

Climate Change and The Four Sciences

And What They Mean for Investors Who May be Confusing “Like” and “Likely”

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<https://www.responsible-investor.com/articles/cop26-special-climate-change-the-four-sciences-and-what-they-really-mean-for-investors-part-2>

Part 1 analyzes the climate change problem in simple terms and argues that investors be science-based but should look not only at climate science to inform investment decisions, but also engineering, economic and political science.

Part 2 argues that investors should manage climate-related risk using scenario analysis and provides a simple framework for this. Also it argues that investors who want to contribute to solutions should do this through active ownership, working with governments and proactively engaging in blended finance.

Part 1

Many pundits today argue that the climate crisis presents investors with unprecedented uncertainty and urgency, and that this requires unprecedented – i.e. new and innovative – action. They are saying investors should reinvent themselves in light of climate change.

However I believe that now, more than ever, investors should play their ‘traditional’ roles: holding corporate management to account, allocating and reallocating capital, and dispassionately assessing and managing risks and opportunities; and also by engineering investment solutions, ideally in cooperation with governments.

In doing so they can make a far greater contribution to the energy transition than by jumping onto the ESG bandwagon, which – while with the best of intentions – has become obsessed with what I call “labelling” – measuring, disclosing and classifying things; while forgetting to think about “enabling”.

We must ask ourselves continuously what our objectives are, what problems we are trying to solve, and then come up with ways to actually enable solutions, and evaluate where there is a genuine role for investors.

A concept that has become popular in ESG and policy circles is that measures and measurements alike have to be “science-based”; the best example of this is the “Science Based Targets” initiative. While well-intentioned, I believe this has set us on the wrong path.

That’s not because I don’t believe in science; on the contrary. But it is because we are not correctly defining “science” when it comes to climate change.

When people talk about the need to be science-based in the context of climate change, they’re referring mostly to *climate* scientists. As a starting point this makes sense.

Climate scientists study weather conditions, averaged over a period of time, and can tell us how carbon and other emissions impact those weather conditions, including the global temperature. They have models that tell us how much fossil fuel we can burn and still keep temperatures below two, or maybe even below one and a half degrees celsius, as agreed in the Paris agreement.

Incidentally, the word “climate” comes from the Greek word “klima”, which means “slope”; the ancient Greeks thought that the climate had to do with the “slope”, or axis, of the earth.

Climate scientists seem quite united in their opinion that what is needed in order to solve climate change is a significant reduction in greenhouse gas emissions. These emissions come mostly from the burning of fossil fuels: coal, oil and gas.

However, climate scientists can tell us little about how to make the technologies needed to shift away from this. Therefore, I’m a proponent of expanding the circle of scientists for the definition of “science-based”.

To answer the question about technologies, we need *another* set of scientists: engineers – the people who invent, design and test machines and technologies. The word engineer comes from the Latin “ingenium”, or “cleverness”, and these clever people are the ones who came up with solar panels and windmills, and are looking at the possibility of modernizing nuclear technologies, and refining and scaling up hydrogen technologies.

Also, they’ve been looking at technologies that can pull emissions from the air, or avoid them going up in the first place: carbon capture and storage (or CCS), and direct air capture (DAC). However, the clever people can show us how to make the machines work, but can tell us little about the prices or incentives that are needed for large scale investment and deployment of these technologies.

For this, we need a third science: the dismal, or some would even say “miserable” science: economists.

And economy is another term we’ve borrowed from the classic languages: it comes from the Greek word for house, or household: “oiko”. Economists study the behavior of

enterprises and markets, and can tell us how to measure and influence supply and demand in our global household.

And economists *have* measured the supply of energy: they will tell us that most of the global economy runs on fossil fuels: more than 80% of the world's energy use comes from coal, oil and gas. The remainder comes from a hybrid category of "renewables" of which wind and solar are only about 5%; the rest is nuclear, hydro and bio-fuels (basically, burning wood). The most carbon intensive sectors are transportation, power (or electricity), industry, real estate, and agriculture.

In addition, economists are measuring, and projecting, the *demand* for energy – all that energy supply is not produced out of a simple desire of companies to produce, it is made because there are willing buyers on the other side. Willing to buy and willing to pay. And those buyers – people sometimes forget – are you, me, and everybody else on this planet.

Also, economists tell us demand for energy is rising, and will likely continue to rise, with growing populations and large segments of populations rising out of poverty and moving towards the middle class, especially in Asia. In short, while every economic problem is a problem of both supply and demand, when it comes to climate change people often forget the demand side of the problem and focus only on the supply side. The naming and shaming of oil companies, through divestment strategies or through the recent Shell verdict from a Dutch court, may give a certain degree of satisfaction to climate activists but will do little to change supply, as long as there are no measures to change demand, or substitutes, such as new technologies, that can deliver the supply.

So, back to economists: they are the people who can tell us *which* levers need to be pulled to influence supply and demand – pricing, taxes, laws, regulations, subsidies – but they are not well-positioned to tell us how those levers are pulled, and more importantly: *how likely* it is that those levers are pulled.

And this brings us to the fourth science: political scientists. Again based on a Greek word: "polis": city, or state. Political scientists study systems of governance and power, and can tell us how governments work, and how governments pull levers and twiddle knobs – also referred to as carrots and sticks – to change the general framework that we all operate in. The toolbox they have for this, simply said, is laws, regulations, taxes and subsidies.

So, in a nutshell, the climate problem is this: the people who measure the slope of the earth are telling us we need to reduce emissions to save the planet, and are telling us we're not doing it fast enough.

The clever people are telling us they are working on technologies that will allow us to generate energy in ways that don't involve fossil fuels, but also that this is a lengthy process and there are barriers to speeding it up.

The dismal scientists who look at the household budget are calculating what prices and other incentives are needed to influence the supply and demand for energy in ways that

those new technologies can replace fossil fuels. But they cannot set those prices or incentives.

And the folks who study the “city managers”, or governments, are telling us how *likely* it is they will make the laws, regulations, taxes and subsidies that will actually determine those prices and incentives, and will set the whole process in motion to meet the goals the climatologists have recommended.

In other words, corporations and investors who want to be “science-based”, and think about climate change holistically, will need to inform themselves, as much as possible, about what all these 4 sciences are telling us.

So where does this leave corporations? This is perhaps an overly simplistic view of the world, but they are stuck in a system they can barely influence, even if acting collectively.

Of course corporations can (and should!) reduce the emissions they control directly – scope 1 and 2 in ESG jargon – but can do little to influence global supply. They can *try*, as the Dutch court recently instructed Shell to do, but this is likely to lead to the most polluting activities simply changing hands, or any reduction in Shell’s production being eagerly matched by a competitor increasing it.

A clear example of labelling versus enabling: Shell has been *labelled* part of the problem, but the Dutch court has not thought about how this *enables* solutions to the problem, or might even make the problem worse.

Corporations, after all, can do little to influence *demand* – they cannot persuade 9 billion people to forgo trips to Paris, or air-conditioning, or the importing of avocados from Mexico. Also they cannot create laws, regulations, taxes or subsidies, that would force people to do this; as a society we’ve decided that governments should be those carrot and stick wielders-in-chief. Corporations can invest in new technologies, but will only do so once this can be done in a way that covers the cost of capital, and unfortunately most nascent technologies require government interventions such as subsidies to get to that stage.

Part 2

Investors should manage climate-related risk using scenario analysis, and those who want to also contribute to solutions should do this through active ownership, working with governments and proactively engaging in blended finance

We need to make a clear distinction between two things that get lumped together in ESG-speak, but are completely different: investment risk management and contributing to climate action.

Almost every day, we hear the following:

1. Climate change presents an existential threat to society
2. Therefore we *all* have the responsibility to *act* and tackle climate change
3. Therefore investors also have a responsibility and should manage the risks that come with climate change

There's something wrong with this picture. *Of course* investors have the responsibility to manage investment risks, this is what they're hired to do. But climate change presents a whole new "science", or even 4 sciences (climate, engineering, economy, political science), they need to take into account, and clearly this is a challenge to them and something they need help with, but should also be proactive on. Regulators, central banks and governments should be firm with pension funds and asset managers on this.

However, they should be careful to not confuse *risk management* with *climate action*: investment risk management will do extremely little to influence any of the moving parts that the four sciences are studying. It will not reduce emissions; it will not speed up technological innovation; it will not change pricing, or supply and demand for energy; and it will not make public policy more likely. However, the way climate risk management is promoted – with grand speeches, strongly worded statements, conferences and announcements every day about how well investors are grappling with this risk, creates the impression that investors – by managing risks – are making some heroic sacrifice in the interest of the greater good.

This distinction may seem like simple semantics but I think it has important consequences. If we're not clear on this distinction we create expectations on what this risk management will actually do to address climate change. We run the risk of creating what the climate scientist Michael Mann calls the illusion of progress.

In his book *The New Climate War*, Mann discusses how this kind of, no doubt well-intentioned, action can actually be *harmful*. He says: "Personal actions, from going vegan to avoiding flying, are increasingly touted as the primary solution to the climate crisis. Though these actions are worth taking, a *fixation* on voluntary action alone takes the pressure off of the push for governmental policies to hold corporate polluters accountable. In fact, one recent study suggests that the emphasis on small personal actions can actually *undermine* support for the substantive climate policies needed."

I guess the thinking is "I've already done my part by not flying to Bali this year, I don't have to worry about voting for politicians that will push a carbon tax". Though clearly of a different order, you could compare those personal actions to the actions investors are taking regarding climate risk: "we've already followed TCFD recommendations and reported our portfolio temperature, so we've done our part to solve the problem".

Not only does this absolve investors from making an active contribution to climate action, but the way climate investment risk is dealt with today also risks giving pensioners and savers a false sense of security.

Keeping in mind the 4 sciences I discussed in Part 1, there is a relatively simple framework to understand climate investment risk, especially what's known as "transition risk" – the risk that is created for companies as we all start going through the energy transition.

Most climate investment risk practices today rely heavily on quantitative approaches – measuring the carbon footprint of companies, determining whether or not the portfolio is 'Paris-aligned', and trying to work out which temperature rise the portfolio companies are associated with – literally putting a single number on this highly complex dynamic being analysed by the four sciences.

And this is 'science-based' in the sense that it is taking into account what climate scientists are telling us *should* happen; but it is not 'science-based' in the sense that it does not take into account the other 3 sciences, which will inform us, how it will happen (looking at the engineers), how fast it will happen (looking at economists, depending on how conducive pricing and incentives are), and, most importantly of all, *if* it will happen – by looking at political scientists and at governments and whether or not they are actually going to live up to their commitment of the Paris agreement, and which carrots and sticks they will wield to get there.

In other words, a carbon footprint of a company, especially Scope 1 and 2 (the emissions they're directly responsible for) is a useful bit of information, but only a tiny piece of a much larger puzzle. Scope 3 information – emissions from a company's value chain, suppliers and clients – is a useful addition, but it only gives you a bit of information about the *system* that company operates in. It tells you extremely little about when that system is going to change, how it is going to change, and *if* it is going to change.

And these of course are exactly the types of things you want to know if you want to truly understand investment risk.

Therefore, I would argue that investors should adopt scenario analysis as a tool; something that has also been recommended by TCFD, but has been little discussed so far, at least in the way that I think it should be done.

Investors should start with a highly simplistic set of three qualitative scenarios, that focuses on people at the top of the climate-action-hierarchy: governments. Though this is not completely true, for the purpose of better-informed investment decisions it is useful to assume, and not a stretch of the imagination to say, that nearly everything depends on what governments will do to address climate change.

This gives us three possible scenarios:

1. Governments do nothing and there will not be an energy transition, at least not in our lifetime
2. Governments get their act together and take climate action, but very slowly, and the energy transition will unfold over many decades

3. Governments get their act together and take climate action very suddenly and rapidly, and the energy transition unfolds over the course of 5-10 years

I won't go into any further detail of what is likely to happen in the three scenarios, but based on my experience it is far better to take this set of simple scenarios as a conversation starter, and let portfolio managers and analysts fill in the details by asking questions about them, to form their own view on the why, what, how and when of the transition, for example:

- What are the tools at governments' disposal?
- How difficult is it to deploy those tools, for instance carbon taxes?
- Is there political support for this in the key regions: the US, Europe, China, Russia? What are the barriers to political support?
- Would governments use different tools if they realised suddenly they have little time, and need to urgently address the problem, *now*?
- Will nuclear energy be further phased out, or phased back in?
- What can governments do to stimulate innovation?
- And, focusing on the US, upon whose leadership the whole international climate debate seems to depend, what is the filibuster? What is budget reconciliation? And who is Joe Manchin and what does he have to do with anything?

In doing this, investors will form their views on risks based on what is *likely* to happen, not on what they would *like* to happen. Also, they will identify a number of key factors they need to track in order to monitor the change in the systems that are most relevant to them.

And then, finally, the flipside of the coin: though investors do not appear in the four sciences framework I laid out before, I believe they can, and should, play an important role in addressing climate change, in other words, contributing to solutions, and *enabling* them; not only managing risks, even though that is clearly very important.

Also, because they don't appear in the four sciences framework, I believe that by definition this means a supporting role for investors, but if they play it well the support could make a meaningful difference.

So what are the three things they can do?

1. Real stewardship and active ownership

Investors have an important role to play in the strategy and governance of corporations – this is called stewardship, or active ownership: active investors, if they play this role well, select companies for investment based on their long-term plans, engage with company management regularly, hold them to account, vote their shares, and challenge management if something in their assumption set has changed, or is likely to change.

For example, they might ask: how do your projections of demand for oil and gas change now that we know that a global carbon tax of \$100 is imminent? (just to be clear, this is a hypothetical example...).

If shareholders feel the company is not on track to deliver on their plans that underpinned the original investment case, they can fire management or get other people on the board, as recently happened at ExxonMobil. And if that doesn't help, and the investment case no longer makes sense, they can insist the company develops a new strategy that will offer a new long-term path to growth and profits. Or, they can ask the company to pay dividends on profits and start thinking about shuttering the business. Or, they can simply divest and reallocate their capital elsewhere, also contributing to the correct pricing of risks and information and the optimal allocation of capital across companies and sectors.

While the ESG movement has brought a renewed emphasis on stewardship, I would argue that many investors are not playing this role very well. The pendulum has swung too far, to engaging *only on ESG topics*. It should swing back to investors playing their crucial role in the governance of corporations, that should of course also incorporate ESG issues.

2. Investing in new technologies

Obviously this is one of the four critical components in the four sciences framework, and there is a hope and reasonable expectation that investors play a key role here. Not to go into too much detail, and not to burst anyone's bubble, but unfortunately there are many barriers here. With some technologies the scaling up depends on other things than access to capital; sometimes the barriers can be social or cultural (for example, people don't want to have a windfarm in their backyard), or have to do with certain industrial processes not being able to run on wind energy. With other technologies access to capital is key, but they may be at such an early stage of development or simply unproven that it is difficult to attract funding even from venture capitalists. In yet other situations, the barriers have to do with emerging market risk: "Would you like to invest in a windfarm? – Yes great! – In a windfarm in Sudan? – Um, no thanks."

The bottom line is that often institutional investors find that the companies and projects working on the development or deployment of new technologies simply do not yet meet their investment requirements of risk, return and size. And these investment requirements are set in stone because they are designed to ensure pension funds can pay out pensions, insurance companies can pay out claims, and banks can pay back savers.

What to do?

There is a solution for this – *governments* (again governments!) can use tools like subsidies, guarantees and co-investments to mobilise private capital. This is called blended finance, because the government intervention allows the blending of different sources of capital, which in turn allows the scaling up of investments beyond what governments could do by themselves.

While there is a market for blended finance, in which today mostly the development banks are active, the private investors of the world - pension funds, insurance companies, asset managers - are nearly absent from this market. I have long argued that if investors genuinely care about climate change and being part of the solution, they should look beyond climate risk management and proactively position themselves as partners for governments in investing in new technologies. And it is encouraging that this message seems to resonate and I see more and more people starting to look into this.

3. Public Policy Advocacy

Going back to the observation that governments are at the top of the climate action hierarchy, I think it is everyone's responsibility, not only investors, to see how they can support governments. Also, because in many ways, we *are* collectively the government: we all individually have a right to vote, to form parliaments, to determine who is in power and who makes the decisions that affect all of us.

Investors, I think, are uniquely positioned to contribute to public policy as well, especially in informing the third science I discussed earlier: the economic science. I think governments would very much appreciate input into discussions about how to structure laws, subsidies or taxes in ways that will really drive change in systems, and industries. If we create a carbon tax of \$60, how will utilities who rely on coal respond to this? Will this force them to shift to wind power, or invest in battery technology? What if the carbon tax is \$80? Or \$100? Will that make the case for investing in carbon capture and storage more valid? I think that the portfolio managers and analysts who follow the energy, utilities or transportation sectors might have a view on this...

The problem is, however, that this type of collaboration and exchange of information is not easy to structure, and today often we lack the kinds of organisations and platforms that would facilitate it. If investors are sincere in their desire to be part of the solution, they have to first acknowledge that governments should be in the lead, and then proactively step forward to contribute to governments' work. And if you're not willing to invest time and energy in this, then please don't pretend that your actions are the solution - they give clients a false sense of security, and are possibly eroding support for the collective action we so very much need.

As Thomas Paine said: "Lead, follow, or get out of the way."

I heard Barack Obama say something very wise recently: "I used to think if the policy is right, the politics will take care of themselves. But now I know you need to sell the steak and the sizzle".

I think the four sciences are demonstrating that we collectively know what the 'right' policies are. Now we just need a bit of sizzle to make sure we can sell the steak.