact



In the No Mitigation scenario, the economy suffers an economic loss that continues indefinitely, while in the Two Degrees scenario, the economy performs worse than Baseline for about the first decade, but eventually recovers and outgrows it by 4.5% in the long-term.

NEXT STEPS

CISL concludes that constructive dialogue between investors, governments and regulators is needed to examine the conditions necessary to build more resilient financial markets under unprecedented environmental change.



DECARBONISED INDEXES CAN HELP HEDGE CLIMATE RISK



Mats Andersson, Patrick Bolton and Frédéric Samama demonstrate that a decarbonised index offers long-term, passive investors a way to hedge climate change risk without sacrificing financial returns.

Andersson et al see existing green indexes as a bet on clean energy rather than a hedge against carbon risk. Their work moves the focus away from the inevitable transition to renewable energy, to concentrate on the timing risk associated with climate policy. The underlying premise is that financial markets currently under-price carbon risk, but that while at some point that will change, predicting the timing of the future climate mitigation policies, which will drive that change, is a key challenge. The authors show that a decarbonised index (one that takes a standard benchmark, such as the MSCI Europe in the figure below, and removes or underweights companies with relatively high carbon footprints) can match benchmark returns prior to the introduction of global CO2 emissions limits, and once CO2 emissions limits are expected to be introduced, outperform the benchmark, effectively giving investors what the authors call a "free option on carbon".

To keep a similar aggregate risk exposure as the standard market benchmark , the authors work with a constraint on the maximum allowable tracking error (how closely the portfolio follows the index to which it is benchmarked) before decarbonising it by divesting from any companies that have a carbon footprint exceeding a given threshold.



MSCI Europe Low Carbon Leaders vs MSCI Europe

(source: MSCI, Amundi)



— EUROPE LOW CARBON LEADERS Standard (Large+Mid Cap) Environmental EUROPE Standard (Large+Mid Cap) Whilst less carbon exposure could be achieved by taking greater risks, this strategy errs on the side of caution to provide stable, long-term returns while limiting active stock trading.

Filtering stocks on a sector-by-sector basis maintains a similar sector composition as the benchmark, with the added benefit of fostering competition between companies within each sector to reduce their carbon emissions. Different filters can be used to normalise companies' carbon footprints to reflect their energy efficiency/wastage and sector peculiarities, for example dividing CO2 emissions by: tons of output in the oil and gas sector, sales per kilometre in the transport sector, total GWh electricity production in the electricity utility sector, or total sales in the retail sector.

EFFECT ON COMPANIES AND GOVERNMENTS

Reviewing the index annually and clearly communicating which stocks are included or excluded should foster competition, rewarding the included companies and putting pressure on those left out to reduce their carbon footprint and join or re-join the index. Governments can act as a catalyst to accelerate the mainstream adoption of these indexes by pushing public asset owners (public pension funds, sovereign wealth funds) to invest in them.



CASE STUDY: AP4

The Fourth Swedish National Pension Fund (AP4) was the first institutional investor to adopt decarbonised indexes on a significant scale. It used a decarbonised index based on the S&P 500 and reduced the overall carbon footprint by 50%. Since first investing in November 2012, AP4's S&P U.S. Carbon Efficient portfolio has outperformed the S&P 500 benchmark index by 24 basis points annually.

AP4, with the Fonds de Réserve pour les Retraites (FRR) and asset manager Amundi, subsequently worked with MSCI to develop the MSCI Europe Low Carbon Leaders Index, which addresses carbon exposure by excluding the worst performers on carbon emissions and stranded assets. From November 2010 to April 2015, this index delivered an 80 basis point annualised outperformance of the MSCI Europe index that it benchmarks.

ARE INVESTMENT CONSULTANTS' REPUTATIONS THE NEXT STRANDED ASSETS?



A paper from Ben Caldecott and Dane Rook lays out why investment consultants are not having a bigger influence on the uptake of green investment practices by asset owners. A key tension underpinning the relationship is the extent to which it is demand from asset owners or supply from investment consultants that determines which issues are addressed.

LACK OF DEMAND

The study identifies a lack of demand by asset owners, not due to a lack of awareness on green issues, but factors including: the belief that green issues aren't sufficiently material, the (false) belief that their fiduciary duty means they have no legal ability to act on sustainability issues as well as underresourcing and a desire for minimal governance structures.

Asset owners also often have misaligned beliefs, values, and investment policies. Investment consultants can help asset owners address these misalignments, but it may not be the place of investment consultants to influence what asset owners' beliefs and values should be in the first place. The authors see investment beliefs as the mechanism to help investment consultants address all material issues, rather than simply the issues that asset owners feel are immediately material at any given point.





RELUCTANCE TO SUPPLY

Study participants also agreed, however, that investment consultants have a duty of care to present their asset owner clients with issues they perceive as material, even if those issues are not specifically requested by their clients.

Yet investment consultants are loathe to push issues onto asset owners if the client doesn't believe an issue is material to them. This leaves the balance of power with asset owners in terms of how issues are broached and prioritised in typical investment consultant-asset owner relationships.

There is similarly a desire by investment consultants to deliver products and services that fit with labels used by asset owner clients (particularly those appearing in mandates), and green investment lacks a standard set of labels. Differing use of terms can also lead to disagreement and misunderstanding between asset owners and investment consultants.

The danger for investment consultants is that in not forcing sustainability onto the table, they risk stranding their most valuable asset – their reputation. When the long-term changes materialise, asset owners may find their investment consultants culpable for not having sounded the environmental alarms loudly enough when they had the opportunity to do so.

Other factors that hinder investment consultants' ability to influence the take-up of green investment practices, include:

- The dominant portfolioconstruction paradigm based on asset classes may be overly restrictive. By focusing on risk factors rather than on asset classes, investment consultants could achieve more progress.
- The major threats from environmental change aren't easily quantifiable so any measurement is viewed as subjective and often given less attention by investment consultants.
- The relatively small margins investment consultants operate under and a lack of specific green investment fees might be driving their lack of innovation.

By collaborating with one another, investment consultants can share expertise, time and experiences to build pools of resources, achieve breakthroughs in products and concepts that would be unreachable separately and correct misinformation, such as misplaced fiduciary duty beliefs. Though there are hurdles around working with competitors, it could help preserve the collective reputation of the industry.

Investment consultants can also add substantial value, and command higher fees, by developing expertise in potential long-term policy and regulatory reactions to sustainability issues, and taking a proactive role informing policy makers and regulators on policy and regulatory moves that may help promote green investment.

EVALUATING INVESTMENT CONSULTANTS

The authors created a checklist and scoring system to give asset owners a rapid indication of how expert an investment consultant is in green investment issues, and how wellmatched an investment consultant is to address an asset owner's specific green investment needs.

The checklist tests, for example, if an investment consultant is:

- familiar with current research and able to instantly identify who in their organisation is the relevant expert;
- a leader in initiatives promoting green investment practices;
- closely involved in developing scoring methodologies, indices or new green investment products;
- integrating green principles throughout their own organisation.

The authors developed a step-by-step procedure to order asset owner's green investment ambitions, relative to its abilities to achieve those goals, and then establish which investment consultants can provide green investment solutions. An asset owner's needs could include:

- selecting green investment funds;
- assessing political opportunities connected to green investment legislation;
- scenario planning for sustainability threats;
- help in recruiting teams with green expertise.

The toolkit can also be used to evaluate or benchmark investment consultant performance on non-green issues, mandate design, budgeting or costing exercises and analysing decisions on in-sourcing advisory functions.



HOW POLICY MAKERS CAN MAKE SUSTAINABLE ENERGY PROJECTS BANKABLE



Christopher Kaminker of the OECD has identified barriers to institutional investors filling the financing gap in sustainable energy investing, outlining recommendations to policy makers on how these barriers can be mitigated.

Over the next 20 years, the capital expenditure needed – in energy supply and efficiency – in order to get emissions consistent with limiting global temperatures to 2°C over preindustrial levels will top US\$53 trillion, which cannot be reached without the capital controlled by institutional investors. Yet in 2013, large pension funds allocated just 1% of their assets to direct investment in infrastructure projects of any type, and only 3% of that infrastructure investment was in sustainable energy infrastructure.

Capital is available to be deployed for sustainable energy projects, but there is a dearth of bankable projects. In order to significantly boost the flow of capital to sustainable energy projects by institutional investors, governments need to consider policy interventions to make more projects viable for institutional investment.

INVESTMENT CHANNELS

Kaminker analysed 47 examples of investment by large pension funds in sustainable energy projects totaling in excess of US\$8 billion, along with 20 examples of investment in companies engaged exclusively in sustainable energy activities.

He established a classification framework and set of investment pathways to illustrate how to classify a particular investment, to identify where investment is or is not flowing, and highlight how governments can support new investment channels.

The result is a review of the investment channels (instruments and funds) that can be used and the policy interventions that can enable these investments, either through mitigating risks (eg. guarantees or public stakes) or lowering transaction costs (eg. securitisation).

For instance, project bonds often can't attain the investment grade rating required by institutional investors due to a lack of performance history, but

FULL REPORT



policy makers can use public funds to improve their creditworthiness as is done with the EU project bond initiative. They could revise covered bond legislation to open up the market to sustainable energy, or pool smaller projects to create securities of an investable scale. Listed equity funds that pool projects, known as YieldCos, are a rising trend among institutional investors, raising approximately US\$4.5 billion in the US and UK in 2014.



RISKS AND RECOMMENDATIONS

Emerging markets will particularly benefit from sustainable energy investment, but bring specific and additional risks: foreign exchange risk, lack of a proven track record from the asset developer, liquidity risk affecting the ability to exit an investment and a lack of credit-worthiness of many state-owned power utilities as offtakers of the energy produced.

These are in addition to the broader set of risks, for which the author makes the following set of recommendations to policy makers:

- Improve the legal and investment regime underpinning sustainable energy infrastructure investments, strengthen competition policy and create a level playing field between independent and stateowned power producers.
- 2. Institute a green investment policy framework to avoid sudden or retroactive policy changes. Address unintended consequences of other policies or regulation.
- 3. Address market failures: improve electricity market design; put an explicit price on carbon; phase out fossil fuel subsidies.
- 4. Establish a national infrastructure strategy and road map and create a credible sustainable energy pipeline.
- 5. Develop liquid markets for sustainable energy infrastructure financing instruments and funds (eg. green bonds and YieldCos).
- 6. Mitigate investor risks to attract private investment (e.g. credit enhancements and revenue guarantees).



- Reduce the transaction costs associated with sustainable energy investment and foster collaboration amongst institutional investors and financial institutions.
- 8. Promote market transparency and standardisation.
- 9. Consider establishing a specialpurpose "green investment bank".

UPCOMING EVENTS



Date:

Wednesday, 17 February 2016

Time:

14:00 – 15:00 GMT

In this one-hour webinar, Deutsche Asset & Wealth Management and the University of Hamburg will present the findings from the most extensive research to date on whether integrating ESG into the investment process has a positive effect on corporate financial performance. The research, which analyses over 2,200 studies, also looks at whether the effect on company's is stable over time, how a link between ESG and corporate financial performance differs across regions and asset classes and whether any specific sub-category of E, S or G has a dominant influence.

The PRI collaborated with Deutsche Asset & Wealth Management and the University of Hamburg in developing the report, which has received growing coverage in the specialist and general press, including being featured in Forbes, Responsible Investor and Environmental Finance.

Join this webinar to:

- learn more about the ESG opportunities that exist in different regions and asset classes;
- put your questions to the authors.

This webinar will be moderated by Katherine Ng, Head of Academic Research, PRI

Confirmed speakers include:

- Gunnar Friede, Director | Senior Fund Manager, Deutsche Asset & Wealth Management Investment GmbH
- Michael Lewis, Head of Sustainable Finance Research, Deutsche Asset & Wealth Management
- Alexander Bassen, Professor of capital markets and management at the University of Hamburg, Faculty of Business, Economics and Social Science

Register here

Access the underlying academic paper

Accessthe report

The PRI is an investor initiative in partnership with **UNEP Finance Initiative** and the **UN Global Compact**.

United Nations Environment Programme Finance Initiative (UNEP FI)

UNEP FI is a unique partnership between the United Nations Environment Programme (UNEP) and the global financial sector. UNEP FI works closely with over 200 financial institutions that are signatories to the UNEP FI Statement on Sustainable Development, and a range of partner organisations, to develop and promote linkages between sustainability and financial performance. Through peer-to-peer networks, research and training, UNEP FI carries out its mission to identify, promote, and realise the adoption of best environmental and sustainability practice at all levels of financial institution operations.

More information: www.unepfi.org



UN Global Compact

Launched in 2000, the United Nations Global Compact is a both a policy platform and a practical framework for companies that are committed to sustainability and responsible business practices. As a multi-stakeholder leadership initiative, it seeks to align business operations and strategies with 10 universally accepted principles in the areas of human rights, labour, environment and anti-corruption, and to catalyse actions in support of broader UN goals. With 7,000 corporate signatories in 135 countries, it is the world's largest voluntary corporate sustainability initiative.

More information: www.unglobalcompact.org

