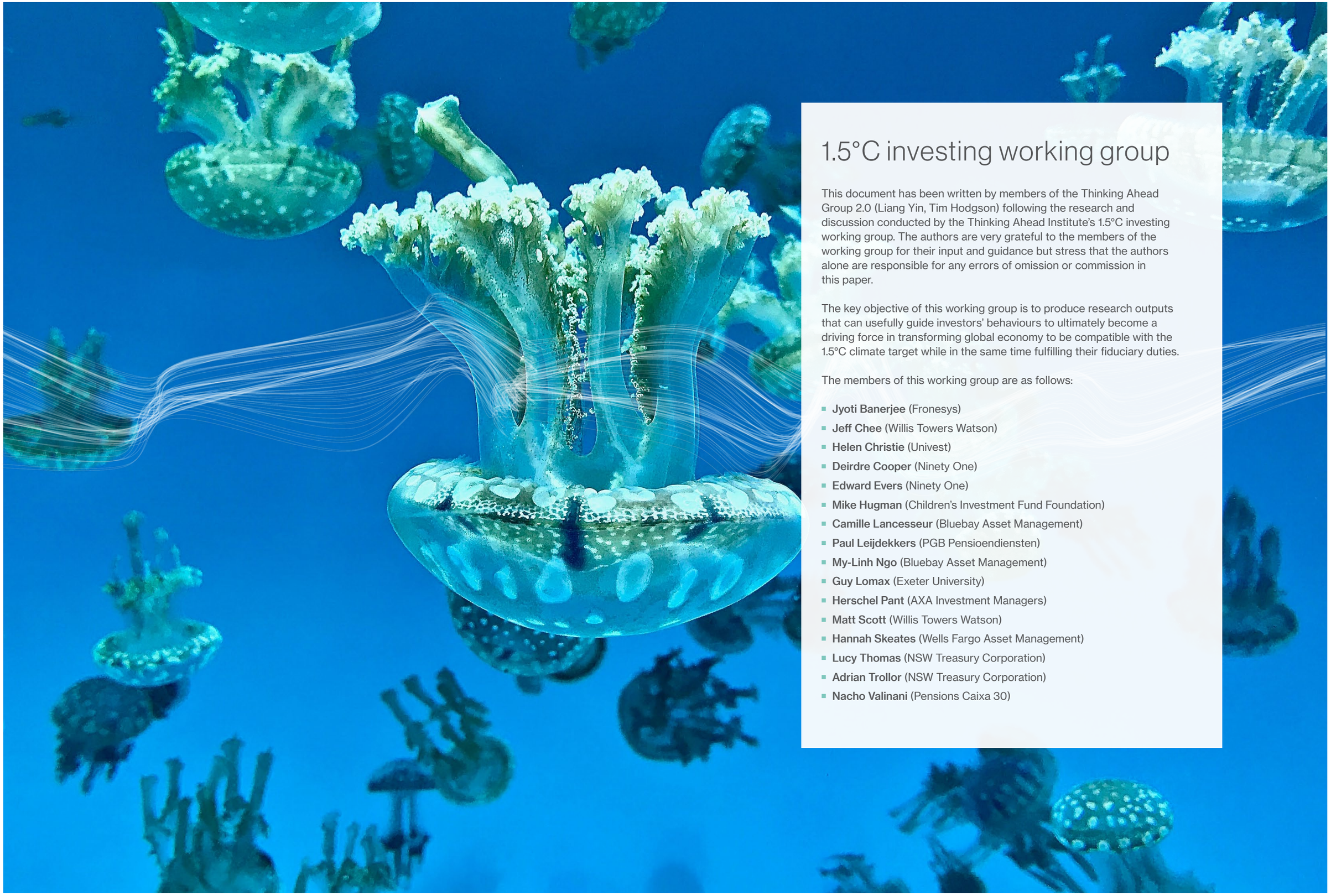
Thinking Ahead Institute

How much of the climate problem does the investment industry own, and what should it do about it?

The answer is a lot more primary investment



1.5°C investing working group

This document has been written by members of the Thinking Ahead Group 2.0 (Liang Yin, Tim Hodgson) following the research and discussion conducted by the Thinking Ahead Institute's 1.5°C investing working group. The authors are very grateful to the members of the working group for their input and guidance but stress that the authors alone are responsible for any errors of omission or commission in this paper.

The key objective of this working group is to produce research outputs that can usefully guide investors' behaviours to ultimately become a driving force in transforming global economy to be compatible with the 1.5°C climate target while in the same time fulfilling their fiduciary duties.

The members of this working group are as follows:

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- **Jeff Chee** (Willis Towers Watson)
- **Helen Christie** (Univest)
- **Deirdre Cooper** (Ninety One)
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Summary

This paper explores two questions:

1 How much of the climate problem does the investment industry own? If it turns out that 99% of emissions come from state-owned coal companies, wildfires and melting permafrost, does it really matter if the investment industry completely decarbonises its 1%? We will conclude that the investment industry owns about one-quarter of the climate problem. Meaningful enough to proceed to question #2

2 How do we cut through the complexity to find the 'one thing' the industry should focus on? We will conclude that the answer is for the investment industry to do more new, primary investment – a lot more. This could be investments in scaling up the mature technologies of renewable electricity generation, or investments in more speculative technologies such as negative emissions technologies (NETs).

How much of the climate problem does the investment industry own?

Answering this question feels like a necessary first step towards assessing how the investment industry might address the climate problem. However, it is not a given that ownership of a problem naturally leads to the owner solving the problem. We will briefly refer to this later. Also, it is worth stating up front that only being a partial owner of the climate problem provides no mitigation to the risk of climate change. Portfolios will feel the effects of the whole of climate change.

As a passing comment, we were surprised at how hard it was to make sense of an apparent abundance of data on emissions. Some datasets favour carbon dioxide (CO_2) emissions, others greenhouse gas (ghg) emissions; each dataset appears to define sectors differently. As a consequence we developed a rule of thumb (CO_2 is 70-75% of total ghg) and developed our own, high-level, sectors to suit the current thought experiment.

Finding total emissions data on the internet is straightforward, but the data comes with a lag. It takes a little more reading around to find estimates of current emissions rates. For our purposes, we do not need a high level of accuracy so we will state that current CO_2 emissions are slightly below 40bn tonnes per annum[1], and ghg emissions around 52bn tonnes[2,3].

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Finding the investment industry's 'ownership' of emissions requires a bit more work, and some assumptions – which can clearly be challenged. Arguably, a more accurate way to quantify the investment industry's emissions would be bottom-up – aggregating all the emissions from all the assets owned. However, there are substantial data challenges with this approach, including the problem of cross ownership of shares. We are not looking for high accuracy at this stage and are willing to tolerate some rough justice implied by simplifying assumptions. Consequently, we assume:

1. The investment industry owns the entirety of all listed companies (they actually own a large subset, so at this stage we are overcounting)
2. Corporate bonds are only issued by listed companies (this assumption allows us to ignore corporate bonds; we do not know in which direction the inaccuracy of this assumption would affect the results)
3. Lending money to sovereigns (buying their bonds) does not make the investment industry responsible for public-sector emissions
4. Allocations to real estate and private equity are relatively small and therefore the emissions can be 'covered' by the overcounting within assumption #1.

In short, this list of assumptions allows us to proxy the investment industry's emissions by simply considering a global equity index, for which aggregate data exists. If we consider the MSCI All Country World Index, then current ghg emissions (scope 1 and 2) are currently 6.4bn tonnes. We make one final, heroic, assumption that the scope 3 emissions (largely attributable to the use of sold products) are the same size as the scope 1 and 2 emissions. From informal conversations with industry peers it appears that the range of estimates for the size of scope 3 emissions is wide, from the lowest being around 50% of scope 1 and 2 to the highest being in excess of 100%. We have assumed something at the upper end of the range. It follows that public investor-owned companies produce around 12.8bn tonnes of annual ghg emissions and are therefore responsible for about 25% of all emissions (12.8/ 52 = 24.6%).

[1] ourworldindata.org states that 2018 CO_2 emissions were 36.58bn tonnes (link here)

[2] ourworldindata.org carries an article quoting 52.3bn tonnes, which we think relates to 2017 as the source quoted is a 2018 paper. The expectation for 2020 from exponentialroadmap.org is 54.2bn tonnes (version 1.5 updated March 2020. link here)

[3] We follow standard convention for these measurements in that ghg emissions are measured in tonnes of 'CO_2e' which is shorthand for carbon dioxide equivalent

Relying on assumptions is more comfortable the more confident we can be that they are reasonable. To this end, we looked for evidence to corroborate this result – and we (re)discovered a CDP report from 2017[4]. Using data for 2015, CDP attributed 30.6bn tonnes of ghg emissions to 224 fossil fuel extraction companies ("operational and product GHG emissions" from page 10 of their report). This is approximately 60% of total emissions (30/50). In essence they have attributed back emissions from all other sectors (ie scope 3 activity). This is very pragmatic in terms of simplifying the number of companies to engage with, but is it reasonable?

We will check the reasonableness two ways. First, we will see if we can get close to the 25% number derived from the MSCI ACW Index, and second, we will see if we can satisfactorily explain the 'missing' 40% of emissions.

"... the investment industry is "directly" responsible for about 25% of annual emissions [(30% + 11%) of 60%]."

Helpfully, CDP provide further information. They state that of the 30.6bn tonnes, 30% come from public investor-owned companies, 11% from private investor-owned companies and 59% from state-owned companies. [Note, this is 2015 data so pre-Saudi Aramco's IPO which would shift the proportions slightly]. For now we will assume all of the 11% private sector is attributable to institutional investors, but this is likely an overstatement. It follows that the investment industry is "directly" responsible for about 25% of annual emissions [(30% + 11%) of 60%]. Tada, as some might be tempted to say.

For the second test we must continue with a relaxed attitude to accuracy as we will need to cast around and combine other data sources. The results of our research are shown in the table below.

For our part, we are satisfied that the missing 40% of emissions is sufficiently explainable that we think the CDP approach is very reasonable. It also throws a new light on the problem, which then suggests new solutions. This is the second question this paper deals with, and we will get to it shortly.

Table 1 – **Research results**

Owner	Allocation	Source
Investment industry	c. 25%	CDP Carbon Majors Report 2017
State-owned fossil fuel companies	c. 35%	CDP Carbon Majors Report 2017
Agriculture	15-25%	Food Climate Research Network Post-farm food system is a further 5-10% but a proportion of this is likely accounted for in top two rows
Wildfires	5-10%	Inside climate news Figure for 20 years to 2017; new records for wildfires have been set over the last couple of years
Other	5%+	A catch-all covering waste, deforestation, melting permafrost and other activities

[4] CDP Carbon Majors Report 2017

An aside on accuracy

We have mentioned a couple of times already that we are not aiming for accuracy. This is largely because of the uncertainty within the data we are dealing with. To illustrate, consider the wildfires row in the table opposite. The linked article suggests the average annual release of CO_2 was 8bn tonnes. However, other effects including regrowth offset some of this, leading to their estimate of 5-10%. The note in the table is intended to convey that the emissions for 2018 would be higher, and for 2019 and 2020 higher still. To this point, Prof Ian Goldin suggests that wildfires in 2018 released 32bn tonnes of CO_2[5]. This is materially different(!). In fact, it is shockingly different. If it is true, then our understanding of the emissions data, such as it is, allows us no other conclusion that the ghg annual emissions data of 52bn tonnes we have being using are wrong – by about 50%. If wildfires are now producing 32bn tonnes, or more, each year rather than the historical level of 8bn, then we need to add 24bn tonnes to our annual figures. We should probably brace for some bad news from the IPCC in due course. We might be told that the remaining carbon budget associated with 1.5°C of warming is now lower, by a substantial margin.

Does owning a problem lead to solving the problem?

Our purpose, in addressing the first of our two questions, was to attribute a proportion of the climate problem to the investment industry. We are satisfied that one-quarter is a reasonable attribution. What the investment industry does with this conclusion is far from certain. A number of considerations apply here:

- What capacity do industry organisations have to contribute to a solution? (ability)
- What should be the extent of the contribution – minimum, fair share, generous? (extent)
- Do industry organisations have a moral incentive to contribute? (intrinsic motivation)
- Is the solution likely to be profitable, reducing fiduciary duty concerns? (extrinsic motivation)

[5] *Terra Incognita: 100 Maps to Survive the Next 100 Years*, Ian Goldin and Robert Muggah, Penguin, 2020

The consideration we would like to expand on here is the extent of the contribution. Is the minimum contribution to do nothing, and leave the problem for governments and investee companies to sort? Is the investment industry's fair share solving 25% of the problem? Or, given that wildfires and melting permafrost are not going to amend their ways and provide their fair share of the solution, is it a higher number? And is being generous even possible when bound by the requirements of fiduciary duty? All of these questions imply autonomy, but that is not a given. The inevitable policy response could introduce compulsion, and if that is combined with cynicism regarding the realism of required actions we could find ourselves in a pretty toxic industry culture. Better, in our opinion, to get out ahead and start on some meaningful actions while they remain voluntary. The Institute and its working groups will continue to grapple with difficult issues such as these.

The answer is more primary investment; a lot more

For now, we will assume the investment industry (more accurately, the organisations within it) wishes to at least do its fair share. In other words, the investment industry will look to reduce annual absolute ghg emissions by 25% (13bn tonnes). This leads us directly to the second question: how do we cut through the complexity to find the 'one thing' the industry should focus on? We have already given our answer in the title. We now document the thinking required to navigate from the question to the answer.

The simplifying assumption

The way to cut through all the complexity of scopes 1, 2 and 3 and the ensuing double counting is found in the CDP report already mentioned. As a quick reminder, in that report CDP attributed 30bn tonnes of (2015) carbon emissions to 224 fossil fuel extraction companies. The logic here is that if fossil fuels were not extracted from the ground, they would not be burned and emissions from this source would be zero. We can therefore simplify the emissions problem as comprising only the scope 1 and scope 3 ('use of product') emissions of the fossil fuel extractors. In other words, emissions from (most) other commercial activity fall within scope 3 of these fossil fuel companies.

We are effectively assuming that energy is fungible – we can painlessly and costlessly switch between carbon-based energy and zero-carbon energy. This is patently not true, particularly in the cases of aviation and shipping. It also ignores other sources of demand for oil in particular, such as the chemicals industry. We will not be able, therefore, to limit our intervention to a small number of fossil fuel companies. In some cases we will need to take the next step down the supply chain.

Even though this assumption is obviously flawed, it yields a very powerful insight. It's all about the cleanness of the energy supply that the economic machine runs on. This in turn leads us to conclude that 'the answer' (the interim answer, in our case) is zero-carbon energy.

Zero-carbon energy | the $110trn transition problem

The International Renewable Energy Agency (IRENA) estimates that the cumulative investment required between 2016 and 2050 to transform the global energy system to meet the objective of the Paris agreement is $110trn[6]. This is a very big number – approximately the same size as the total assets currently stewarded by the investment industry. And, for the avoidance of doubt, this is the 'a lot more' new, primary investment we are talking about.

The path to zero-carbon energy

To define the path of decarbonisation we must consider two further questions. First, how close to zero are we aiming?

To answer this question let's define a spectrum. At one end, net-zero emissions are achieved by reducing absolute emissions to zero. We label this the 'low-carbon risk, high-transition risk' (LCHT) path. At the other end, absolute emissions could, theoretically, grow as achieving net-zero is driven by scaling-up negative emissions technologies (NETs). We label this the 'high-carbon risk, low-transition risk' (HCLT) path. It is clear, then, that the choice of how low to drive absolute emissions will be driven by a belief concerning where on the spectrum we should aim[7]. It is worth stressing that this is a belief – the consequences of running either high-carbon risk or high-transition risk are unknowable at this point in time.

It is worth noting that the choice of position on the spectrum does not change the requirement for a massive amount of new primary investment. At the LCHT end the investment is into renewable energy capacity; at the HCLT end the investment is into NETs.

The second question is what 'shape' of decarbonisation path do we prefer? (We can worry about practicality later.) The Institute's 1.5°C investing working group have already adopted an exponential shape (-7% pa) as a foundation, but the path could take a close-to-infinite number of forms. The key point we make here is the difference between front-end loading, where the big carbon reductions are done early (as with the exponential) and back-end loading, where the big carbon reductions are left until the end of the target period. This is another angle on the carbon risk issue. Back-end loading the reductions is choosing to run higher carbon risk and would be a characteristic of any path relying heavily on NETs which will require time to be scaled up.

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[6] See the IRENA.org website: summary page here, 2019 report page here

[7] This spectrum is analogous to the four illustrative model pathways within the IPCC special report on 1.5°C. LCHT corresponds to the IPCC's P1 path, and HCLT to P4 (link here)

"Not only is the carbon problem novel, it is also non-linear. The physical consequences of the next 0.1°C rise in temperature are more severe than the previous 0.1°C increment".

An aside on carbon- versus transition-risk beliefs

According to our beliefs, carbon risk and transition risk are very different, and therefore should receive different consideration.

Whether you subscribe to Joseph Schumpeter's idea of creative destruction, or to the Santa Fe Institute's conception of the economy as a complex adaptive system, the global economy is always in transition. Sometimes the transition is smooth and gradual, at others it is abrupt. So, as we transition from a carbon-based economy to a zero-carbon economy new jobs will be created. We just don't know whether they will be more or less numerous, or better or worse than the jobs that get destroyed. In any event we should expect some individuals to be adversely affected, perhaps severely so. It is only humane, therefore, to minimise and carefully manage the transition risk.

Carbon risk is different in that the economy (and humans for that matter) hasn't had to deal with this concentration of carbon in the atmosphere before. Not only is the carbon problem novel, it is also non-linear. The physical consequences of the next 0.1°C rise in temperature are more severe than the previous 0.1°C increment. And, most significantly of all, at some unknown level of temperature rise humans, and most other life forms, will face existential risk. In our beliefs, an existential tail risk like carbon should carry a far higher weight in any decision than a 'mainstream' risk like transition. This pushes us towards the LCHT end of the spectrum. To be clear this is about prioritisation, not either/or. We believe the top priority is rapidly to reduce absolute emissions, but we also believe we are at a stage where 'all of the above' is the correct answer[8]. We need to invest heavily, and rapidly.

[8] For example, the IRENA report referred to suggests four large, necessary categories of investment within the $110trn total: $27trn in renewables, $26trn in electrification, $37trn in energy efficiency and even $20trn of new investment in fossil fuels (and others) – presumably in the near term only

"Assuming the IRENA figure of $110trn is correct, and that the investment industry owns 25% of the problem, investment's share of the cumulative total over the next 30 years is $27.5trn."

The investment industry and (net-) zero-carbon energy

It is now time to consider the investment industry. To play its part in achieving (net-)zero-carbon energy two actions are required:

1. Manage the existing investor-owned fossil fuel companies to net-zero emissions
2. Decide what to do about new primary investment.

Managing existing fossil fuel companies to net-zero emissions

The first action throws up an immediate problem. An investor's incentive to preserve capital value is in opposition to the goal of running down their fossil fuel companies' carbon business. This means the natural incentive must be over-ridden by either (i) a risk narrative, or (ii) a pro-social (impact) narrative, or (iii) a combination of the two. A suitable risk narrative would explain possible threats to capital value, such as write downs (permanent reduction in demand for fossil fuel products; stranding of reserves), or future litigation. Hopefully it is obvious that this framing is dripping with issues, but as they lie outside our current argument we will leave them for future treatment. For now our focus is on new primary investment.

The new primary investment thing

The simple truth is that the current industry infrastructure is set up to manage portfolios of securities. New primary investment is a tiny part of current activity. Outside a handful of Canadian funds and a similar number of the largest sovereign wealth funds who have the internal teams to pursue genuine primary investment, most investors are not doing any[9].

We need some sense of scale for this discussion. Assuming the IRENA figure of $110trn is correct, and that the investment industry owns 25% of the problem, investment's share of the cumulative total over the next 30 years is $27.5trn. If you will allow us a little rounding, this is new primary investment of $1trn per year. For a size comparison, it is estimated that the private equity has $1trn in 'dry powder' ie cash waiting to be invested.

The comparison with private equity dry powder raises the question of supply of capital versus the demand for capital. The presence of dry powder could be taken to mean that there is a greater supply of capital, looking to be invested, than there is demand for it – or, alternatively, there is a shortage of institutional-grade innovations to fund. We think a more nuanced explanation is warranted – involving normal speed of drawdown, and general partners having fairly high return targets – but the main point remains valid. The bulk of private equity investments, by value, are mainly buyouts rather than the funding of new ideas (such as venture capital). In other words, it is hard to invest large amounts in new ideas. Technologies can take decades to mature until they are capable of being scaled significantly. This is the main reason why the carbon reduction benefits of NETs would necessarily be back-end loaded. Thankfully there appear to be some seasoned technologies which could be scaled – solar and wind electricity generation! However, as a regulated utility business, these investments would not offer high-enough prospective rates of return for those with high-return hurdles.

Can't we deploy this capital through the secondary markets?

If the bulk of the investment industry's expertise lies in the secondary markets, why not deploy the required capital that way? This would be a pragmatic option, but equally problematic. This route would outsource the capital allocation to listed company managements. On the one hand this is very sensible as company managements do primary investment as part of their day job. On the other hand, we need to worry about (i) size and (ii) incentives.

With respect to size, there are two aspects. First, we should expect the larger listed companies to do more primary investment than the smaller ones, and hence the investment will be biased towards what already-large companies think is required. Second, will listed companies invest enough? Hold that thought for a moment.

[9] Even if they have a private equity program the majority of this will be dedicated to changing ownership (eg buyouts) rather than primary investment (eg venture capital)

The incentives point overlaps with size (large, leading companies find it hard to cannibalise their own revenue even if that is necessary to survive and thrive long-term[10]) but is wider. The classic formulation would be to investigate whether the executive pay arrangements promote large-scale uncertain capital projects.

Returning to the thought we held, BP offers an interesting case study. While its market capitalisation has fallen, it remains a large company. In September 2020 it announced its strategy review, part of which was a commitment to invest $5bn in low carbon energy each year. How should we assess this commitment? It is 0.5% of the hypothetical $1trn annual need we derived above. May be that is OK for a single company. But the $5bn is perhaps around 33% of the new capital BP intends to invest in its existing carbon business[11]. May be that is less OK. Is it to do with the internal incentives?

The final point to make is that if the primary investment is done from cashflow, it is unlikely to be big enough. Investing at scale via this route will still involve handing over large amounts of cash for newly issued securities.

Didn't we get burned by the last clean tech bubble?

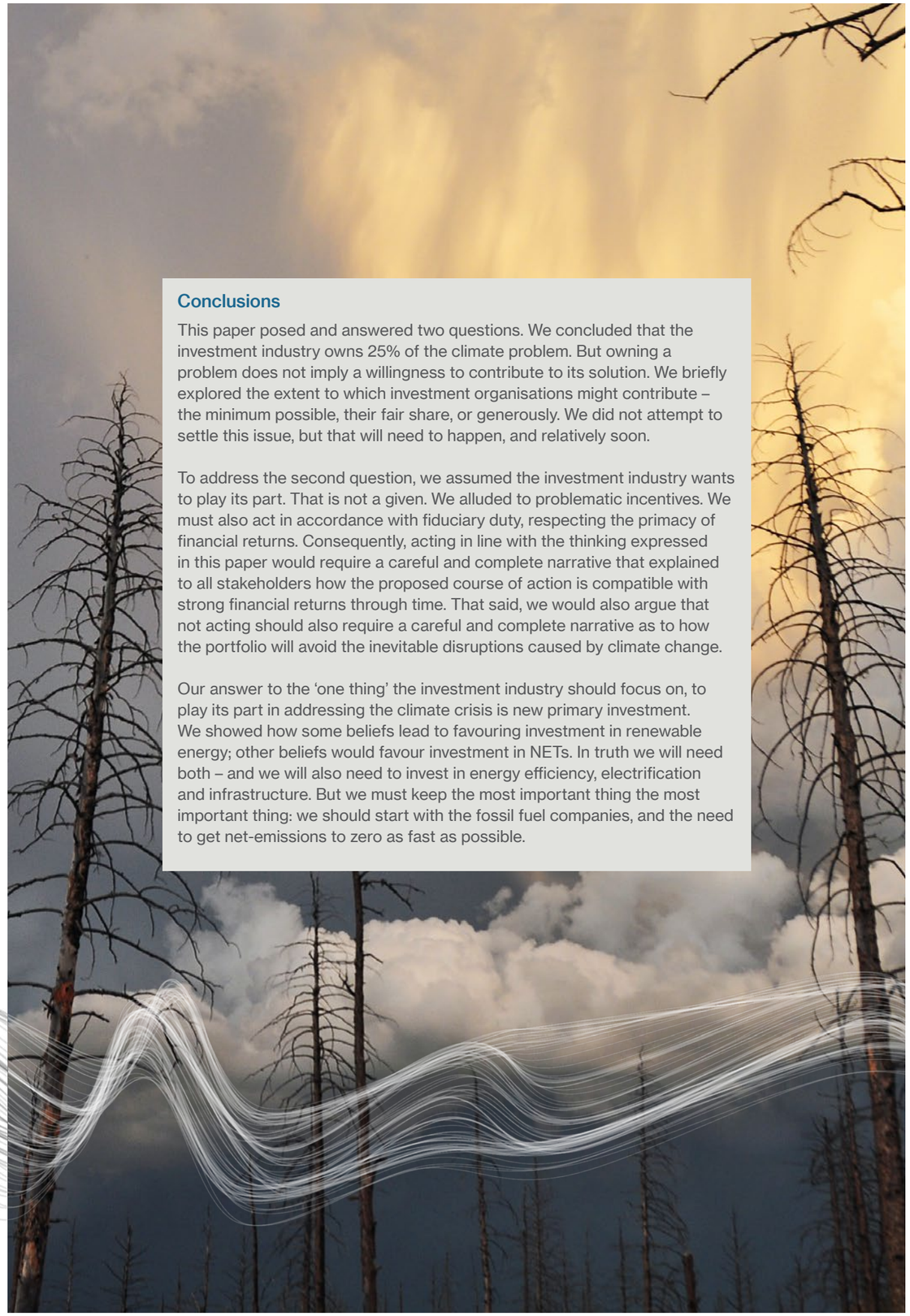
Irrational exuberance and bubbles are an occupational hazard for investors, and it is always possible to provide capital at the wrong price. This note simply lays out a flow of logic – if we want to solve the climate problem we need to reduce emissions to net zero; this requires us to replace carbon energy with clean energy; this requires a level of new investment, for a length of time that none of us have experienced in our careers. There will be plenty of opportunities to invest in more speculative NETs, but there is also an enormous opportunity for lower-risk, lower-return investment in renewable energy infrastructure. Our belief is that the demand for clean energy will not disappear. It will therefore be about the entry price.

It seems clear, to us at least, that we need to massively scale the investment industry's ability to deploy primary capital. This will be non-trivial to say the least. What does this say about quantum and quality of skills required in industry? And where will those people reside – within mainstream asset managers, boutiques, or within large asset owners?

"... if we want to solve the climate problem we need to reduce emissions to net zero; this requires us to replace carbon energy with clean energy; this requires a level of new investment, for a length of time that none of us have experienced in our careers."

[10] *The theme of The innovator's dilemma* by Clayton Christensen

[11] Source bp.com, new strategy statement dated 4 August 2020 (link here): "Within 10 years, bp aims to have increased its annual low carbon investment 10-fold to around $5bn a year" and "bp intends to maintain annual capital expenditure – including inorganic investment – in a range of $14-16bn to 2025""



Conclusions

This paper posed and answered two questions. We concluded that the investment industry owns 25% of the climate problem. But owning a problem does not imply a willingness to contribute to its solution. We briefly explored the extent to which investment organisations might contribute – the minimum possible, their fair share, or generously. We did not attempt to settle this issue, but that will need to happen, and relatively soon.

To address the second question, we assumed the investment industry wants to play its part. That is not a given. We alluded to problematic incentives. We must also act in accordance with fiduciary duty, respecting the primacy of financial returns. Consequently, acting in line with the thinking expressed in this paper would require a careful and complete narrative that explained to all stakeholders how the proposed course of action is compatible with strong financial returns through time. That said, we would also argue that not acting should also require a careful and complete narrative as to how the portfolio will avoid the inevitable disruptions caused by climate change.

Our answer to the 'one thing' the investment industry should focus on, to play its part in addressing the climate crisis is new primary investment. We showed how some beliefs lead to favouring investment in renewable energy; other beliefs would favour investment in NETs. In truth we will need both – and we will also need to invest in energy efficiency, electrification and infrastructure. But we must keep the most important thing the most important thing: we should start with the fossil fuel companies, and the need to get net-emissions to zero as fast as possible.

Limitations of reliance

Limitations of reliance – Thinking Ahead Group 2.0

This document has been written by members of the Thinking Ahead Group 2.0. Their role is to identify and develop new investment thinking and opportunities not naturally covered under mainstream research. They seek to encourage new ways of seeing the investment environment in ways that add value to our clients.

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The Thinking Ahead Institute

About the Thinking Ahead Institute

Mobilising capital for a sustainable future.

Since establishment in 2015, over 60 investment organisations have collaborated to bring this vision to light through designing fit-for-purpose investment strategies; better organisational effectiveness and strengthened stakeholder legitimacy.

Led by Tim Hodgson, Roger Urwin and Marisa Hall, our global not-for-profit research and innovation hub connects our members from around the investment world to harnesses the power of collective thought leadership and bring these ideas to life. Our members influence the research agenda and participate in working groups and events and have access to proprietary tools and a unique research library.

Join the Thinking Ahead Institute

We seek collaboration with like-minded organisations to achieve our vision, so for more information about us please contact:

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About the Thinking Ahead Institute

The Thinking Ahead Institute seeks to bring together the world's major investment organisations to mobilise capital for a sustainable future. Arising out of Willis Towers Watson's Thinking Ahead Group, formed in 2002 by Tim Hodgson and Roger Urwin, the Institute was established in January 2015 as a global not-for-profit group comprising asset owners, investment managers and service providers. Currently it has over 45 members with combined responsibility for over US$12trn.

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