Accelerating the Rate of Investment in Local Energy Projects

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SIEMENS

UK: 100

Acknowledgements:

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About UK100:

UK100 is a network of highly ambitious local government leaders, who have pledged to secure the future for their communities by shifting to 100% clean energy by 2050. This is not just good for the planet but for the people and communities they serve, be they in villages, towns or cities. Local leaders are working together to create flourishing communities, seizing the opportunities of technology to create jobs and establishing a nationwide project of renewal, focussed on local needs and ambitions.

UK100 is the only network for UK local authorities, urban, suburban and rural, focused on climate and clean energy policy. We connect local leaders to each other, to business and to national government, enabling them to showcase their achievements, learn from each other and speak collectively to accelerate the transition to clean energy.

We work closely with elected representatives, policy experts and grassroots campaigners to make the clean energy transition a reality. This involves developing solutions to challenges faced by each and all of our local leaders, whatever their geography, history or makeup, so as to influence national government and building public support for clean energy solutions.

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Foreword:

In unprecedented times it is important to see the opportunities for renewal as well as protecting our communities from economic, health and environmental shocks. The Covid-19 crisis demands that we protect people now and offers us a moment to build resilience into our economy and our communities.

That includes how we transform our communities and local economies to meet the challenge of climate change, specifically the target to be a Net Zero economy by 2050. Many UK100 members have committed to reaching that target earlier, and this report includes important policy proposals to enable the action that is required by local government to achieve this goal.

Access to finance to realise our ambitions isn't only a consequence of austerity, but also of policy and regulation. Just as the recovery needs to be locally-led, the shift to Net Zero needs to be led by those who know their communities best. Local clean energy systems development is also an essential part of levelling up.

Local leaders are practical and hard-headed - we have to deliver for our communities every day. This report is written in that vein: it is the result of significant research conducted before and during the pandemic, thus reflecting some of the new realities but also rooted in the practical experience of dozens of industry experts, financiers, local authority officers and councillors, civil servants, think tanks and community energy pioneers.

The report makes the case for national government to be an enabler of local government, and a shaper of markets, both local and national. It proposes smart use of public money to facilitate greater investment in our energy system that will meet the demands of decarbonisation, and meet our goals of health and wellbeing for our communities as well as essential economic recovery that works for everyone.

I hope decision-makers of all kinds consider these proposals as a genuine and constructive contribution to solving the challenges we face. National government can't meet the Net Zero target without local government's active involvement. This report sets out some ways to enable that to happen.

Cllr Judith Blake,
Leader, Leeds City Council, Co-chair UK100

Siemens believes that local government leaders have a crucial role to play in decarbonising the UK and in the process delivering hundreds of thousands of new jobs across the country. Siemens estimates that more than £100 billion of investment in local clean energy schemes could be generated through local authorities, private capital and government investment working together on projects across the UK.

Government funding should focus on programmes that can be delivered at scale. Siemens fully supports the report's recommendation of a Net Zero Development Bank. It would address many of the barriers to the development of local energy schemes by combining a central hub with a focus on core financing expertise, strategy development and policy engagement with government and strong regional-based development teams to deliver cost effective schemes optimised for local conditions.

There is an urgent need to scale up local energy investment across the UK if we are to have any chance of meeting Net Zero by 2050. This requires a national effort with government, business and the public all playing our part. I hope this report is a catalyst to get the work moving at pace.

Carl Ennis,
CEO, Siemens GB&I

Summary:

Our transition to a Net Zero economy requires a fundamental change in the way our energy system operates. Our switch to renewable generation requires us to develop a balanced energy system which combines a mix of large-scale power generation with local decentralised energy systems.

The opportunity is now. As we rebuild our economy post Covid-19, there is a clear and pressing opportunity to invest in our transition from fossil fuels. Failure to take this opportunity poses risks to our future economy and the acceleration of changes to our climate.

Local energy systems will involve energy consumers becoming generators themselves. To be cost-effective they will use local generation, smart technology and storage solutions to balance demand and supply. The closer the energy is generated to where it is used, the less will be lost through transmission. Rapid investment in energy efficiency measures, which reduces the amount of energy we consume, will enable us to reduce their size and cost.

Local authorities are uniquely placed to help in this process. Their democratic accountability requires them to engage with their populations and encourages them to establish political consensus to bring about long term change. They have significant powers and responsibilities and control large budgets which they can use to help underpin investment in new infrastructure. They think across the whole economy. By adopting integrated systems-thinking they can solve more than one problem at a time, such as facilitating job creation, reskilling and economic growth, saving money for residents, generating income to support public services, designing public space and tackling air quality.

The solutions won't be the same everywhere. We will need to design our local energy systems to take advantage of the different resources available across the country to support our energy demands, such as solar and wind energy which varies in intensity across the UK, and warm water in old mine shafts in our former mining regions to heat our homes.

Government has a role to play in shaping markets to unlock investment. We have identified the potential to unlock over £100 billion of investment in local energy systems by 2030 through partnership approaches, which would enable industry and private capital to work with the UK's local authorities to scale up investment initiatives, delivering the transition to Net Zero that is now being demanded by our population and now enshrined in law.

Our researchers, Charles Abel Smith and Malcolm Ball each have over 30 years of experience in finance and industry, with a focus on developing low carbon projects, having worked together at Arup and the Green Investment Bank.

This report includes the evidence that they have gathered from the following sources

- Five regional workshops which brought together 347 people involved in developing and financing local energy projects
- Interviews with individuals from the public and private sectors involved in developing large scale low carbon investment programmes in Bristol, Greater Manchester, Nottingham and Warrington
- Interviews with other experts, including financiers, who are active in promoting the development of local energy investment
- Desktop review of relevant reports
- A challenge session with over 20 leading industry participants across the public and private sectors who considered our emerging findings

The results of this work confirmed the strong potential for local energy investment and the key role that local authorities have to play in working with the private sector to deliver this.

But to achieve this we need to address key barriers.

Participants in the local energy market are confused and frustrated by inconsistent policy and regulation as government and regulators grapple with evolving technology and the changing energy market. There is confusion about what investment is really needed, when it needs to be made, and uncertainty about how the revenue needed to support this investment will be generated.

£100 billion of capital investment requires initial development funding of the order of £5 billion. Government already recognises the need for support with a range of programmes currently in place, but much more is needed.

The private sector can provide much of the development capital needed, but only if there is sufficient market clarity to provide confidence that it can generate an appropriate return for the risks it is asked to take. Regulatory constraints and inconsistent government policy do not yet provide the necessary level of market clarity.

Local authorities lack the development capacity to support local energy investment and deliver the Net Zero transition that their populations are demanding, despite being keen to do so. Their constrained resources are focussed on delivering their statutory obligations in other sectors and the current Covid-19 crisis has exacerbated this position.

Government support, provided in a coherent and consistent manner, could help to provide the necessary market certainty and stability to address the problem of the poorly developed supply chains which are needed to deliver this investment, thereby creating a large number of new jobs across the country, with the associated health and social benefits that our transition to net-zero offers.

UK 100 believes that government support for local energy Net Zero investment would be delivered most effectively through a new Net Zero Development Bank, working in partnership with UK local authorities, to mobilise private investment by:

- becoming a centre of excellence for developing, procuring and delivering Net Zero project investment;
- scaling up investment opportunities to make them more attractive to institutional investors; and
- engaging with regulators and central government to ensure the necessary support for market development.

1. Background:

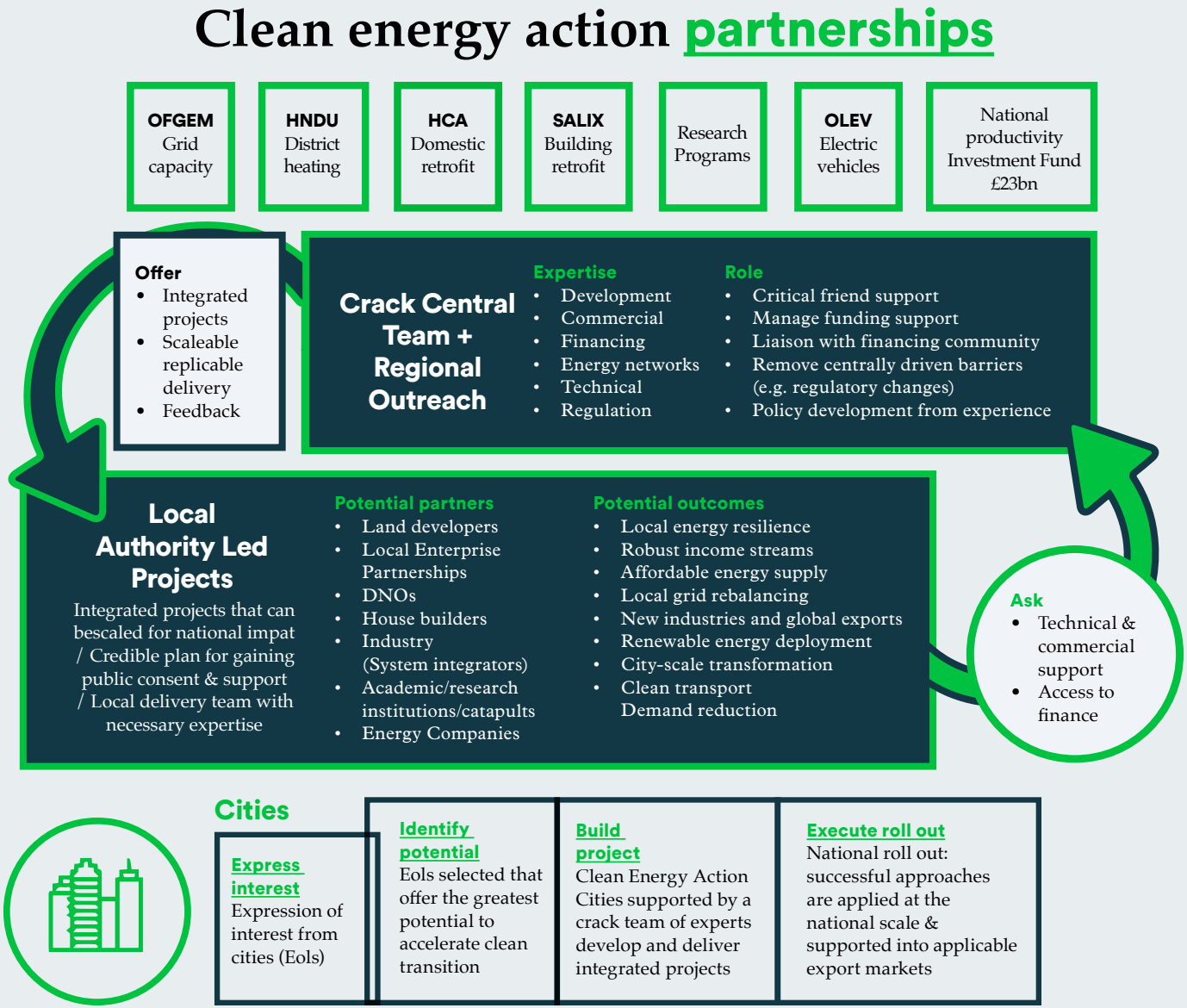
Financing the transition - UK100's proposal

In September 2017, UK100 published 'Financing the Transition'.

This report explained that the ambition of local leaders to facilitate the transition to clean energy is high. But this ambition was stymied by a lack of capacity and capability when it comes to turning that ambition into reality.

UK100 teamed up with policy experts, local leaders, developers and financiers to explore ways to solve this problem.

Our proposal was to develop Clean Energy Action Partnerships, a platform to enable national government to develop a low carbon Industrial strategy, with local leaders addressing the need for clean energy, focussed on place.



Government's response

- The government recognised the potential for locally driven clean energy projects to contribute to the country's transition to zero carbon by supporting the creation of five regional Local Energy Hubs (Hubs) across England in order to increase public sector capacity to bring forward local energy schemes. The Hubs were set up in 2018 with initial funding until 2021. They are governed by representatives from each Local Enterprise Partnership (LEP) in their respective region, with management boards that oversee the allocation of resources to strategic low carbon activities that align with locally determined objectives.

- In parallel, Innovate UK, the UK Government's innovation agency, embarked on its Prospering from the Energy Revolution (PFER) programme [1], designed to fund locally based energy system projects which will deliver cleaner, cheaper energy for consumers, while creating high value jobs and world leading capability across the UK. This is focused less on innovative technologies and more on innovative business models, integrating a range of proven technology to deliver local clean energy systems at scale. This challenge is about proving that low carbon living in low carbon places is more convenient and more comfortable than what has gone before. It will revolutionise energy management for consumers through new smart systems that can deliver energy according to society's needs and wants from a modern energy supply that is clean, efficient and affordable.

- The Energy Systems Catapult (ESC) is playing a key role within the PFER programme through its Energy Revolution Integration Service [2], which is helping selected projects to develop better business models by taking a systems-thinking approach.

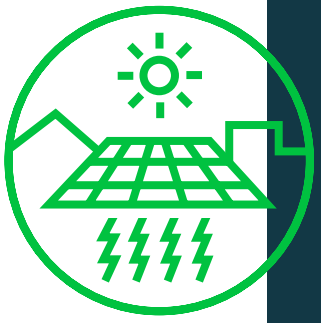
- The development of viable business models for the new energy systems we need to achieve our transition to a Net Zero carbon economy is crucial to attracting the finance that will be needed to fund the investment required. The Government, through seed funding from HM Treasury and BEIS, has supported the establishment of the Green Finance Institute. As the UK's principal forum for public and private sector collaboration in green finance, the Green Finance Institute is uniquely placed to mobilise capital to accelerate the domestic and international transition to a sustainable, Net Zero carbon economy that is also climate resilient.[3]

Committee on Climate Change Net Zero recommendation

In 2019, the Committee on Climate Change (CCC) recommended a new emissions target for the UK: Net Zero greenhouse gases by 2050.[4]

It stated that this is achievable with known technologies, alongside improvements in people's lives, and within the expected economic cost that Parliament accepted when it legislated the existing 2050 target for an 80% reduction in emissions from 1990.

It argues that this is only possible if clear, stable and well-designed policies to reduce emissions further are introduced across the economy without delay, concluding that current policy is insufficient for even the existing targets.



Increasing political support for climate change action

Political support for action has grown rapidly over the last two years. With the House of Commons climate emergency declaration in April 2019, the UK became the first country in the world where a bipartisan parliament had declared a climate emergency.[5]

This has been supported by the UK's local authorities. Over 90% of the UK's population now lives within one of over 450 council areas that have declared a climate emergency. Many of these councils that have declared a climate change emergency are demanding that we achieve our transition to Net Zero by 2030, not 2050.

The climate change protests of 2019 provided further evidence of the depth of people's concern. People are looking to their local council to show leadership in tackling the climate crisis.[6]

Delivering a green economic recovery

Building on analysis by the CCC and leading environmental NGOs, IPPR recently estimated that the UK government needs to invest an additional £33 billion per year to meet its Net Zero commitment by 2050.[7]

An example of the scale of the task: the UK Green Building Council estimates we need to retrofit nearly 2 homes every minute between now and 2050 to meet the Net Zero target.[8]

The Covid-19 crisis has revealed unexpected benefits of cleaner air and reduced carbon emissions. But we need to press on to tackle the long-term climate emergency.

As we explain, much of this investment needs to be made in local energy projects. Local energy projects have the potential to reduce the overall cost of achieving Net Zero and to help level up our economy by generating significant economic activity and jobs across the country, whilst improving the environment and leading to a healthier UK.

We have the opportunity to deliver a green economic recovery, firmly rooted in Net Zero, which is fair and just.

Accelerating our investment in UK local energy projects should also make us better placed to access the US$1.4-3.3 trillion global market that is expected to be spent annually (on average) in delivering the goals of the Paris Agreement.[9]

2. The role of local energy:

What do we mean by local energy and why is it so important?

Our transition to Net Zero requires a fundamental change in the way our energy system operates.

100 years ago, our gas and electricity was locally generated, often by municipally owned companies serving their own communities

The national grid was created in the 1920s to solve the problem of Britain's inefficient and fragmented electricity supply industry, by linking the country's most efficient power stations with consumers across the nation. The energy density of fossils fuels enabled the creation of a centrally generated energy system reliant on large power stations. Energy costs were low, and we were not aware of the environmental implications of our use of fossil fuels, so energy inefficiency in our systems was accepted.

Our switch to renewable generation, which relies heavily on smaller but widely spread solar and wind power installations, requires us to develop a balanced energy system, which combines a mix of large-scale power generation with local decentralised energy systems.

These involve energy consumers becoming generators themselves. To be cost effective, these local energy systems will use smart technology and storage solutions to balance demand and supply.

They will also need to keep generation geographically close to demand to minimise energy transmission loss. But they need to be linked to the national grid to ensure security of supply when local demand and supply become unbalanced.

Some areas of the country have their own particular energy sources which can be used to support their local energy systems, such as warm water in old mine shafts, or more sun or wind to power renewable generation. In other parts of the country, such as Lincolnshire, the waste disposal strategy of its agricultural economy involves biomass energy.

Energy supply is needed to support local economic growth. This is constrained in many areas where there is insufficient grid capacity to support new development and business investment without costly grid investment.

Before we invest in new energy capacity we need to make sure that we have minimised energy demand by investing in energy efficiency.

Homes accounted for 18% of territorial emissions in the UK in 2018, primarily from natural gas use for heating and cooking.[10]

Emissions from heating more broadly, including in non-residential buildings and for industrial processes, accounted for 37% of UK territorial emissions in 2016.[11]

We will also need to change the way that people consume or buy energy, such as recharging their electric vehicles instead of refuelling their cars at the fuel pump.

Our move away from fossil fuels to renewables will help to improve our energy security by reducing our reliance on imported fuel. It will also create greater long-term cost certainty as our energy prices will no longer be subject to the vagaries of the oil and gas markets.

The importance of area based energy systems

Developing our local energy systems will play a key part in solving our national energy transition challenge.

The ESC's Local Area Energy Planning pilots[12] demonstrate how a balanced and well planned transition, reflecting local priorities and circumstances, would be much more cost effective than imposing a single solution across the country. Local Area Energy Planning would also create benefits for people and business, including the opportunity to drive clean growth, create new jobs and increase confidence to invest in new energy products, services and infrastructure.

We need to consider all energy as a dynamic system, encompassing transport, heat and power rather than separate themes. Well planned local energy systems can deliver co-benefits such as a more efficient local economy, job creation and health improvements.

InnovateUK's PFER programme recognises the need to think in terms of area-based energy systems. This programme is seeking to encourage the development of new business models that can support the investment needed to create our new dynamic local energy systems.

Prospering from the Energy Revolution

The PFER Challenge will develop cutting-edge approaches to local systems that deliver cleaner, cheaper, energy for consumers, while creating high value jobs and world-leading capability for the UK.

The challenge is about showing people that they can live low-carbon lifestyles in low-carbon places more conveniently and more comfortably. It will revolutionise energy management for consumers through new smart systems that can deliver energy according to the society's needs and wants from a modern energy supply that is clean, efficient and affordable.

New smart systems can link energy supply, storage and demand patterns across power, heating and transport to improve efficiency, resilience, infrastructure productivity and service to consumers.

PFER is funded through the Industrial Strategy Challenge Fund (ISCF). As part of ISCF, the UK government is investing up to £102.5m in the PFER Challenge.

What local energy investment do we need?

The table below illustrates the range of technologies that we will need to invest in at a local level.

Themes	Technologies
Energy saving & efficiency	• Energy efficiency in homes (retrofit & newbuild) • Non-domestic energy efficiency
Renewable Generation	• Solar, wind & hydro generation • Biomass energy
Low carbon heating	• District heat network roll-out including CHP • Heat pumps • Off-gas grid homes • Use of hydrogen and green gas
Smart energy systems	• Smart grids • Distribution upgrades • Battery storage • ESCOs to manage dynamic new energy market
Transport revolution	• EV charging • Hydrogen fuelling • Shift to electric and hydrogen-powered vehicles

What role can local authorities play in delivering local energy solutions?

Ensuring that this local energy investment meets local needs requires local strategic vision with accountability - a role best performed by local government. UK local authorities are uniquely placed to help our transition to Net Zero.

Their democratic accountability requires them to engage with their populations and encourages them to establish political consensus to bring about beneficial change.

They control large budgets, owning and operating a wide range of local buildings and transport assets, purchasing large amounts of energy on their own account and procuring and commissioning services. Their increasing reliance on business rates, due to reduced government grants and heightened demands on their services, provides them with a strong incentive to work with business to help increase local economic activity.

They have significant local powers and responsibilities which include planning, procurement, service delivery. Some have housing and transport responsibilities, training and skills development.

They think across the whole economy. By adopting integrated systems-thinking they can solve more than one problem at a time, such as saving money for residents, generating income to support public services, designing public space and tackling air quality.

“We are very interested in the role of local and regional government in navigating the Net Zero transition, particularly with regard to the capacity to take a place-based systems approach to deploying the right technologies/infrastructure with local upstream public engagement.”

National Engineering Policy Centre - a unified voice for 39 professional engineering organisations, representing 450,000 engineers, 19% of the UK workforce, and over a quarter of registered UK companies. It is a partnership led by the Royal Academy of Engineering.

Creating local economic impact

Many local authorities have invested in local energy projects because they offer attractive financial returns or help them to reduce their energy costs.

They also see the broader local economic impact they can create by retaining local spend on energy within their area and addressing grid constraints that hold back local economic development. But local energy projects also offer the opportunity to add significant value to their local economies through the creation of jobs. A recent Local Government Association report[13] estimated that, in transitioning to a Net Zero economy, as many as 694,000 direct jobs could be employed in the low-carbon and renewable energy economy by 2030 in England, spread relatively evenly across the country. The IPPR has produced the following breakdown by sector.

Sector	Job Estimate	Year
Energy Efficiency	223,387	By 2030
Heat Networks	Up to 81,000	By 2030
Smart Meters	12,000	By 2030

Source: Faster, Further, Fairer - Putting People At The Heart Of Tackling The Climate And Nature Emergency, IPPR, 2020

Delivering social benefits

Organisations such as the Impact Investing Institute are developing approaches to put a social value on zero carbon investment.

One pilot project in Portsmouth, which deployed Passivhaus-standard energy efficiency upgrades to 111 flats, reduced energy bills by an average of £700 per year,[14] equivalent to over half the annual cost of a standard energy bill.[15]

The chronic health effects from fuel poverty driven by high energy bills and inefficient homes is estimated to cost the NHS between £1.4 billion and £2 billion per year in England alone.[16]

> **“Local energy investment is going to be a key player in the recovery of our economy, in the recovery of our communities. When I think of some of the schemes in Cambridgeshire, in particular, it’s very much about putting energy at a very local level.”**
>
> Cllr Josh Schumann, Cambridgeshire County Council

3. UK100 review process:

Summary

To produce our report we pursued the following process:

- We held a number of workshops, with a pre-event questionnaire, with round tables focused on specific challenges, which resulted in an issues paper.
- We tested this issues paper on each of the Hub leaders.
- Then we interviewed 20 people over 4 city/local authority programmes to ascertain why they think their approach is going to be successful, whether it is replicable, and will it lead to scale?
- All this provided a wealth of evidence along with the literature review to which we synthesised to write the report.
- We held a challenge session with a range of industry experts and local authorities to test our initial recommendations on them.

UK100's Regional Workshop Programme

In 2018 the Government's Green Finance Taskforce published its report 'Accelerating Green Finance'. This recognised the potential role of UK local authorities in helping to drive emission reductions. It stated that 'greater action is needed to unlock the full potential of place-led investment across UK regions and cities'.

In response to one of the report's recommendations, UK100 was commissioned by BEIS to hold a local energy workshop with each of the five Hubs, designed to raise awareness of green finance opportunities among local authorities with green infrastructure investors.

About 70 people attended each workshop from the public and private sectors, active in developing or financing local energy projects. Each Hub showcased projects in its area, and funders and investors active in the local clean energy market outlined how they currently see the opportunities and barriers. The workshops provided an opportunity for a frank exchange of views and experiences on how best to accelerate investment in this sector.

We sent out pre-event questionnaires to gather information on the challenges of developing local energy projects. We then held roundtable discussions as part of each workshop which considered specific issues relating to the development and financing of projects.

Interviews

Following these workshops we interviewed over 30 people who are active in the sector.

They included the five Hub managers and over 20 people involved in four city scale programmes (Bristol, Greater Manchester, Nottingham and Warrington) which are being led by local authorities with strong ambitions to accelerate their transition to Net Zero. These city scale approaches have the potential to deliver a cost-effective transition through integrating the range of different local energy investment needed. However, these approaches are generally at an early stage of project development. UK100 recognises the need to create viable approaches for rural and smaller scale communities and is seeking to address this through our Countryside Climate Network.

We also interviewed a number of other experts, including financiers, who are active in promoting the development of local energy investment. A full list of interviewees is included in Appendix II.

Challenge session

Our draft report was reviewed and discussed in a challenge session attended by 22 experts from across the private and public sectors who are active in promoting and developing investment in local clean energy projects. The list of attendees is set out in Appendix III.

4. Size of the local energy opportunity:

What have Local Energy Hubs achieved so far?

At the end of March 2020, after 18 months of operational delivery, the five Hubs had successfully developed a pipeline of 162 projects valued at £841 million. 90% of these projects were still at an early stage of development, with only £84 million of this investment potential having reached the final business case stage. Most of the projects are also relatively small scale, at below £5 million.

Theme	Total No. Projects	Est. Total Value
Renewable energy generation (inc. storage)	45	£208m
Heat led projects	37	£255m
Energy Efficiency Buildings (public, private & homes)	21	£92m
EV transport	15	£34m
Zero carbon developments	13	£121m
Network innovation	13	£36m
Community renewables	7	£14m
Other	11	£81m
Total	162	£841m

Source: BEIS.

The potential for local energy investment is much broader than this.

What is the scale of the local energy opportunity?

Siemens estimates that more than £100 billion of investment in local clean energy schemes could be generated through local authorities, private capital and government investment working together on a wide range of projects across the country.[17]

Siemens bases this on the energy strategies that it has carried out for two regions in England, the TriLEP area which covers much of South East England outside London, and the Humber region.

The table below sets out UK100's estimates of how this £100 billion investment potential might be distributed across each of the local energy sectors which we have identified. This represents around 25-50% of the total investment required over the next 10 years to get to Net Zero by 2050, based upon 1-2% GDP as indicated by the Stern Report.[18]

Themes	Total No. Projects	Potential investment by 2030
Energy saving & efficiency	• Energy efficiency in homes • Non-domestic energy efficiency	>£40 bn
Renewable Generation	• Solar & wind generation • Biomass energy	>£10 bn
Low carbon heating	• District heat network roll-out • Heat pumps • Off-gas grid homes • Use of hydrogen	>£30 bn
Smart energy systems	• Smart grids • Battery storage • Distribution upgrades • ESCOs to manage dynamic new energy market	>£10 bn
Transport revolution	• EV charging • Hydrogen fuelling • Shift to electric and hydrogen-powered vehicles	>£10 bn
Total		**>£100 bn**

- At a city level, Bristol estimates that it needs to invest £5-7 billion in local energy over the next 10 years to achieve Net Zero by 2030.[19]
- Edinburgh has assessed cost-effective carbon reduction investments up to 2030 in the housing, public and commercial buildings, transport, industry and waste sectors up to 2030 at almost £4 billion.[20]

The consensus among our interviewees and UK100 members is that the scale of the investment required cannot and should not be met by the public purse. Instead, the investment opportunity for private finance needs to be created by shaping markets.

5. Scaling up local energy investment:

The need to scale up

For private finance to flow into local clean energy, we have to move from a project-by-project focus to systematic area- or technology-based programmes. We should develop viable partnering or programmes approaches which involve the standardisation and streamlining of the development process, and the aggregation of projects to attract the large pools of capital that are keen to invest in our transition to Net Zero.

Local authorities cannot do this on their own.We must develop new models of how the private sector can work with local authorities to achieve this in ways that meet the objectives of both parties.

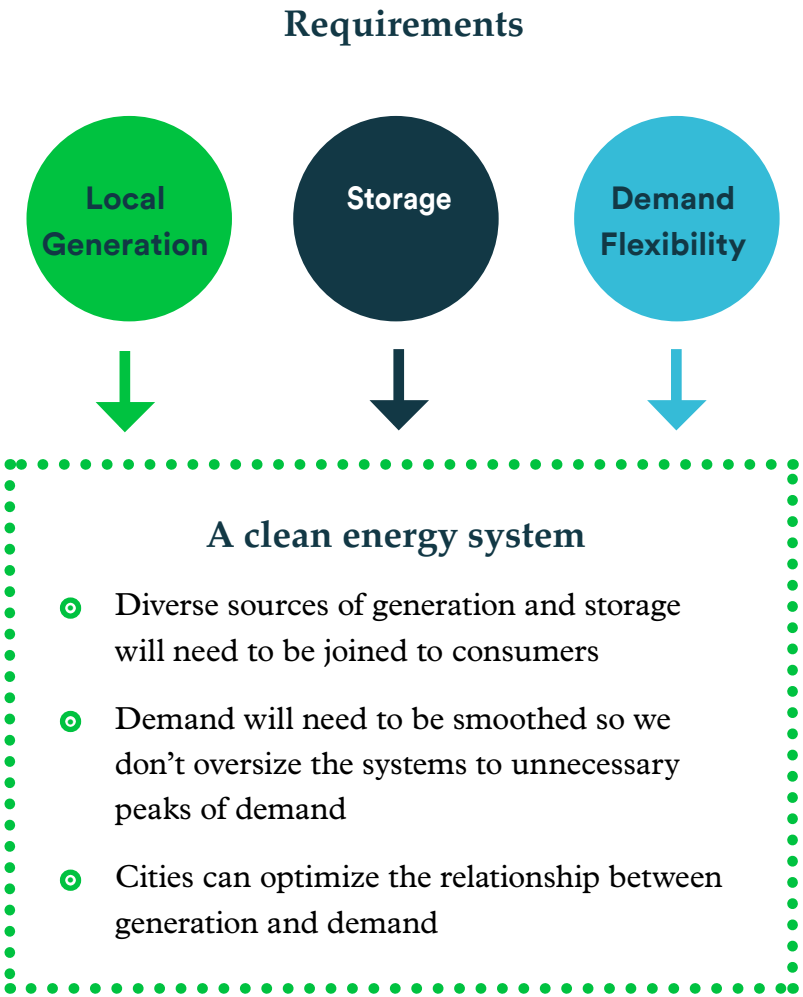
Technology versus placed-based aggregation of projects

To date, investors have preferred aggregating clean energy projects on a technology basis, such as developing portfolios of solar PV or wind generation assets spread over wide areas. The advantage of this approach to aggregation is that it involves assets which offer similar risks and rewards and the single technology investment rationale is relatively easy to explain. Geographical diversification also helps developers to reduce their risk by making them less dependent on the relationships they need to build in individual locations to make their projects happen.

But our transition to Net Zero requires us to integrate the smart energy technologies we now have to build our new local energy systems combining:

- Locally developed smart grids which connect consumers with increasingly diverse and decentralised sources of electricity generation
- Storage, where technology is accelerating at a remarkable speed
- Demand flexibility, so we can save money by not creating a system which is sized to peaks of demand, but instead can be smoothed by changing how and when users consume energy.

Smart Power requires integrated thinking



For example, Siemens produces many of the technologies we need to create our new energy systems. These range from the wind turbines that produce half of the UK's wind powered energy through to the smart technology that it is deploying on the Keele University campus to create a 'living laboratory' of 10,000 people connected to a campus network, comprising smart generation, storage and monitoring to improve energy security, reduce energy costs and increase sustainability.

"There is an urgent need to scale up local, sustainable, energy if the UK is to have any chance of meeting Net Zero by 2050. This requires a collective national effort with government, business and the public all playing our part. Local energy should be at the heart of the National Infrastructure Strategy creating a more consistent policy landscape that will give investors the confidence to invest earlier."

Carl Ennis, CEO, Siemens GB&I

Amongst those who we interviewed, there was strong consensus that well planned, place-based approaches involving integrated investment can deliver this more cost effectively, through reaping the synergies and economic benefits of combining the technologies in one area, than approaches based on geographically spread single technologies.

> **“Keeping energy secure and affordable in the transition to Net Zero requires consideration of how different energy sectors interact, with action at the local level to plan and assess current and future energy needs. Designing and delivering optimal local energy solutions needs local leadership, and capability will be critical to unlocking investment and delivering fully functioning smart local energy systems.”**

Dr Andy Davey, Strategic Development Manager, ENGIE UK

The complexity of creating integrated solutions for a single place involves more development risk than simply rolling out a single technology. Private sector developers therefore need strong local sponsorship and clarity of opportunity before they are willing to take on this risk. Integrated solutions are also likely to involve more technical and market complexity, making the investment case more difficult to explain to investors.

Standardising investment approaches

Siemens is working with a wide range of local authorities on clean energy schemes. Whilst the technical solutions exist to deliver these projects, the biggest challenges tend to arise because each project is a one-off. This requires bespoke contractual solutions to be developed with under-resourced local authority teams. Business case and financing solutions have to be developed on a project by project basis.

One solution to this would be to develop standardised approaches to projects with similar features, either though a nationally driven approach or a consortium of local authorities working together. The table on the next page shows some types of projects where this might apply.

Project Type	Exemplar Project	Scale-up Approach
Solar PV and microgrid on landfill sites	⊙ Westhampnett Solar Farm: ⊙ West Sussex County Council's first solar farm opened 2018 ⊙ 7.4MW capacity & on-site batteries ⊙ Equivalent to powering 2,400 household	Consortium of local authorities with a landfill development portfolio ready for investment by low risk funders, utilizing land that is contaminated and currently not ready for development
Solar PV on car parks	⊙ Chelmer Valley Park & Ride: ⊙ Solar PV canopy ⊙ 1.5MW capacity & battery storage ⊙ EV charging for 44 vehicles	Consortium of local authorities with car park development portfolio ready for investment by low risk funders

"The big barrier is the need to replicate and aggregate in a cost effective way, so we don't just keep reinventing the wheel: standardised contracts for example."

Louisa Cilenti, Founding Partner, Lux Nova, Legal Advisers to co-funder for the Warrington solar PV and battery projects

Private sector working in partnership with local authorities

In order to realise this overall investment potential, we need to develop more effective ways for the private sector to work with local authorities through the investment cycle to turn conceptual opportunities into reality.

There are already many good examples of how this is working in practice. EDF, a major international utility company, is one of the many companies that are engaged with public sector bodies in helping them to achieve their transition to Net Zero.

In 2011, it was awarded the UK's largest ever electricity supply contract by the Government Procurement Service to bodies across central and local government. It is working with a wide range of its public sector customers to help them move towards Net Zero.

The transition process starts with helping them to understand how they use energy. With this knowledge, they can then identify the steps they should take to reduce their energy consumption and the measures they can adopt to achieve Net Zero. The box on the next page summarise the work that EDF has been doing with the Scottish Fire and Rescue Service to help it on the road to Net Zero.

EDF's analysis of energy usage across its public sector client base has identified the potential to scale up this approach to achieve very significant cost and carbon emissions savings through developing programmes to deliver this investment across the public sector estate.

> **“This approach has the potential to significantly decarbonise much of the public sector, but it needs to be scaled and that will require incentives and pressure from central government to encourage public sector bodies to address these opportunities as a matter of priority.”**

Vincent De Rul, EV Solutions Director, EDF

Scottish Fire and Rescue Service (SFRS)	

Reducing energy usage	• Simple changes identified which could lead to large savings
	• With over 400 sites in their portfolio, ensuring efficient operation across all sites was proving difficult
	• EDF Energy Solutions introduced PowerNow, a live energy monitoring tool, to four of the service's key sites. This gathered all the information from the headquarters' sub-metering and along with data from the other sites into one platform
	• Across the 4 sites being monitored, the following potential savings were identified:
	  • £41,500 per year on energy spend
	  • 61.5 tonnes of CO^2 per year

Achieving Net Zero targets	• Having improved the monitoring of its energy usage, SFRS was able to identify significant additional opportunities to achieve financial and environmental targets • The installation of solar PV on two sites has enabled it to generate its own electricity, reducing its overall consumption • The sites have also installed batteries to enable storage of generated energy. This means that energy can be saved and used at times when it is needed most – not just at the time of generation • Having energy storage on site provides additional resilience for the future, when SFRS will need electricity for vehicles

Source: EDF Energy

City scale programmes

We have considered four urban areas in England which have strong ambitions to accelerate their transition to Net Zero and are at different stages in developing programme scale approaches to achieving this.

Bristol

Bristol was the first UK city to declare a climate emergency and has committed to being carbon neutral by 2030.

Since 2005, Bristol City Council (BCC) has delivered a wide programme of energy efficiency and investment initiatives, investing tens of millions of pounds in renewable energy generation and energy efficiency.

In May 2018, BCC released its 'City Leap Prospectus' which set out details of the council's current sustainability programs, past successes and identified £875 million pounds of investment opportunities across a range of sectors.

The prospectus attracted interest from over 180 local, national and international organisations, including tech firms, investors, community organisations and innovative energy and infrastructure developers.

Following soft market testing and a six month options appraisal, the preferred option for taking forward the City Leap programme was a 'Joint Venture' (JV) structure.

BCC's ambition is to select a partner capable of developing and financing a portfolio of projects which will help the city achieve its Net Zero ambition whilst delivering social benefits for its population.

Bristol is in a relatively unusual position for a UK city, as the delivery of many of the City Leap investment opportunities lie within the control of BC. This is because it owns or operates the underlying assets that will

be needed to deliver these opportunities, such as 27,000 homes in the city, a corporate estate of 2,000 property assets and 500ha of land, representing approximately 40% of the total land area of the city.[21]

The procurement of a JV partner to deliver this ambition is a complex exercise as evidenced by BCC's recent decision to pause the procurement process, that it began in September 2019, to enable it to refine its requirements in the light of market feedback.

> **"There is very strong private sector interest in partnering with us to deliver our portfolio of Net Zero projects but procuring a JV partner on the right terms is a complex exercise which we are pioneering."**

David White, Chief Executive, Bristol Energy Services

City Leap – Estimated low carbon investment opportunities	
Domestic energy efficiency	• £300m
Commercial energy efficiency	• £100m
Heat networks	• £300m
Small energy systems	• £125m
Renewable energy	• £40m
Monitoring, dissemination & evaluation	• £40m
Transport	• Additional
Hydrogen	• Additional
Marine energy	• Additional
Total	**£875m**

Source: City Leap Prospectus, Bristol City Council, 2018

Warrington

Warrington Borough Council (WBC) declared a climate emergency in June 2019 and approved its Green Energy Strategy[22] in September 2019. It has been involved in the green agenda for some years and has taken a leading position amongst local authorities in the UK in pushing forward innovation in this market.

The council has a twin goal of becoming energy self-sufficient by 2030 and to support the work underpinning its climate emergency declaration.

In response to the changing energy market, it decided to enter the renewable generation market and capture social, economic and financial gains. Its first solar PV investment involved fitting 2,000 council-owned homes with solar PV installations, supplying electricity to tenants.

Following this, WBC has invested in two sizeable commercial solar PV projects, a 34.7MW solar farm plus 25.7MW battery near York and a 27MW solar farm near Hull, at a cost of about £60 million.

These sites were developed by a national contractor, Gridserve, using private finance provided by Leapfrog and Investec Bank. On completion they were acquired by the council, funded with a combination of its own funds and borrowing through the Public Works Loan Board (PWLB).

The electricity generated from the Hull site will be used to power all council buildings via an electricity distribution sleeving arrangement, securing savings in energy costs, whilst the remainder of the power will be sold to the grid or other public sector organisations.

The council has offered to fit solar PV installations on premises owned by third parties, on the basis that it will fund the installations and retain income derivable from them, whether from government financial incentives and/or from the sale of the electricity to the occupants of the buildings.

The council is also involved in supporting two local community energy companies. It has established its own charitable organisation, Warrington Community Energy, to manage the community benefit funds flowing from its investments in these sites. It will be making its first investments this year.

Few local authorities have taken as active an approach to developing energy projects, particularly in relation to assets that they do not own. WBC has benefitted from a cross-disciplinary team of internal experts with the council who have worked together over many years with strong leadership. This has developed a long-term strategy focus with clear fuel poverty alleviation and return on investment drivers supported by an internally developed risk framework which applies the UN Sustainable Development Goal framework to all investment.

Warrington has used PWLB loans to provide long term funding for its solar PV investments. Many local authorities are reluctant, or lack the borrowing capacity, to use PWLB funding to support this type of investment, so Warrington's approach may have limited replicability with other UK local authorities.

"I think we need some changes to the way that local authorities are empowered to carry the green agenda forward, on behalf of their citizens, including activities in collaboration with other local authorities and in collaboration with the private sector outside their own immediate administrative areas."

Louisa Cilenti, Founding Partner, Lux Nova, Legal Advisers to co-funder for the Warrington solar PV and battery projects

Nottingham

Nottingham has set itself a target of becoming the first carbon neutral city in England, reaching this target by 2028.

The city has a wide range of clean energy demonstrator projects which have received support from Innovate UK and EU Horizon 2020 programmes. These projects benefit from strong collaboration between Nottingham City Council (NCC), the city's universities and private sector partners.

NCC has:

- invested in over 50 commercial solar PV schemes across the city,
- owns and operates a waste incinerator that was built in the 1970s,
- owns 26,000 social housing units.

It is involved in a number of innovative energy efficiency retrofit and energy storage programmes across this housing stock.

In the Trent Basin regeneration area, its joint venture development partner, Blueprint, is working with SmartKlub to develop a subsidy-free commercial model for community energy.

Whilst these are all at a community scale, the aggregation of a hundred or so similar scale schemes across the city has the potential to address the significant electricity grid constraints that the city currently faces, and which will become more challenging with economic growth in the area and the switch to electric vehicles.

> **"Much of the exciting innovation will be driven by SMEs, spin-out companies from universities and smart people coming from big corporates. How can local government help to mobilise this SME innovation which has the potential to contribute strongly to local economies?"**

Nick Ebbs, Vice Chair, Igloo, for People, Place and Planet

Manchester

All 10 of Greater Manchester's local authorities have declared a climate emergency and they have set themselves the target of achieving Net Zero by 2038. The Greater Manchester Combined Authority (GMCA) has been supporting decarbonisation initiatives across the region for over 10 years, formerly as the Association of Greater Manchester Authorities (AGMA). It fully recognises the need to create a step change in the pace of investment to achieve its goal, requiring an average 15% reduction in carbon emissions per annum.

But GMCA, like other areas in England, does not have governance over all the infrastructure that is critical to its success. To help achieve its ambitions, GMCA has adopted an innovative `Mission Based Approach', breaking the task down into a number of discrete challenges led by cross-sectoral Challenge Groups. The Low Carbon Building Challenge Group, for example, aims to reduce emissions through energy efficiency interventions in over 60,000 properties per annum.

In comparison to Bristol, Greater Manchester is seeking to develop greater definition of what investment it needs as a city region to get to carbon neutrality and how it wants to procure it, before going out to the market to select its partners.

GMCA has already delivered:

- large scale demonstrator projects for energy efficiency in social homes,
- demand side response technologies for smart heat management,
- solar PV for domestic consumers, using a reverse auction to obtain best value.

GMCA is now assessing the potential for:

- ground mounted solar PV at scale,
- onshore wind,
- a wider ranging study with BEIS to assess the potential for decarbonising heat across the conurbation.

GMCA has also secured PFER Detailed Design competition funding to develop a local energy market concept, supporting the creation of a smart low carbon local energy system, including vehicle to grid development.

The project combines a place-based approach with the development of a unique new local energy market aggregation platform, integrating new smart technologies across heat, power and transport, and linking into local distribution and national transmission platforms.

The project involves citizens, the public and private sector, and seeks to protect the most vulnerable in society from the impact of rising energy bills or poor-quality homes.

A new local market will reduce carbon emissions and consumer bills, providing market confidence and leading to increased local investment with the accelerated deployment of renewable energy and storage assets.

6. Understanding the barriers:

Overview

We need a step change in how we convert conceptual solutions, available to us with existing and rapidly evolving technology, into operational infrastructure that can deliver our transition to Net Zero.

However, there is confusion about what we need to do in practice.

Our energy systems are hugely complex and are going to get a lot more complex. But we will still expect the remarkable reliability that we have grown used to.[23]

The pace of change, and the rapid fall in the unit cost of renewable generation and battery storage, makes it difficult to know what to invest in in the short term. Projects are only investable if it is clear that their predictable revenue streams will cover the investment, so they often follow the money that is available from government in the absence of clear pricing signals from the market, or sufficient certainty of demand to generate the necessary return on investment.

Demand assurance is therefore key to making our Net Zero investment attractive to investors. This assurance can be achieved in a number of ways, such as:

- a highly supportive planning policy (for example, with a strong presumption in favour of installing low-carbon heat networks for new developments, or connecting to existing networks),
- mandating connections,
- long-term heat supply agreements with public bodies (using public buildings with high heat demand as anchor loads),
- economic incentives (such as imposing a levy on more carbon intensive methods of supplying heat).

Investors are not very concerned about how this assurance is achieved, but the cost of their capital will be closely linked to the clarity and predictability of their potential returns.

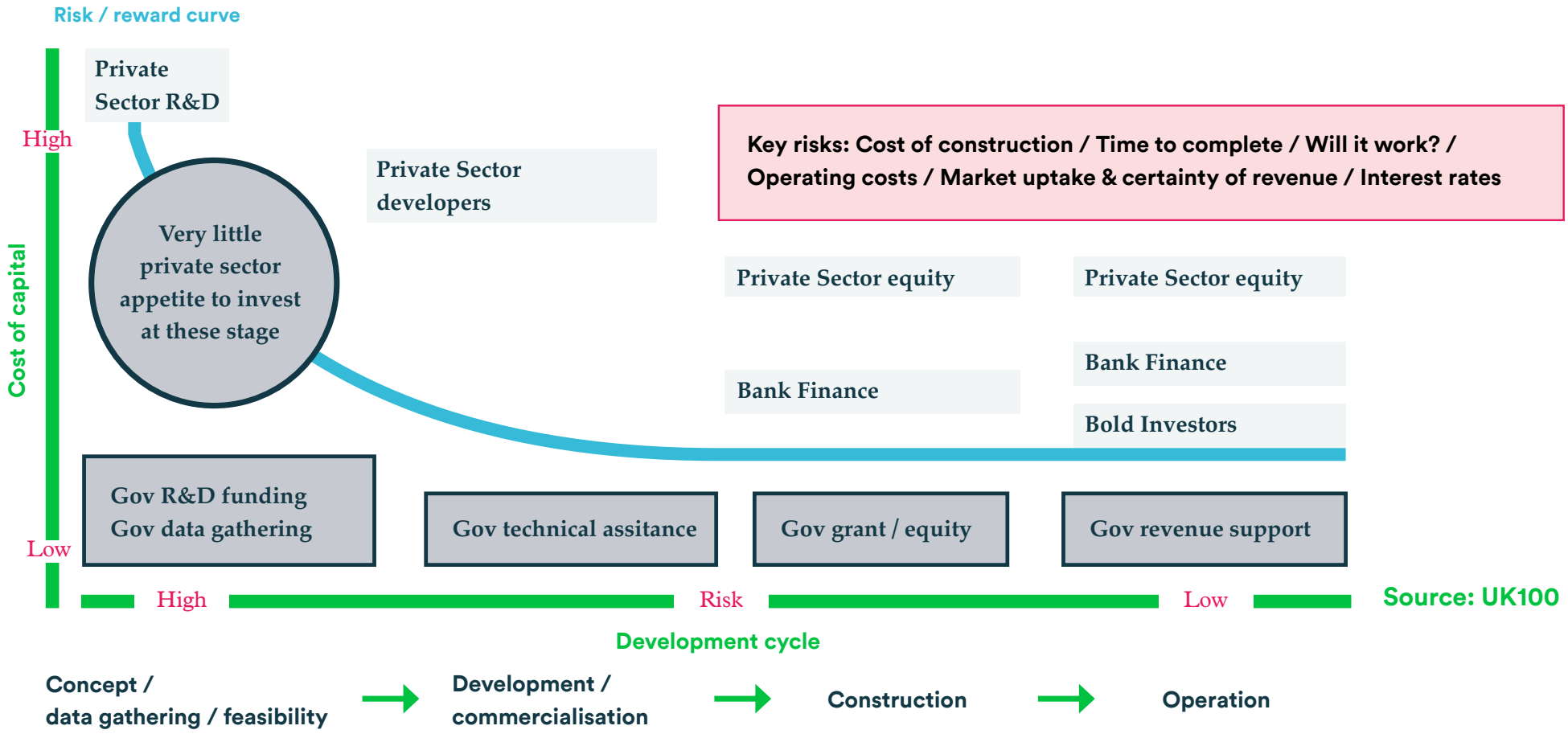
Government policy and regulation in relation to Net Zero local energy investment does not yet provide the necessary level of demand assurance needed to support this investment at scale.

Without clear and viable markets that can operate at scale, investors will look to other, better functioning markets, despite their desire to invest an increasing proportion of their funds into climate change mitigation.

The financing challenge

The graph below illustrates the types of funding needed to support the development of Net Zero investment projects from concept through to implementation, and the way in which public and private funding needs to work together to achieve this as the risks and returns change through the development process.

The graph does not include the pools of individuals' savings that could be used to finance domestic Net Zero investment such as energy efficiency and solar PV, or corporate cash holdings to fund commercial Net Zero investment.



Lack of development capital

£100 billion of investment requires about £5 billion of development funding. This is based on the typical development cost range of 10-15% of overall capital costs for large scale district heating projects, down to 2-5% for more straightforward energy efficiency projects.

The role of the public sector in supporting the early stage of project development is recognised by the UK government, but it will need to address the loss of European funding and access to finance from the EIB following our withdrawal from the EU.

- There is a range of R&D and development funding provided through UK and EU programmes such as PFER, European Local Energy Assistance (ELENA)[24] and other Horizon 2020 programmes.[25] These successful programmes have a very high economic leverage impact.
- For example, ten European technical assistance programmes have been located in the UK, providing EUR 23 million in grant funding which has delivered around EUR 859 million investment in energy efficiency in public buildings, district energy infrastructure, LED street lighting, solar PV, domestic energy retrofit, grid balancing services, EV charging and solar PV car parks.[26]

There is limited private capital available at the development stage.

- Private companies will only invest when they can see how they will be able to generate an acceptable return from their R&D and development work.
- Pharmaceutical companies are prepared to invest large sums in the development of new drugs because there is clarity on how the market will reward them for a successful new treatment.
- In contrast, the uncertainties associated with investing in local energy projects, with issues such as constant policy changes and the constraints of public sector procurement, force private sector participants to have contractual certainty before they are willing to commit significant resources.

There is a need for patient or first loss capital.

Whilst there is a large amount of private capital chasing green projects, it may not necessarily be in a form that is needed by these projects. For example, much institutional capital, such as pension funds, is only available for low risk investments.

- The Green Finance Institute, with the Coalition for the Energy Efficiency of Buildings (CEEB), is currently exploring the scope for the public sector to provide guarantees that could help to de-risk investments in building energy efficiency retrofit projects.
- In some segments of the local energy market, such as district heating, where the forecast revenue streams are insufficient or too unpredictable, patient or subsidised long term capital is required to complement private or PWLB funding.

Lack of development resource

Funding by itself is insufficient to turn concepts into delivered projects.

The process requires development resources that have the necessary commercial drive and experience to navigate a complex process of technical, commercial, organisational and financial challenges.

For a local authority, this includes the preparation of a business case that can persuade a sceptical finance officer who has a host of other calls on his council's budget.

There is very limited local authority capacity to develop projects.

- In response to increasing financial pressures, local authorities have had to scale back what limited resources they had to develop local energy projects.
- The Covid-19 crisis is exacerbating this as councils focus on satisfying their immediate statutory responsibilities.
- Whilst the Hubs have provided some additional development support, their resources are thinly spread.

Inconsistent policy support and 'initiativitis'

Whilst the UK government has indicated over £10 billion support for Net Zero programmes, including its manifesto commitments, participants in the local energy market are confused and frustrated by inconsistent policy and regulation, as government and regulators grapple with evolving technology and the changing energy market.

- Government has provided support through a myriad of different programmes across different departments, often technology focussed, which are not joined up with each other.
- The tables on this page and the next list some of the wide range of programmes that government provides or is committed to providing for local energy investment (including energy efficiency). They are not exhaustive and focus mainly on programmes delivered by BEIS.
- Disjointed government support is a difficult issue, particularly for SMEs who tend to be the most agile and innovative participants in the industry. They complain of government 'initiativitis' and policy changes which make it difficult to keep abreast of the policy landscape and develop financeable business models.

Themes	BEIS Support Programme/Policy	Intervention
General	UK Shared Prosperity Fund	Undefined
Energy saving & efficiency	SALIX	Low cost loan
	£5m Green Home Finance Innovation Fund	R&D
	£18m Industrial Heat Recovery Programme	Grant
	£6m Boosting SME Access to Energy	Grant
	£3.8bn Social Decarbonisation Fund	Manifesto Commitment
	£2.5bn Home Upgrades Grant	Manifesto Commitment
	£9.2bn homes, schools and hospitals energy efficiency	Manifesto Commitment
Renewable Generation	Renewable Heat Incentive (closes 2021)	Grant
Low carbon heating	Heat Networks Development Unit	Development support
	£320m Heat Networks Investment Project	Subsidised patient capital
	£270m Green Heat Network Fund (from 2022)	Grant
	£100m Low Carbon Hydrogen Fund (in development)	?
	Future Heat-RHI replacement and Green Gas Support Scheme consultation	Grant?

Themes	BEIS Support Programme/Policy	Intervention
Smart energy systems & networks	£102.5m Prospering from The Energy Revolution (PFER) programme	Grant
	Various OFGEM programmes	Grant
	£20m Storage at Scale	Grant
Transport revolution	£400m Charging Infrastructure Investment Fund (£200m Govt with private investor matched funding)	Grant
	£500m Rapid Charging Infrastructure Fund	tbc
	Automotive Transformation Fund (up to £1bn)	Manifesto Commitment
Industry	£250m Clean Steel Fund (in development)	Grant
	£18m Industrial Heat Recovery Support Programme	Grant
	UKRI Industrial Strategy Challenge Fund	Grant
	£800m Carbon Capture and Storage Clusters	Grant
	£289m Industrial Energy Transformation Fund	Grant
Innovation	£40m (£100m target) Clean growth Innovation Fund	Equity
Natural Environment	£640m Nature for Climate Fund	Grant

Regulatory constraints

Our regulatory system was designed to deal with our existing centralised energy system under the privatisation process of the 1980s. It was not designed to support local energy investment.

- The flow of private capital into local energy projects depends on consistent policy and supportive regulation that provides investors with confidence that they can generate appropriate returns for the risks they take.
- There is also the challenge that in our free market energy system, the main regulator, OFGEM, is regulating in terms of price and customer service for the current consumer, and not in terms of system efficiency, outcomes (such as reducing carbon emissions) or costs to future consumers.

Poorly developed supply chains

Local energy markets lack the supply chains that are needed to deliver the required scale of Net Zero investment.

- For example, most of our current heating systems are fuelled by gas. We need to retrain our gas engineers to install and maintain low carbon heating systems such as heat pumps.
- The experience of offshore wind has shown how supportive government policy can help develop a market that operates at scale with competition and innovation that has driven costs down from a cost of £167/MWh in 2017 to nearly £40/MWh by 2023.[27]

Lack of confidence in local authority support

Private sector developers often express a concern about their ability to rely on a local authority for the elements of support they need to deliver a project successfully.

- They are concerned about the timescales needed for local authority approvals and the risks associated with the political process. Where more than one local authority is involved, diverging local authority policies and priorities can make co-investing much more difficult.
- For example, the financial success of a local energy scheme, such as a district heating network, often depends on a local authority providing support such as helping to ensure that targeted customers connect to the network. Some developers have experienced impaired returns on their investment because local authorities have failed to honour their commitments, often because of a lack of resource or a change in political views.
- The lack of statutory obligations in relation to energy results in local authorities tending to prioritise other areas of their activity for which they do have statutory responsibility, particularly in times of severe financial pressure.
- Whilst local energy investment has strong potential to deliver a range of benefits to local communities, local politicians often lack confidence that this will deliver on their other social and economic priorities.
- This experience can cause reluctance to enter into the development of a project before a detailed risk framework has been negotiated as part of the procurement process.

Limited local authority powers to drive change

Local authorities have only limited powers to drive the investment they need to transition to Net Zero.

- Bristol has identified a far-reaching range of powers that it needs to accelerate this investment. These are listed on the next page. Whilst it can set out and start its transitional decarbonisation programme without these, the lack of formal powers to organise and require action makes the success of its programmes heavily dependent on persuasion.
- Business rates can act as a deterrent for businesses to invest in renewable generation, such as solar PV, because of the concern that such investment will increase their property's value and therefore give rise to increased rates. Greater flexibility for local authorities to vary business rates would enable them to address this issue.

Bristol: Powers needed to accelerate Net Zero investment

- Establishing Net Zero heat zones and setting progressive energy performance standards for the upgrade of existing buildings
- Ability to coordinate effectively the local roll-out of EV charging infrastructure, oversee public transport, require within-city freight consolidation
- Extend influence over commercial waste collections and raise levies on excess residual waste
- Effective powers to set and enforce local planning policies and building standards to ensure all new build deelopments achieve meaningful Net Zero carbon standards and are aligned with the city's approach to decarbonisation

Source: Bristol Net Zero by 2030: The evidence base, CSE, 2019

7. What can local authorities offer?:

Local authorities can play a valuable role in helping to deliver our new integrated energy systems. They have a crucial role in helping to ensure a 'just' transition to Net Zero for all of their populations. And their support can help to mobilise the private sector investment that is waiting to accelerate our transition to Net Zero.

- Some local authorities have the desire and capacity to act as developers and business owners.
- Others want simply to act as enablers whilst they focus on delivery of their statutory services.
- They all recognise the need to work with the private sector to achieve their Net Zero ambitions.

Local political support and leadership

They want to lead on supporting their communities towards Net Zero.

- Climate emergency declarations provide evidence of their strong political commitment to do this. Citizens are demanding that they take action.
- Some cities, like Bristol and Nottingham have large energy service teams who can define what needs to be done and lead on its implementation.
- Others have the political support to lead but require more support to develop and implement clear investment plans.
- Local authorities recognise that partnering arrangements with the private sector will need to address the risks of political changes through the electoral cycle.

Citizen engagement to encourage buy-in

They are willing to engage with their citizens on the changes that will be required of them to transition to Net Zero.

- Attitudes to this will vary across the country but pioneer local authorities have the desire to test solutions which, if successful, other parts of the country will want to adopt.
- Some local authorities are seeking to combine the mobilisation of finance with citizen engagement through the issuance of Community Municipal Investments (CMI). These are bonds or loans issued by councils via an investment crowdfunding platform to both local residents and public investors more broadly. Recent research has shown that a majority of UK investors are interested in this concept.[28] West Berkshire Council is about to launch a CMI, with other local authorities following quickly after.

Willingness to test potential solutions at a local levels

They are willing to test ideas and solutions at a local level.

- Successful and scalable solutions can then be rolled out on a wider regional or national scale.
- Nottingham has a history of playing this role as a city where manufacturers would often trial new products before introducing them nationally.

Interest in all vectors of energy

They have an interest in all vectors of energy.

- They are concerned about how the buildings in their area are heated.
- Transport is an important area of their responsibility with an impact on their environment and local economies.
- Decentralised energy investment opportunities are causing them to become increasingly involved in the generation of power.

Desire to address their own assets

They want to accelerate Net Zero investment in their own assets, if they have the development resource that is needed, and can make the economics work in relation to their own financial constraints.

- They recognise the value of their anchor energy loads in supporting long term energy investment in their areas.
- Their involvement in transport and their planning powers enable them to play an influential role in the transition to electric and hydrogen-fuelled transport.

Encouraging local economic growth

Limit economic growth in their areas.

- They are major consumers of energy across their activities and understand the constraints that their local energy infrastructure places on economic growth in their areas.
- They are willing to engage with their energy providers to develop the most cost-effective Net Zero transition solutions for their areas.

Local competencies

Local authorities are ready to use their local powers and competencies, such as planning, service delivery and procurement, to support Net Zero investment.

- Some of these competencies can lie in unexpected departments, such as minerals and waste planners, usually employed by unitary authorities or county councils, who have skills in relation to resource assessment and long term complex developments, which is crucial in supporting the infrastructure issues relating to local energy solutions.
- Additional powers, such as those cited by Bristol, would give them greater ability to influence the pace of change.

UK100 is currently reviewing the scope for additional local authority powers that would help them to support local energy investment and we plan to report on this later in 2020.

Willingness to partner with private sector

They want to address the energy constraints that Local authorities recognise that they can't achieve their Net Zero ambitions on their own.

- PWLB has provided funding on attractive terms to support much of their low carbon investment to date. They realise that the public finance position resulting from the Covid-19 crisis will require private capital to support the investment that is required to achieve Net Zero.
- They are keen to work with the private sector to develop solutions that can operate at scale. But they need to develop partnership approaches that can deliver benefits across all of their communities.
- Their procurement and delivery expertise can enable them to develop programmes which can be rolled out quickly. Through LEPs, they are already working with private sector partners to deliver critical infrastructure and training investment for their areas. The Midlands Energy Hub has produced a guide to establishing public-private joint ventures.[29]

8. Asks of government to accelerate local energy investment:

Local energy investment at scale requires government to support the development of this market with a range of complementary measures.

To ensure an even transition across the country, recognising that local solutions may differ from area to area, government needs to create an ecosystem in which local authorities can be both investors and enablers in partnership with the private sector, whilst ensuring that public funding crowds in private investment as effectively as possible.

Funding and investment support

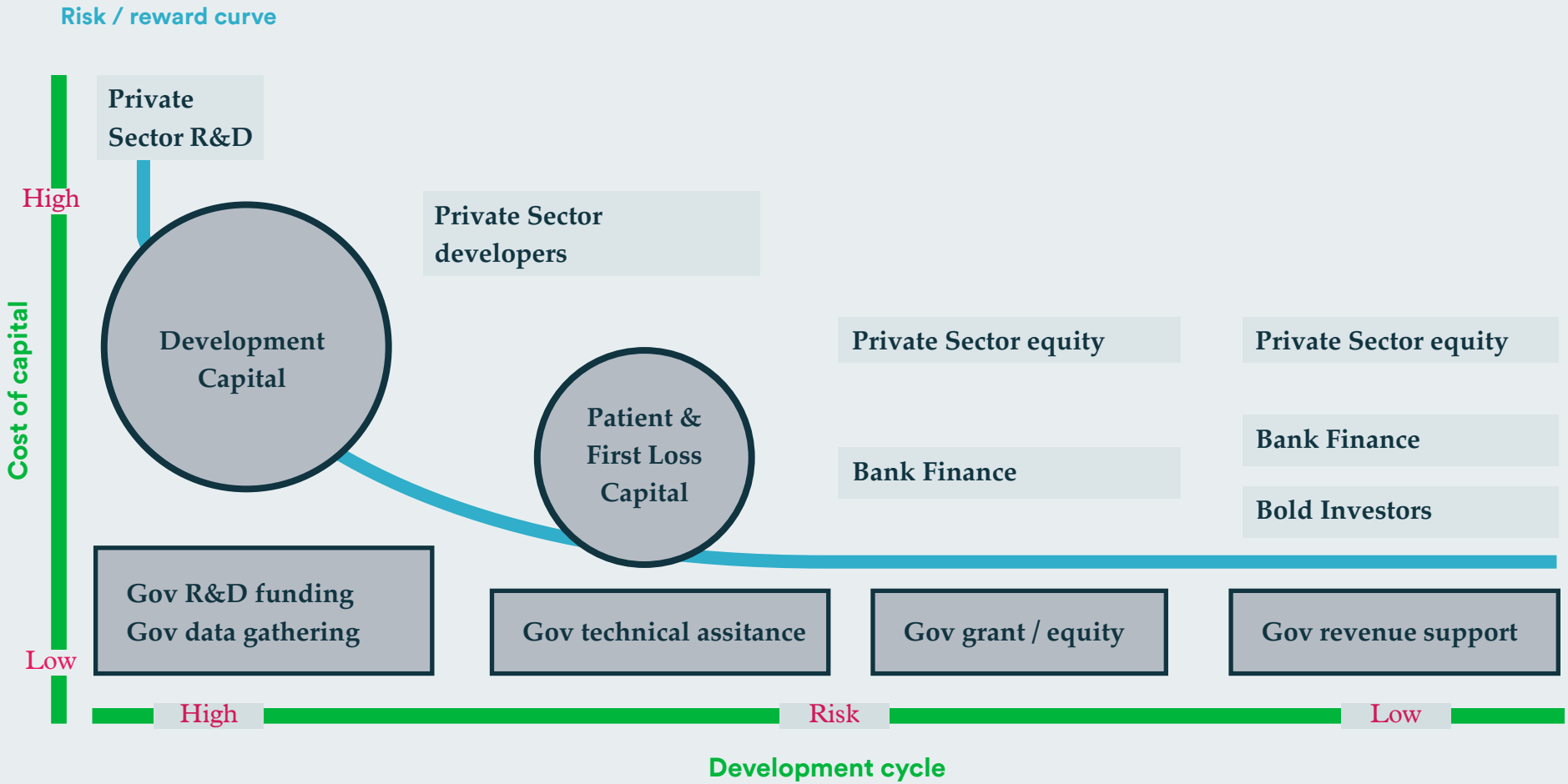
Funding and investment support is critical, both for the initial development of projects and to support the build-out of solutions which are desirable from an energy system perspective, but which may take time to support conventional funding as the market develops.

- Some of the SMEs we have interviewed have described the 'valley of death' challenge they face as they seek to scale-up successful concepts.
- Government funding should focus on supporting programmes that can be rolled out at scale, enabling unit costs to reduce as we learn how best to roll out these programmes.
- We can use this experience and knowledge to both minimise the cost of the UK's transition, and export this expertise to other markets.
- Government funding needs to be provided with a sufficiently long term horizon to match the realistic timescales of investment delivery.

- For example, the two year funding commitment for the Hubs has resulted in a focus on projects which can be delivered in a short timeframe, such as solar farm and public sector building energy efficiency retrofit investment, as opposed to more complex place-based initiatives which have greater scope for helping us to achieve Net Zero.
- We must move quickly but we need to invest wisely. Government needs to ensure that its funding is allocated through agile and disciplined allocators of capital.
- In order to repay the government borrowing needed to support this funding, we should consider how to provide it in the form of equity or loans, as opposed to grants, to enable the taxpayer to benefit from the successful roll-out of this investment.
- Following our exit from the EU, we have the opportunity to develop a national funding system that can operate more quickly than the EU funding mechanisms which have provided much of the public funding support for low carbon investment to date.
- Given the constraints of public finance, which local authorities recognise have become much more challenging as a result of the Covid-19 crisis, government funding must be designed to crowd in private capital.

The areas of focus should be development-related and patient/first loss capital financial instruments, designed to encourage private capital at an earlier stage than would otherwise occur, as illustrated in the graph.

Funding support
from government



Source: UK100

Development capacity and skills

Funding support must be coupled with experienced development capacity and skills which can move projects rapidly through the development and implementation process.

- To achieve the desired scale of investment, this development capacity should focus on how projects can be aggregated by technology or region using system-level approaches and solutions.
- It must involve the creation of replicable partnering solutions which can solve the procurement challenge of bringing in private sector development expertise and capital as early possible.
- This capacity needs to work with pioneers who are prepared to carry out initial groundbreaking work, but who can recognise the features that will be required for broader market take-up.
- The Hubs have started this process but the resources they have at their disposal are insufficient to create the step change we need.

Single Gateway to Government

Government should simplify how it supports the development of Net Zero investment so that developers have a single gateway to understanding the public funding available to them and the policy and regulatory support that underpins local energy investment.

Supportive and consistent policy to support longer term planning

Local authorities and the broader market require greater clarity on the energy investment landscape.

- We need a clear national strategy to address the climate emergencies declared by a large number of local authorities and other public bodies.
- This strategy needs to enable the adoption of proven technologies in integrated local energy systems, support innovation and facilitate the use of local energy resources rather than crowding out innovation with a one-size-fits-all approach.
- There is genuine anxiety at local level that national government may mandate particular technologies at a later date.

Policy will also need to include an extensive skills and capacity development programme to enable delivery at scale. This should be part of a 'bounce back from Covid' economic plan, as called for by the Resilient Recovery Taskforce, convened by UK100 and Core Cities.

> **"Effective local area energy planning within an overarching policy framework aligned to appropriate incentives, is needed to help accelerate investment and the development of cost-effective smart local energy systems."**
>
> **Richard Halsey, Director, Energy Systems Catapult**

A stable regulatory regime is needed in which finance can be deployed to support the clean energy investment we require. It must provide for the ability to invest in advance of need.

- The business models needed to sustain private capital must be able to generate predictable revenue streams. The more predictable these are, the lower the cost of capital required by investors. Increased volumes of investment should also enable industry to develop more efficient solutions which drive down unit costs.
- A good example of this is the way in which the cost of offshore wind energy has fallen with help from the government's Contracts for Difference programme, designed to support low carbon energy generation, and funding support provided by the UK Green Investment Bank (GIB).
- But regulation will have to protect the interests of consumers, for example, the ability for users to switch in and out of district heating schemes.

National policy frameworks, regulations and duties need to be designed to enable or mandate local action to decarbonise energy. The design of such powers and duties needs to go hand-in hand with the development of skills, capacity and adequate financial support for delivery.

Devolution of responsibilities and powers

Local authorities have powers and duties for a wide range of areas through planning and procurement, licensing and service provision that can achieve considerable emissions reductions, not only on their own estate and assets but beyond, in the wider local economy. But they could do more.

- Some of their powers have specific applications to designing and delivering local clean energy systems: setting planning frameworks that prioritise low carbon technologies for example.
- However, the potential to effectively use local powers and duties is often hampered by a lack of national policy frameworks that support local action, or by centralised processes that are dependent on decision-making by UK Government.
- Devolution deals have varied in their success in enabling local action to develop clean energy locally, but the experience of many local and combined authorities is that devolution of power, backed up by national policy frameworks, needs to go much further.
- UK100 is researching the powers and duties of local authorities in every tier of government in England to identify what changes might be needed to create the conditions for locally-led Net Zero delivery - and will share the findings of research soon.

9. A structure to accelerate the transition to Net Zero:

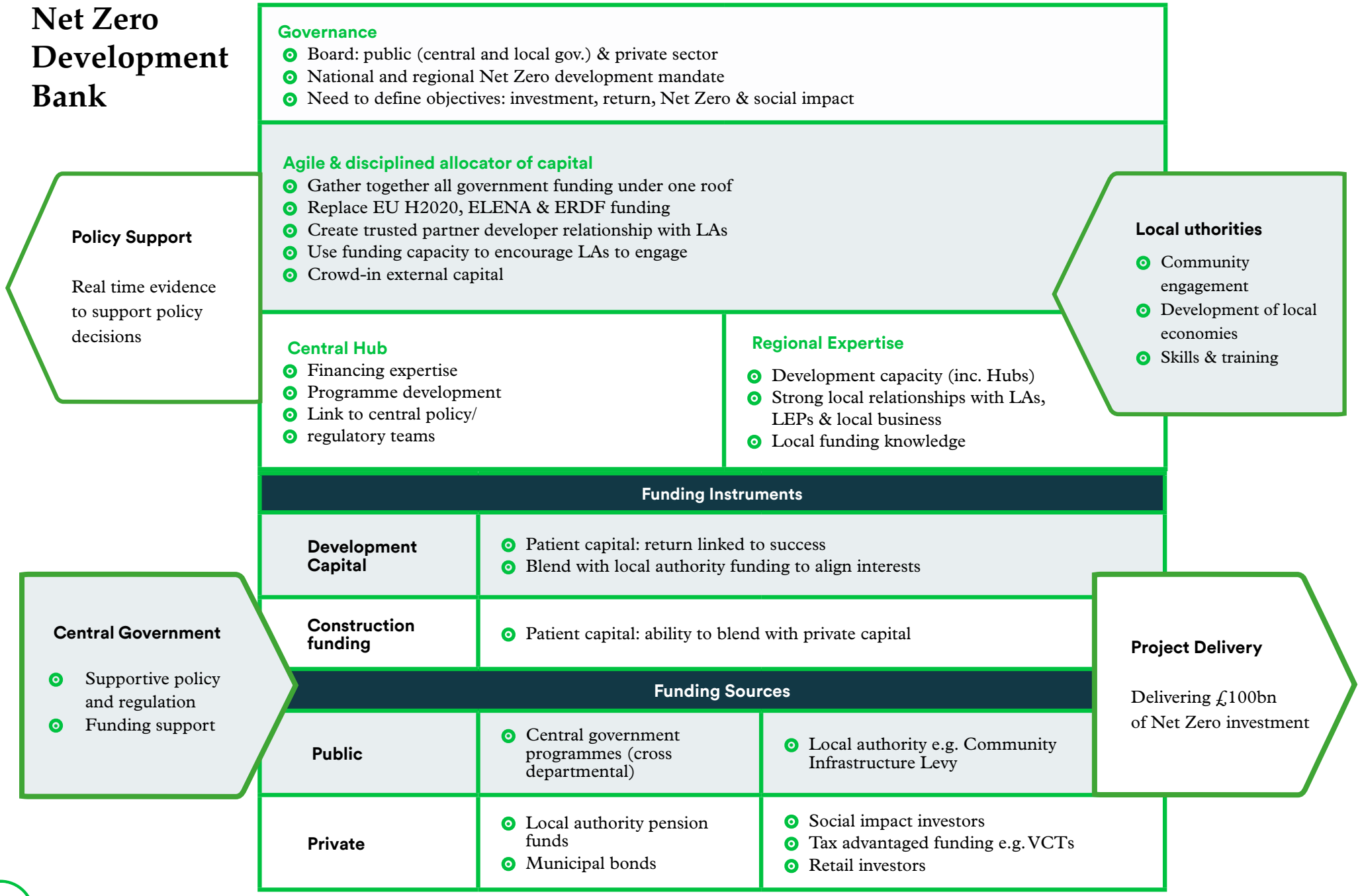
A Net Zero Development Bank

We recommend the creation of a UK development bank which brings together the government's investment related execution activities in relation to transitioning to Net Zero.

The overall objective of the Net Zero Development Bank would be to mobilise private investment, working in partnership with UK local authorities, by:

- becoming a centre of excellence for developing, procuring and delivering Net Zero project investment;
- scaling up investment opportunities to make them more attractive to institutional investors;
- engaging with regulators and central government to ensure the necessary support for market development;
- and ensuring the delivery of the over £100 billion local energy investment potential that we have identified.

Net Zero Development Bank



> **“Very supportive of a Net Zero Development Bank operating at a local level helping to crowd in private capital and development expertise to accelerate investment in local energy projects.”**
>
> **Ken Hunnisett, Partner, Triplepoint Capital**

- Government is already providing significant support for our transition to Net Zero, with commitments of over £10 billion of programmes designed to support Net Zero investment.
- The scale of this support is likely to increase as the government fulfils its manifesto commitments and seeks to rebuild a greener economy as we emerge from the Covid-19 crisis.
- The management of this funding, supported by agile and disciplined allocators of capital within a single institution, would help to accelerate deployment of government support and ensure that the taxpayer gets the best return possible over time from the support that government provides.
- The new bank would have a much greater development role than the UK Green Investment Bank (GIB).
- The GIB’s mandate was focussed on crowding capital into green projects which were already being developed by the market in response to supportive government policies like Contracts for Difference for offshore wind and long term contracts for waste to energy projects.
- It must also have a **strong regional operating structure** with **deep understanding of the local resources and networks** available to support local energy investment.
- In this it would have parallels with the Industrial and Commercial Finance Corporation (ICFC) that was founded in 1945 to provide finance for small and medium sized industries as the country emerged from World War II.
- The ICFC was successful because it set up local branches and got to know local businesses so that it could judge which were promising and which were not.[30]

> **Building up this regional expertise could help to tap into key pools of institutional capital (such as local authority pension funds), as well as attract the savings of local citizens who increasingly want ways to invest in place-based climate action.**
>
> **Nick Robins, Professor in Practice - Sustainable Finance, Grantham Research Institute, London School of Economics**

The Canada Infrastructure Bank, formed in 2017, provides an interesting model.[31] Its mission is to work with government (federal, provincial and municipal) and private sector investment partners to transform the way infrastructure is planned, financed and delivered in Canada by:

- engaging private sector partners early in the planning and design process;
- advancing revenue-based business models, where appropriate;
- and exploring new and innovative approaches to project finance and delivery.

A number of recent reports have identified the need for a similar concept to support our transition to Net Zero including those by the IPPR [32] and the London Sustainable Development Commission, which calls for the creation of a London Future Finance Facility.[33]

Key features of the Net Zero Development Bank should be:

- Agile and disciplined allocator of capital
- Conduit for all government funding to support Net Zero investment
- Deep financing expertise, using public funding to crowd in private capital e.g. local authority and university pension funds, social impact capital, bonds from private investors and tax-advantaged funding sources (e.g. Venture Capital Trusts). It would be prohibited from crowding out private capital
- Trusted development partner for local authorities, with a clear focus on developing programme scale solutions which can satisfy local ambitions
- Trusted adviser to government, providing it with real-time market feedback to support evolving government policy
- Central hub (with a focus on core financing expertise, strategy development and policy engagement with government) and strong regional based development teams (incorporating the Hubs)
- Central, local government and private sector board membership

Supportive advisory and policy structure

We need much greater clarity on what investment is actually required and the development of clear and consistent policy to support this.

We therefore recommend that the government creates a Net Zero investment advisory and policy structure, which supports the new development bank with the following two elements:

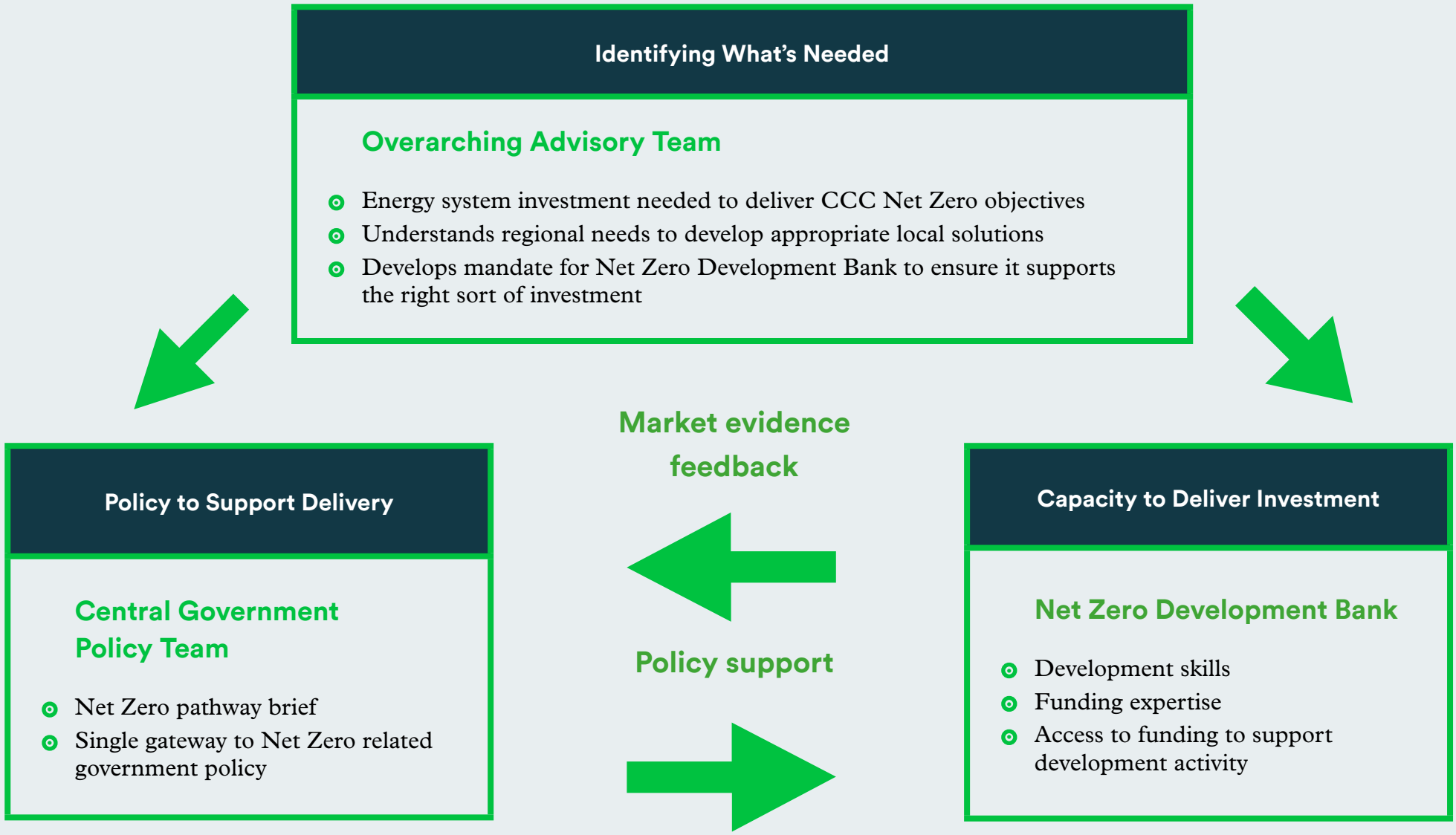
Overarching Government Advisory Team

- The role of this team would be to identify what energy systems the country should be investing in to deliver the Net Zero objectives set out by the CCC.
- It must consider the overall national energy system and the local energy systems that we will need to achieve Net Zero energy security on the most cost-effective basis.
- This team will inform government energy policy and the reform of regulatory frameworks such as those applied by OFGEM and the National Planning Inspectorate. It will also help shape the mandate for the development bank.

Central Government Policy Team

- In order to create a single gateway to government for Net Zero investment, we recommend the creation of a central government team with a Net Zero pathway brief.
- This team would be responsible for developing government policy on energy and related issues needed to realise the country's Net Zero ambition.

Government's Net Zero Delivery Structure



Glossary:

AGMA	Association of Greater Manchester Authorities
BEIS	Department for Business, Energy and Industrial Strategy
BCC	Bristol City Council
CCC	Committee on Climate Change
EIB	European Investment Bank
ESC	Energy Systems Catapult
ESCO	Energy Service Company
EU	European Union
EV	Electric vehicle
GIB	UK Green Investment Bank
GMCA	Greater Manchester Combined Authority
GM LEM	Greater Manchester Local Energy Market

Hubs	Five regional energy hubs created by BEIS
ISCF	Industrial Strategy Challenge Fund
ICFC	Industrial and Commercial Finance Corporation
JV	Joint venture
LED	Light emitting diode
LEP	Local Enterprise Partnerships
MWh	Megawatt hour
NHS	National Health Service
NCC	Nottingham City Council
OFGEM	Office of Gas and Electricity Markets
PFER	Prospering from the Energy Revolution
PV	Photovoltaic
WBC	Warrington Borough Council

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Appendix I: Documents reviewed

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Appendix II: Experts interviewed

Organisation	First Name	Surname	Position
Greater Manchester Combined Authority	Mark	Atherton	Director of Environment
Nottingham City Council	Wayne	Bexton	Head of Energy Services
SmartKlub	Charles	Bradshaw-Smith	CEO
Lux Nova	Louisa	Cilenti	Partner
Igloo	Nick	Ebbs	Vice Chair
Midlands Energy Hub	Michael	Gallagher	Regional Energy Projects Manager
University of Nottingham	Mark	Gillot	Chair in Sustainable Building Design
Innovate UK	Matt	Hastings	Head of Innovation
Gridserve Sustainable Energy Ltd	Mark	Henderson	Chief Investment Officer
Local Energy Hub North West	James	Johnson	Regional Hub Manager
Northwards Housing	Robin	Lawler	Chief Executive
North East, Yorkshire, and Humber Energy Hub	Alan	Millar	Interim Hub Manager
Greater South East Energy Hub	Maxine	Narburgh	Regional Hub Manager
Graham Oakes Ltd	Graham	Oakes	Director & Principal Consultant
Welsh Government / Llywodraeth Cymru	Jonathan	Oates	Head of Clean Growth / Pennaeth Tŵf Glan
South West Energy Hub	Jon	Rattenbury	Programme Manager
Centre for Sustainable Energy (CSE)	Simon	Roberts	CEO
Innovate UK	Rob	Saunders	PFER Director
North East, Yorkshire, and Humber Energy Hub	Sarah	Tennison	Regional Hub Manager
University of Edinburgh	Mags	Tingay	Researcher
Bristol City Council	David	White	Head of Energy Services

Appendix III: Challenge session participants

Organisation	Name	Role
Grantham Institute, Imperial College London & EnergyREV	Jeff Hardy	Senior Research Fellow
Grantham Research Institute, LSE	Nick Robins	Professor in Practice - Sustainable Finance
Green Finance Institute	Emma Harvey	Director
TriplePoint	Ken Hunnisett	Head of Public Sector
Igloo	Nick Ebbs	Vice Chair
Lux Nova LLP	Louisa Cilenti	Co-Founder and Partner
Mott MacDonald	Clare Wildfire	Global Practice Lead, Cities
EDF Energy	Vincent De Rul	Director of Energy Solutions
Siemens	Carl Ennis	CEO, Siemens GB&I
Siemens	Justin Kelly	Director of Corporate Communications and Business Development
Energy Systems Catapult	Richard Halsey	Innovation Business Leader
Centre for Sustainable Energy (CSE)	Simon Roberts	Chief Executive
Leeds City Council	Tom Knowland	Head of Sustainable Energy & Climate Change
Stephens Scown	Sonya Bedford	Head of Renewable Energy at Stephens Scown, consultant Bristol City Council
West Midlands Combined Authority	Jackie Homan	Head of Environment
Cambridgeshire County Council	Joshua Schumann	Councillor and Council Deputy Leader
Scottish Futures Trust	Steven Vere	Programme Director - Low Carbon
Llywodraeth Cymru / Welsh Government	Jonathan Oates	Head of Clean Growth
Cabinet Office	Charlie Ogilvie	Director of Strategy, COP26
BEIS	Edward Hogg	Head of team - Green Finance
BEIS	Patrick Allcorn	Head of Local Energy
Siemens	Victor Sellwood	Senior Consultant

Accelerating the Rate of Investment in Local Energy Projects

Polly Billington
Charles Abel Smith
Malcolm Ball

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