European Conservatives and Reformists Group

Ensuring the future of tech innovation in Europe

The hidden tech innovators

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INTRODUCTION

Tech is a huge success story across the continent of Europe.

Outside of Silicon Valley in the United States, London, Berlin and Paris lead the world in tech but the developing world is catching up. It is therefore important that as European Union legislators we look in detail at the problems facing tech innovation and development and then see what role we can play in helping to fix them to ensure we stay ahead.

It's very easy to think that tech is only about headline making companies like Facebook and Google but a lot of tech doesn't gain the same publicity. It's vital that we understand this lesser known, even "hidden" sector, because it's here that some of the most important innovation is happening.

The problem comes in that because it's so unknown there is little information quickly available. It's for this reason that I decided to commission a report.

What I asked for was research into a series of companies who are potentially changing our world, without us hearing about them. I asked if there is anything EU legislators or national governments could be doing to encourage innovation and to address any concerns.

Syed Kamall, MEP for London, co-Chair European Conservatives and Reformists

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CASE STUDY 1

FINANCIAL EXCLUSION

Firms opening up the credit market

ClearScore

Identified company

ClearScore

Sector: FinTech
Technology: Online financial services aggregator for consumer products, with tools to help improve credit scores of its users.
Website: www.clearscore.com
Location: London
Parent Company: Being bought by Experian

Company Background

No longer a startup, ClearScore has over 7 million users in the UK alone and is planning to expand into 10 new markets around the world within the next five years. All this has been achieved before the company turns three years old.

ClearScore's stated vision is simple – to help anyone no matter what their financial circumstances and improve their financial well-being. The onboarding process begins with a free credit report. The platform then helps users to build a credit score from scratch.

Technology Overview & Future

ClearScore is fundamentally about financial inclusion and using technology to achieve this goal. The company decided from the start to offer customers their own credit report for free, "bucking the trend in the industry".

The platform and credit report were specifically designed to make financial information easy to understand for those less financially literate. The average adult has the math ability of an 11 year old and therefore often is not able to interpret data or understand what a financial bar chart is telling them. This is a particular problem when individuals come to take out a mortgage or want to buy a car.

ClearScore makes money in the same way as other aggregators such as comparethemarket.com do: by recommending products which match their users' requirements.

The firm uses chatbot technology to help provide personalised recommendations to users on a larger scale than would be possible with human advisors. They are also providing personal finance coaching tools.

Note that as providing guidance is not regulated, ClearScore is able to suggest financial products and steps that users can take without having to deal with the FCA which raises both concerns and opportunities.

The firm uses Open Banking with selected partners, as the additional data helps ClearScore to understand common behaviours users display, as well as insights into the financial topics users need to learn more about.

Key Issues & Needs?

- More adoption of the Open Banking platform: While ClearScore has adopted the Open Banking platform, many have not. ClearScore sees access to Open Banking as essential to help its algorithms in order to recommend products to individuals with a greater degree of accuracy in order to deal with individuals issues. Access to data from bank statements for example provides a whole new level of detail on consumer spending habits. Open Banking means opening up data and therefore carries questions about security and privacy but allows firms such as ClearScore to innovate and disrupt the existing banking market. Banks should be encouraged to take part.

- Agreement on the API standards for Open Banking to build industry and public trust: These questions need to be resolved if there is to be real adoption of the Open Banking platform and in turn the opening up of the opportunities it offers. Until standards are agreed, it is hard to build confidence among the public, let along among the firms involved. Therefore standards need to be agreed as a priority.

- Access to talent: ClearScore is currently 160 people strong and has over 40 open positions for engineers. Just as with many other rapidly growing firms, it is planning to expand into new markets within Europe and beyond e.g. India. Access to talent is expected to be an ongoing issue. Most new hires are expected to be in London, with software engineers and data scientists being the most sought after. ClearScore does sponsor visas in some instances, but say it wants to ensure there is easy access to talent post-Brexit.

- Improvement in industry diversity: Part of the problem with access to talent is the lack of applications from women for technical roles. ClearScore says it has tried very hard to recruit more women for software engineering and data science roles, including supporting non-technical staff to re-train for engineering roles. This model of re-training non-technical staff at technology companies could provide another technique to help overcome this issue.

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ClearScore Recommendations

- Open Banking: presents a great opportunity to tackle financial inclusion. Both banks and the public should be encouraged to take part. By sharing data, more new products and services can be introduced. There will be a need to reassure members of the public about security and the use of their data first and a need to ensure suitable regulations exists to ensure that these procedures are followed.

- Talent: It is important that tech firms can find the best talent from around the world. Immigration processes should recognise the need for tech to stay at the cutting edge of global industry. This can only be achieved by allowing the best minds to work for firms whatever country they come from. This can not just mean access for employees from within the EU but from around the world.

- Retraining - Governments should recognise the need to retrain existing workers who face being made redundant by emerging technologies. The educational curriculum should be adapted to the future world of work, rather than be based on current requirements.

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CASE STUDY 2

SUSTAINABLE ENERGY

How tech firms can better protect our environment

SIMEC ATLANTIS ENERGY

Identified company

SIMEC Atlantis Energy

Sector: Green Energy

Technology: Tidal Power

Website: www.simecatlantis.com

Location: London, Edinburgh & Newport

Parent Company: Member of the GFG Alliance

Company Background

SIMEC Atlantis Energy is a sustainable energy generation company with a particular focus on tidal (sometimes referred to as marine) power generation.

It does everything from system design, project development, construction management, financing and operation of turbines.

Together with its owner GFG Alliance, Atlantis has a number of assets in the UK and Australia with a gross capacity of 680MW.

Technology Overview & Future

There are two ways to generate tidal power. One is to build a sea wall to trap water like a hydro power station to generate energy when the water is released. This was the proposal for the Swansea tidal lagoon. The second is through a 'tidal stream', where you essentially place turbines, similar to the ones used in wind farms under water, in a river. The latter generates energy continuously (as water always flows) and so is very attractive.

As with wind energy, there are not many technology challenges with tidal power generation due to the maturity of the technology and an established supply chain, which is shared with the wind energy sector. As a result, the cost of power generation started out at £305/MWh, dropping to £150/MWh in 2017 and is expected to drop to a very competitive sub-£80/MWh in the 2019 energy auction.

Scotland and Wales are currently the world leaders in marine energy sector. Atlantis has a major project called "MeyGen" in development in Scotland with a total of 8,500 jobs expected to be created. At 6MW rated capacity, MeyGen is the world's largest tidal stream array and has 392MW of further development capacity, with consents and grid connection agreements in place to pave the way to exploit more of this potential. It should also provide a template for other projects around the world.

Altantis is also exploring tidal stream projects in locations such as Canada, India, China and Indonesia, so potentially is a fantastic global exporter of green energy technology around the world.

Key Issues & Needs?

- The need for a seperate "sustainable tech" fund: Firms such as Atlantis say they are often reliant on government subsidies for large infrastructure projects such as in Scotland. The European Investment Bank provides a mechanism to access such funding but it still remains difficult to acquire this money and firms say they spend a lot of money "lobbying" to gain access. Now that marine power has become more economically sustainable, a better system would be to have a dedicated pot within existing government spending for 'sustainable tech' managed by experts in the sector. This would allow sustainable technology to be judged against similar efforts rather than against general infrastructure projects such as new public bridges or motorways. We recommend that this should be supported more by private investment and perhaps by government loans to be repaid based on profits.

- EU/UK post-brexit co-operation: Atlantis calls for future cooperation and knowledge sharing between the EU and UK, post Brexit. The firm feels that the sector is still growing and there is a need for knowledge sharing if sustainable tech is to advance at the rate it needs to in order to overcome old energy production methods and to halt the speed of climate change.

- Marine energy is economically viable: The CEO of Atlantis has said that it can compete at market rates in the next energy auction and so does not call for a budget to be ring-fenced for tidal stream energy. Government and the public need to be made aware that renewable energy is now mainstream.

- Sustainable technology is often criticised for being dependent on taxpayer subsidies, but such firms would argue that other forms of energy, such as nuclear and even coal rely on subsidies or government support. It would be an interesting exercise to map all the subsidies received by all energy generating companies and to see which ones are more viable as the technology develops.

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SIMEC Atlantis Energy Recommendations

- To encourage future marine sustainable technology developments across Europe and the world by encouraging and facilitating co-operation between global experts in order to combat climate change.

- To raise awareness of marine energy: Marine energy is self sustainable and therefore economically viable in its own right however, lack of awareness can mean the technology is by-passed. We recommend the need to improve awareness of the technology and the benefits to both the public sector and individuals.

CASE STUDY 3

TELEMATICS

Transforming the way we drive and share cars

Identified company

Octo Telematics

Sector: Sharing Economy

Technology: Insurance and fleet telematics data, including car sharing

Website: www.octotelematics.com

Location: London

Parent Company: None. Founded in 2002 in Italy.

Company Background

Octo Telematics is the world's largest telematics technology company and says it is transforming the way car insurance companies assess risk, manage claims and build customer relationships.

According to Octo, it has a 36% market share of the global telematics industry, providing driver behavioural data, vehicle tracking and stolen vehicle recovery.

Over the last few years, Octo has used its analytics capabilities and algorithms to offer insurance companies a solution for insuring car sharing companies and its users. It is a strong advocate of the sharing economy, especially in the automotive sector. So much so, it launched Oomove, a platform for fleet management and car sharing in its various forms, all using Octo Telematics technology capabilities. It also started Sharemine 2, an online platform that enables anyone to start a car sharing community.

Technology Overview Future

Telematics is all about "connected vehicles". Vehicles constantly collect data and send it back to a central global telematics database in order to be analysed. So far Octo Telematics says it has collected 196 billion miles of driving (including 442,00 crashes) which then feed into its data analytics and proprietary predictive algorithms to assess risk.

The data can then be shared with partner's IT systems in order to advise decisions. For example, Octo is working with a number of large insurers including Admiral and Allianz.

Octo sees car sharing as the future, since the long term trend is that car ownership is in decline. As a result, Octo has adapted their algorithm for the car sharing sector, encouraging insurers to offer products to car sharing platforms. Notably, Admiral now offers insurance products to sharing economy companies as well as to the users of those platforms.

Octo also works with car manufacturers such as BMW and Toyota for whom driving styles and habits data helps them develop and monitor warranty programmes and preventative services. These companies are very aware of the changing marketplace and see P2P car sharing as a new market to actively enter and be seen to be involved in for marketing. The logic being if people won't buy a BMW made car, then they might as well rent or share one.

Newer developments include rolling out products which automatically refuse insurance for unsafe drivers based on previous driving data. This already exists for the general insurance market and is being adapted to the P2P sector.

Key Issues & Needs?

NOTE: There are some major questions about privacy, data and exclusion from services due of algorithms which will need to be addressed but the focus of this report will be on the impact on the sharing economy and car sharing. Telematics can make driving safer and car sharing more practical.

- Car sharing needs to be more actively encouraged by politicians: Politicians should encourage apps which facilitate car sharing. Revenue models are relatively weak and therefore do not receive the same attention from investors. Octo claims it has a very small uptake of its Sharemine product despite being free and because it is free they can not justify promoting it more heavily.

- More innovation is needed in the sharing economy: The challenge to making car sharing more popular is one of logistical e.g. parking, new cars, cleaning, vehicle entry, matching potential sharers etc. In the car sharing sector, there are some car entry solutions via smartphone apps, but not much else. We need to encourage entrepreneurs to address some of these issues to make car sharing far more convenient, more accessible, cater for people's everyday lives and to encourage a change in lifestyle. We need to better understand the obstacles to doing this.

- Improving innovation in the car sharing market: The sharing economy is dominated by monopolies or a handful of large companies. There are two reasons for this: 'first mover' advantage and network effects. This gives companies such as AirBnB and Uber a big advantage over competitors. These large companies are now more focused on maintaining market share rather than innovating with new business models or improving product experience. Creating a new marketplace is incredibly expensive and almost impossible to bootstrap, so new innovative companies or communities trying something different in the sharing economy is something which is less likely to happen. Again there is a need to look at what will open up innovation.

- The need to change people's relationship with their car: People are still very tied to car ownership in the UK. Unlike the USA, in the UK, car sharing has had a slower uptake. Octo believes there are cultural reasons behind this, such as valet parking being the norm in the US. Politicians should do more to make people aware of the benefits and efficiencies of car sharing, including how it can help the environment.

Octo Telematics Recommendations

- Promoting car sharing : Awareness of car sharing apps and their potential remain limited. Government should get behind promoting it more heavily and encouraging entrepreneurs to be more innovative in this space. For example, by encouraging mapping apps to include "car share" as an option, not just public transport, solo driving and uber. Could tax incentives be offered to those who act as the driver and carry a certain number of passengers? Could car-pooling lanes be introduced or car pool parking spaces?

- To promote Octo's sharemine product.

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CASE STUDY 4

ENDING FINANCIAL EXCLUSION

Tackling banking regulation

Identified company:

Vanquis Bank

Sector: FinTech

Technology: Credit cards for those rejected elsewhere. Also offering fixed rate bonds

Website: www.vanquis.co.uk

Location: London, with sites in Bradford and Chatham

Parent Company: Subsidiary of Provident Financial Group

Company Background

15 year old Vanquis Bank is helping people rejected by high street banks to get a credit card and start improving their credit score. Customers can be those with a bad or slim credit history. Most customers leave when their credit rating improves to access better products elsewhere.

Vanquis has 1.7 million customers across the UK. The company is part of the Provident Financial Group which is 130 years old.

Technology Overview and Future

Customers interact with Vanquis through an app called eVanquis. This is a highly rated app. The app allows users to check balances, bills and make payments flexibly i.e. pay over the minimum (which is very popular with those struggling financially). SMS payment reminders are also sent, including a 'promise to pay date' option for people behind with payments. There is also a fraud alert tool which flags suspicious transactions.

Interestingly, Vanquis Bank does not see itself as a 'challenger bank' as it does not consider itself to be particularly innovative when it comes to technology unlike Starling Bank or Monzo and it is not trying to take on the big name banks either. However, the government and the FCA would class it as such, as it does have similarities to other small banks and building societies.

Key Issues and needs?

- Reducing the cost of doing business: Vanquis is less concerned about capital requirements, it does not lend huge amounts of money and its fixed rate bonds product also helps with this regard. However, the cost of doing business due to the volume and complexity of regulations is a considerable burden.

- The impact of Open Banking: Vanquis thinks that uptake will be slow, especially from tech-suspicious customers or by people with poor credit scores who are untrusting and don't want their information shared. Just like the difficulties there are with getting people to switch bank accounts, it sees the same issue with Open Banking. The fear is that what is intended to help challenge the big banks, will actually just help them because of the huge amounts of work involved and smaller banks not having the resources or ability to take advantage in the same way. The messaging around Open Banking is also confusing as financial institutions are told not to share information with third-parties and now it looks as if that is being turned on its head. The company did admit that Open Banking could potentially be a new channel to the market for Vanquis.

- Improving financial inclusion: How to help people? Vanquis thinks that it is doing the right things. However, there has been some concern over whether those with financial struggles should be allowed further loans. Vanquis does not believe that tighter constraints on lending will 'help' people and neither will layer upon layer of regulation. More scrutiny is needed of proposals such as those which look to cap limits and ban credit increases. Vanquis feels this will not help people to improve their credit scores, but will have the effect of forcing people out of mainstream lending to dangerous online lenders from overseas who are often fraudsters. The challenge is for a banks like Vanquis not to be tarnished with the same brush as the payday lenders. There need to be proportionate regulation for responsible lending and then the market should be left to deliver.

- Too much focus on the credit card market: The home credit market (which has a lot of overlap with payday lending) is ~£1-2 billion, the credit card market is ~£60 billion and the student loans market is ~£100 billion. The question needs to be asked, why do regulators and governments focus on credit card lending so much? Vanquis's own customers are likely to be in private rental accommodation (so tend to move around a lot) and may have some relationship problems. Its customers are also likely to be in employment, more digitally tooled and in their mid-30s to mid-50s. However, just the fact that people move home a lot is enough to put the high street banks off. As a result, Vanquis feels that this perception of extreme vulnerability is a little unfair.

Vanquis Bank Recommendations

- Regulatory burdens: Regulatory bodies need to have better relationships with small banks in order to ensure regulation does not stifle innovation and growth of the sector.

- There needs to be a clear understanding of what the dividing line is between payday lenders and those offering loans to help those struggling get on top of their debt.

CASE STUDY 5

ALTERNATIVE ENERGY

Hydrogen as an alternative fuel

Identified company:

Intelligent Energy

Sector: Green Energy

Technology: Hydrogen fuel cell design, mostly for the defense and transport sectors Website: www.intelligentenergy.com

Location: Loughborough (UK)

Parent Company: Spun out of Loughborough University, now an independent company

Company Background:

Spun out of Loughborough University, Intelligent Energy is an engineering company which designs hydrogen fuel cells. The company was established in 2001 and is still headquartered in the city. Intelligent Energy has designed a number of different fuel cells, mainly smaller sized ones with capacity between 5W and 120kW for the defense and transport sectors.

Examples for the military include powering small drones, where a silent fuel cell is hugely advantageous, battery packs for night vision goggles and to ensure platoon connectedness in challenging locations. In the transport sector, Intelligent Energy has partnered with Suzuki Motor Corp. to develop hydrogen fuel cells for a range of vehicles, notably for the Lotus fuel cell taxis which were used during the London Olympics. Fuel cell motorcycles that also trialled by the Metropolitan Police (UK) in September last year.

Unfortunately for Intelligent Energy, the London Taxi Company (formerly known as Manganese Bronze) was purchased by the Chinese company Geely, who also purchased Volvo back in 2010 and the firm say this has resulted in a delay in getting hydrogen cars to London's streets.

Technology Overview and Future

At its heart the technology behind the fuel cell is called a polymer electrolyte membrane (PEM) that conducts hydrogen ions (protons) but not electrons. Within the fuel cell the overall chemical reaction is represented as: H 2 + ½ O 2 H 2 O. This simple electrochemical reaction produces electrical energy and water. Initially used for rocket engines, the energy potential is enormous.

Although there are no unwanted pollutants from the fuel cell itself, how the hydrogen is produced may or may not be a clean source of energy.

The vast majority of hydrogen is produced from methane (CH 4) which also produces carbon dioxide, essentially defeating the purpose of decarbonisation.

Another method using electrolysis is gaining momentum where the hydrogen production is almost like the fuel cell in reverse. Intelligent Energy have dabbled in the hydrogen production space, but sold the two companies that it used to own and instead refers customers to these companies when the case arises.

To develop the fuel cell materials, special processes and technology are required. Intelligent Energy has either had to develop or design these from scratch themselves. For example, Intelligent Energy has developed two types of cooling technology (air-cooled and evaporatively cooled), it has developed four generations of air compressors and many parts such as valves, seals and gaskets cannot simply be bought in the market and have to be specially manufactured.

Intelligent Energy sees a future where hydrogen cars are more prevalent, with the infrastructure to support charging. It believes it has a reason to be upbeat as Japanese car makers seem committed to hydrogen, in contrast to Tesla which is fully committed to EVs. New opportunities are present in additional sectors, including telecommunications and consumer devices.

Key Issues and Needs?

- The need to develop truly “clean” hydrogen fuel: As highlighted above, hydrogen cars are unlikely to be seen as ‘green’ if we continue to produce greenhouse gases during the production of hydrogen. We need to look at producing hydrogen cleanly, cheaply and on a vast scale if we are to move away from using methane. This presents a problem for the sector.

- Immature and spread out supply chain: Investment in material science and R&D will help to improve the supply chain for hydrogen. We have seen how the wind energy ecosystem has benefitted from there being a mature supply chain. The result in terms of lowering the cost of wind energy speaks for itself. We must try to achieve the same with hydrogen if we see it as part of our decarbonised future.

- Hydrogen refueling infrastructure: Hydrogen refuelling is fast, especially when compared to electric vehicles which can currently take hours, but we need the infrastructure to be on a similar scale to petrol stations.

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Intelligent Energy Recommendations

- Hydrogen innovation: Firms are reluctant to invest in R&D to the level required to move the technology ahead quickly due to concerns over public priorities. Governments need to create the space of both back battery electric and hydrogen electric technology.

- Public transport adoption: In order to demonstrate trust and support for hydrogen as a fuel, more public transport vehicles could be converted to hydrogen. This could include not just buses and taxis but also trains. There are already Hydrogen buses in London and other cities. Siemens is experimenting with a hydrogen train and there is a project to convert old trains to hydrogen electric.

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CASE STUDY 6

ALTERNATIVE ENERGY 2

Cleaning up hydrogen

ITM POWER
Energy Storage | Clean Fuel

Identified company:

ITM Power

Sector: Green Energy

Technology: Hydrogen energy solutions including clean hydrogen fuel production through electrolysis

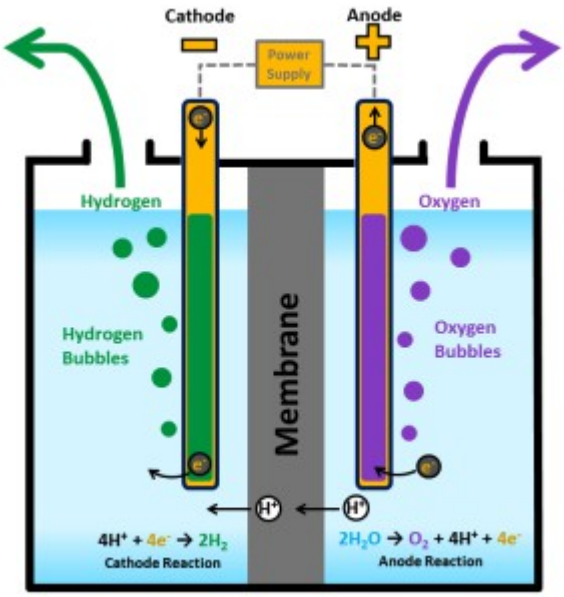
Website: www.itm-power.com

Location: Sheffield, further offices in Germany, France, USA and Canada

Parent Company: Public company listed on AIM

Company Background

ITM Power manufacturers integrated hydrogen solutions such as refueling stations, on-site hydrogen production for oil refineries and power to gas solutions. Based in Sheffield, the company was founded in 2001 and floated on AIM in 2004.



Technology Overview and Future

ITM Power uses electrolysis to produce hydrogen fuel. This makes its hydrogen a clean source of energy (known as green hydrogen) unlike the process to produce "blue hydrogen" which uses methane and produces carbon dioxide as a by-product. An electrolyser is essentially an anode and cathode separated by a membrane that are all submerged in water. Two reactions take place. Water reacts at the anode to form oxygen and positively charged hydrogen ions (protons): 2H 2 O O 2 +4H + + 4e - . Only the hydrogen ions pass through the membrane to the cathode where they combine with electrons to form hydrogen gas: 4H + + 4e- 2H 2 .

Different types of electrolysers and methods do exist, but the one described is most common and it is how ITM power produce its hydrogen fuel.

As a result, ITM Power owns and operates refueling stations for fuel cell electric vehicles (FCEV) in the UK, with four around London and another coming soon to Gatwick airport. FCEVs take just a few minutes to fill up and are ready for long range travel.

ITM Power has been working with Green Tomato Cars, a taxi service based in London for over three years and with the Metropolitan Police to provide fuel for its cars.

ITM Power plans to have more refueling stations in London and the South East of England and is working closely with Shell to get these in place at petrol stations. A great advantage of hydrogen refueling stations is that the fuel can be produced on site and does not need to be transported like petrol does. The company is also working on getting larger vehicles to switch to hydrogen such as buses, lorries and boats. For these, hydrogen is the only green option.

Hydrogen trains could also be an option, which is an interesting alternative to electrification of train lines. ITM Power is also producing industrial scale electrolysers to reduce the carbon produced in oil refineries. A project in Germany is in progress to switch from natural gas to hydrogen for power. The same can also be done for ammonia and methanol production plants to make these industries considerably greener. There are five oil refineries in the UK with whom ITM Power would love to work with.

The company also has the technology to use surplus capacity from intermittent renewable sources such as wind and solar to produce and store hydrogen. This may actually be a better storage option for the UK as the volume of batteries required to store this electricity is huge and with hydrogen storage it may be possible to use the existing natural gas infrastructure. This stored hydrogen can be mixed with natural gas i.e. a 20% hydrogen / 80% gas mix and be used to heat homes. ITM Power thinks that the proportion of hydrogen can be increased incrementally to ensure that gas plants remain safe and that this new fuel works in harmony at the consumer end too.

Key Issues and Needs?

- Government priorities made clear: As before, governments must make clear where its priorities will be, either with battery electric or hydrogen electric vehicles or a mixture of both. The hydrogen industry is looking to see where regulation may go in future in order to decide whether hydrogen will be economically viable to invest in.

- More partnerships and facilities to develop production: With its German oil refinery project up and running, ITM Power is looking for larger projects to go from 10MW to 100MW electrolysers. It would like to work with oil refineries, ammonia and methanol plants. ITM Power is looking to governments to help facilitate new partnerships.

- A recognition of the fact hydrogen provides an "energy storage solution": As more renewable energy is being produced, it is clear that to balance the grid better storage options will be needed. Batteries are not the only option. Hydrogen is an alternative.

- Advocate for hydrogen to gas: 'Hydrogen to gas' is getting some interest and the big gas companies worried about how fast decarbonisation is happening want to switch to hydrogen completely. ITM Power thinks the staged approach using a gas / hydrogen mix is best, but it is small compared to the might of the gas companies. It also wants to ensure that hydrogen used in gas plants is renewable and not produced from methane. There is a need for stronger advocacy for clean hydrogen.

ITM Power Recommendations

- R&D and the future: Governments to make clear whether it will create the space for both battery electric and hydrogen electric vehicles. Due to the costs involved in hydrogen R&D, firms will be unwilling to commit without a clearer indication of future regulation and public priorities.

- Storage: Hydrogen presents a real alternative for energy storage. All renewable energy sectors should be encouraged to work together to look at ways they can store the energy they are producing better together. Meetings should be facilitated to develop cooperation.

- Public Transport: Hydrogen powered public transport vehicles would send a strong signal to the public and industry about the value of hydrogen if this is chosen to be the public's priority. In which case public transport authorities should look to introduce such vehicles.

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REPORT RECOMMENDATIONS

There is an enormous range of developments taking place in tech yet public, media and political attention often remains on the headline tech firms such as Google, Facebook, Apple and Amazon.

Our clear goal must be to encourage innovation and ensure the UK and Europe as a whole remain world leading hubs for technological developments.

While companies would welcome increased support in this, we recommend that government's role should be in creating the space for them to succeed and removing the barriers that restrain them from growing and competing.

- Open Banking: Open banking presents a great opportunity to tackle financial exclusion. Both banks and the public should be encouraged to take part. By sharing data, more new products and services can be introduced. There will be a need to reassure members of the public about security and the use of their data and this will mean suitable regulations to ensure proper standards are followed.

- Talent: It is important that tech firms can find the best talent from around the world. Immigration policy should recognise the need for European tech to stay at the cutting edge of the global sector. This can best be achieved by allowing the best minds to work for firms whichever country they come from which, which means looking beyond the EU as well.

- Retraining - We must recognise the need to retrain existing workers who face being made redundant by emerging technologies. The education curriculum must be adapted to the future world of work, rather than be based on current requirements.

- Policy and investment strategies should focus more on marine energy. As marine technology becomes economically sustainable, ways must be explored of facilitating and funding its adoption.

- Promoting car sharing : Awareness of car sharing apps and their possibilities remains limited. Better promotion is required, along with encouragement for entrepreneurs to be more innovative in this space. For example, encouraging mapping apps to include car sharing as an option, not just public transport, solo driving and Uber. Could tax incentives be offered to drivers to carry a certain number of passengers? Could dedicated carpooling lanes or car pool parking spaces be introduced?

- Regulatory burdens on challenger and small banks need to be reduced: Regulatory bodies need to have better relationships with small banks in order to ensure regulation does not stifle innovation and growth of new competitors.

- There needs to be a clearer understanding of the dividing line between those payday lenders who have no regard for their debtors and those offering loans to help those struggling to get on top of their debt.

- Hydrogen innovation: Policy must present clear public priorities or create sufficient space for hydrogen technology companies to continue to invest in R&D.

- Public transport adoption of hydrogen: For hydrogen electric/fuel cell technology to be encouraged, there needs to be greater awareness of the technology. Where feasible, public transport companies and those with large fleets, such as local councils or airports should be encouraged to switch to hydrogen vehicles. This should include not just buses, taxis or working vehicles but also trains.

- Storage: All renewable energy sectors should be encouraged to work together to look at ways they can store energy better. Hydrogen as a storage technology should be one of those options considered, so that more green hydrogen is produced. Meetings should be facilitated to develop cooperation.

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APPENDIX

Information sources of interest

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