Unlocking potential

Closing the innovation gap in UK EnergyTech

BARCLAYS | Eagle Labs

Introduction

As we progress into 2023, a brief post-pandemic boom has been upended by war in Europe, a supply chain crisis and the biggest global energy shock since the 1970s. These supply shocks to energy markets have caused an increase in inflation, sending interest rates soaring and creating cost-of-living crises across the globe.

And yet we still have to face up to the huge pressures of the climate crisis and the required transition away from fossil fuels. The price of failing to meet pledges and commitments made at COP26 to achieve net zero, and stick to the Paris Agreement to limit global warming to as close to 1.5 degrees Celsius, has been more evident than ever as extreme weather events continue to impact on a global scale.

Part of the solution to many of these challenges lies with technology. New ideas and innovations are driving new behaviours and new ways of working in the built environment, transportation and agriculture. But while most of these advances are welcome, almost all new technology requires more energy and power.

Right now governments are being forced to rethink energy policies at pace, trying to solve short-term supply shocks and calls for greater energy security - all while sticking to net zero targets. But "short term" in energy is often shorthand for fossil fuels. Long-term pressures to fight the climate crisis are at odds with immediate energy security demands. But some of the solutions lie in EnergyTech. A range of startups are finding innovative solutions to previously intractable problems. All they need is the right support to scale up.

Grace Fan, Managing Director, Global Policy and Disruptive Themes Research at TS Lombard, says there are two transitions that startups can play a part in. "The first is scaling up green energy; the other is scaling down fossil fuels," she says. "The driving force for both will be the growing intensity and frequency of disruptive weather that will unleash huge changes ahead. Decarbonisation is a one-way street, but the later we delay, the more it will cost."

In energy, as in all markets, certainty favours large, established, incumbent players, while uncertainty favours challengers, disrupters, entrepreneurs and innovators. At the same time uncertainty reduces the availability of funding, making it harder for scale-ups to grow. But, as Fan observes: "If you go back to the 1970s, that was when renewables were galvanised. It was when ethanol-only cars were developed in Brazil and when biofuels took off. That happened because of energy shocks, and we're facing a similar crisis today. That could help to catalyse some transformative technologies."

Unlocking EnergyTech's full potential

This report is for disrupters driving transformative technologies: and for the EnergyTech challengers. They're finding new ways to fight the climate crisis, realising new thinking on how we harvest, store and use energy. To do this, they need to work with each other and with established industry players. Human ingenuity has solved massive problems before and can do so now.

There is huge potential in the sector and many brilliant founders are forging ahead with new technologies and innovations that will drive the UK EnergyTech market over the coming decade. If we can create the right environment and encourage the right behaviours, these businesses can play a role in helping the UK economy and the world to transition to a low carbon economy.

The expert panel

Ollie Barrett is Founder of Clean and Cool, which runs trade missions for EnergyTech founders. He is an expert in the startup economy and connecting founders and investors.

Martin Boyle is VP of Transformation at CodeBase, which runs programmes for EnergyTech founders with Barclays Eagle Labs.

Luke Christoforidis is EnergyTech industry lead at Barclays Eagle Labs.

Horace Dediu is an Analyst and Founder of Asymco, the Critical Path and the Micromobility podcast. He first coined the term “micromobility”.

Grace Fan is Managing Director of Global Policy and Disruptive Themes Research at TS Lombard.

Jack Lewis is the Co-Founder of EnergyTech start-up ADA Mode.

Professor William Nuttall is the Professor of Energy at the Open University

Marty Reed is Founding Partner of Evok Innovations. He is a serial EnergyTech entrepreneur and investor.

What do we mean by EnergyTech?

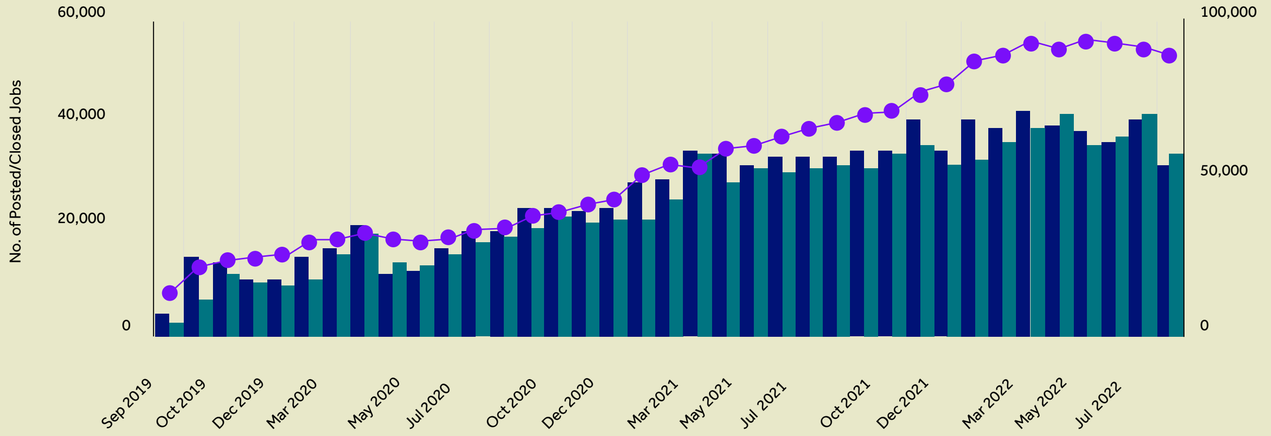
There are many different names for tech firms working in the energy sector: CleanTech, GreenTech, ClimateTech or EnergyTech. No one is hung up on descriptors. The tech businesses this report is aimed at cover everything from robotics to AI, data management to materials science. They're working on innovations across a broad front, providing solutions that can be grouped into the three "stages" of the energy market: the initial harvesting of energy (the source); management and storage; and system and energy use (which covers all sectors of the economy but is focused on agriculture, industry and transport for the purpose of this report).

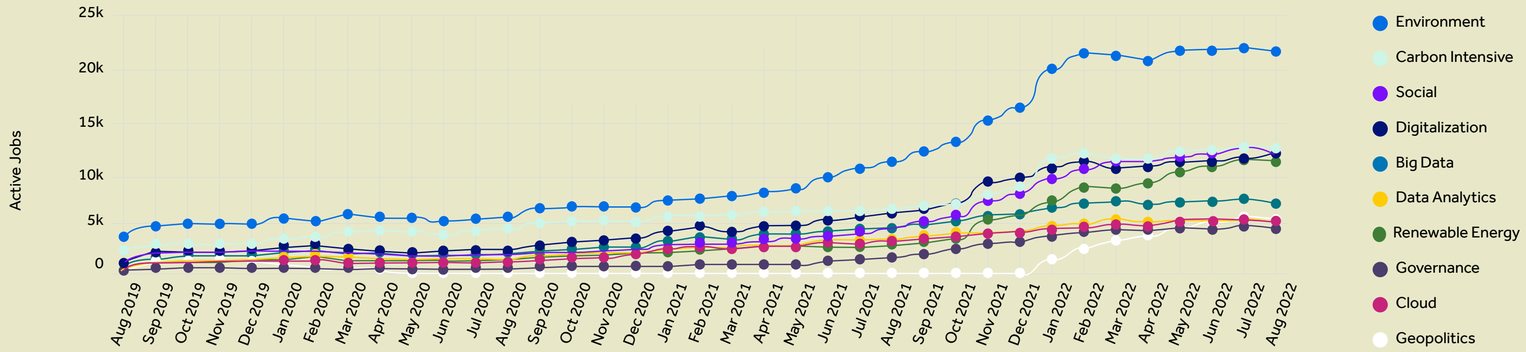
The macroeconomic context

Due to increased economic uncertainty and recent market upheavals, few economists hold optimistic views for the near future of the UK economy. But if we're heading for recession, no one has told the jobs market. According to GlobalData, the jobs trend for the energy sector - going back before Covid-19 - has been moving steadily upward.

The energy sector as a whole continued to recruit throughout the pandemic. And a more detailed breakdown of jobs by keyword shows the vast majority of these jobs focussed on the environment or renewable energy.

Global Energy Sector Job Trends





Source: GlobalData

Where job description is contained within the job title

Between summer 2019 and summer 2022, jobs including the keyword “environment” were up 512%; “carbon emissions” by 479% and “renewable energy” by 2,058%. There is life in the energy market, but the focus is on the green economy[1].

TS Lombard’s most recent economic forecast stated that the main driver of moves in the world economy is the Ukraine war, but there are also lingering after-effects from Covid-19. “Emerging nations accumulated debt during Covid,” says Grace Fan. “And we’re entering a higher interest rate environment, which means the energy transition is going to cost a lot more.”

The influence of inflation

CleanTech investor Marty Reed, Founding Partner of Evok Innovations, takes a pragmatic view of the economic situation but admits it spells a shift for startups. “Throughout my career, the cost of a startup has gone down. It’s got faster, cheaper, easier. There are more incubators, accelerators and government programmes to help nurture startups. Now things are becoming more expensive. This is the highest inflation period of our lifetimes. For companies that are pre-revenue or early in commercialisation, rising costs are not offset by higher prices and increased revenue.”

On top of this there has been a removal of capital. “If you’re a generalist fund, you’ll be licking your wounds right now because of the public markets,” says Reed. “You’re less likely to make new bets. So startup costs have gone up and the ability to raise capital is down. That’s a classic one-two punch.”

Energy security

Russia’s invasion of Ukraine has focused political minds on energy security and made the transition away from fossil fuels harder. “This is the trickier transition anyway,” says Grace Fan. “The latest US climate package means wind and solar leases on federal lands are tied to oil and gas leases. And the UK government has announced new licences for North Sea oil and gas, while Germany is investing in coal. The more you emit – unless carbon capture technologies get ramped up more quickly – the worse we’re making things for the future.”

Only by recognising the two transitions – towards green energy and away from fossil fuels - can we realise a smooth transition. “You want to scale one down at the same time you’re scaling the other up,” says Fan. “One of the problems we’re going to face is that supply and demand mismatches. It’s where price shocks come in. Price shocks will be exacerbated by extreme weather, and they’ll cause inflation. When you get inflation, the cost of finance rises and tips us into the uncertain period we’re heading into.”

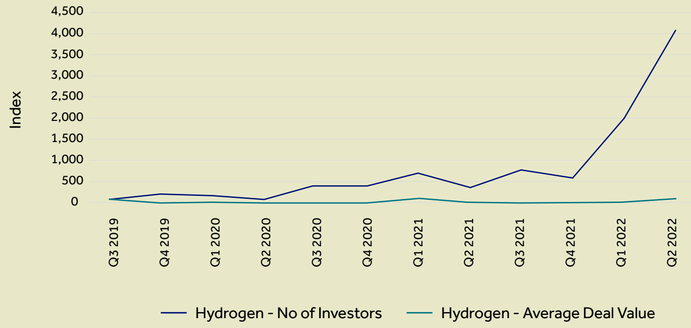
Source: (1) GlobalData : October 2022

However, Marty Reed sees some silver linings even in global insecurity. “Not since 1973 has there been such a focus on energy security. That goes hand-in-hand with the energy transition and with the opportunity for EnergyTech. If you’re in hydrogen, for example, or you’re deploying solutions for renewables, there are definite upsides.”

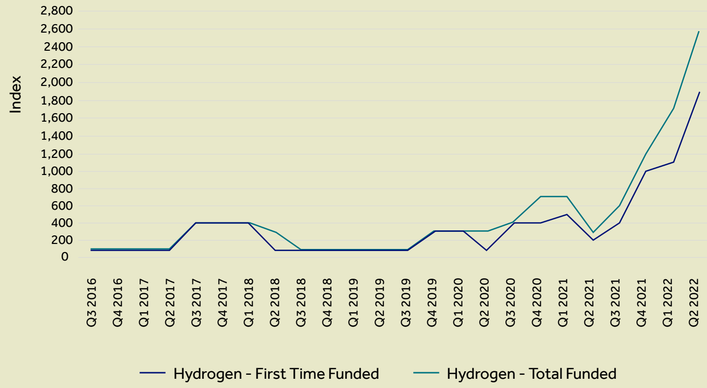
Research from GlobalData shown in the charts supports this view, with hydrogen activity acting as an interesting barometer for the expansion of EnergyTech. Perhaps the most striking of its findings is the rapid increase in deals taking place. While the average size of deals has remained stable, the volume has rocketed in the past year.

This, combined with the proportion of companies that are first-time funded (right), shows the degree of innovation in the market.

No. of Investors and Average Deal Value Index

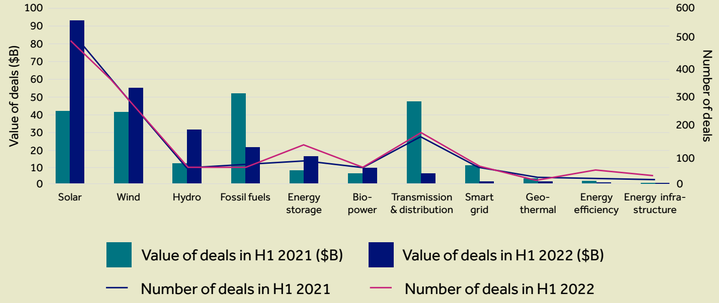


First Time Funded Companies and Total Funded Companies



Source: GlobalData : November 2022

M&A in the global power sector by deal value and deal volume, by sub-sectors - H1 2021 vs. H1 2022



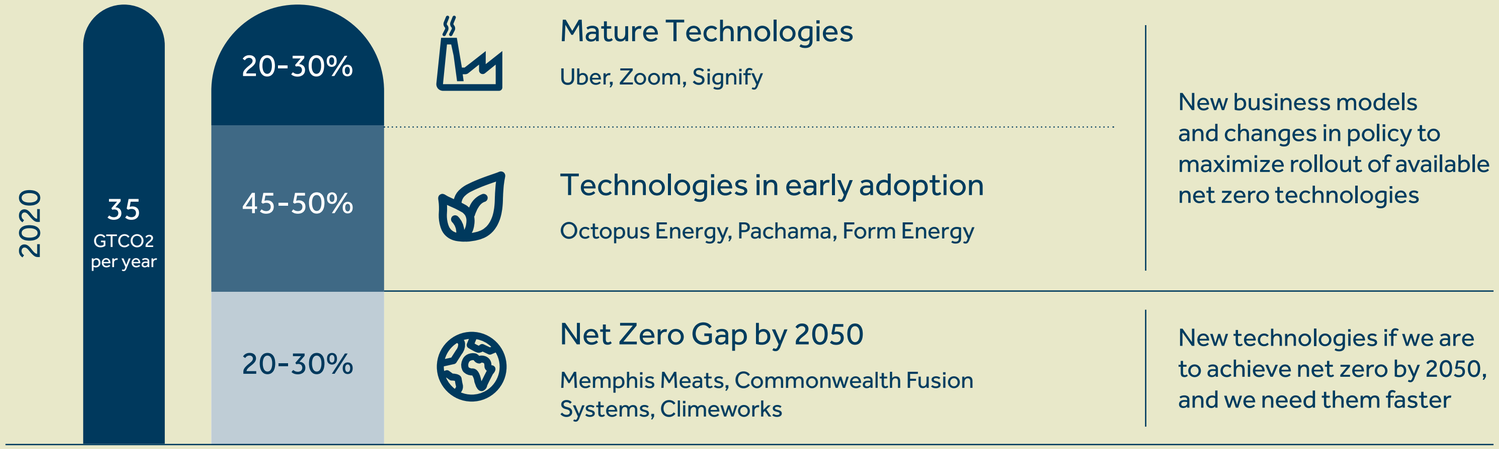
Source: GlobalData

But hydrogen is not the only EnergyTech game in town. There is also considerable activity in other renewable sectors, with deals in H1 2022 in areas such as solar, wind and storage. This spread reflects the greater focus on energy security (above).

The technology gap

While all this activity is positive, according to research by Boston Consulting Group (BCG), even with all the innovation and technology developments underway, we will still fall short of global net zero goals (Exhibit 1, below).

Exhibit 1 - GTCO2 Per Year (Gap from Net Zero)



Source: IEA Sep 2020: Global energy sector CO2 emissions reductionsby current technology maturity category in the Sustainable Development Scenario relative to the Stated Policies Scenario, 2019-2070, BCG analysis

Note: 10.2 GTCO2 of the Net Zero gap in 2050 comes from technologies in demonstration (5.4) or large prototype (4.8); The excess 6.4 is the remaining forecasted gap not filled by technology at any maturity stage

As shown in their graphic, BCG estimates indicate there is still a 30% technology gap before we hit net zero. Pessimists see this as alarming, while optimists say such figures don't account for breakthroughs and discoveries.

Professor William Nuttall, Professor of Energy at The Open University, suggests we're stuck in thinking that's framed by digital revolutions. "We're talking about an innovation challenge," he says. "One interesting aspect of the early 21st century is that digital innovation, of the sort seen since 1990 with telecoms, mobile and IT systems, has become the dominant paradigm. We see all innovation, regardless of sector, through that. It means we ask the right questions - about the role of incumbents and startups, government and legacy infrastructure inherited from the last generation - but the answers aren't the same."

Tech innovations start slowly, then accelerate rapidly

While most of us accept change as a constant, many also recognise that the pace of change seems to be accelerating. Azeem Azhar, investor, author and creator of The Exponential View, refers to this unexpectedly rapid acceleration of new technologies as the "deep tech inflection". As he explained in a recent newsletter: "Breakthrough technologies often require an ecosystem of new inventions to make them work. We'll often be underwhelmed in the short term, but surprised by DeepTech's development in the long run."

Challenges and Opportunities

This report highlights the potential across the EnergyTech sector and the myriad of startups operating in areas as diverse as hydroelectricity, city-based micromobility solutions and smart-grid products. Each startup has its own strengths and weaknesses and faces a unique set of challenges, which can give rise to opportunities to develop creative solutions.

The key challenges identified in the report are:

1. **The funding gap**
   Investment is not flowing as easily into the EnergyTech space as it is into sectors that are viewed as less risky or complex and have models that are more appealing to investors. Software companies' valuations, for example, often outpace their operational costs. This is a pattern Venture Capitalists (VCs) can model and de-risk. In EnergyTech, the opposite is true because hardware and infrastructure requirements mean capital is needed early and operational costs grow faster than valuations.

2. **The skills and talent gap**
   The founders of EnergyTech startups come from a predominantly scientific or professional background. While great at innovation, they often need help with product design skills or the ability to take a product to market. As well as needing the right co-founders, EnergyTech startups need to attract and retain the sharpest minds. With talent scarce and big tech chasing the same people, this is a key battleground in the war for talent. EnergyTech startups will need to play smart to win.

3. **The partnership gap**
   Startups and scaleups will play a major role in shaping EnergyTech's ability to meet and resolve the challenges of net zero and an equitable green transition. But they won't do it alone. The best outcome will only be achieved through collaboration with existing large players and with governments and policymakers. One thing that puts investors off funding EnergyTech startups is the need for infrastructure investments to make their vision realistic. Whether that's getting electricity into cars or hydrogen into homes and businesses, infrastructure certainty is important. And that infrastructure requirement is one of the main reasons for finding the right partners.

The funding gap

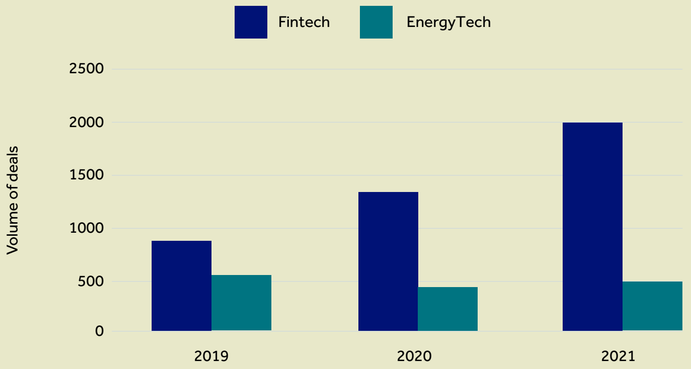
Funding EnergyTech businesses is important to an efficient energy transition and the realisation of net zero goals. As Oli Barrett, Founder of Clean and Cool, explains: “The inter-generational pressure within families is vital. A lot of kids are going to be asking their parents what they did in the climate crisis. Parents are going to want to give a good answer. Saying 'I funded an app to get pizza more quickly' won't cut it.”

But unlike sectors such as FinTech – where the pitch to investors is based on familiar technology, existing infrastructure and a relatively short time to market – the road to commercial growth for EnergyTech firms is longer and tougher. EnergyTech projects have a different profile from other tech startups. There are longer lead times, greater reliance on infrastructure and a higher dependence on hardware as well as software.

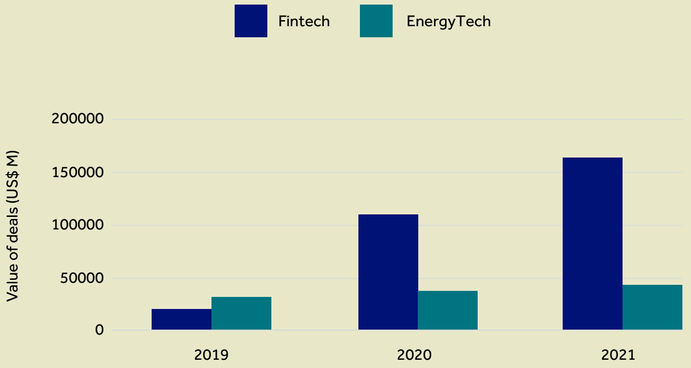
Eagle Labs' Luke Christoforidis explains: "If you have a mobile phone, you can create a challenger mobile bank. With energy, there's infrastructure challenges and engineering problems to overcome. And you're often looking at political and geopolitical issues."

Research by GlobalData shows that financial services, and fintech in particular, has attracted a higher volume of deals - including VC deals and merger and acquisition (M&A) activity - than the energy sector over the same period.

The volume of Fintech deals since 2019 has outstripped EnergyTech



The value of Fintech deals since 2019 has outstripped EnergyTech



Sources: GlobalData

Is energy appealing enough?

CodeBase's Martin Boyle says that a tough truth for EnergyTech firms is they are simply less appealing to the typical investor. "A lot of the startups we see through the programmes we run with Barclays Eagle Labs are started by people who have been working in traditional energy companies and have a good idea of how to disrupt them. They find it difficult to get funding from institutional investors to deliver it.

"EnergyTech startups often require hardware as well as software. If you're looking for investment from private equity, they understand software more."

Attracting investors

Having spent the best part of two decades connecting startups and investors, with a particular focus on climate-related startups, Oli Barrett is optimistic the sector can attract mainstream investor interest. “When we started Clean and Cool in 2010, the investors coming to pitches were niche to energy and CleanTech. Now you’re seeing brilliant investors like Daniel Waterhouse, who earned his stripes on Spotify, backing CleanTech companies. That’s exciting.”

A recent example of this trend is the announcement of $78m (£68m) funding for Tesseract, a UK-based renewable energy company founded by Alan Chang and Charles Orr, two ex-employees of challenger bank Revolut. The pair have attracted big, mainstream investors such as Balderton and Lakestar, as well as specialist fund, Lowercarbon Capital, and individuals such as former Formula 1 world champion Nico Rosberg.

For specialist investors like Evok Innovations’ Marty Reed, interest from generalists raises questions, the biggest of which is how they’ll react to a downturn. “Over the past two years, we’ve seen a record amount of capital pour into EnergyTech. What happens now to the generalists investing? Will they continue? Or will they go back to generalist software or tech investing?”

TS Lombard’s Grace Fan sees reasons for optimism, as the drive towards the decarbonisation of finance delivers positive returns for investors. “If you go back pre-Covid, in 2018 and 2019 there was already a shift on Wall Street, after a decade of plunging costs driven by economies of scale. Then in 2020, BlackRock's investor letter on how climate risk was fundamentally reshaping finance was a wake-up call to many investors, followed by Tesla in 2021 becoming the first trillion-dollar green company by market cap.

"Suddenly, even investors outside the climate space started seeing decarbonisation not just as virtue-signalling but as an incredible once-in-a-generation opportunity.”

A matter of policy

Before swinging in behind energy, investors need to see regulatory certainty. Grace Fan highlights the US, where Barack Obama tried and failed to pass carbon legislation. Although the Obama administration issued the loan that propelled Tesla forward, he was followed by Donald Trump, who won the presidency on a pro-fossil fuel ticket. “He didn’t succeed in bringing back coal, but Russia’s invasion of Ukraine has, temporarily,” she says. “Now Joe Biden has passed his massive climate change legislation, the Inflation Reduction Act with generous 10-year tax credits for a wide spectrum of clean energy that should galvanise innovation and help to bring costs down for multiple emerging clean and green technologies by 2030.”

Fan says there are always concerns that a change in the ruling party at every election will lead to further policy flips. Set against this, she believes the Inflation Reduction Act and the EU's Fit for 55/RePowerEU plans offer a stable base to start from. "You can quibble about loopholes, and so on, but it sets the longer-term regulatory framework for investors, and that matters".

Professor William Nuttall thinks policy may be less of an issue than it once was. “If you look at decarbonisation as a 60-year journey from 1990 to 2050, the first 30 years have been led by academics, think tanks and civil society. Government led and industry lagged. For the second 30, industry will lead. It will get ahead of government and academia and start to implement change.”

The role of corporates

Established energy corporations have a unique perspective on EnergyTech startups. They understand issues surrounding hardware costs and infrastructure. They have a clear sight on operational costs, which as a result scare them less than they might a potential VC investor. They may even be able to loan infrastructure, facilities and plant to the startup, as well as becoming first or early customers.

Many are also realistic enough to see that the long-term trend is not for a business model built on fossil fuels. Which is why the sector sponsors so much corporate venturing. Most large energy firms have divisions making strategic investments in startups, which remains a lucrative source of investment for EnergyTech founders. As profits soar, large firms want to be seen to be reinvesting. While traditional private capital funds are cutting investments, there could be more corporate venture capital to access.

This venture capital activity leads to a conundrum, says Clean and Cool’s Oli Barrett. He suggests the public have conflicting views on the role large corporates, and especially energy companies, are playing in the transition. “If we don’t unpick these questions, we end up making cartoon generalisations and using language that stops collaborations because both sides are scared of each other.”

In terms of problems that need fixing for investors, Barrett says there’s often a perception that innovation in energy is going to cost a huge amount of money. “That might not necessarily be the case, especially in the very early stages. But there’s a perception gap. It’s a challenge of education and it’s why we need more environments, like the Barclays Eagle Labs programmes, where investors can ask so-called ‘silly’ questions, to educate themselves and their peers.”

The founder's perspective

Founded by serial entrepreneur, Michael Evans, Cambridge Carbon Capture has developed technology to remove carbon dioxide from the air and turn it into materials that can be used in construction.

While Evans and his business partner have secured a £3m government contract for a two-year project to build a pilot plant, he told the Guardian in a recent article about UK startups experiencing funding difficulties: "The investment that's needed is huge; we have to produce an industry that's at least the same size, if not bigger, than the current oil and gas industries. That's trillions and trillions of pounds' worth of capital equipment and infrastructure."

And he emphasised the difficulties that lie ahead for EnergyTech startups when he added that, in the next two years, the company needed to raise close to £150m. He said UK investors are more willing to fund software startups and don't really understand the risks of hardware projects, which take longer to hit the market and generate profits.

"We're probably 10 years away from making returns, but we predict profits of £300 per tonne of CO2 that we capture. But many investors expect a return between three and five years. There's a lot of money sloshing around for quick-turnaround, low-risk investment opportunities, but very little for the big, important ideas."

The investor's perspective

Marty Reed is Founder at Evok Innovations, a CleanTech VC based in Canada. He says the current economic climate is the toughest he's seen. "Computing platforms and other factors have made it faster, cheaper, easier to start a business, and there are incubators, accelerators and programmes to help nurture startups, including government programmes. But now it's getting more expensive," he says.

"For companies at pre-revenue or early commercialisation stage, rising costs can't be offset by higher prices and extra revenue. And if you're making an actual product with components, supply chain challenges mean that instead of getting parts in one month, it now takes five. It's a killer."

Reed says EnergyTech founders need to focus on core strengths. "It's a question of talent," he says. "Often these companies are started by someone with deep technical expertise, an engineer or PhD type. The universal challenge is, can they form a team to make them attractive to investors?"

And when he says team, Reed means literally two people. "Our view of the perfect founding team is the PhD who spent years working on something and a business lead, someone who knows how to manage sales, marketing, business development and finance. That's the perfect combo, but it happens too infrequently."

More often Reed sees programmes trying to make technical founders commercial. "That's a horrible idea," he states. "If you're a world-class technologist, that's your advantage. Use it, focus 100% on it and build a team around you. Don't take a technical competitive advantage and dilute it with other work."

The skills and talent gap

It’s been 10 years since Rei Inamoto, at the time Chief Creative Officer at communications agency AKQA, made a speech to the SXSW conference. Addressing a roomful of investors and hopeful founders, he stated: “To run an efficient team, you only need three people: a hipster, a hacker, and a hustler.”

It was a powerful yet simple formula that continues to resonate with many who work in or around the EnergyTech space. The sector does not suffer from a lack of innovation or shortage of scientifically minded and engineering-focused founders. What is missing is getting people with the right skills to complement what Inamoto described as "hacker founders". These hacker founders, he said, while good at "DeepTech" – the science and understanding the potential and application – often can't build a product. "They can't see the actual tool customers will deploy to get a job done. You need hipsters and hustlers to build a product, to iterate for market fit and then to scale it. There's a real lack of co-founders with those skills in their locker."

A question of levelling up

Luke Christoforidis says a large part of Eagle Labs' mission is to help founders "level up" in terms of startup smarts. "Investors are looking for a team that understands the domain, the challenge and the technology, but also — and perhaps most importantly — a team that knows the startup playbook really well. That's a key indicator for potential success."

To level up, he says, there needs to be a stronger startup community across the EnergyTech sector. "While many happy accidents created the startup community of Silicon Valley, much of it was by design. For example, non-compete obligations are unenforceable in California and a well-understood playbook is 'frenemies' – when a VC has invested in several startups from the same sector, they're encouraged to meet up. One benefit of this is that while most startups are likely to fail, if one succeeds then they hire from the ones that failed. This de-risks the endeavour and encourages entrepreneurship and the exchange of knowledge."

Spaces like Barclays Eagle Labs operate within an ecosystem, collaborating with academia, corporates, industry institutions and government to bring the right people, with the right knowledge and experience, together through its programmes. "If you're a founder struggling with product market fit, or with tech or sales, programmes like Eagle Labs' EnergyTech Bridge or our mentoring network will expose you to people who've done this before and that can help address the challenges you're facing as a company," says CodeBase's Martin Boyle.

Evok Innovations' Marty Reed is clear that teaming up with the right people is the best approach. "Our view of a perfect founding team is a PhD who's spent years working on something, partnering with a real business lead. Someone who maybe has an MBA, but knows how to manage sales, marketing, business development and finance. Marry those two together and you've got the perfect combo."

Peer-to-peer networks

Clean and Cool's Oli Barrett says that smart founders know raising their profile among their contemporaries and peers, and testing ideas with fellow founders, helps create opportunities. "This kind of sharing doesn't have to involve divulging all their secrets. It's possible to signal to your peers, the market and potential customers the gist of what you're doing, in order to attract interesting conversations, without giving all your IP away."

While the UK is blessed with several strong networks that bring founders together, from Helm (formerly The Supper Club) to Founders Forum, Vistage, YPO and many more, Barrett says more could be done to create a supportive culture. "We need to get a lot better in the UK at fostering collaborations between startups. The main banks have a role to play here, and Barclays Eagle Labs is a great example. Innovate UK is also doing interesting work with a programme known as Edge, fostering some of those peer-to-peer conversations.

"But, as a founder in the UK, if you want to find out who your fellow travellers are in that community, where do you go? Connector brands, like Eagle Labs, play an important role. But there is always more to be done."

The three roles explained

Martin Boyle, VP of Transformation at CodeBase, has worked with Barclays Eagle Labs for several years and has run various programmes for founders in the EnergyTech sector. He says he's noticed that in energy a higher proportion of founders than normal come out of roles in large corporations. "These founders have got that domain expertise and know how they can disrupt the existing process," he says. "Sometimes they lack specific skills and experience in tech or sales. They ask us for help to find a technical co-founder, who can help with the build, or they need to find somebody to go out and sell it."

He says this three-role model of the hipster, hacker and hustler - first outlined by Rei Inamoto – is pertinent for the EnergyTech sector.

The hacker

Most often in EnergyTech, this is the category that founders fall into. The hacker is the domain expert, the academic or the inventor; the person who identifies a problem that needs solving and arrives at a good solution.

The hipster

The hacker may not know how to implement the solution in a way that appeals to enough people, but they need a technical co-founder - a hipster, in other words - to help them navigate the non-product side. They need someone who can show them how to build the product in a way that is rigorous and will reach potential customers' businesses effectively. The hipster is the philosopher or the artist. They listen to customers, think about what the product is or isn't or what it could be, and drive iteration. Steve jobs was the hipster (as well as the hustler) to Steve Wozniak at Apple.

The hustler

If the hacker and hipster between them can arrive at a great idea that is built to suit the target market, they still need someone to take it out to that market and sell it. In short, they need the hustler, someone entrepreneurial who can go out and raise money, talk to investors, talk to potential customers and get them interested in what they're doing.

The war for talent

At the time of writing some of the heat is coming out of the labour market, particularly in the tech sector, as the recent bubble deflates, valuations fall, and CEOs look to reduce their burn rate by laying off all but core staff.

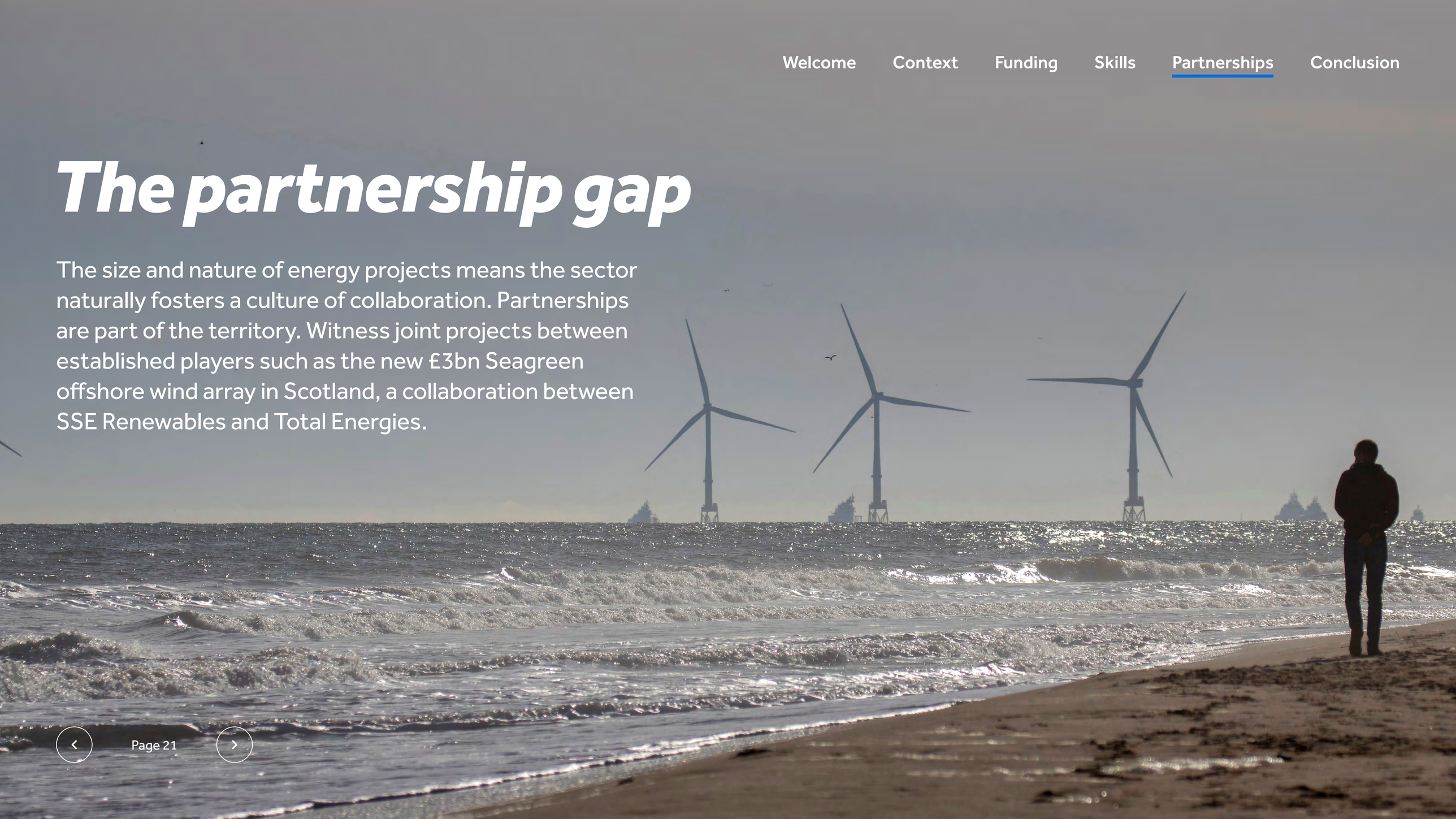
This is potentially good news for EnergyTech startups who are often fishing in the same pool of talent. They need highly qualified mathematicians and physicists, and graduates in these categories have been in demand by big tech firms, which are able to offer better salaries and benefits.

But for Eagle Labs' Luke Christoforidis, EnergyTech is an exciting enough space to attract that talent and can offer a sense of purpose that's important to current graduates. "People want to work in EnergyTech," he says. "The problems are so big, and they impact everyone. Whoever gets the right answers will ultimately be an incredibly positive part of the future of society. Working in that environment, solving those challenges, is exciting for young talent."

A lot of people want to be involved in fixing the climate crisis, agrees Clean and Cool's Oli Barrett. "There's a potential heavenly match here for energy startups. It relies on startups getting out there and raising their profile. They have to shout about the fact they're hiring and looking for industry mentors, advisers and coaches. It's the best way to smoke out people who are on the threshold of seeking a big new chapter in their career."

The partnership gap

The size and nature of energy projects means the sector naturally fosters a culture of collaboration. Partnerships are part of the territory. Witness joint projects between established players such as the new £3bn Seagreen offshore wind array in Scotland, a collaboration between SSE Renewables and Total Energies.



But it's also happening at the other end of the industry, where startups collaborate with each other. These partnerships are beginning to reshape the industry.

Just as important are the growing number of collaborations between large, established players and startups. The big energy players all have accelerators and investment programmes. While cynics question the motives of "big energy" in these areas, worried it may be greenwashing or that larger players merely want to "buy and kill off" disruptive startups, the size of investment behind such deals suggests otherwise.

Collaboration in EnergyTech is critical to helping it realise its potential. As the EnergyTech ecosystem develops, initiatives and communities such as Eagle Labs help to create the environment for expertise to meet agility. "Energy is a hardware-intensive industry and has to be more collaborative," says Luke Christoforidis. "Eagle Labs brings together startups working on disruptive tech and big companies. Helping large firms open themselves up to new ideas, when they have historically been closed off, is key."

Startups also need to open up, adds Christoforidis. "They need to be open to meeting corporations and sharing ideas. There are often lots of startups in the same market area that don't talk to each other. They can all end up building the wrong thing. If they talked to each other, they could figure out the right approach sooner."

Will the incumbents survive?

One of the major assumptions in disruption theory is that new, unexpected players enter the market to steal market share from sleepy, complacent incumbents. Professor William Nuttall is not sure this applies in EnergyTech.

"There is a strong role for startups, but there's a role for incumbents, too," he says. "It isn't going to look like the internet or mobile. There is a desire to innovate, but to what extent are the incumbents going to be displaced? Are they going to be the engines of innovation?

Are they going to be in opposition to, or in partnership with, startups? Are startups going to eliminate parts of the incumbent's business models?"

Indeed, Professor Nuttall doesn't think so. "Decarbonisation is an imperative. International oil companies have shifted over the years. Most recently they've become natural gas companies. They could become hydrogen companies. But they only deserve a future if what they sell is consistent with the low-carbon future."

Bridging the divide

EnergyTech Bridge is a programme bringing together global energy companies and promising startups from the UK. “It focuses on building new products through a series of meetups involving experts from CodeBase, Barclays and speakers from our network,” says Eagle Labs’ EnergyTech industry lead Luke Christoforidis.

The programme is run on the premise that big companies find it difficult to buy from small companies, while startups find it difficult to sell to big companies. “We do something facilitative and educational to bridge that gap,” says Christoforidis.

The programme lasts for 12 months, and each cohort consists of large businesses and startups. CodeBase’s Martin Boyle explains: “We've been running it for two years, so we’re on our second cohort. We have around 25 startups and 10 big companies who are getting to know each other well. Large companies open themselves up to startups, learning what startups look like, how they behave, their risk appetite and how they can work together.”

They are, he adds, re-evaluating their work and rethinking strategy. “They’re thinking about what they do in the net zero context. On our programmes, we invite guests who have built startups in different industries to present. The programme participants – be they startup founders or industry leaders – have the opportunity to challenge the presenters, ask them what they learned and how they negotiated specific issues. Crucially, they begin to work out how they can take these playbooks and map them to their own company. That’s an important piece of work for many of these companies.”

Partnership through investments

When it comes to disrupting markets, Horace Dediu knows more than most. The man most deserving of the title “the father of micromobility”– a term he devised to cover all two- and three-wheel vehicles smaller than a car – has disrupted personal transport and last-mile delivery. “The nature of the creation of a new industry is that investors are unsure,” he says. “The new market is fraught with risk. But the difference between now and a century ago is that if you’re a large incumbent in energy, for example, you can put down small amounts of money in a few venture bets. Either you learn - which is the nice word for failure - or you chance upon something that ends up being big, and you’re there to prosper.”

He points to the way that micromobility - and electric scooters and bikes in particular - offer opportunities for the large energy companies to get involved. “There is no reason, in the same way some people already use switchable bottles of gas, that the energy firms couldn’t sell batteries,” he says.

This would require some degree of harmonisation on batteries, but again Dediu says there is a precedent for new markets to quickly cohere around one approach. “My background is in the mobile phone sector,” he explains. “There was no uniform form or function and then the iPhone landed and now the touchscreen is ubiquitous.”

Dediu points out that the historic trend has been that incumbents who ignore these new trends eventually get disrupted. “There’s also a risk in not acting,” he says. “The prescription for the large players is not to ignore this innovation.”

His one-word advice to large corporates couldn’t be simpler: “Participate. There are all kinds of emerging technologies in energy that need development. Everybody in the energy business is under pressure at the moment. The oil giants and energy firms are seen as the bad guys. They can turn it around and become the good guys. That's a political discussion to be had at board level.”

The role of corporates

Marty Reed of Evok Innovations says he has seen a resurgence in corporate venture activity, especially in the EnergyTech space. “Practically all the legacy incumbents like Shell or Total have very active corporate VC units. They’re putting capital into the market. But there is still this absolute challenge, this language barrier. Startup founders are speaking Latin and executives in corporations speak Greek. They both have trouble communicating.”

For CodeBase’s Martin Boyle, the idea of building with a particular buyer in mind is a smart move. “A lot of EnergyTech companies are built to be acquired by an incumbent and they’re building to that. They may have left a job at an existing energy company, having spotted an opportunity to build something to disrupt, circumvent or improve a process they were working on. And they pitch it back to the company.”

Low-risk developments

While Martin Boyle suggests startups may not know much about large energy companies, who in turn don’t know much about startups, he says fostering partnerships between the two is important. “For large incumbents, doing small pieces of experimental work with startups shouldn’t be that risky.”

But there is risk aversion in energy space, he adds. “That risk consideration is appropriate when focused in the right place. These can be dangerous places to work. However, that culture of risk aversion or risk management permeates other areas in these businesses. It doesn’t lend itself to setting up experimental partnerships.”

This is one reason why energy giants are successful. “When you get to a certain size, you have to manage risk because you’ve got to protect your people, the environment and your investments. It’s about knowing where you can and can’t accept risk.”

What’s crucial is for both sides to take a first step, says Boyle. Typically, that would be a small contract, proof of concept pilot. “Once a corporate and startup build trust, and the first piece goes well, they do another piece, incrementally bigger, and another until both sides are comfortable working together.”

The infrastructure issue

One of the biggest factors slowing investment is the need for regulatory certainty. They want a framework that gives an indication of which technology to back.

However, plenty of investors jumped into the electric vehicle market, producing hybrids and pure electric cars and vans before the supporting infrastructure was in place.

Infrastructure is rarely a quick fix. Government action takes time, even when we know what's needed. At the more radical fringes of EnergyTech, we may not know what's even required.

And where we do know, with that example of EVs, we're not progressing at the rate we need to. The government target is for there to be 300,000 charge points across the UK by 2030, as part of its Electric Vehicle Infrastructure Strategy[2]. That would require some 35,000 to be installed every year until then (which means roughly 100 every day). And every day we miss that target, the number needed each day increases.

Martin Boyle says: "Technology has disrupted banking, and massively disrupted retail, and has even had an impact on professional services. It has disrupted energy less, and that is because there is a big moat built around it called infrastructure. There's a bunch of infrastructure that government and the state protect. But it is slowly beginning to be disrupted. Right now, energy security and protection, the climate crisis and the requirement to use energy more effectively means focusing in on this."

Source: (2) Electric Vehicle Infrastructure Strategy

A startup's story

January 2020 may not strike many as the ideal time to have launched a new venture. But for Jack Lewis and his three co-founders at ADA Mode, it turned out to be good timing. The founders – all former employees in the energy sector – use AI technology to help industrial operators manage assets better.

As Lewis explains, the pandemic held early positives for them. "We had planned well in advance and managed to get our heads down and got stuck into doing work exclusively for EDF," he explains. "EDF had to make a lot of last-minute changes to how they cope with outages. In the past, a swarm of people would come onsite and everything would shut as people fixed and maintained stuff. They couldn't do that because of Covid-19. So we helped optimise outages, using AI and machine learning to work out what they should focus on and what they could leave for a year or two."

Many startups struggle to get a foot in with such large customers, and Lewis admits this was a question of who they knew. "The work with EDF came off the back of strong personal relationships. We knew the right people and they knew and trusted us."

ADA Mode was part of an Eagle Labs EnergyTech Bridge cohort. "The programme was great. It raised our profile with the cohort, which was a mixture of people like us and some quite big organisations.

Being present and contributing helped a lot including us getting introduced to Sellafield," says Lewis. "With Sellafield, it's been a positive partnership. We do things they can't. I've found them open-minded and receptive to different ways of thinking."

Ada Mode is now a 10-person team, based out of Barclays Eagle Labs in Southampton, with a few team members in Bristol. Lewis has been impressed with the services offered to date, particularly citing advice during the pandemic. "Eagle Labs helped us with things like AWS credits, which has been useful. And during Covid-19 they signposted us towards grants and funding that we wouldn't have otherwise seen. Also, the general networking is great. We're always being introduced to people and that's been really helpful."

Conclusion

Eagle Labs' Luke Christoforidis says he is extremely optimistic that EnergyTech can overcome obstacles and meet the innovation challenges that lie ahead. This is because he sees first hand lots of companies, across the Eagle Labs network and elsewhere, working on incredibly exciting new solutions. And because humanity has solved massive challenges in the past.

"We know the existing technology we use and our means of harvesting energy comes with a cost and consequences. We know we need to transition away from fossil fuels. There are hundreds of startups bubbling up, with brilliant people and capital behind them to solve the key challenges and innovate. Fusion is only stable for a few minutes, renewable energy is in the wrong place at the wrong time[3], hydrogen is expensive. But there are ideas to deal with all these bottlenecks, and people are experimenting.

"The size of the problem presents a unique requirement for collaboration. Big companies will play an important role in scaling solutions, supporting with capital and potentially helping with infrastructure and talent as well. This is a new concept for big companies that will require a whole new set of playbooks.

"At Eagle Labs we can help to convene the right people in a safe space to solve the challenges. We'll play our part in getting large energy giants and innovative startups together, and through our spaces, events, content and programmes, we'll push the EnergyTech sector to be the best it can be and realise its full potential."

3: Looking at the data from any given winters day in the UK, Solar PV falls to 0.00% of the UK's energy mix after sunset i.e. demand for energy is higher in winter and all energy peaks after the sun has gone down in the UK are met harvesting energy from other means. In the summer months (when there is less demand) more energy is harvested from Solar PV. Peaks of Wind in the UK energy mix do not always align with peaks in demand and fluctuate dramatically. Innovations in storage and transportation of energy are needed to capture these peaks and align them with demand, reducing the mix of fossil fuels in the National Grid.
(Source: National Grid. Source URL https://www.solar.sheffield.ac.uk/pvlive/)

Barclays Eagle Labs

Connecting the UK's entrepreneurial community

At Barclays Eagle Labs our mission is to support the UK's entrepreneurial ecosystem through a network of business incubators, expertise and support. We have created a community of top innovators, industry experts and mentors designed to support ambitious entrepreneurs and startups looking to scale as well as helping transform organisations and empower future skills.

Our EnergyTech team works with many corporates and industry partners to bridge the gap between emerging EnergyTech innovation in order to support innovation in the harvesting, management and use of energy for the future.

In the face of emerging technologies and disruption across all industries, there has never been a better time to connect the startup community to each other, to central and local government, academia and corporates to exchange ideas, partner and innovate. Find out more at labs.uk.barclays.

We're also working closely with our colleagues at Barclays who have committed to invest £500m in climate-tech start-ups through the Sustainable Impact Capital portfolio by end of 2027.

Before you go

Get in touch if you would like to find out how we can support you and your business. We'd love to hear from you.

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