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# *DW 2022: DE-CARBONISING THE GLOBAL ECONOMY*

*INTERVIEW WITH PAULINA MCPADDEN*

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The need to transition to a low-carbon economy is one of the profound challenges of our time, a challenge that brings with it huge opportunity. In this session, Paulina focuses on how we as asset managers can invest in and support some of the most exciting companies around the world looking to solve the biggest environmental issues.

*All investment strategies have the potential for profit and loss, your or your clients' capital may be at risk. Past performance is not a guide to future returns.*

**MB** The damage that humans have caused is all around us. So far this year, we've seen record heatwaves in the North West of India and Pakistan, we've seen catastrophic flooding in the South African provinces of KwaZulu-Natal and the Eastern Cape, and we've seen wildfires cause considerable damage to parts of Arizona and Nebraska.

But what if we were able to slow down or even reverse the process of climate change? Yes, we can plant more trees, but there are only so many trees we can plant and there's only so much room on the planet. So what about capturing carbon out of the air and pumping it deep into the ground, where it is safely and permanently stored as rock through a process called rapid mineralisation? This is a natural process, where the CO<sub>2</sub> reacts with basalt rock.

Welcome to Climeworks, which is the brainchild of these two Swiss engineers who have helped to turn the magic of carbon removal into reality. And this is their Orca plant, just outside Reykjavik in Iceland. Every year, it sucks up to 4,000 tons of CO<sub>2</sub> out of the air. And it's powered by geothermal energy. It's these type of companies, at Baillie Gifford, that we are trying to identify.

So how do we find them and how do they support the carbon transition? Well, this is the topic of today's Disruption Week. I'm Malcolm Borthwick, Managing Editor at Baillie Gifford, and I'm joined by Paulina McPadden who is an Investment Manager and expert on this topic. Paulina, welcome to Disruption Week. Great to have you with us.

**PM** Glad to be here.

**MB** So today, Paulina, I'll be exploring two broad topics, the energy transition and the companies providing solutions. Just a reminder, this webinar is 45 minutes, and this will be familiar to those who joined us yesterday. Paulina and I will chat for 30 minutes, then we'll open it up to questions from you, the audience. We'd love to get your questions. So if you do have questions, the Q&A function is live, and you can find it



just at the bottom of your screen.

So one of the challenges for the energy transition is really expressing the value of it to consumers. And that's something that we wanted to explore in our poll. So the question in today's poll is which of the following represents the best value for money when it comes to reducing carbon emissions?

So you have three choices, if you could pick one, the plant-based burger, electronic vehicle, or the third, an eco-friendly washing machine. So if you'd pick one, and Paulina and her team have been researching the answers into that and we'll come back to that a little bit later on. But I wanted to start, Paulina, with an overarching question about the energy transition. What's the scale of the opportunity here for investors?

PM It's a great question, Malcolm, and I think the scale is tremendously exciting. So as a reminder, Baillie Gifford is a long-term growth investor, and the opportunity here ticks both of those boxes, to my mind.

So in order to combat climate change, and I won't go into the details of why specifically we want to do that, I think that should be patently obvious to most people, we need to decarbonise our energy supply, electrify goods and services, introduce energy efficiencies and produce and manufacture goods in just fundamentally different and low-carbon ways.

And you can start to put numbers around the opportunity quite quickly. So on an annual basis, we use about 180,000 TW of energy annually. That's not just electricity. That is all energy use globally. If you decarbonise all of that energy production, you would need about 30,000 GW of solar and about 10,000 GW of wind. That's a 30 and 12x increase on capacity last year, and that's just to decarbonise what we used.

Over time, energy use tends to increase because people get used to having more energy, using appliances in their lives, for example, and so actually, the scale of that opportunity is continually increasing. That's just the energy production, which is solved by things like wind turbine OEMs and solar panel manufacturers.

You've then also got the opportunity in electrification. So that's things like electric vehicles, so taking an internal combustion engine, which is typically powered by fossil fuels, and electrifying that. That's a huge opportunity in and of itself. You've also got things like electric aircraft by the likes of Lilium and Joby, for example.

You've then got issues around energy efficiency. So you can't just decarbonise energy supply. In order to get to net zero faster, you also need to reduce energy demand. And the best way to do that is through efficiency improvements. That includes things like recycling as well, so the idea of the circular economy. And companies like TOMRA are solving that by automating the sorting and recycling process.

And at the end, you've also got that at the 2040s or 2050s, ideally, we would also like to reverse some of the damage that we've caused. We've already emitted so much carbon into the atmosphere that we've locked in at least 1.2 degrees of warming. To really stay below 1.5, we need to remove carbon from the air. And the best way to do



that is through direct air capture.

**MB** And we'll come back to direct air capture a little bit later on. I guess some people watching will be thinking, the oil price has remained stubbornly high, above \$100 a barrel for most of this year. We've seen Saudi Aramco overtake Apple as the world's largest company. There's never been a better time to invest in oil and gas.

**PM** That's one way of looking at it, certainly. But I think it's instructive that there have been periods in the past where oil and gas companies have performed particularly well. So just prior to the 2008 financial crisis, you saw fairly similar performance from oil and gas companies. And the reason for that is this is a cyclical industry. When oil prices go up because there is more demand than supply, the prices of oil and gas majors go up and they are able to pay more dividends to their shareholders.

But over the very long term, they haven't actually returned that much money. They've tended to underperform most benchmarks over long enough timeframes. Most of the returns have tended to come from dividends actually. And while I think they are doing well at the moment, I still think the fundamental economic argument against them exists, which is that there is a floor price for fossil fuel production, because not only do you need to pay for the equipment to extract it, the actual molecule itself also costs money.

Whereas when it comes to wind and solar production, as long as you have the equipment to harvest wind energy or solar energy, the actual sunlight is free. And that means that there's no... Or the floor price for those particular sorts of energy should be significantly lower. And so even without the need for decarbonisation on an environmental basis, I think you have a clear economic reason for why you should have faster adoption of renewable energy, because it's just fundamentally cheaper.

**MB** And how do the two prices compare of renewable energy and fossil fuels?

**PM** So in the last few years, we've reached the point of having subsidy-free projects for pretty much all of the major renewable sources of energy. So solar was the first. That has declined in price, something like 80% or 90% over the last decade, and has room to decline further along that curve. You might be familiar with Swanson's Law which says that for every doubling of capacity, the price of solar price decreases about 20%.

Wind energy has been a bit slower. So it's a lot more capex intensive. Big wind turbines, which are the ones that can harvest the most energy, are very costly to produce and to maintain as well. So the pricing there has declined not quite as quickly, perhaps 50% to 60% to 70% over the last decade. But just in the last 12 months, you've seen the first subsidy-free offshore wind farm being commissioned, for example, off the coast of Denmark. So I think the signs are there that you no longer need these subsidies to make these projects make sense.

And then there's also an element that even if prices don't drop further, there's a huge benefit from having the certainty of what those prices will be in the very long term. So what companies and businesses can do, and are increasingly doing, for example, is they're signing corporate PPAs, or power purchasing agreements, with renewable energy generators.



And that means that for a period of ten or 15 years, those companies are getting an assured electricity supply at a certain price that they know they will be paying over that time period. And the energy generator is assured of getting that price as well, so they're not exposed to the volatility of the wholesale market.

So it's a win-win for both scenarios. And it's not really something you can do with oil and gas. I don't think you've seen the likes of Tesco sponsoring an oil platform in the North Sea, for example. So I think that in itself is tremendously exciting. Because businesses want certainty. Even if they're paying slightly higher prices on a ten-year view, just knowing what those prices are has a value in itself.

MB And there are some short-term challenges maybe with licencing and other things, which is maybe why, in the short term, in response to the war in Ukraine, we've seen countries like Germany restart coal fuel power stations.

PM Yes. I think it's an interesting and also frustrating development. And I understand why they're doing it. Fundamentally, this is about energy security and knowing that you can power your citizens' homes. And in the absence of enough renewable capacity, they're really slightly out of options.

But the best way to assure yourself of energy security is to be able to generate that energy at the point of use. And you can really only do that with renewables, which again doesn't even get into the environmental benefits of wind versus coal which should be fairly obvious. Nobody wants to live next to a coal-fired plant. Whereas wind turbines are perhaps objectionable on aesthetic grounds to some, but you can site them off the coast, off the Baltic coast, and you're not going to see them. So I think there's clear benefits there as well.

MB And the other challenge is just persuading consumers to make the journey in the energy transition, isn't it?

PM Yes. And that's a slightly tricky one because there's a small cohort of consumers that are willing to pay significantly more for something that is clearly green. And they tend to be early adopters of products like oat milk, which Oatly, a Swedish company, produces for example.

But if you really want to cross the chasm to widespread adoption, you need to create a product that is both better and cheaper than the alternative. So companies that have a pathway to doing that, to creating a product that is cheaper than dairy milk or a burger that is cheaper than the beef equivalent or a car that is cheaper than its internal combustion engine alternative, I think those are the very long-term winners because they're effectively disrupting very large existing markets.

MB And that's a good opportunity to go back to our poll, Paulina, which is up on your screen at the moment. Pretty close, actually. Plant-based burger, 35%, electric vehicle, 39%, eco-friendly washing machine, 27%.

PM That is very interesting. So in terms of the question itself, the quote/unquote correct answer would be electric vehicle. So, congratulations. I think the cost of a ton of avoided carbon was about £180 per ton versus £280 for the plant-based burger and



£3,000 for the washing machine.

MB Wow.

PM Mainly because energy efficiency, when what you're doing is just heating up and churning clothes around, is actually quite expensive. But I think there's a more interesting layer to that, which is that... It took me and my team a couple of hours to come up with these numbers. And to be clear, they're not verified. They are very much back-of-the-envelope, to find the data and find alternatives that make sense to compare a Tesla to, for example.

It's really impractical to expect consumers to do that on a daily basis. So if you're going into a shop and you want to know, should I buy this product or that product, unless there's a label telling you what the carbon emissions are, you can't really do that on your own for every purchase you make.

So there's big-picture things you can change. There's simple rules to follow. Don't travel on planes quite as much, probably cycle more, use your car less, wash your clothes less, for example. But fundamentally, in order to enact the systemic change that we need, we need companies to come up with low-carbon, exciting, affordable alternatives for consumers to buy without having to think about what the carbon emissions are.

MB So companies with alternatives. That's a great transition for us to get on to the companies providing solutions, and I know you mentioned Oatly earlier. What about some of the other companies maybe in the supply chain?

PM Well, I think wind turbine manufacturers are really interesting from that perspective. So this is an industry that's definitely had its ups and downs in the past, and Vestas has been one of the few companies that has emerged as a clear leader in terms of being able to actually remain profitable over the long term, especially in its onshore business. So its main competitor, Siemens Gamesa, has struggled to integrate the acquisitions of Siemens and Gamesa, and that's hampered it quite a bit.

And I think we might be at an interesting inflection point on an industry basis, where all the main manufacturers are singing from the same hymn sheet in that they're all saying that prices need to at least stabilise if not go up slightly. They are not profitable enough in order to sustain themselves over the long term.

Governments are hopefully relaxing permitting and regulation to allow more wind farm development to be done. And developers, who have been making money hand over fist through fairly high energy prices, seem to be a bit more willing to maybe give a bit of that value away.

And then finally, and slightly circling back to one of the first questions is the entrance of the oil majors into the industry is potentially quite interesting as well because they have a lot of lobbying pull with governments, for good or ill, developed over many decades. And if they can deploy that lobbying power to encourage more permissive regulation on things like offshore wind farms, I think the industry could really see a massive growth inflection.



MB And one of the challenges is the grid, isn't it, when it comes to storing and providing the energy.

PM Yes. An interesting illustration of that is I was recently on Orkney with a few colleagues. And Orkney is a collection of small islands just off the North Coast of Scotland, slightly south of Shetland. And they have been producing 120% of their electricity needs through renewable power.

Now, because they are connected to the grid on the mainland, they don't actually use all of that renewable energy themselves. It is shipped or transported through transmission wires elsewhere. But the really interesting fact about them is that there was a point in time where Orkney had 20% of the UK's community or privately owned wind turbines despite only having 0.2% of the population.

MB Gosh.

PM So they were already giving the price signals that they wanted to be energy independent, they wanted to have energy security. And the only reason that trend didn't continue for them is because the energy regulator said that they were destabilising the grid.

So there's a technical problem there because the grid regulator can't curtail or turn off decentralised power production, so they don't have an off switch for a wind turbine that I buy to put in my back yard. And if I'm exporting energy from that turbine into the grid, there is a chance that I could overload it because it is not being managed to match demand and supply.

So Orkney is having to come up with some interesting solutions around how do we use this excess power? Could we maybe produce hydrogen, for example? But the idea is ultimately that we need to prevent curtailment of these wind turbines and solar panels, because you're basically losing free energy, which is completely ridiculous.

MB It's really interesting. We often just focus on the end product and we don't focus on the supply chain.

PM Yes, absolutely. And it's a system problem ultimately.

MB Yes. So are there opportunities there in the supply chain that you're focusing on, whether it's for wind turbines or storage or other things?

PM Oh, there's so many that I could talk about. I think bottlenecks to growth are a really interesting concept here. So again, you can see why demand should continue rising, because energy is cheaper. You can see why the supply of the actual generating assets should continue to increase and why those companies should do well. But there's a few bottlenecks to realising that growth that also make compelling investment opportunities.

So cable manufacturers like Prysmian and Nexans, for example, make high voltage cables that are used to connect wind farms to shore and also countries to countries so that you can balance grids across greater areas. And these cables, if you compare a Prysmian cable and a Nexans cable, they're basically the same on the inside, but





actually making them consistently well is an art in itself because there's very small manufacturing differences that can mean the difference between success and failure.

And if you spent tens of millions of Pounds installing a cable that connects Scotland and England, and it keeps failing, you don't really want to have to keep digging it up to fix that, because that's time that could be spent installing cables elsewhere.

MB And what about zero or low-carbon alternatives?

PM So this gets back to Oatly, for example, which I think is a tremendously interesting company. So they're based in Malmö, Sweden. People might have seen their advertising around, famously irreverent and funny advertising. And they produce oat-based milk and oat-based milk products like ice cream and yogurts and suchlike.

Now, in terms of carbon emissions, cows, due to the methane that they produce, are one of the largest emitters globally. On a country scale, I think they're just ahead or just behind India basically, if you put them all together. So making milk out of oats is significantly better.

And Oatly is interesting because it's the leader of the pack in terms of professionalism. So other small, independent oat milk manufacturers don't have the scale that Oatly does, and I think that's a bit of a reinforcing advantage. And relative to the large players like, say, a Nestlé or a Danone, for Oatly, this is simply a growth opportunity. There is no doubt in their minds that this is what they want to do. They are driven by sustainability and the chance to make a difference.

Whereas for a Nestlé or a Danone, they're effectively cannibalising their existing sales. And it's not that I don't think they can make this industry work for themselves. It's just that there is that tension between an existing product line-up that relies on dairy and the new, improved version that doesn't. And how do they reconcile that within one company? I think that's a bit of a struggle, potentially.

MB There's a lot of innovation coming out of Sweden. And Rob and I were chatting about Spotify yesterday, so it's good to talk about another Swedish company. What about carbon removal, which is where we started the conversation really?

PM Yes. So there's a few interesting companies in this space. Perhaps the most relevant is Climeworks. But to take a step back, it's worth touching on why carbon removal is interesting and what the difference is to carbon capture.

So direct air carbon capture or carbon removal is when you take fans, they push air over a solid sorbent, that sorbent absorbs the carbon in the air, and you can heat that up, extract the carbon and lock it away deep underground. So you have removed carbon from the atmosphere. That is a negative emission technology, and it is locked away forever.

The difference to carbon capture is that carbon capture is typically applied at a source of emissions. So you might put it on top of a cement kiln stack, for example, because cement production emits carbon through a chemical process and also through the heat used in the process. And so if you can capture that carbon, you are making what is a very carbon-intensive process potentially a low-carbon or carbon-neutral one.



The problem with that is that it adds cost on to an existing process, whereas I think in some cases, like steel manufacturing, you could simply revamp the process to make it carbon neutral by slightly changing the steps around instead of using carbon capture, whereas direct air removal again is a negative emissions technology.

And I think there is a growing cohort of companies and people who are willing to pay slightly over the odds to be able to say that we know exactly how much carbon we've captured and we know it's locked away forever. And this isn't fiddling with numbers. This is actual tons removed from the air.

**MB** That's quite a different idea, isn't it, in terms of reducing the impact to actually reducing it. It's extraordinary. Are we seeing many companies doing this?

**PM** I think Microsoft is probably the best-known, but I think the interest in it is increasing. And that's partly because there's a growing recognition that carbon offsets, which are the typical way for companies to say that they are carbon neutral, are perhaps not always as high quality as one would like. There's a lot of very low-cost carbon offsets available in the world that have very limited evidence for actual efficacy.

But there's also that element of companies just wanting to demonstrate that impact in a tangible way. And it's not for everybody. The floor for direct air capture cost is probably around the \$200 to \$300 per ton mark. And if you compare that to what people typically think a carbon tax should be at, about \$100 per ton, there's a clear difference between the two. But we have already locked in a high degree of global warming. If we want to reverse some of that damage that we've done in the long term, we just need to be removing carbon from the atmosphere.

**MB** And the first step is probably proving the technology works, and then the cost benefits will come and the cost reductions will probably come over time.

**PM** Yes. I think that's a playbook that's been seen many times over, that you prototype something, you do the first commercial production, you scale it up, and with each iteration, the costs go down slightly, both because you learn and because, if you're building something at scale, it tends to be cheaper on a cost of system basis.

**MB** And it's hard to pick up the paper these days without seeing some kind of headline on greenwashing or something else. So I think it's fair to point out that Baillie Gifford also invests in cement and mining companies. How do we square that?

**PM** Oh, there's a number of ways to square that really. The simplest one is that the level of investment in infrastructure that we're going to need over the coming decades is tremendous. So I've seen estimates that, at the moment, we spend about \$260 billion a year on infrastructure investment. That probably needs to go up by \$1 trillion annually.

And that's heavy infrastructure. That's building work. That requires cement production. That requires mining of raw materials. Electric vehicles obviously require raw materials. You can't really make an electric vehicle without lithium, and you need to increase the world's capacity of that. So these are industries that are needed to decarbonise the global economy and enable the energy transition. And there are





pathways to make them less harmful or carbon neutral in the long term as well.

**MB** And we're going to move on to questions from the audience now. So if you do have questions, please use the Q&A function which is on the bottom of your screen. So one of the first ones here is, what's your view on the way metals are mined and rare earth minerals are extracted?

**PM** Oh, it's a really interesting one. This is where being a bottom-up stock picker is really interesting, because as a whole, the industry is terrible for the environment on pretty much every basis that you can imagine. But there are companies that are doing genuinely different things.

So Allkem, which produces lithium in Chile in the salt flats there, I think that's a really interesting company because they actually have very good relationships with the local community. That leads to better relationships around things like water rates usage and suchlike. And I think that they have a pathway to producing that lithium in a more sustainable manner.

If you think about something like iron ore, the likes of Fortescue Metals Group really stands out. So again, they produce iron ore, which is tremendously carbon intensive. It's used in steel production, which emits two tons of carbon per one ton of steel produced. But they've announced a plan to produce 15 million tons of green hydrogen by 2030.

And that all would allow them not only to decarbonise their own production, so by using hydrogen in the fuel cells for mining trucks, for example, or using it to power the train line that they have going across Australia, it would also allow them to start enabling the decarbonisation of their steel-making partners, which is tremendously exciting.

And I don't think enough companies are thinking about that sort of downstream impact that they could have, not just on their upstream suppliers, where they have control over who they source from, but also on helping their customers transition.

**MB** So you mentioned hydrogen there. I can't resist asking you a question about that. What's your view?

**PM** So I'll admit that I was slightly sceptical about hydrogen as early as two years ago. But I've come to the view that there's a few industries that simply cannot decarbonise without hydrogen use. And they tend to be ones where you need either very, very high energy density or process heat, so industrial manufacturing, things like cement, for example, or steel-making, in particular.

So steel-making emits 8% of the world's carbon. But if you shifted the current mode of production which uses blast furnaces and basic oxygen furnaces to direct reduction of iron, using hydrogen and electric arc furnaces with renewable energy, you have a pathway to reducing carbon emissions by at least 95%. And that remaining 5% comes from the mining, which Fortescue Metals is solving.

**MB** And green steel?

**PM** Yes. Tremendously exciting area. Sweden again features, actually. So there's a



couple of companies in Sweden that are particularly interesting, an existing incumbent, SSAB. It's relatively small on the global scale. It only produces about ten million tons of steel annually versus about 2 billion tons globally. But I think because they're relatively small, they're actually much more motivated to transition faster.

So they in the last six months announced that their already fairly ambitious plans to be carbon neutral by 2040, they were bringing forward, and they were going to start retiring their existing assets before their end of life, which is very unusual in this industry. Pretty much everybody else says, we'll wait until they're gone before we start replacing them.

And then there's also a private company in Sweden that is still relatively unknown, still starting up, hasn't actually produced anything yet, but again, potentially making green steel that's effectively carbon neutral.

**MB** So we chatted about consumer behaviour and changing consumer behaviour earlier. And this question relates to that and questions whether or not it's also about ensuring governments correctly regulate and incentivise companies.

**PM** Yes, absolutely. And all the academics, industry experts, everybody interested in this area that I've spoken to on the matter is pretty much unanimous in saying that the simplest way to do that is just to introduce a carbon tax. If you actually tax carbon at, say, \$100 per ton, you would start to see tremendous behavioural shift from companies and individuals.

And you are seeing that in steel-making again. I realise I keep going back to that topic, but it's just top of my mind at the moment. And the European Union has started to phase out the carbon allowance that steel-making companies have been getting for the past few years, and that has forced them to be a lot more thoughtful about how they're going to transition to a green world.

So they're starting to think about things like where are we going to get our hydrogen from, where are we going to build these new direct reduction processes, who are we going to source our supply from? So I think that's really exciting.

**MB** Are there any countries or, you mentioned the European Union, any other areas that stand out in terms of doing it well, do you think?

**PM** The European Union, I think, is ahead of the curve in terms of pricing of carbon and there's also just more consumer demand. But I think China is really interesting as well. So China has by far and away the largest concentration of electric vehicles globally. They're still the largest purchaser on a global scale.

And that's partly because of government action, not direct subsidies interestingly anymore, but softer touches, so things like making registration plates for electric vehicles free, whereas charging for internal combustion engine vehicles. And that just makes the economic argument, for people, very simple to make.

**MB** Yes, so the carrot and stick approach. So is car battery recycling a challenge for environmental sustainability? How does this compare with pollution of regular cars? So it's quite a wide question.



PM Oh. So the numbers that I've seen in terms of lifecycle analyses of electric vehicles versus internal combustion engines say that certainly within the lifespan of the car, probably significantly sooner, on a five- to seven-year basis, they have already paid back, effectively, their carbon emissions.

Recycling remains an issue, I think, and it's not just in electric vehicles. It's across industries. It's wind turbines. It's solar panels. And that's again a system issue, where it's not enough to have better processes for sorting, which is the problem that TOMRA, based in Norway, are solving. You also need to have better design. You basically need to create products to be recycled. And again, companies are starting to think more carefully about that. Umicore, for instance, is doing a lot of work on battery recycling, so I think that's a very interesting company as well.

MB So we've chatted about hydrogen, wind, solar. A question here that's come in, about nuclear fusion and whether or not that just changes things entirely. The long-term nuclear fusion, is that the best thing? Are we just waiting, with solar and wind as a stepping stone, until we've cracked nuclear fusion?

PM Perhaps. The exciting thing about being a long-term growth investor is that you don't have to be certain about the future. You can have different scenarios. So do I think that renewables are the most likely path forward? Yes. But there are other options. Nuclear fusion is potentially one of them. The thing that gives me a bit of pause there is that's a technology that's perpetually ten years out. So perhaps we see it, perhaps we don't.

MB And what can we do with the existing millions of petrol oil cars once the transition to electric cars is finished?

PM It's a really interesting question. Well, first of all, probably continue to use them for as long as you can. It is still better to use your current car than go out and buy a new one. But interesting recycling schemes perhaps will need to be created. Wind turbines here might offer some sort of roadmap. So there was a project in Ireland that used decommissioned wind turbine blades to build a bridge, for example. So maybe you can do something similar with cars.

MB And what about Baillie Gifford? What are we doing about the energy transition as a company, as opposed to how we're investing?

PM So as a company, for some years now, we have been, to start with, double-offsetting all of our omissions. And most of those emissions in our case do come from air travel, so going out to see clients, going out to see interesting companies. So some behavioural change there is probably in order over time.

And I think the pandemic has been a useful motivating factor. I've certainly found that hour-long informational meetings with companies can be relatively easy to do on Zoom. But if you're building a relationship over the long term, at some point, you want to go out and spend a significant chunk of time with them, where they are. So the important thing there is not flying out for one meeting, basically, but making a bit more of a trip around it.



And then we're also, in the next couple of years, moving to a new office in Haymarket. And we're in conversations actually with Scottish Power to upgrade the electric substation nearby because we want the entire building to be powered by electricity, and therefore renewable. And the current substation is not rated high enough for the usage that we envision.

MB And there's another question about electrification and efficiencies here. I guess that would relate to maybe Cloudflare and other companies.

PM Yes. So there's lots of opportunities in electrification and efficiency. Cloudflare is one of them. So making the data centres that power everything in the world these days more efficient is tremendously useful. I've mentioned TOMRA, so the idea of a circular economy and making recycling more efficient, cheaper and more sustainable. Some new processes coming up in that area, actually.

So I met with a company called PureCycle relatively recently, and they've developed a new process for recycling polyethylene. So that's the stuff that makes the flimsy plastic bags that you get in supermarkets, and traditionally it's very hard to recycle. But they've created a new process that means that you get basically virgin plastic out of it, which is very exciting.

And companies like Pinduoduo, for example, in China, which is creating significant efficiencies in the agricultural supply chain. So food waste accounts for a significant proportion of carbon emissions globally, and particularly in China, where there are so many steps between producer and consumer. And PDD is simplifying that chain, and therefore hopefully removing inefficiencies.

MB I'm sure we'll be chatting about Pinduoduo later with Rio in our conversation about e-commerce in China. There's a question here about carbon credits. We used to hear a lot about these a few years ago, have heard less about them recently. What's the best and most direct way to benefit from this trend in terms of carbon credits?

PM I'm not sure, is the honest answer. My slight scepticism around things like carbon credits and carbon offsets, in some cases, is that they are too often used as a form of greenwashing. The accounting behind them seems to be very complicated and I'm much more in favour of just going back to first principles and thinking about who is actually emitting the carbon, who isn't, how do we remove that process or change it significantly. And to me, carbon credits just feel a bit like fiddling with the numbers to make yourself feel better.

MB Am I right in saying that we did hear a lot about this a few years ago, but haven't heard much recently?

PM Yes. Carbon credits still exist and companies do make money selling them. Tesla, for example, sells carbon credits or provides carbon credits to other auto manufacturers. But I don't think, in the long term, that is something that I'm tremendously excited about.

MB And there's a question here, a general question about whether or not there are any founder leaders in this space that you're excited by, that are running some of these



companies providing solutions?

PM Yes. Well, we do have a preference for founder leaders in the companies that we own. Elon Musk famously, in Tesla, for all his faults, is also just a tremendously motivating and visionary individual and has dragged the entire auto industry along with him, kicking and screaming. I don't think you've seen that in many places.

Toni Petersson, I think, the founder of Oatly, in terms of his willingness to help create a culture that is genuinely differentiated but also leaves individual departments room for almost their own mini-cultures. So the type of culture that a manufacturing centre needs is very different than the type of culture a marketing department requires, for example.

Fortescue Metals Group I think is very interesting from that perspective as well. So Andrew, the CEO there, created this company from scratch, made a bet on the iron ore price in the early 2000s, used high-yield debt to build the third or fourth largest iron ore manufacturer and producer in the world, and he's now made this announcement about wanting to transition to the hydrogen economy. So if anybody can do it, I think he's certainly got the ambition and the vision to do so.

MB And the other thing that's interesting about Oatly is it does show that consumers will pay more on environmental grounds.

PM Yes. And again, some consumers are very willing to pay a green premium, effectively. But I think for companies to be really exciting investments on a five- to ten-year view, you need to see a path to providing better and cheaper alternatives that delight their customers. So you need to see a path to cost reductions over time. And Oatly does have that. Electric vehicles have that. Most carbon-neutral or carbon-zero products have that.

MB And there's a question here about how you got interested in this field.

PM So there is a twofold reason. One is perhaps the professional one of it seems fairly self-evident to me that this is a trend that is going to define the rest of my career in terms of investment opportunities, that the number of companies coming up in this space is constantly increasing. And I think, as long-term growth investors, we're very well placed to find them and own them for the long term.

And then there's a slightly more personal one around I was having discussions with friends. They were having trouble finding green investments and they didn't really understand the industry. And it fuelled this frustration that there's so much greenwashing, so much opaque speech about what the solutions are, when in reality, it's fairly simple. You don't need to be a genius to figure any of this out. So trying to explain it to people in those terms I think is really motivating for me.

MB And we've just got a minute left. So if there was one point that you'd like to leave the audience with, what would it be?

PM We spent a lot of time talking about specifically the energy transition but also some of the other factors around that. So it's not just about renewable energy generation. It's also about how we use it, when we don't use it, so those efficiency improvements,



making products in a fundamentally different way, and then removing carbon from the atmosphere.

And if you put all that together, the opportunities are so vast and level of disruption so clear that I think it's a really exciting time to be a stock picker, and thinking about what the next five to ten years might bring.

MB That's a great positive note to end it on. Paulina, thanks very much.

PM Thank you.

MB And if you'd like to find out more about Disruption Week, some of the topics that we're discussing, such as entertainment and how we at Baillie Gifford are disrupting our own investment process by learning from academia and other areas, check out [bailliegifford.com/disruptionweek](http://bailliegifford.com/disruptionweek). And tomorrow, we'll be talking about e-commerce in China with Rio, and digital retailing. What's all that about? Curious? Well, join us tomorrow. In the meantime, thanks for investing your time in Disruption Week.

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