

# Local Net Zero Projects

Market Intelligence Report

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Innovate  
UK

In association with:



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### Disclaimer

While every attempt has been made to ensure that the information published in this report is accurate, this is not a substitute for regulated advice. No responsibility is accepted for any loss or damage to any person or entity relying on any of the information contained in this report.

### About this report

This report was commissioned by Innovate UK as part of a wider project into unlocking investment into local net zero projects across the UK. It has used engagement with investors and local net zero projects, and has also used insights from Working Group sessions with key stakeholders across a range of organisation types (including Local Authorities and financial institutions). This report is the result of that engagement and desk-based research and analysis.

### About [UKRI](#) and [Innovate UK](#)

UKRI provides funding to researchers, businesses and universities, investing in science and innovation in the UK in order to support the delivery of the Government's net zero strategy. Innovate UK is one of UKRI's councils which focuses on helping UK businesses grow through innovation. UKRI's £104m Prospering from the Energy Revolution challenge programme, delivered by Innovate UK, enabled businesses and researchers to work with local organisations to accelerate innovation in smart local energy systems. This programme has built [strong foundational knowledge and learnings](#) about the value of local net zero delivery, and has led to two further programmes by Innovate UK: Net Zero Living, a £60m place-based net zero programme designed to ensure UK places and communities thrive as part of the transition; and Financing Net Zero, a £15m programme dedicated to unlocking investment for scaling net zero innovation, which will develop innovative investment models for a diverse range of place-based net zero projects.

**For more information, including getting involved with Innovate UK's activities, please contact Sophie Kempthorne at [Sophie.Kempthorne@iuk.ukri.org](mailto:Sophie.Kempthorne@iuk.ukri.org)**

# Glossary

**AQMA | Air Quality Management Areas:** An area where the local air quality is unlikely to meet the Government's national air quality objectives.

**CAs | Combined Authorities:** A legal body set up using national legislation that enables a group of two or more councils to collaborate and take collective decisions across council boundaries e.g., the Greater London Authority (GLA) and West Midlands Combined Authority (WMCA) which are the devolved regional governance bodies of Greater London and West Midlands respectively.

**CAZ | Clean Air Zones:** An area within a city where a Local Authority has put measures in place to improve the air quality.

**CIL | Community Infrastructure Levy:** A charge which can be levied by Local Authorities on new development in their area.

**DESNZ | Department for Energy Security and Net Zero:** A government department focused on the energy portfolio from the former Department for Business, Energy and Industrial Strategy (BEIS). Priorities include energy security of supply, meeting UK net zero commitments and reducing energy bills.

**District Heat Networks :** Systems that use a singular central heat source to distribute hot water through a network of insulated pipes to multiple individual entities.

**EaaS | Energy-as-a-Service:** A business model whereby customers pay for an energy service without having to make any upfront capital investment.

**ECO | Energy Company Obligation:** A UK Government energy efficiency scheme designed to tackle fuel poverty and help reduce carbon emissions.

**ESCOs | Energy Service Companies:** Companies that offer energy services which may include implementing energy-efficiency projects (and also renewable energy projects) and in many cases on a turn-key basis.

**EVs | Electric Vehicles:** A mode of transport which is powered by electricity.

**Green Gilts:** Government bonds which are sold to institutional investors and raise capital specifically for green government projects. They provide a fixed rate of return until their expiry.

**HNZ | Heat Network Zoning:** An approach proposed by the UK Government Department for Energy Security and Net Zero to identify and designate areas of England where technical analysis shows heat networks to be the lowest cost means of decarbonising heat supply.

**Heat pumps:** A heat pump extracts heat from a source, such as the surrounding air, and amplifies and transfers the heat to where it is needed. They are an option to replace gas boilers to decarbonise homes.

**ICE Vehicles | Internal Combustion Engine Vehicles:** Vehicles that ignite and combust fuel within an internal combustion engine.

**LAEP | Local Area Energy Plan:** A data driven and whole energy system evidence-based approach that sets out to identify the most effective route for the local area to contribute towards meeting the national net zero target, as well as meeting its local net zero target.

**LCEI | Low Carbon Energy Infrastructure:** Infrastructure that generates fewer carbon emissions than traditional infrastructure and includes projects which use renewable energy (solar, wind and hydropower) that produces lower carbon emissions than fossil fuel.

**LEPs | Local Enterprise Partnerships:** Non-statutory bodies responsible for local economic development in England.

# Glossary (continued)

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**LNZP | Local net zero projects:** Local net zero projects focus on future infrastructure and capital investment needs to support a net zero economy.

**Local Net Zero Hubs:** Entities that promote best practice and support Local Authorities to develop net zero projects that can attract commercial investment.

**LTP | Local Transport Plans:** Plans that assess an area's transport needs and challenges and set out different ways in which these challenges will be addressed.

**MDC | Mayoral Development Corporations:** A statutory body created to bring forward the regeneration of a defined area. They have powers to acquire, develop, hold, and dispose of land and property. They also have powers to facilitate the provision of infrastructure.

**MEES | Minimum Energy Efficiency Standards:** Require landlords granting a new lease of commercial premises to hold an Energy Performance Certificate (EPC) with a rating of E or above, unless an exemption applies and has been registered on the Private Rented Sector Exemptions Register (Register).

**NPPF | National Planning Policy Framework:** Sets out the Government's planning policies for England and how these are expected to be applied.

**NZN | Net Zero Neighbourhood:** One that has greatly reduced energy needs through efficiency gains such that the balance of energy for vehicles, thermal, and electrical energy within the community is met by renewable energy.

**OFLOG | Office for Local Government:** An Office of the Department for Levelling Up, Housing and Communities, that provides authoritative and accessible data and analysis about the performance of local government, and supports its improvement.

**Ofgem | Office of Gas and Electricity Markets:** Ofgem is the government regulator for the electricity and downstream natural gas markets in Great Britain.

**PFER Programme | Prospering from the Energy Revolution Programme:** Funds businesses and researchers to work with local organisations to accelerate innovation in smart local energy systems.

**PPAs | Power Purchase Agreements:** A long-term electricity supply agreement between two parties, usually between a power producer and a customer.

**PWLB | Public Works Loan Board:** A facility operated by the UK Debt Management Office (DMO) on behalf of HM Treasury (HMT), providing loans to Local Authorities, and other specified bodies, from the National Loans Fund, operating within a policy framework set by HMT. This borrowing is mainly for capital projects.

**REMA | Review of Electricity Markets Arrangements:** A review of electricity market arrangements to identify reforms needed to transition to a decarbonised, cost effective and secure electricity system.

**RHI | Renewable Heat Incentive:** A government financial incentive that promoted the use of renewable heat, to help reduce carbon emissions and meet the UK's renewable energy targets.

**SPV | Special Purpose Vehicle:** Also called a special purpose entity (SPE); a subsidiary created by a parent company to isolate financial risk.

**UKIB | UK Infrastructure Bank:** A domestic development finance institution launched by HM Treasury to encourage private finance alongside public investment, to help tackle climate change and support regional and local economic growth.




**VPP | Virtual Power Plant:** A network of decentralized, medium-scale power generating units as well as flexible power consumers and storage systems.



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# 1

## Executive summary





# Executive summary (continued)

This report presents a market overview of local net zero projects, providing guidance to investors and lenders looking to invest in the UK's green economy.

## There is a growing demand for the local delivery of net zero

Delivery of the UK's net zero by 2050 target will need action at the local level to complement and enable national progress against targets. Local net zero projects (LNZPs) target the reduction of greenhouse gas emissions across energy, heat, buildings and transport. They offer the opportunity to invest in net zero in line with local strategies. PwC analysis has shown that taking a place-specific approach to investment can maximise socioeconomic outcomes and lower delivery costs. Local authorities can influence approximately 82% of UK emissions, however they must draw on both public and private finance to deliver the local investment that's needed. This provides private finance with the opportunity to make commercially viable investments while also supporting wider society and the government with its net zero targets.

## Purpose of this report

This market intelligence report profiles the growing opportunities to invest in the UK LNZN market. It considers the size and maturity of opportunities, the market drivers and current barriers.

## The audience for this report

This report is designed for private sector investors and lenders looking to invest in the UK's green economy through project development and capital allocation. It aims to demystify LNZNs and showcase the investment opportunities that come from them.

## Report structure

**Section 2 | Sector overview:** Overview of LNZNs and the sector's evolution.

**Section 3 | Policy and regulations:** Overview and update of key actors, policies and legislation.

**Section 4 | Market opportunity, drivers and barriers:** Summary of opportunities and their related drivers and barriers using existing international and UK examples.

**Section 5 | Case studies:** More detailed case studies from across the UK, US and Europe looking at their governance structure and funding flows.

**Annex 1 | LNZN examples:** Details on the risks, revenue streams and expected investment characteristics of example components of LNZNs.

**Annex 2 | Emerging governance structures:** Details on specific delivery models and their applicability to LNZNs.

**Annex 3 | Policies and regulation:** Additional detail on relevant policies and regulation.



# Executive summary

This market intelligence report profiles the growing opportunities to invest in the UK local net zero market. We have compiled this report as background information for investors and lenders looking to invest in the UK's green economy.

Delivery of the UK's [net zero by 2050 target](#) calls for urgent action at both the national and local level. This report focuses on investment opportunities into local net zero projects (LNZPs). **LNZPs focus on reducing greenhouse gas emissions across the local energy, heat, buildings and transport sectors in the UK's cities and towns.**

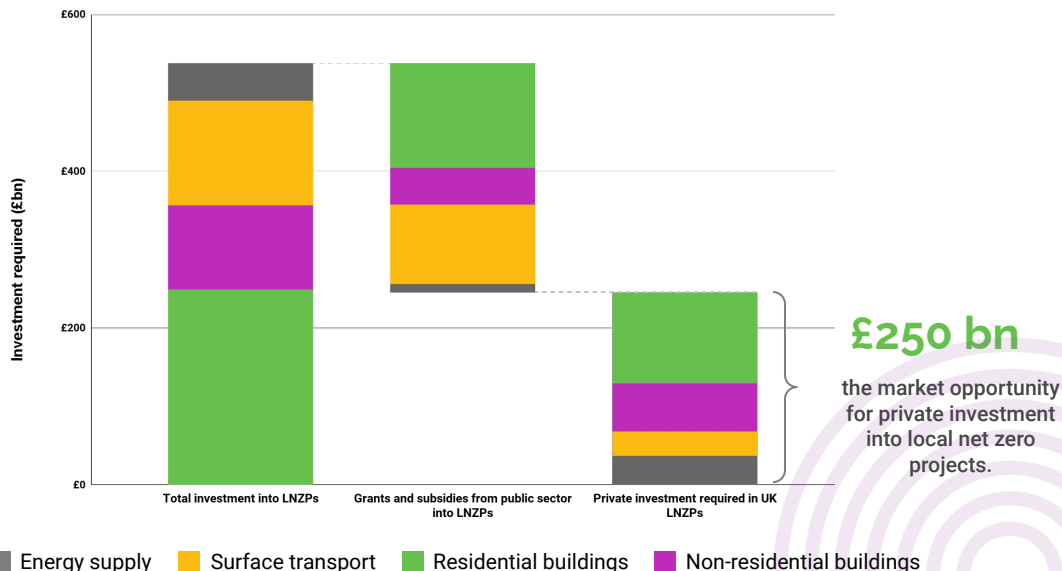
**With an estimated market size of £250bn, LNZPs make it possible to align private capital with net zero strategies** and public policy. [PwC analysis](#) has shown that taking a place-based approach to investment can create positive socioeconomic outcomes and lower delivery costs.

**Over the last 5 years, there's been significant growth and investment into LNZPs.** This is reinforced by Government's growing recognition of the importance of local action. While public sources have dominated investment to date, private capital is now unlocking as the market matures. For example, [Green+ Gilts has raised over £16bn](#) from the first two issuances, and the UK is set to raise a further £10bn by the end of this fiscal year.\*

**There's a clear opportunity and need for investors to enter this market. They can fill the funding gap and help meet the UK's net zero target, while unlocking new revenue streams and market opportunities.**

\*Gilts are government bonds which are sold to institutional investors and provide a fixed rate of return until their expiry. Green Gilts raise capital specifically for green government projects, for example, offshore wind.

**Fig.1** The UK needs more than £500bn in total investment by 2050 (roughly £20bn per year) into LNZPs to support its net zero ambitions. Under current technology, policy and market assumptions, £250bn will need to come from the private sector supplemented by approximately £300bn from the public purse. (Source: PwC analysis).





## Executive summary (continued)

Local net zero projects target the reduction of greenhouse gas emissions across energy, heat, buildings and transport in line with local strategies. They are about joining together parts of the local energy system in the most cost effective way.

There are six types of local net zero projects:

### Energy



Renewable energy generation



Private wires & Heat networks



Energy storage and flexibility services

### Buildings



Building energy efficiency and retrofits



EV infrastructure



Public transport and mobility services

### Transport

Several key policy and regulatory developments provide the foundations for the UK's net zero transition, including but not limited to the [Net Zero Strategy](#), [Powering Up Britain](#), [Green Finance Strategy](#), [Review of Electricity Market Arrangements](#) and [Mission Zero Net Zero 'Skidmore' Review](#). This is an ever-changing policy landscape with authorities regularly releasing new legislation, policies and consultations.

UK public finance institutions help projects across the commercial maturity spectrum from funding innovation to de-risking and unlocking private investment. These include UK Research & Innovation, British Business Bank, UK Infrastructure Bank, Public Works Loan Board, the UK Municipal Bonds Agency and Salix. There have also been several major grants awarded to support net zero adoption.

Different government departments and related entities develop and implement the policies, plans and programmes that build an LNZZ pipeline. These include the Department for Energy Security and Net Zero, which awards grant funding as well as setting policies, and Ofgem, which regulates the electricity markets in the UK. Local and combined authorities are key stakeholders seeking investment in LNZZs. They are also the entities that make project decisions, such as around planning consent.

There's a diverse set of delivery models in the market. These range from a wholly private sector solution, with no public sector involvement to schemes entirely funded, owned and operated by the public sector. All schemes will involve some level of interaction between government and the private sector, but this varies from transactional (planning), to arm's length (concession) or partnership (joint ventures).

## Executive summary (continued)

LNZPs can provide an investment opportunity which delivers social value and progress on net zero goals. The projects can benefit investors, Local Authorities and communities.

### Investing in LNZPs offers many benefits to investors

- **Return on investment timescales have greatly reduced** due to high energy prices and falling technology costs.
- **Low risks** associated with sovereign-backed counterparty.
- **First-mover advantage** as there may be missed opportunities for investors that are slow to enter this rapidly growing market.
- **Alignment to public policy** creating long-term demand and minimising policy risk for investor capital.
- **Fulfilment of ESG reporting requirements** and commitment to net zero.
- **Contribution to local social value**, for example local government pension scheme investors have a [5% allocation target](#) to local impact investing.

### Financial institutions are increasingly committing capital to net zero

For example, the Glasgow Financial Alliance for Net Zero (GFANZ), a global coalition of financial institutions, has committed over US\$130 trillion of private capital to transforming the economy to net zero. UK financial institutions are leading the way in net zero target-setting and planning, though with gradual progress so far in the implementation stages.

Local place-based investment has advanced beyond the proof-of-concept phase. In the UK, pension funds in Cambridgeshire, Clwyd, Greater Manchester, Strathclyde, Tyne & Wear and the West Midlands have each announced their intentions to make place-based investments.

### While LNZPs provide an investment opportunity, there are several barriers to local net zero investment which need to be overcome

- **Revenue uncertainty** due to uncertainty of offtake and difficulties in capturing revenue for certain project types (for example, retrofit energy savings).
- **Limited pipeline** of investable net zero projects.
- **Small ticket size** of investable net zero projects.
- **Volatile energy prices** due to unpredictable energy markets.
- **Lack of in-house skills, resources, capacity and access to finance by Local Authorities**, especially for non-core cities or devolved areas.
- **High costs, complexities and/or uncertainty surrounding technology-specific regulation**. There may be additional regulatory steps (for example, technical licenses), limited legal frameworks or standardised permit procedures in place, and policy uncertainty.

### Investors can help project developers mitigate these risks and seek out project developers that have overcome barriers in the following ways

- **Aggregating or bundling** of LNZPs.
- Agreeing on **risk-sharing** mechanisms.
- Ensuring there are **offtakers** (for example, via PPAs).
- Harnessing mechanisms to generate **revenue streams**.
- Developing a **project feasibility and development fund**.
- Receiving support from **technical assistance facilities and technical delivery partners**.

## Executive summary (continued)

The UK market has diverse project types that cater to local requirements. These include area size, governance structure and technology type.

**The UK market for LNZPs is growing rapidly.** Significant investments in 'demonstrator' and detailed design projects have helped create a pipeline of investable projects. These have been facilitated through initiatives such as the [Prospering from the Energy Revolution Programme](#).

The UK is seeing diverse approaches to financial structuring. There has been typical project finance with direct investment into projects, but also cases of finance aggregation (for example, [Net Zero Neighborhoods](#)) and call down facilities (for example, [MEEF](#)). Other forms of finance include using land and assets as collateral for investment, such as in the Bristol City Leap programme. These innovative financing structures are enabling more private investment to flow into LNZPs with greater returns on investment.

Looking internationally, the US has benefited from a robust municipal bond market, which has more recently been able to fund LNZPs, often as part of general obligation bonds. The EU has also experienced growth in locally delivered projects, including the [Climate KIC's NetZeroCities](#) project, the [European Regional Development Fund](#), and the European Investment Bank's [JESSICA programme](#).

**The market is set to continue on its growth trajectory by replicating the success of financial structures used in demonstrator projects.**

### What's happening in the UK LNZN market?

#### Investment raising

Local authorities and innovators can pool projects to increase ticket size by aggregating LNZNs, a solution which actors are increasingly proposing and using (for example, [3Ci's model](#)). LNZNs can use public finance to raise funding for project development. For example, the GreenSCIES project, initially funded by Innovate UK, aims to tap into multiple income streams, with attractive potential [internal rates of return of 10%](#).

#### Investor types

Existing investment has been diverse in means and source. For example, [Bristol City Leap](#) secured finance through a partnership with Ameresco Ltd and Vattenfall Heat UK. Other sources of finance include [local climate bonds](#) issued by LAs to raise money directly from the public. There's also a diverse pool of investor types, from small and large energy lenders (for example, Thrive), to public finance and general investors. As the market matures, institutional investors will make up an increasingly large proportion of investors.

#### Partnerships

LAs are partnering with private sector entities and other LAs. One recent partnership is the [Mayor of London's Energy Efficiency Fund \(MEEF\)](#), an investment fund set up by the Greater London Authority with funding from the European Commission to help meet London's net zero by 2050 goal. The independent fund manager, Amber Infrastructure Group, is responsible for project evaluation and has successfully attracted private sector capital to the fund (approximately [£456m leveraged against £51.2m of public funds](#)).



# 2

## Sector overview

# The sector today

## There's broad cross-party support for delivering net zero in the UK.

In 2019, the UK became the world's [first G20 country to pass a law](#) committing to net zero by 2050. The UK has set some ambitious targets, including decarbonising the electricity system by 2035 as well as dates for bans on ICE vehicles and gas boilers. However, progress is lagging behind UK policy ambition. There is recognition from both major parties that more needs to be done. In March 2023, the Government published its plan for delivering the energy transition, [Powering Up Britain. The Green Finance Strategy](#), published on the same day, included plans to mobilise the capital needed to meet the UK's ambitious targets. Following the energy crisis in 2021, Government has also focused on energy security, prompting the development of the [British Energy Security Strategy](#), [Energy Price Guarantee](#), [Energy Bill Relief Scheme](#) and the [Review of Electricity Market Arrangements](#). National policy and strategy are helping to unlock revenue streams for LNZPs. This includes the [Flexibility Innovation Programme](#) and [Hydrogen Production Business Model](#), which aim to provide investors with revenue certainty.

### Local investment into net zero

Local investment will be needed to support a more decentralised future energy system. The UK's current energy grid was designed around a centralised approach to power. The switch to clean electricity – as part of the net zero targets – will place greater demands on the grid.

This transition will require a [balance of large-scale power generation with local decentralised energy systems](#). This includes storage solutions and smart technology at the local level. This set of innovations is creating a growing market with opportunities for private investors to get involved.

Local delivery of net zero maximises socioeconomic outcomes. Analysis found that adopting a place-specific approach (rather than a place-agnostic one) would [save £137bn in investment cost and generate an additional £431bn in energy savings and wider social benefit](#). Local delivery also benefits from the involvement of Local Authorities and communities. This is because projects are more likely to have planning authority and potential customers onsite from the start, creating projects which are more likely to last. Investors can gain a share in this growing market and make financial returns on projects.

### Devolved power

The UK has seen increasingly devolved powers and [funding](#) from national to local government, with legislation boosting policy support for devolution. For example, regional mayors in the West Midlands, Manchester and Teeside now have more power, which has accelerated LNRP development. Since 2019, 308 local councils have declared climate emergencies and many are acting to reduce carbon emissions, including drafting Local Area Energy Plans (LAEPs), appointing climate and energy teams and negotiating with central government for powers and funding.

# How the sector has evolved

There's been significant growth and investment into LNZPs, bolstered by government policy and strategy. While public sources have predominantly funded investment to date, private capital will be increasingly important as the market matures.

In the UK, momentum has been growing for investment into LNZPs (see timeline below). For example, UKRI's [Prospering for the Energy Revolution](#) programme advanced a range of projects. These showcased how technologies can be successfully applied to distribute renewable energy at a commercial scale. Recent [policies](#), such as the UK Government introducing its Green Financing Framework, Green+ Gilts and retail Green Savings Bonds in 2021, have complemented this work. Green+ Gilts has raised more than [£16bn](#) from the first two issuances, and the UK is set to raise a further £10bn.

Looking internationally, the US has witnessed the growth of the municipal bond market, which has more recently been able to fund LNZPs, often as part of general obligation bonds. The EU has also seen growth in locally delivered projects, with the [Climate KIC](#), [Net Zero Cities Programme](#), [European Regional Development Fund](#), and European Investment Bank's [ELENA](#) and [JESSICA programmes](#) funding LNZPs (amongst others).

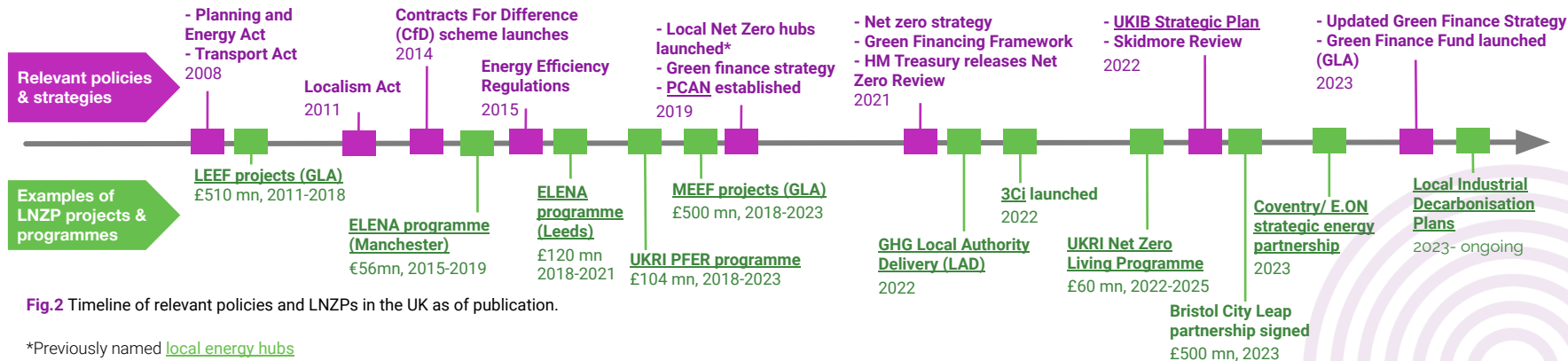


Fig.2 Timeline of relevant policies and LNZNPs in the UK as of publication.

\*Previously named [local energy hubs](#)

# Types of local net zero projects

LNZPs target the reduction of greenhouse gas emissions across energy, heat, buildings and transport in line with local strategies. They are about joining together parts of the local energy system in the most cost effective way. The parts of this system can be summarised into six key asset types. (See [Annex 2](#) for more detail on specific assets.)

## Energy

### Renewable energy generation

Using renewable energy sources to generate electricity such as solar, onshore wind, geothermal and energy from waste\*.



### Private wires & Heat networks

Delivering electricity and/or heat through private networks. For example, private wires transform and distribute electricity but are not part of the National Grid. This electricity may be generated from a range of renewable energy sources.



### Energy storage and flexibility services

Using technologies to store energy, mainly through batteries, but also through other approaches such as hydrogen storage. These support the delivery of flexibility services and demand side response schemes which help balance energy supply and demand to improve efficiency in the grid /network. For example, via smart tariffs and vehicle-to-grid technology.



## Buildings

### Building energy efficiency and retrofits

Modifying existing buildings to reduce energy usage primarily through energy efficiency Measures. For example, improving insulation, installing heat pumps and implementing smart energy management systems.



## Transport

### EV infrastructure

Installing and operating the structure, machinery and equipment needed to encourage the adoption and use of electric vehicles within the local community, including battery charging stations and battery exchange stations.



### Public transport and mobility services

Implementing infrastructure to encourage the adoption and use of active and low-carbon mobility within the local community. Examples of this include car clubs, public bus fleets and mixed cycle infrastructure.



\*Energy from waste is seen as partly renewable, as waste treated in EfW plants is partly biomass ([ESWET](#)).



# Governance and delivery

LNZPs can be delivered in many ways. Governance and delivery involves allocating roles, responsibilities and decision-making processes to ensure projects are managed and executed effectively.

LNZPs can be delivered through many different models, from wholly private sector solutions to schemes entirely funded, owned and operated by the public sector. All schemes will involve some level of interaction between the Government and the private sector, but this varies from transactional (planning), to arm's length (concession) or partnership (joint ventures).

The spectrum from public-led to private-led will influence the level of risk and reward for investors.

Further detail on specific delivery structures is set out in [Annex 2](#), which looks at **in-house delivery**, **project sponsor SPV**, **joint venture SPV**, **3rd party ESCO** and the **aggregated model**.

Common characteristics of UK LNZPs		Examples
<b>Private sector led</b>	Private sector-led service, concession and franchise agreements are observed in LNZPs where there is limited delivery capacity or appetite for borrowing within the Local Authority and where there is a clear financial model that does not require government support, increasingly for EV charging infrastructure.	Zero Carbon Rugeley
<b>Public-private partnership</b>	Joint ventures (JVs) are often a preferred governance structure, with the LA providing land/assets, technical input and planning consent, alongside project partners supporting with technical delivery (such as building, operating and managing the sale of energy). JV arrangements can be challenging to manage, but also a good way of meeting joint objectives. The LA retains some control, the parties share the risks and there are greater opportunities to attract private sector expertise/funding.	Bristol City Leap
<b>Public sector led</b>	LAs are more involved in projects where they have the capacity and skills to provide greater technical input and where they're willing to take on higher levels of risks. They often have greater use of public funds. LA-influenced projects are likely to focus more on social outcomes whereas private-sector led projects will focus primarily on financial returns. In addition, projects that are LA-led and delivered, if financially successful, can return funds to the LA that can be invested in other local services.	EIT Climate-KIC Net Zero Cities Programme

Spectrum of options



# 3

## Policy and regulation



# Policy landscape

There's a growing consensus on the need to deliver net zero. The Government is increasingly considering the role that Local Authorities will play in delivering the UK Net Zero Strategy.

## Policy landscape overview

Several key policy and regulatory developments provide the foundations for the net zero transition in the UK (see [Annex 3](#) for a long-list of policies), including but not limited to:

**Net Zero Strategy (2021, updated 2022): sets out how the UK Government will deliver on net zero commitments.** The UK Government has committed to providing support for public and private investment opportunities in local places that will enable local delivery of emissions savings across sectors. Public finance organisations will invest in projects alongside private sector capital to crowd in finance and bring economic growth to Local Authorities.

**Green Finance Strategy (2023): the UK Government's strategy to harness the financial services sector to support climate and environmental objectives.** The UK Government has committed to attracting private investment through the work of Local Net Zero Hubs. It has also established a partnership with business and finance leaders through a new Net Zero Business & Investment Group. Government has also launched a range of schemes that use blended finance which will enable greater returns. For example, the Impact Investing Institute is working with Wakefield Council on a place-based impact investing pilot.

**Powering Up Britain (2023): sets out the UK's energy security and net zero plan.** Government-funded research through 3Ci and Innovate UK will help identify opportunities for local governments to work with the private sector to finance profitable net zero projects.

**Review of Electricity Market Arrangements (REMA) (2022): government consultation and responses on a range of issues and options related to electricity market reform.** Future power market reform will likely to lead to many new opportunities for private sector financing.

**Mission Zero Net Zero 'Skidmore' Review (2023): review of UK net zero strategy and recommendations.** The review highlights the importance and opportunity of private and public sector collaboration.



# Recent and upcoming announcements

There is a constantly evolving policy landscape which will help grow investment opportunities. But uncertainty surrounding upcoming announcements may pose a barrier.

The policy landscape is ever-changing, with regular releases of new legislation, policies and consultations. Changes in the political landscape will also likely impact the policy landscape and this market. Here are some recent and upcoming announcements:

**Ofgem Consultation on Regional System Planners**. Ofgem have consulted on and subsequently proposed a package of reforms for energy systems across the UK, and in particular governance arrangements. System reform will involve investment and engagement opportunities for private investors.

**Heat Network Zoning (introduced in England by 2025)**. Heat networks projects will require central and local government to work closely with industry and local stakeholders.

**UK Green Taxonomy is expected to set out classifications for 'green' financial activities in the public and private sector**. This will provide a tool to investors with definitions of which economic activities should be labelled as green to support the quality of standards, labels and disclosures. This will provide a huge opportunity to investors to be assured that what they are investing in is actually environmentally sustainable. Beyond that, it is an opportunity for the UK to set a high bar globally with an ambitious, science based taxonomy that helps support the UK's transition to a net zero economy. The publication date of the Taxonomy is pending.

**The Energy Bill 2023: Currently under passage, this will make provisions on energy production and security and the regulation of the energy market**. The provisions under this bill will include licensing of CO2 transport and storage, arrangements for CCUS, hydrogen production and new technology including low-carbon heat schemes. Regulation around these topics is likely to lower the risks for prospective investors.

**Launch of Office for Local Government (OFLOG) has ambitions to simplify the funding landscape for Local Authorities**. Private financing is often blended with public financing to reduce investment risk. As it's made easier for LAs to get financing, there will be more LNZPs for investors to engage with.

## **The Mayor of London's Green Finance Fund**

The Green Finance Fund was launched in 2023 and will lend up to £500m to projects that help London meet its net zero ambitions. It aims to accelerate decarbonisation by lowering the cost of borrowing through offering loans with flexible terms. UKIB, PWLB and the Greater London Authority (GLA) will fund the loans. Following successful proof of concept, the GLA is planning to scale up its ambitions with a larger raise that blends capital from private sources, particularly institutional investors, such as pension funds and insurance companies.

# Public finance and its role

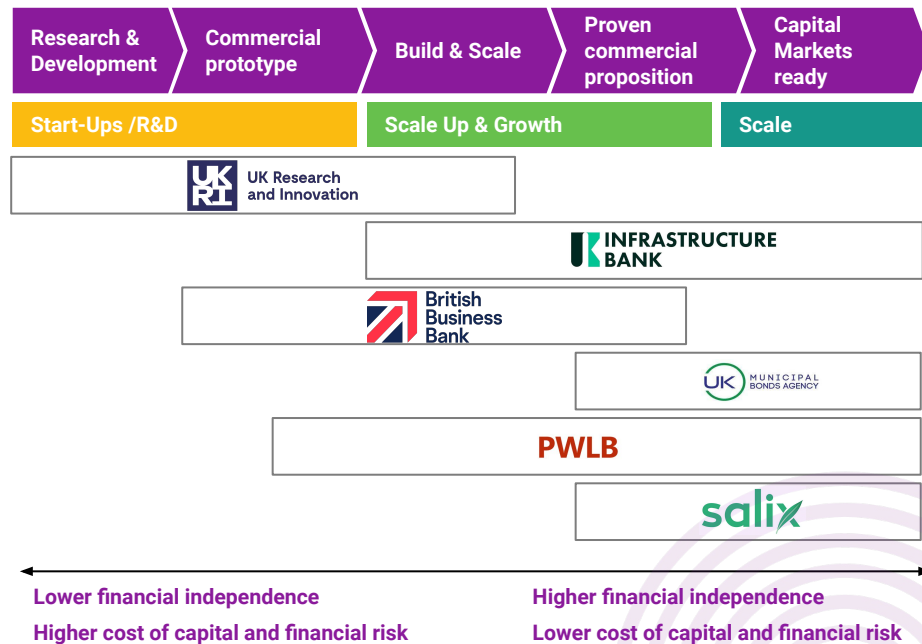
UK public finance institutions sit across the commercial maturity spectrum, performing essential functions from funding innovation to de-risking and unlocking substantial private investment.

## UK public finance institutions

There are several UK public finance institutions which support the delivery of LNZPs through a range of measures including funding innovation, de-risking investment and unlocking barriers to investment (e.g. via market coordination and supporting the transition of subsidy removals). These include:

- **UK Research and Innovation (UKRI)**
- **UK Infrastructure Banks (UKIB)**
- **British Business Bank (BBB)**
- **UK Municipal Bonds Agency (UKMBA)**
- **Public Works Loan Board (PWLB)**
- **Salix**

These public finance institutions sit across different stages of project maturity and development to ultimately generate a project pipeline at the scale necessary for private investment (Fig.3). The next page provides more detail on the role and purpose of each of these. There have also been several major grants to support net zero adoption. For example, the boiler upgrade scheme (£450 million available from 2022 to 2025) and the Industrial Energy Transformation Fund (IETF - £70m for feasibility and engineering studies).



**Fig.3** Focus of public finance institutions across the commercial maturity spectrum (Source: based on [Green Finance Strategy](#) analysis).

# Public finance and its role

UK public finance institutions like UKRI and BBB are providing investment opportunities to private investors at early stages of innovation and business. UKIB, PWLB, MBA and SALIX are building the market for LNZPs and leveraging in private investment.

## UK Research and Innovation

UKRI is a non-departmental public body and provides funding to researchers, businesses and universities, investing in science and innovation in the UK to support net zero delivery. UKRI has a combined budget of over £6bn.

UKRI invests in early stage R&D that is too high risk for private investors. This enables proof of concept and helps de-risk private investment. For every £1 of public investment in R&D, a further £2 of private investment is attracted.

## UK Municipal Bonds Agency

The UK Municipal Bonds Agency is owned by the Local Government Association and provides loans to UK Local Authorities to fund capital projects.

The UKMBA provides funding to LAs to finance capital expenditure on climate change related projects. These investments will act as the precursors to private sector investments, proving the business case and building the market for LNZPs.

## UK Infrastructure Bank

UKIB is a government-owned policy bank. It partners with the private sector and local governments to de-risk investments and increase infrastructure investments that will tackle climate change and promote economic growth.

UKIB prioritises investments where there is an undersupply of private finance and aims to help crowd-in private capital through addressing barriers to investment. UKIB has a Local Authority lending service supported by advisory services which help Local Authorities fund and develop complex projects.

## PWLB

The Public Works Loan Board (PWLB) lending facility is operated by the UK Debt Management Office and provides loans to UK Local Authorities for capital projects. It accounts for around two thirds of their current borrowing needs.

Loans provided to Local Authorities include climate related projects. For example, Cambridgeshire County Council used PWLB funding to adopt an energy efficiency programme. These projects help demonstrate opportunities for returns from LNZPs to investors.

## British Business Bank

BBB is a public development bank dedicated to making finance markets work better for small businesses and provide SMEs with support on the net zero transition.

It has several programmes. For example, the Enterprise Capital Funds programme where BBB co-invests alongside VC funds on terms which improve the outcome for private investors. BBB also has a nations and regions fund which serves to crowd in private investment into the UK's regions.

## Salix

Salix is the government-owned delivery body for the Government's Public Sector Decarbonisation Scheme and the Low Carbon Skills Fund. It provides funding to projects enabling the public sector to reduce their carbon emissions.

Salix has provided £2.7bn of funding to public sector organisations and offers interest free loans and grants to support decarbonisation projects. This helps support project pipeline development.

# Local net zero decision-makers and enablers

Different government departments and related entities develop and implement the policies, plans and programmes that build an LNZN pipeline. We've outlined the most prominent of these below.

Scale	Stakeholder	Description	Implications for LNZNs
<b>National</b>	Department for Energy Security and Net Zero (DESNZ)	DESNZ focuses on the energy portfolio from the former Department for Business, Energy and Industrial Strategy (BEIS). Priorities include energy security of supply, meeting UK net zero commitments and reducing energy bills. DESNZ chairs the Local Net Zero Forum that brings together local government officials to collaborate on delivering net zero at the local level.	Awards grant funding, sets policies, legislation, subsidies.
	Department for Levelling Up, Housing and Communities ( <a href="#">DLUHC</a> )	DLUHC invests in local areas to drive growth, create jobs, deliver homes and support community groups. It also oversees local government, planning and building safety. DLUHC has developed a net zero framework for local government and supported the devolution deals, allowing Local Authorities to have more funding and greater powers.	Awards grant funding, sets policies, legislation, subsidies.
	HM Treasury ( <a href="#">HMT</a> )	HM Treasury is the government's economic and finance ministry. It's responsible for public spending, financial services policy, strategic oversight of the UK tax system, infrastructure project delivery across the public sector, private sector investment facilitation and sustainable economic growth.	Awards grant funding, sets policies, legislation, subsidies.
	Department for Transport ( <a href="#">DfT</a> )	The DfT is responsible for providing policy, guidance and funding to Local Authorities to help them run and maintain their transport networks as well as develop new major transport schemes. The DfT has a <a href="#">Local Authority toolkit</a> for transport decarbonisation which provides guidance and signposts available funding.	Awards grant funding, sets policies, legislation, subsidies.
<b>National regulator</b>	Office of Gas and Electricity Markets ( <a href="#">Ofgem</a> )	Ofgem regulates the monopoly companies that run the gas and electricity networks in Britain. It makes decisions on price controls and enforcement, acts in the interests of consumers and helps industries to realise environmental improvements. Ofgem works with Local Authorities and has developed some proposals to address current issues with the UK's energy system to ensure there is effective local governance.	Sets regulation and legislation which may directly impact LNZNs.



## Local net zero decision-makers and enablers (continued)

Different government departments and related entities develop and implement the policies, plans and programmes that build an LNZN pipeline. We've outlined the most prominent of these below.

Scale	Stakeholder	Description	Implications for LNZNs
<b>Regional</b>	Combined authorities ( <a href="#">CAs</a> )	A CA is a legal body set up using national legislation that enables a group of two or more councils to collaborate and make collective decisions across council boundaries. Ten combined authorities have been established so far. LNZNs often occur at combined authority level, for example the West Midlands RESO project and the Zero Carbon Rugeley project. Furthermore, there is a role for combined authorities where larger infrastructure is needed, for example <a href="#">CAs could take the lead in setting the EV charging strategy</a> for the region.	Planning consent, project partner approval, community-based funding and grants.
<b>Local</b>	Local authorities ( <a href="#">LAs</a> )	LAs are run by elected councillors. There are different tiers of authorities with responsibility of local services (such as housing and planning) divided between them. As of November 2021, 308 LAs have declared climate emergencies and are now beginning to design LNZNs to meet their net zero targets.	Planning consent, project partner approval, community-based funding and grants.
	Local Enterprise Partnerships ( <a href="#">LEPs</a> )	LEPs are non-statutory bodies responsible for local economic development in England. They're business-led partnerships that bring together the private sector, Local Authorities and academic and voluntary institutions. The Greater South East Net Zero Hub is an example of where 11 LEPs are working together to increase the number, scale and quality of local energy projects being delivered across the region.	Secures and manages funding, provides local support.

### Stakeholders seeking investment

Scotland, Wales and Northern Ireland all have bespoke accountabilities depending on their devolved agreements. For example, the Scottish Government is mandating local heat and energy efficiency plans whereas the Welsh Government is developing local and regional energy plans. While the net zero strategy covers the whole of the UK, there will be nuances across the devolved regions that should be considered.



# 4

**Market opportunity, drivers  
and barriers**



# The market opportunity

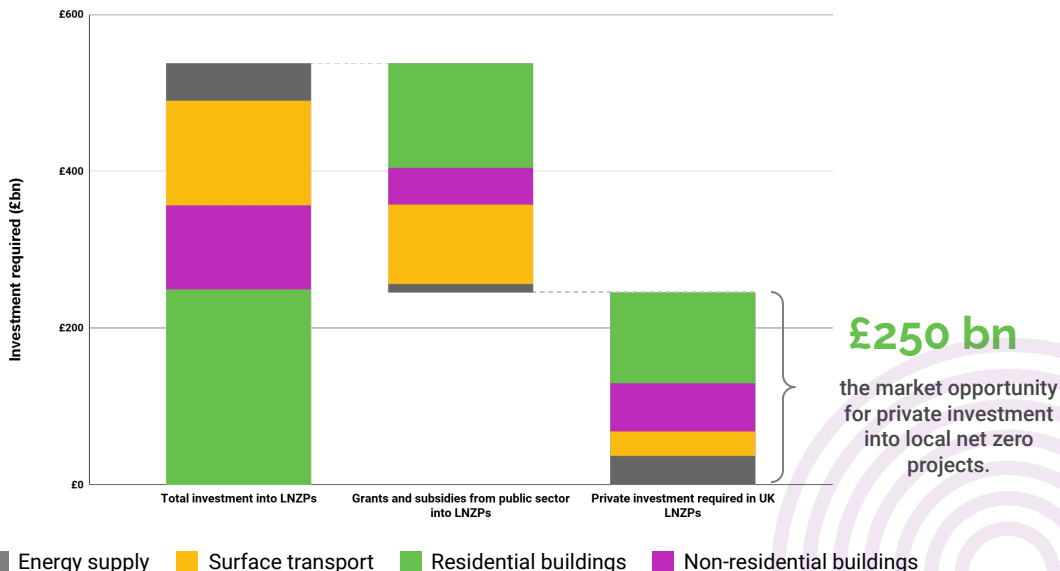
We estimate the size of the local net zero investment market is £250bn. This is the investment required to reach UK net zero targets.

Since 2010, the public and private sector in the UK have invested almost **£200 billion** into low carbon energy. Unlike other infrastructure sectors, such as transport, private investment dominates the energy market. Since 2018, **95% of recent energy investment** has been from private sources. UK low-carbon investment still needs to increase from around **£10 billion per year in 2020, to £50 billion per year by 2030**, and continue at that level through to 2050.

PwC analysis shows that to support the UK's journey to net zero by 2050\*, the public and private sector need to invest more than **£500bn** into LNZPs - roughly **£20bn per year**. Under current technology, policy and market assumptions, that equates to a market size of £250bn private sector investment. Different investors will tap into different parts of the market. For example, venture capitalist firms may invest in innovative new products and technologies (for example, Heat as a Service) which provide suitable ROIs. Larger institutional and traditional high-street investors may provide asset finance. Individuals may invest via community shares or directly into domestic retrofit, which can be supported by additional public and private finance.

**There is clearly a need and an opportunity for investors to enter this market to fill the funding gap and help meet the UK's net zero target.**

**Fig.4** Investment required to reach net zero by 2050 in the UK in electricity, buildings and transport sectors (Source: PwC analysis).



\*Based on Climate Change Committee's Sixth Carbon Budget (6CB) [Balanced pathway](#)

# Investor rationale

LNZPs can provide an investment opportunity which delivers social value and progress on net zero goals. The results will benefit investors, projects and local communities.

**There is a growing market demand for net zero or 'green' investments.** The global green economy is [expanding rapidly](#). In 2022, global investment in the low-carbon energy transition totaled [US\\$1.1 trillion](#), setting a new record. Renewable energy and electrified transport (EVs and associated infrastructure) took the top spots in terms of largest sector investment, with [\\$495bn and \\$466bn committed in 2022](#) respectively. In 2022, the [UK remained in the top 5](#) for countries attracting energy transition investment.

**Financial institutions are increasingly committing capital to net zero.** For example, through the Glasgow Financial Alliance for Net Zero (GFANZ), a global coalition of financial institutions, [over \\$130 trillion of private capital](#) has been committed to transforming the economy to net zero. [UK financial institutions are leading](#) the way in net zero target-setting and planning, although progress remains slow in implementation stages.

**There is an increased market interest and policy drive to ensure that asset owners are investing in the local area.** Institutional investors are showing more interest in investments with a [local place-based lens](#). In the UK, pension funds in Cambridgeshire, Clwyd, Greater Manchester, Strathclyde, Tyne and Wear and the West Midlands stated their intention to make place-based investments.

## Investing in local net zero projects has many benefits

**Return on investment timescales have greatly reduced** due to high energy prices and falling technology costs

**Low risks associated with sovereign-backed counterparty.**

**First mover advantage** as there may be missed opportunities for investors that are slow to enter this rapidly growing market.

**Alignment to public policy** creating long-term demand and lowering risks.

**Meeting ESG reporting requirements** and demonstrating commitment to net zero.

**Contributing to local social value** for example, local government pension scheme investors have a [5% allocation target](#) to local impact investing.

**Filling the finance gap** to deliver net zero aligned with local strategies.







**Providing additional benefits** such as risk transfer, leveraging expertise and efficiency benefits to Local Authorities.

Benefits to investors

Impact

# Revenue streams

Different project types can generate different revenue opportunities for investors. For more detail on investment return and market characteristics see [Annex 2](#).

	Revenue Streams	Revenue Capturing Mechanisms	Scale of returns	Ease of capturing revenue
	<b>Renewable energy generation</b> The primary revenue stream is the sale of electricity/power. Additional revenue might include government subsidies /price guarantees. Waste plants also receive fees for processing waste.	Power Purchase Agreements (PPAs), virtual PPAs/contracts for difference, export payments, charges/fees	High	High
	<b>Private wires &amp; Heat networks</b> Private networks have a range of revenue streams - sale of heat, electricity and cooling, asset rental and customer and/or developer connection charges.	Pay per use, PPAs, virtual PPAs	Medium	Medium
	<b>Energy storage and flexibility services</b> Battery storage provides a number of revenue opportunities, primarily through ancillary services for supporting grid stability, such as through participating in the National Grid's Balancing Mechanism. An additional revenue stream includes charging fees for vehicle-to-grid technologies.	Flexibility services, charges/fees	High	Medium
	<b>Building energy efficiency and retrofits</b> There are revenue streams for constructing, installing and maintaining retrofit solutions, such as heat pumps and insulation. A large source of this revenue will come from Government, for example, the 10-year £3.8bn Social Housing Decarbonisation Fund, as well as from private households and landlords.	Government grants, household private contracts. Potential for on-bill financing with government support.	Medium/Low	Low
	<b>EV infrastructure</b> The primary revenue stream for EV infrastructure is charging fees. There is also some revenue support and subsidies from Government (for example, LEVI capability funding).	Pay per use, flexibility services	High	High
	<b>Public transport and mobility services</b> Electric buses and shared mobility (for example, bicycle sharing) will have operating revenues from ticket sales and service use fees. Another large source of revenue will be government funding, for example, for electric buses.	Pay per use, charges/fees	Low	High

# Market barriers and uncertainties

There are a number of technical and non-technical barriers (financial, social and regulatory) to local net zero investment. (Annex 1 contains a risk evaluation of typical LNZPs.)

## Investors may face barriers when investing in LNZPs:

- **Revenue uncertainty** due to uncertainty of offtake and difficulties in capturing revenue for certain project types (for example, retrofit energy savings).
- **Limited pipeline of investable net zero projects.**
- **Small ticket size** of investable projects.
- **Limited evidence** /demonstrable projects.
- **Legal structure and due diligence of projects.**
- **Energy price volatility** due to unpredictable energy markets.

## There are also wider barriers to investment which might impact delivery and uptake of LNZPs:

- **Local authorities often lack in-house skills** (for project development from both a commercialisation and engineering perspective), **resources, capacity and access to finance**, especially for non-core cities or devolved areas.
- **Uncertain policy and regulatory landscape** due to policy inconsistency or uncertainty.
- **Lack of investor awareness and readiness.**
- **High costs, complexities and/or uncertainty surrounding technology-specific regulation** as there may be additional pre-requisite regulatory steps before an LNKP can begin (for example, technical licenses), limited legal frameworks or standardised permit procedures in place, and policy uncertainty (for example, decarbonisation of domestic heat).

## Investors can help project developers mitigate these risks and seek out project developers that have overcome barriers in the following ways:

- **Aggregation or bundling of LNZPs:** Create delivery mechanisms that group together local net zero projects into a single investment portfolio which avoids investor cherry picking and in some cases reduces risk. This will be likely led by local government, for example, Bristol City Leap and London's MEEF.
- **Anchor offtakers:** Set up contractual agreements that guarantee offtake for example, via PPAs with large commercial developments.
- **Harnessing mechanisms to generate revenue streams from energy savings:** Financial mechanisms such as pay-for-performance in energy-as-a-service (EaaS) schemes, would enable LNZPs to capitalise on further revenue streams.
- **Develop a project feasibility and development fund.** For example, a circular fund could be designed to be self-sustaining on the basis of a premium paid by successful projects. Unsuccessful projects would have loans converted to grants.
- **Technical delivery partnerships and support from technical assistance facilities** to support with complexities surrounding regulation and licensing.

# Existing examples in the UK

The UK has seen investment into a range of LNZPs.

## Overview

The UK market for LNZPs is growing rapidly. There are diverse project types that cater to local requirements and are delivered at the local level. Significant investments in 'demonstrator' and detailed design projects have laid the groundwork for a project pipeline that can attract investment. These have been facilitated through initiatives such as the [Prospering from the Energy Revolution Programme](#). This programme included 93 projects, and attracted £104m in public investments and £783m in private investments. Programme projects emphasised replicability – particularly among early-stage demonstrator projects – prioritising those with similar characteristics such as area size and governance structures.

## Financial structuring considerations

Local authorities are exploring structure financing of LNZPs in various ways. There is an opportunity for early stage investors to support LAs still considering the best route for them. Some projects use a typical approach to financing with direct investment in the project. Others use aggregated finance (for example, Net Zero Neighbourhoods) and call down facilities (MEEF). Other forms of finance include using land and assets as collateral for investment, for example, the Bristol City Leap programme. These innovative financing structures are enabling more private investment to flow into LNZPs and greater returns on investment.

## Typical UK examples

### Investment Raising

The GreenSCIENS project, initially funded by Innovate UK, aims to tap into multiple income streams, with attractive potential internal [rates of return of 10%](#). Projects can be pooled to increase ticket size with aggregation of LNZPs by local government increasingly proposed and viewed as a solution. Public finance can be used to raise funding for project development.

### Investor Types

The investment methods and sources are diverse. For example, Bristol City Leap secured finance through a partnership with Ameresco Limited and Vattenfall Heat UK, whereas other sources of finance include [local climate bonds](#) issued by LAs to raise money directly from the public. There's also a diverse pool of investor types, from small and large energy lenders (for example, Thrive), to public finance ([see earlier slide](#)) and general investors. As the market matures, institutional investors will make up a larger proportion of investors.

### Partnerships

LAs are partnering with private sector and other LAs. One recent partnership is the Mayor of London's Energy Efficiency Fund (MEEF). This is an investment fund set up by the Greater London Authority with funding from the European Commission to help meet London's net zero by 2050 goal. There's also private interest in this fund, with commercial funding and Amber Infrastructure leading on the technical assistance.



# Existing international examples

The international market has seen investment into a range of LNZPs.

## Overview

There's a growing market for net zero projects internationally, as organisations and countries seek to meet their net zero goals. International net zero projects are also diverse due to the differences in priorities and capacities of various regions and municipalities. For example, the NYCEEC supports investments into the energy efficiency of buildings in New York, while the EU Climate KIC programmes support any type of innovation that contributes to greenhouse gases reductions in Europe. Most international projects are government driven and delivered in partnership with specialised organisations that have been established purely for development purposes.

## Financial structuring considerations

The nascent nature of net zero projects makes them high risk. This limits the availability of potential investors. Special purpose vehicles (SPVs) blend these factors to facilitate the capital structures of different net zero projects. Grants and seed funding are the most common forms of finance for net zero projects as they ramp up. Credit enhancement mechanisms are also crucial in encouraging debt investments into the projects.

## Typical international examples

### Investment Raising

Investment raising techniques are diverse. For example, NYCEEC partners with private sector institutions to on-lend to property owners. EU Climate KIC helps start-ups and SMEs to raise seed funding and grants.

### Investor Types

Investor types vary, ranging from private, public and philanthropic organisations. Institutional investors, such as banks, prefer established industries. NYCEEC is already investing in net-zero projects, and is, through proof of concept, increasing the pool of private investors.

### Partnerships

Managing organisations and project vehicles form diverse partnerships with private, public and non-governmental organisations. This helps them maximise the available investment. Most international net zero projects are run through partnerships that have an established organisation leading them, for example, EU Climate KIC leads projects such as the NetZeroCities. Organisational structures vary, with a majority governed by their board of directors.

# Current and future innovative finance and financing structures

There's a growing market of new financing mechanisms and structures to deliver net zero in local areas and generate revenue streams to finance LNZPs. We've listed a range of these below.

Performance-based financing	Community Municipal Investments	Urban Development Funds	Land value capture	As-a-service
<p>Performance-based financing creates a financial incentive for meeting impact targets by linking returns to investors with the impact of the project. Performance based financing is <a href="#">≥10 years old</a>, with environmental impact bonds &gt;5 years old.</p>	<p>Local Authorities can issue climate bonds as community municipal investments. They issue them through a crowdfunding platform and allow the public to invest in low-carbon projects. These are classic investments with generally fixed returns.</p>	<p>Urban Development Funds (UDFs) are specialist investment vehicles which invest in urban development projects. These are typically funded through a combination of public and private sources and use a <a href="#">range of financial products</a> (for example, guarantees, loans, mezzanine capital).</p>	<p>Land value capture monetises the increase in land value resulting from infrastructure development. Projects can capture revenue through a range of mechanisms, including taxes, development rights or land sales with conditions attached.</p>	<p>As-a-service business models are increasingly being applied to a range of low-carbon measures. These shift the customer-supplier relationship from a traditional model of ownership to providing a service on a non-ownership basis. The most common types are energy-as-a-service models.</p>
<p>Washington DC's <a href="#">Environmental Impact Bond</a> is a private placement \$25m 30-year bond, with potential contingent payments based on five-year outcomes.</p>	<p>Abundance has launched two bonds aimed at funding green infrastructure, with over <a href="#">800 investors investing £2 million with two councils</a>.</p>	<p>The <a href="#">Liverpool City Region Urban Development Fund</a> is a £25m fund backed by the European Regional Development Fund, which includes investment projects that support a transition to a low carbon economy.</p>	<p>E-rail and Northumberland County Council (NCC) secured between <a href="#">25% and 30%</a> of the capital funding required for a new passenger rail line from Land Value Capture (LVC).</p>	<p><a href="#">Bristol Energy</a> has trialled Heat-as-a-Service, tailoring an offering to a consumer's individual home and lifestyle, instead of selling energy directly.</p>

# Innovative finance spotlights: Retrofitting buildings

The building sector presents many challenges when financing decarbonisation as cost savings are often difficult to capture. Green mortgages and Property Linked Finance are two solutions that tackle this challenge.

## Green mortgages

Green mortgages incentivise homeowners to improve the energy efficiency of properties through offering preferential terms, such as an increased loan amount or lower interest rates. Banks, building societies and mortgage lenders are launching green mortgage products at an [ever-increasing rate in the UK](#). For example, Nationwide Building Society aims to improve the energy performance certificate (EPC) ratings of its mortgage portfolio, so that at [least 50% of homes on its mortgage book are EPC C or better by 2030](#). This includes launching a range of products, such as the Green Reward Mortgage product which offers cash back for properties with EPC of A and B.

## Property Linked Finance

Property Linked Finance (PLF) links a loan to the property instead of the owner. This overcomes the 'payback period barrier' where homeowners are put off from retrofitting homes if they have plans to move in the near future. There is also a lower lending risk, which allows longer repayment terms and lower interest rates. Many countries have successfully implemented PLF. For example, in the US, the Property Assessed Clean Energy (PACE) model has supported [c.\\$10 billion investment](#). In the UK, this market is in earlier stages. In August 2022, Greater Manchester Combined Authority (GMCA) and the Green Finance Institute (GFI) launched a pioneering partnership to provide practical and innovative financial solutions to support energy-efficiency improvements for thousands of homes across the city region, including developing Green Mortgages, Local Climate Bonds and Property Linked Finance.

Retrofitting buildings is complex. In addition to specific finance products, innovators are developing approaches to simplify and standardise retrofit solutions. For example, RetrofitWorks is a cooperative which simplifies the marketplace by bringing together local retrofit subcontractors to help address supply chain bottlenecks. Another example, is Energiesprong. This full-house retrofitting approach uses offsite and pre-assembled housing parts. Tenants pay an energy service plan to a housing association, which can then be reinvested to retrofit other homes.

## Government investment into innovative finance aimed at building decarbonisation

The [Green Home Finance Accelerator](#) which is part of the UK Government's [Net Zero Innovation Portfolio \(NZIP\)](#), provides up to £20 million in grant funding to support the design, development and piloting of a range of finance propositions. These propositions encourage domestic energy efficiency, low carbon heating and micro-generation retrofit in the owner-occupied and private rented sectors. The programme has awarded discovery phase projects to a range of organisation types, from major banks, lenders and insurance companies to energy suppliers and retrofit providers. They are developing and testing innovative finance products from lifetime green mortgage products, to one-stop-shops, to selling future [carbon retrofit credits](#) to allow for upfront payment of retrofits.



# Financial transaction structure spotlight: Aggregation

Aggregating projects offers an opportunity to reach the market scale called for by investors and create financially viable business opportunities.

Local authorities and innovators are using project aggregation or bundling to unlock investment, especially from institutional capital. This can address one or both of the following barriers;

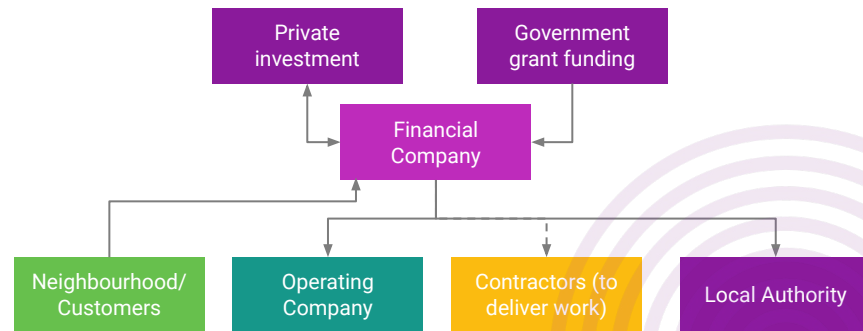
- Small ticket size and;
- Less commercially viable project types. For example, combining building retrofit with solar PV installation which have different cash flows and levels of risk and return.

The Net Zero Neighbourhood (see right) is piloting aggregated models in the UK, for example, by the [West Midlands Combined Authority](#). As the market matures further, [asset securitisation opportunities have been proposed](#). This would aggregate diverse assets and their cash flows so that they are converted into an asset-backed security which is traded in a financial market. Contracts (for example, PPAs, subscription plans) and associated cash flows will be sold to the SPV. This has the benefit of standardising and simplifying transactions which may have several distinct cash flows (for example, PPAs or transaction-based remuneration). This approach can also achieve market scale, increasing the number of willing investors.

Projects may be bundled together in a variety of ways. In some instances, LAs will group projects with common levels of risk and return, while in others the capital investment portfolio will contain a diverse mix of assets and risk profiles.

## Case study: Net Zero Neighbourhoods

The [Net Zero Neighbourhood](#) (NZN) is a place-based, multi-intervention approach to decarbonisation developed by 3Ci. This is designed to leverage private sector capital on top of public finance. Rather than investing in a specific LNZN, investors can invest in a neighbourhood. Actors set up a funding vehicle (Financial Company) that pays for upfront decarbonisation costs in a local area. Residents keep part of the savings (for example, energy cost savings). Some of the savings are captured through contracts which creates an annuity income stream for the funding vehicle and is used to repay investors. This model packages decarbonisation interventions together, capturing cash returns and other benefits in a blended finance structure to create financially viable business opportunities for private investors.



**Fig.5** NZN model showing flows of money (grey arrows indicate the direction of capital flows). Further detail on how these entities interact can be found [here](#).



# 5

## Case studies

# Case study deep dive | Bristol City Leap

Bristol City Leap is a 20-year concession to support the City Council's decarbonisation targets. An initial prospectus identified over £1bn of investable projects designed to deliver low carbon, smart infrastructure at scale (for example, solar PV and heat networks).

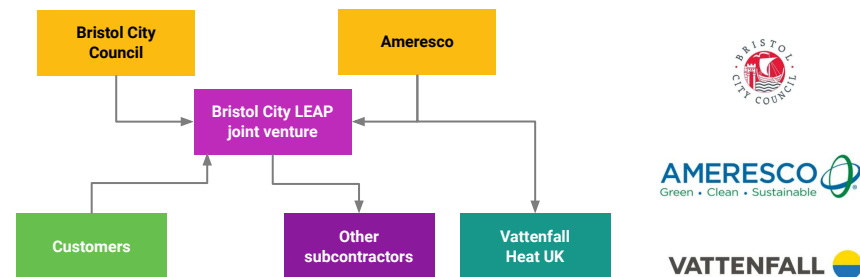
**Project overview:** The project was launched in 2018, with strategic partner Ameresco and their essential subcontractor Vattenfall appointed in 2022. Bristol City Leap is a 20-year concession that will deliver over £1bn of inward investment over its lifetime to deliver low carbon, smart energy infrastructure at scale to help the city meet its target of becoming carbon neutral by 2030. The City Leap Energy Partnership is a joint venture between Bristol City Council and Ameresco, a leading clean tech integrator and renewable energy asset developer, owner and operator. The project integrates numerous highly technical elements, including the development of Low Carbon Energy Infrastructure (LCEI) from Ameresco and a Heat Network development plan from Vattenfall. The project will deliver a minimum of **£424 million** in capital expenditure in the first five years, with £61.5 million in social value and reduce CO2 by **140,000 tonnes** across the City.

**Delivery model:** Public-private special purpose vehicle.

**Project typology:** Renewable energy generation; Private networks (heat networks); Buildings (energy efficiency measures); Flexibility services (smart energy systems).

**Legal & Governance structure:** Joint venture special purpose vehicle that is **50% owned by Bristol City Council and 50% owned by Ameresco**. Vattenfall Heat UK is an essential subcontractor. This is a 20-year concession to decarbonise the built environment.

## Funding flows



**Fig.6** Funding flows in the Bristol City Leap (grey arrows indicate the direction of capital flows).

**Expected Returns:** Bristol City Leap is a world first innovative **20-year joint venture** providing a range of services, including energy efficiency upgrades, renewable energy developments for heat and power, project financing and long term operation and maintenance. Returns depend on the types and specifics of the investment. It offers the opportunity to test new energy propositions and business models which can be replicable at scale.

## Case study deep dive | West Midlands RESO (Coventry)

Coventry Regional Energy System Operator (RESO) is a £2.62 million project focused on improved energy systems, including local low carbon energy generation, storage and management, and mobility infrastructure.

**Project overview:** The West Midlands RESO project aims to use Coventry as a pilot to explore the advantages of a new type of energy system operating at a city scale. The new system includes local low carbon energy generation, storage and management, and integrated infrastructure to support future mobility assets such as EV. It integrates heat, power and transport technologies, using smart systems to help develop net zero neighbourhoods. The outputs demonstrated that a more localised smart energy system could generate a net present value of £720m for the region.

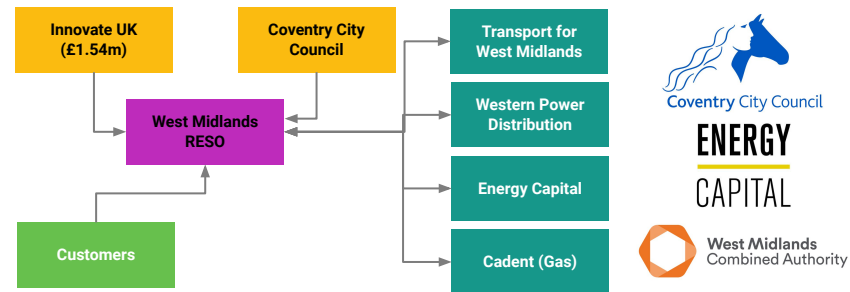
**Delivery model:** Aggregated Model.

**Project typology:** Renewable energy generation; Energy storage and flexibility services; Building retrofits; EV infrastructure.

**Legal & Governance Structure:** The RESO project team is a group of leading-edge partners, led by [Energy Capital part of the West Midlands Combined Authority \(WMCA\)](#), including energy providers, technology, not-for-profit, academic and Local Authority partners. Energy Capital and West Midlands Combined Authority (Coventry city council) lead the project.

**Funding flows:** [£1.54 million](#) was directly granted from Innovate UK through their 'Prospering from the Energy Revolution Programme' with the remaining £1 million coming from the consortium of partners.

### Funding flows



**Fig.7** Funding flows in the West Midlands RESO (Coventry) (grey arrows indicate the direction of capital flows).

**Expected Returns:** Modelling showed that a more localised smart energy system could generate a net present value of [£720 million for the region](#) over 30 years and include wider societal benefits of £144m in the next decade. This comes from more local opportunities and will benefit citizens in the local areas, such as through lowering bills and creating jobs. This value is dependent on key enablers such as data, collaboration and regulatory change.



## Case study deep dive | Zero Carbon Rugeley

Zero Carbon Rugeley is a £3 million project focused on the redevelopment of the old Rugeley Power Station. This project aims to provide town-wide decarbonisation by pulling together investment, local stakeholders and service providers.

**Project overview:** The project is being delivered by a consortium including Equans, Conigital, Chase Community Solar, SHAP, Cadent, Regen and Opus One. It aims to deliver an energy system design that is low carbon and drives the regeneration of Rugeley after the coal-fired power station was closed. The project will [develop 2,300 new homes in Rugeley as well as office, retail and commercial space](#) that represents significant growth for a town of around 24,000 people. It will also include low carbon mobility, smart solutions that enable flexible services and energy efficiency measures for new build and retrofit.

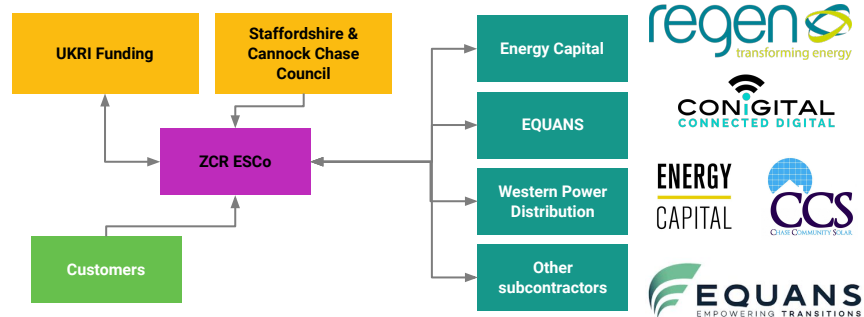
**Delivery model:** Private sector led (3rd Party ESCO).

**Project typology:** EV Charging Infrastructure, Whole House Retrofit (with energy efficiency and heat pump measures), Shared Mobility, Flexibility services.

**Legal & Governance Structure:** The programme is formed of a consortium led by Equans that includes energy network, technology, not-for-profit, academic and Local Authority partners.

**Funding flows:** Equans and the consortium have contributed [£1.5 million](#) to the project which has been [boosted by £1.9 million from the UKRI's](#) 'Prospering from the Energy Revolution Programme.' There has been limited investor appetite to fund ZCR due to the lack of clear revenue channels and obscurity on the Government's long-term policy direction regarding retrofits.

### Funding flows



**Fig.8** Funding flows in the Zero Carbon Rugeley (grey arrows indicate the direction of capital flows).

**Expected Returns:** Zero Carbon Rugeley's commercial modelling has predominantly explored financing the retrofit program through community loan schemes which are repaid through the end users' energy bill. This approach has only been shown to be feasible with significant grant funding. The key revenue mechanism will be on-bill financing. This will involve billing customers through their energy bills to cover the cost of the retrofits.

# Case study deep dive | NYCEEC

The New York City Energy Efficiency Corporation (NYCEEC) is structured as a revolving fund, and provides credit enhancement mechanisms to encourage private sector lending.

**Project overview:** The NYCEEC works with building owners, contractors, project developers and ESCOs to provide financing solutions that increase cash flow from day one and help to reduce energy use or greenhouse gases (for example, energy efficiency, fuel conversion, renewables, cogeneration and demand management). It offers loan products as well as credit enhancement mechanisms to encourage private lenders to offer efficiency loan products. To date, NYCEEC has mobilised [\\$445m](#) towards clean energy projects, greening 15,334 affordable housing units, upgrading 325 buildings, and creating 4,796 jobs.

**Delivery model:** NYCEEC uses a range of delivery models, an example is the [Roosevelts Landing project](#) where a private sector led model was used.

**Project typology:** Buildings retrofits.

**Legal & Governance Structure:** NYCEEC is a non-profit specialty finance company. It was originally created as a component unit of NYC government, and subsequently “spun off” as a fully independent non-profit with continuing contractual ties to NYC.

**Funding flows:** NYCEEC’s core capital is structured as a revolving loan fund - it can recycle capital as property owners repay the loans, and can lever its balance sheet to multiply its impact. Banks may choose to lend money to NYCEEC with funds being put towards projects that it originates. As a result, lending institutions gain greater familiarity with loan origination opportunities in energy efficiency and climate resilient infrastructure and may choose to design their own financing solutions. NYCEEC also provides credit enhancement to encourage private lenders to offer efficiency loan products.

## Funding flows

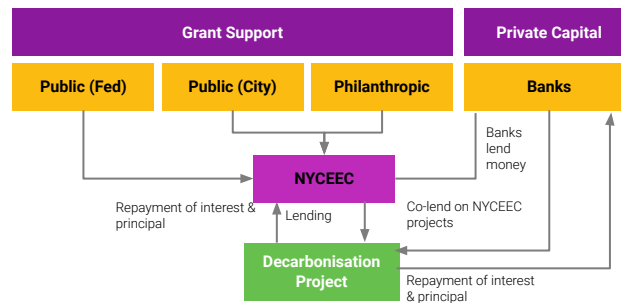


Fig.9 Funding flows in the NYCEEC (grey arrows indicate the direction of capital flows).

## Expected Returns

NYCEEC works with borrowers to develop loan structures that meet their financing needs and achieve cost and energy savings. On average, loans are financed at a [rate of 6-7.5%](#) over an average term of 5-7 years, and all financing is subject to final credit approval. NYCEEC’s financing was designed to unlock these incentives by servicing the subsidized NYSERDA (a state agency) loan and bridge-financing the incentives, which were staggered and dependent on project milestones.

# Case study deep dive | EIT Climate-KIC's NetZeroCities

NetZeroCities, part of the EIT Climate Knowledge and Innovation Community (KIC) and funded by Horizon 2020 (European Commission), supports the mission to achieve 100 climate-neutral and smart European cities by 2030 through innovation-focused projects.

**Project overview:** NetZeroCities (NZC) aims to help cities overcome barriers to achieve climate neutrality by 2030. This programme is coordinated by EIT Climate KIC, operating in support of the EU Cities Mission and funded by the [Horizon 2020 Framework Programme](#). The NZC programme includes the creation of a one-stop shop platform to make tools, resources and expertise accessible to cities. NZCs is supporting over 100 cities, providing additional resources for innovative City Pilots, aimed at helping drive rapid learning about how to achieve climate neutrality at city scale. The programme currently includes 53 City Pilots across 21 European Union and Horizon 2020 Associated countries (including the UK, Germany, Italy, Netherlands, Poland, Slovenia and Israel). Knowledge from this will be shared via a Twinning programme. NZC also includes the development of individual cities' investment plans to achieve their net zero targets, helping optimise capital allocation and secure funding and financing.

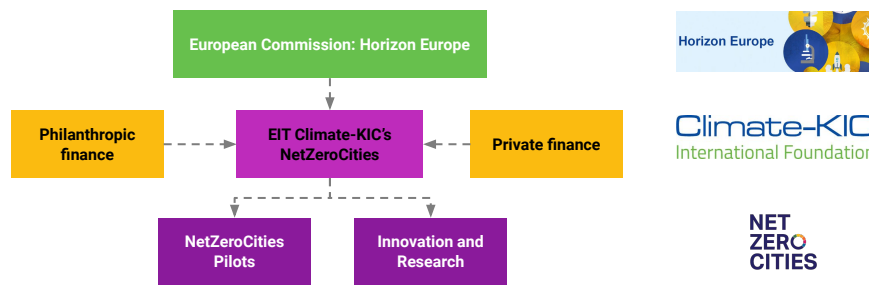
**Delivery Model:** A number of delivery models are used depending on the project. As projects are at the innovation stage, most funding is currently from public grant funds.

**Project typology:** Energy, Flexibility, Buildings, Transport.

**Legal & Governance Structure:** The programme is coordinated by Climate-KIC, and overseen by the European Commission. It has a large [consortium](#), bringing together 33 leading city networks, research organizations and stakeholders from 13 countries.

**Funding flows:** The majority of funding (c.100m EUR) is provided by the European Commission under Horizon Europe as part of the Horizon 2020 Research and Innovation Programme. Within this, the NZC Pilot Cities is a two-year, cascading grant funded programme, financed under Horizon 2020. This is providing €32M for approximately 30 grants. Complementary funding from the private sector and philanthropies is currently being secured.

## Funding flows



**Fig. 10** Funding flows in NetZeroCities (grey arrows indicate the direction of capital flows).

## Expected Returns

Investment plans developed for cities will identify the portfolio of initiatives required, including an analysis and estimation of implementation costs. These plans will also include verified environmental and social returns. Returns depend on the type and specifics of an investment.

One of the cities, Valencia, is creating new instruments to make net zero investments more attractive to private finance by designing and showing bankable business cases in each area of work and building diverse funding portfolios to reduce private risk and increase return of investment.

**Annex**



1

# Risk evaluation of Local Net Zero Projects



# Risk evaluation of Local Net Zero Projects

Depending on the governance and delivery structure selected, this will impact a range of risks; counterparty, enabling environment, technology and offtake.

Category	<b>Risk considerations</b> <i>Counterparty, enabling environment, technology and offtake may all pose risks when investing in and designing an LNZZP. The governance and delivery structure selected will impact the level of associated risk in some cases.</i>	<b>Mitigation</b> <i>Mitigations should be built in when selecting the design of delivery structure and designing the LNZZP to reduce associated risks. This column outlines a non-exhaustive list of potential mitigation actions for each risk type.</i>
<b>Counterparty</b>	<p>Counterparty risk can exist in credit, investment and trading transactions. It is the likelihood or probability that one involved in a transaction might default on its contractual obligation. Counterparty risk will be different depending on the governance and delivery model selected. For example, Local Authorities are desirable counterparties for investment; their strong asset bases, legislative framework and access to lenders of last resort mean they are unlikely to default.</p> <p>Decision-making can also be more complex when responsibility is split across several actors (for example, Local Authority, funder, technical delivery partner, energy company), which might increase project risk.</p>	<ul style="list-style-type: none"> <li>• Due diligence of delivery partners, including reviewing track record of delivery, level of internal reserves and their credit rating.</li> <li>• Collateralisation for example, Local Authority land assets as collateral.</li> <li>• Using guarantees and insurance.</li> <li>• De-risking through using public finance for example, UKIB.</li> <li>• Considered approach when building the delivery model, depending on the counterparty involved for example, in-house delivery team vs joint venture.</li> <li>• Implement good governance structures, such as a shareholder agreement with clear processes for decision-making.</li> <li>• If investing in a portfolio of projects, investors may consider diversifying this portfolio to have a range of different delivery partners across the portfolio.</li> </ul>
<b>Offtake</b>	<p>Offtake risks are those associated with not getting paid for outputs, in this case the lack of consumer uptake of energy provision or other low-carbon measures. The governance and delivery structure may impact this risk as offtake may be dependent on trust of delivery partners for example, if local residents trust the delivery organisations to deliver reliable and clean energy sources. Certain delivery partners may already have established stakeholder relationships or customer bases to tap into. Additionally, if the price for outputs is not cost comparable to other energy sources, the offtake risk is higher.</p>	<ul style="list-style-type: none"> <li>• Projects which are Local Authority led, or have some stake of LA ownership may be able to access customers within their Local Authority to guarantee offtake. Local authorities may be able to offer up owned buildings to be used in the LNZZP, or offtake guarantees in cases where a customer cannot pay.</li> <li>• Partnering with delivery partners which have established relationships in local areas and a well known and trusted brand.</li> <li>• Identification of customers ahead of project development for example, energy, to meet demand of a new housing development.</li> <li>• Build trust through proven experience in delivering similar projects and local stakeholder engagement.</li> </ul>

# Risk evaluation of Local Net Zero Projects (continued)

Depending on the governance and delivery structure selected, this will impact a range of risks; counterparty, enabling environment, technology, and offtake.

Category	Risk considerations continued	Mitigation continued
<b>Enabling environment</b>	<p>Enabling environment considerations are diverse, and can include risks associated with resource access, capacity and skills, and the political and regulatory context. Governance and delivery structure selection will impact the level of enabling environment to a certain extent. For example, capacity and skills are dependent on the experience and expertise of the Local Authority and other stakeholders involved. Certain stakeholders may also have different access to resources; if there is a higher level of Local Authority involvement, this might mean there is greater access to government resources.</p> <p>Wider enabling environment risks include:</p> <ul style="list-style-type: none"> <li>• Changes to political leadership at both the national and local level which could affect future access to resources and public funding.</li> <li>• Changes to regulations and policy (either due to changes in leadership or for other reasons) which may impact the long-term stability of programme support.</li> <li>• (Mis)alignment with national energy infrastructure and planned future infrastructure works, for example, is the project compatible with proposed changes to the grid?</li> <li>• Dependency on incentives to make the LNZZP more financially competitive for example, the renewable heat incentive policy intervention which helped several zero-carbon heating projects.</li> </ul>	<ul style="list-style-type: none"> <li>• Building an LNZZP with access to both public and private resources where possible.</li> <li>• Understanding dependencies on public funding, incentives and programmes and, if required allocating reserves or collateral in the event these change.</li> <li>• Support from a long-term technical facility to help meet legal and general project planning costs and fill any capacity/capability gaps.</li> </ul>
<b>Technology</b>	<p>Technology risk is the potential for any technology failure to disrupt delivery. This may be due to the deployment of complex technologies (for example, flexibility software to balance energy and demand), or more nascent technologies (for example, battery storage). As technology continues to evolve in this sector, there may also be risks associated with shifting price points, meaning that products or services sold are no longer competitive. Governance and delivery models impact technology risk to a lesser extent, however, they may help mitigate these risks through providing technical support to quickly respond to any technology disruptions.</p>	<ul style="list-style-type: none"> <li>• Many technologies required to deliver an LNZZP are well established and not considered high risk.</li> <li>• Partnership or subcontracting of a technical delivery partner.</li> <li>• Role of government to de-risk emerging sectors, such as hydrogen.</li> <li>• Exploit and create potential <a href="#">comparative advantages</a>, for example, shortening technology supply chains to de-risk projects.</li> <li>• Build in flexibility into the LNZZP to enable medium to long-term changes as technologies are updated and new options enter the market.</li> </ul>

# 2

## Components of local net zero projects





# Energy

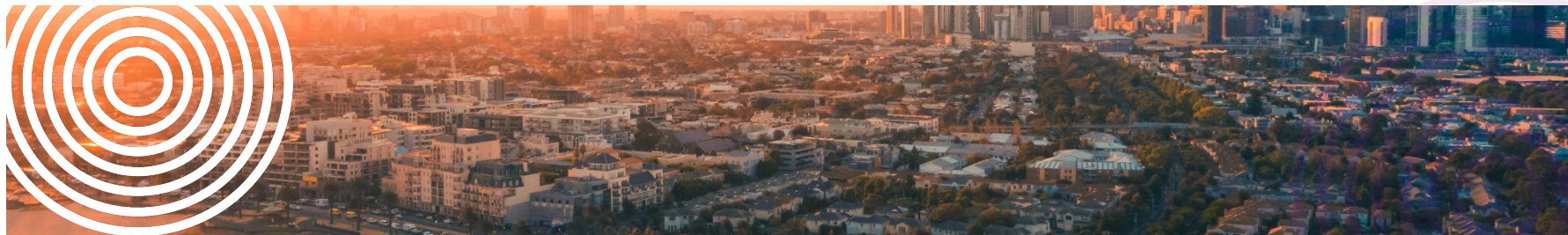
In addition to more commonly understood technologies, there are a range of other energy supply-side low carbon technologies available that can provide stable long-term returns with government support.

Solution	Description	Revenue streams and revenue capturing mechanisms	Delivery costs	Investment return and market characteristics	Market maturity
<b>Heat networks</b>	<b>Heat networks</b> distribute heat or cooling from a central source or sources, via a network of pipes, to more than one end-user. While heat can be sourced from any fuel or generation process, including gas boilers, low or zero carbon sources such as waste heat are required to reduce the environmental impact of heating.	There are a wide range of revenue streams such as <b>sale of heat, electricity and cooling</b> , asset rental, and customer and/or developer connection charges.	Costs are dependent on the heat network size, with recent projects costing <b>c.£50m</b> (for example, <a href="#">Leeds City Council</a> ). Government funding can reduce initial capital costs and may improve rate of return.	<ul style="list-style-type: none"> <li>• <a href="#">Long-term contracts</a> (20+ years).</li> <li>• <a href="#">Stable cash flows and ROI</a>.</li> <li>• High growth potential as relatively <a href="#">low market penetration</a>. Returns are dependent on proximity and availability of customers.</li> </ul>	<b>Medium</b>
<b>Energy from waste</b>	<b>Energy from Waste (EfW) involves taking waste and turning it into a usable form of energy.</b> This can include electricity, heat and transport fuels. Using waste for this purpose <b>reduces the amount of waste at landfills</b> that would have released GHG gases into the atmosphere.	Revenue is captured through fees paid for <b>processing waste and the sale of produced electricity and heat</b> . While some plants are privately built and operated, government funding can reduce initial capital costs.	<b>~£50m+</b> (for example, <a href="#">CoGen</a> has 5 plants, representing c.£250 million of investment; <a href="#">Carlton Forest Waste to Energy Plant</a> has a capital requirement of £60m).	<ul style="list-style-type: none"> <li>• Long-term contracts (average EfW plant lifetime is <a href="#">25 years</a>).</li> <li>• Stable cash flow - two revenue streams at both ends of the value chain and attractive ROI.</li> <li>• <a href="#">Growing market</a> as there is a decreasing amount of waste sent to landfill.</li> </ul>	<b>High</b>

## Energy (continued)

In addition to more commonly understood technologies, there are a range of other energy supply-side low carbon technologies available that can provide stable long-term returns with government support.

Solution	Description	Revenue streams and revenue capturing mechanisms	Delivery costs	Investment return and market characteristics	Market maturity
Solar	Solar panels work by absorbing sunlight with photovoltaic cells, generating energy that can be used both domestically within homes and at commercial scales.	Electricity revenues are primarily captured through <b>Power Purchase Agreements (PPA)</b> with an electricity reseller. At a domestic level, both <b>Local Authority and nationally delivered subsidies</b> for solar panels exist.	Cost is largely <u>dependent on the scale of the investment</u> . For 0-4kW installations, the mean cost per kW is £2,365, whereas for larger installations (10-50kW) the cost is £1,351 per kW.	<ul style="list-style-type: none"> <li>• Medium-long term contracts (PPAs for solar are typically 10-25 yrs).</li> <li>• Robust <u>revenues are expected</u> through high power prices and government support streams.</li> <li>• Large market growth in past 15 years with this set to grow further. High energy bills driving market demand for local solar installation. Development of smart tariffs and battery storage technology will influence future growth of this market.</li> </ul>	High



## Energy (continued)

In addition to more commonly understood technologies, there are a range of other energy supply-side low carbon technologies available that can provide stable long-term returns with government support.

Solution	Description	Revenue streams and revenue capturing mechanisms	Delivery costs	Investment return and market characteristics	Market maturity
Wind	Wind can be used by large turbines to generate mechanical power which is converted by a generator into electricity.	Wind energy revenue is primarily captured through the <b>sale of electricity</b> or mechanical <b>power, primarily through a Power Purchase Agreement (PPA)</b> or through a Contract for Difference. Alternatively, some <a href="#">companies are opting for equity financing for renewable projects</a> which is another way wind energy suppliers can capture revenue. There are also other revenue generation opportunities: MH:EK are creating green hydrogen using energy from offshore wind. This will help translate the intermittent energy stream from wind into a more easily storable energy.	The cost of a wind turbine can vary greatly, typically a turbine with <a href="#">100kW max power output will cost around £405k</a> , while a turbine producing 3.5MW will cost around £3.13 million. The cost of producing energy from offshore wind is reportedly <a href="#">nine times cheaper than gas (per MWh)</a> .	<ul style="list-style-type: none"> <li>• Long-term contracts as the average wind turbine lasts <a href="#">25 years</a>.</li> <li>• <a href="#">Stable revenue under CfD contracts</a>.</li> <li>• Rapidly growing market with most capacity expansion from offshore wind. <a href="#">Proposed changes</a> to planning bill will enable onshore wind.</li> </ul>	Medium

# Energy storage and flexibility

As we shift towards low carbon energy, pressure will be placed on the electricity grid. Flexibility solutions help manage this demand and offer access to long term returns with expected growth in demand as energy demand increases.

Solution	Description	Revenue streams	Delivery costs	Investment return and market characteristics	Market maturity
<b>Batteries</b>	Battery storage of electricity enables <b>flexible energy use</b> and can help manage the supply-demand balance of renewable energy sources. Technologies include <b>lithium-ion battery storage</b> , pumped hydro storage and flow batteries.	<b>Revenues</b> are captured from <b>ancillary services revenues</b> for supporting grid stability, from participating in the National Grid's <b>Balancing Mechanism, and wholesale trading</b> . Government funding has awarded £32.9 million to projects across the UK to develop new energy storage technologies.	Large scale batteries can cost upwards of £40m (for example, Oxford's Energy Superhub which features a battery storage system and EV charging hub cost c.£41m). Domestic scale solar battery storage systems cost between <b>£1k-£6k in the UK</b> .	<ul style="list-style-type: none"> <li>• Range of contract lengths from short-long term (<b>1-15 years</b>).</li> <li>• Battery <b>lifetimes of around 25 years</b>.</li> <li>• Increasing revenue opportunities for battery storage as the market evolves e.g. participating in the Balancing Mechanism (BM). <b>Ability to stack revenues</b> from different services.</li> <li>• Expected short-to medium-term <b>growth in demand</b>.</li> </ul>	<b>Medium</b>
<b>Vehicle to Grid</b>	Vehicle-to-Grid (V2G) enables a <b>two way flow of electrical energy</b> between the grid and EVs. This ability to share electricity from the vehicle battery, provides <b>flexibility in electricity supply</b> .	<b>Electricity sales</b> can be captured by a <b>Virtual Power Plant (VPP)</b> . V2G chargers can be managed domestically as a stand-alone unit or in local clusters. They can also be aggregated to allow them to be managed and operated as groups selling electricity back to the grid.	Key costs are the V2G chargers, which are around <b>£650-1150 for a 7kW V2G charger</b> in 2030.	<ul style="list-style-type: none"> <li>• Shorter term contracts currently as <b>V2G is still being trialled in the UK</b>.</li> <li>• Good market growth potential as still in early market stages.</li> <li>• Potential for stable revenue from the service provision and savings on imported electricity.</li> <li>• High initial costs of providing V2G infrastructure. Potential <b>positive returns when providing services to Distribution Network Operators (DNO)</b>.</li> </ul>	<b>Low</b>

# Buildings

The UK has the oldest housing stock in Europe, providing a big opportunity to reduce energy demand through retrofit and energy efficiency measures. These measures offer high potential investment opportunities, however currently they require government support.

Solution	Description	Revenue streams	Delivery costs	Investment return and market characteristics	Market maturity
<b>Heat pumps</b>	Heat pumps <b>extract heat</b> from a source, such as the <b>surrounding air, geothermal energy stored in the ground,</b> or nearby sources of <b>water or waste heat</b> . Heat is then amplified and transferred to the offtaker. As most heat is transferred rather than generated, heat pumps are far more efficient than conventional technologies such as boilers (~3x versus 1x).	Revenue is primarily from the <b>sale of heat pumps</b> , which is likely to require <b>subsidies</b> . Revenue also comes from <b>subscription services</b> and <b>Energy Supply Contracting</b> and <b>Energy Performance Contracts</b> via Energy Service Companies. The <b>UK Heat Pump Investment Accelerator Competition</b> provides up to £30 million to support private sector investment in heat pump and component manufacturing infrastructure across the UK.	Costs of <b>installing an air source heat pump</b> can vary from £8k-18k while ground source heat pumps can range from £14.5k-£45k. <b>Larger scale investment projects</b> include Octopus Energy's £10m investment in the UK's first heat pump R&D and training centre.	<ul style="list-style-type: none"> <li>• Range of contract lengths - air source heat pumps (ASHPs) have a working life of 15+ years.</li> <li>• Revenues associated with energy saving benefits are challenging to capture and require subscription models or government intervention.</li> <li>• Typical ROI for an ASHP is <b>around 10%</b> at the household level with a payback period of around 12 years.</li> <li>• High <b>potential opportunities</b> given the expected rapid growth of the heat pump market and UK government ambition to increase installations to <b>600,000 installations per year by 2028</b>.</li> </ul>	<b>Medium /Low</b>
<b>Insulation</b>	Insulation <b>reduces energy use</b> , reducing demand for natural gas, propane, fuel oil and electricity while also improving indoor air quality.	Revenue is from <b>installation</b> , operations and maintenance. A large source of revenue may come from government with the <b>£1 billion Great British Insulation Scheme</b> (formerly known as ECO+). Several mechanisms to capture revenue from efficiency savings are being explored but nothing has been successfully implemented at this stage.	Estimated cost of insulating non-standard cavity walls and lofts is <b>£470-£3,300 per home</b> . This cost will vary for commercial buildings.	<ul style="list-style-type: none"> <li>• Longer term investment - loft insulation lasts about 40 years. Contracts may be in place between insulation installers and energy suppliers, as well as homeowners. These may be in the form of energy performance contracts, (although these are not widely used in the current UK insulation market).</li> <li>• Revenue savings from increased energy efficiency in homes are complex to capture.</li> <li>• Given that <b>minimum energy efficiency standards</b> will become more stringent, and rising energy prices, there is growing demand for insulation.</li> </ul>	<b>High</b>

## Buildings (continued)

The UK has the oldest housing stock in Europe, providing a big opportunity to reduce energy demand through retrofit and energy efficiency measures. These measures offer high potential investment opportunities, however currently they require government support.

Solution	Description	Revenue streams	Delivery costs	Investment return and market characteristics	Market maturity
<b>Area based retrofit</b>	Area-based retrofits provide a comprehensive plan for multiple homes in a neighbourhood to be more environmentally friendly and energy efficient. This takes advantage of economies of scale and coordination benefits by taking a neighbourhood by neighbourhood approach.	Revenue is from <b>installation, subsidies and support from local governments</b> . Low returns due to relatively low energy savings compared to capital outlay has led to long-term blended finance models, for example, <a href="#">The Mayor's Retrofit Accelerator-Homes Innovation Partnership</a> , <a href="#">Retrofit London, West Midlands Net Zero Neighbourhoods</a> .	Given that all buildings and homes are very different it is <b>very difficult to estimate retrofit costs</b> . This varies from £5-10k, to as much as £100k per home.	<ul style="list-style-type: none"> <li>Contracts would be likely longer-term in local areas/cities. Most of these projects have been demonstrators at this stage for example, <a href="#">Leeds City Council's Priority Neighbourhoods</a>.</li> <li>There are few <a href="#">models of investing in retrofit</a>, however it is likely that it will take <a href="#">15-28 years to see a return</a> on investment.</li> <li>Growing demand for retrofit actions, although unclear on how much this will focus on area based retrofit specifically.</li> </ul>	<b>Low</b>





# Transport

Electrification of transport coupled with a shift towards shared mobility and public transport will be vital for decarbonisation. High capital expenditure offset through government support can unlock strong returns on developing technology.

Solution	Description	Revenue streams	Delivery costs	Investment return and market characteristics	Market maturity
<b>Electric Buses</b>	Each zero emission bus (ZEB) reduces <a href="#">carbon emissions by about 70% annually</a> compared to a diesel bus and also avoids 23 kg of nitrogen oxides.	Ticket sales, support from the Government (for example, the <a href="#">Zero Emission Bus Regional Areas (ZEBRA) Scheme</a> ). <a href="#">UKIB has recently supported Transport for Greater Manchester</a> with funding for 50 zero emissions buses. For operators, ZEBs have <b>lower operating costs</b> compared to diesel buses though capital costs are higher.	<a href="#">First Bus placed an £81m order</a> for 193 electric buses, suggesting the average price is ~£420,000.	<ul style="list-style-type: none"> <li>Range of contract lengths depending on the contract model, for example, <a href="#">6-10 years</a>. For example, <a href="#">UKIB will work with Transport for Greater Manchester to decarbonise the city's bus fleet</a>.</li> <li>High <a href="#">capital expenditure</a> so some level of support needed initially for example, National Express' recent <a href="#">£150m investment</a> was backed by UK Gov investment.</li> <li>UK Electric bus market has seen significant past growth and is expected to continue to grow at a CAGR of around <a href="#">13.8% between 2023-2030</a>.</li> </ul>	<b>Medium</b>
<b>EV Charging Infrastructure</b>	There could be as many as <b>11 million EVs on UK roads by 2030</b> . Providing infrastructure will encourage adoption of EVs and speed up the transition of the transport sector.	<b>Charging revenues are the primary revenue stream</b> , although revenue support and subsidies from local government is available for example, LEVI capability funding.	The cost of a commercial EV chargepoint is <a href="#">£1000-£1500</a> , however there can be other capital costs such as grid upgrades which are more expensive and/or may prohibit the scheme. There are also some costs associated with <a href="#">regulatory barriers and planning rules</a> .	<ul style="list-style-type: none"> <li>Range of contract lengths from <a href="#">2-10+ years</a>. Charging infrastructure has a lifetime of around <a href="#">8 years</a>.</li> <li>Return on investment is dependent on certainty and level of offtake demand.</li> <li>Market growth opportunities linked to growing EV market and integration of EV charging infrastructure with smart grids.</li> </ul>	<b>Medium</b>

## Transport (continued)

Electrification of transport coupled with a shift towards shared mobility and public transport will be vital for decarbonisation. High capital expenditure offset through government support can unlock strong returns on developing technology.

Solution	Description	Revenue streams	Delivery costs	Investment return and market characteristics	Market maturity
Shared mobility	<a href="#">Shared mobility</a> is either made up of vehicles available to multiple users (for example, Zipcar and Bike Share) or shared trips (filling empty capacity in vehicles that are already making a journey, for example, Ridepooling).	Revenues from rental of bikes (pay-per-use) and subscriptions. Additional revenue streams, including advertising on apps, and support from local government for some shared micro mobility initiatives (for example, <a href="#">Santander Bikes in London</a> where it is government owned).	Costs are <a href="#">dependent on the form of mobility</a> . These include costs of purchasing the mobility, with e-scooters ranging from £400-£1000 and cars costing £10,000+, but also operation and maintenance costs for example, repairing e-bikes.	<ul style="list-style-type: none"> <li>Contract lengths depend on the type of shared mobility, e.g. bike contract length should be <a href="#">linked to bike lifespan (5-8 yrs)</a>.</li> <li>Shared mobility businesses are often <a href="#">capital intensive and it takes time before profits are returned</a>. Lime is the first micromobility company to post a <a href="#">full profitable year</a> (2022).</li> <li><a href="#">Shared mobility has a global market value of \$60bn</a> with an estimated annual growth of 20%.</li> </ul>	Medium /Low





# 3

## Emerging governance structures



## Key roles in a local net zero project

The table below describes the main roles that need to be performed if an LNZZP is to be successfully implemented. In each of the projects there is a broad range of actors. Each stakeholder may take on one or many of these roles, which will help determine the delivery model.

Roles	Description
<b>Project sponsor</b>	The project sponsor is a party with the motivation to establish a successful LNZZP, and takes responsibility for driving delivery and managing the network. This role will include setting objectives, prescribing policies and overseeing performance.
<b>Customer</b>	A customer will contract with a supplier who will provide their energy or another service in exchange for promise to pay. The customer may be a commercial entity, a domestic tenant or homeowner.
<b>Funder</b>	The funder arranges finance and enters into agreements with the funding recipient. This may be the project sponsor where it has access to funds itself or a party with access to funds from one or more third parties.
<b>Asset Owner</b>	The asset owner owns the physical assets of the smart local energy system. Ownership might be split across different parties and different classes of assets.
<b>Land Owner</b>	The role of the land owner, in this context, is to grant leases and easements for the siting of network assets and provide rights of access for the installation, operation and maintenance of any physical assets.
<b>Installer</b>	The installer designs and installs any physical assets.
<b>Operator</b>	An operator is responsible for the operation and maintenance of the local net zero projects to ensure that energy of suitable quality and quantity can be delivered to customers.
<b>Sale of services supplier</b>	The sale of services is a distinct role from the physical delivery of energy to customers. A supplier must operate a 24 hour per day, 365 days per year customer call centre. There is a mandatory separation of generation, delivery and sales in electricity and gas without licensing.
<b>Supplier of last resort</b>	The supplier of last resort role involves providing energy to the customers if the scheme's provider is unable or no longer required to do so.
<b>Energy aggregator</b>	An energy aggregator is a company that engages with customers to encourage them to coordinate their energy demand to lower demand on the grid, in return for payment from the grid.

# In-house delivery

Local Authority delivers the project in-house, using its own resources and expertise to implement local net zero projects. The project sponsor is the Local Authority in this case, and retains full control while being exposed to high levels of risk and reward.

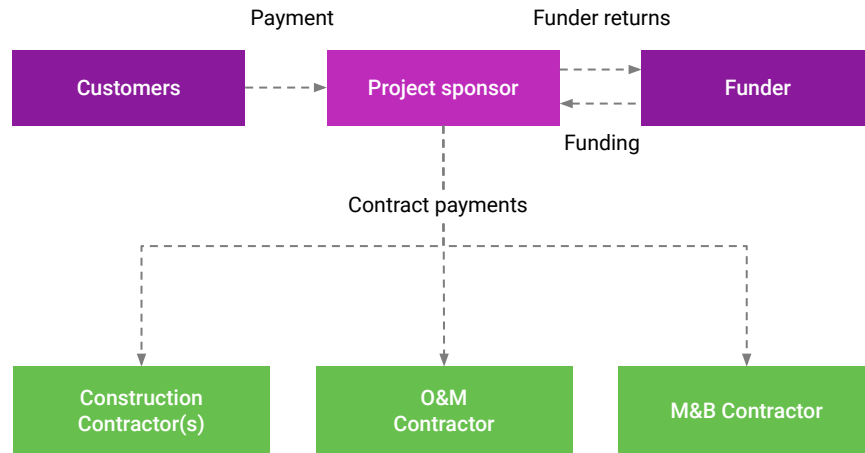
**Typical investment length:** Medium to long term.

**Typical contractual structure:** Funding agreements between the funder and Local Authority. The Local Authority may outsource some elements of construction and delivery.

**Funding considerations:** Local Authority led projects will likely utilise public sector loans to a greater extent for example, from the Public Works Loan Board (PWLB). LAs can also use equity funding from reserves and property assets. Private investment will likely use instruments such as green bonds, green loans and grants.

**Local net zero project asset considerations:** LAs may be well suited to delivering LNZPs which decarbonise assets owned by the Local Authority and/or serve large areas within the Local Authority for example, building retrofit, district heat networks. Equally they have significant influence over planning restrictions.

**Key risk and returns considerations:** In-house delivery by a Local Authority gives the Local Authority high levels of control over the project, however, it will also expose them to more risk and reward. Investors take on a position of lower control and consequently lower risk and reward.



**Fig.11** In-house delivery model showing funding flows as indicated by the arrows.

**Overview:** Under this delivery model, the Local Authority is the project sponsor and uses its own resources, expertise and personnel to implement and oversee local net zero projects without establishing a stand-alone delivery vehicle. They are responsible for funding or securing funding for the project and will have control over the delivery, including managing contractors, further development and billing offtakers.

# Public-owned SPV

The Local Authority establishes a wholly owned special purpose vehicle (SPV) to provide services to consumers and assume financial and technical risks. Sometimes they are referred to as an Energy Service Company (ESCO).

**Typical investment length:** Short to medium term.

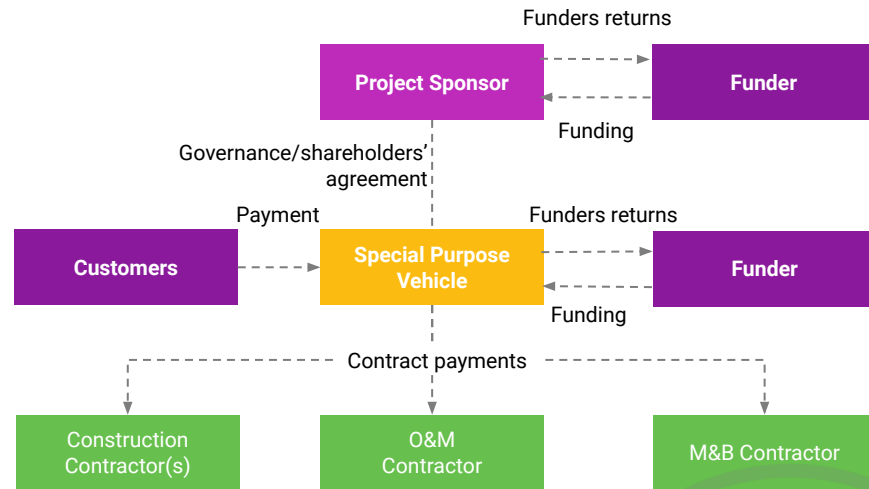
**Typical contractual structure:** Funders may contract directly with the special purpose vehicle or via the Local Authority. As a distinct entity the Local Authority has the option to sell shares or refinance the SPV.

**Local net zero project asset considerations:** LA retains control, so may be well suited to delivering LNZZPs which decarbonise assets owned by the Local Authority and/or serve large areas within the Local Authority for example, building retrofit and district heat networks.

**Funding considerations:** Traditional public financing options such as the Public Works Loan Board (PWLB) are applicable under this structure. Project Sponsor ESCOs can also explore green finance. The ESCOs can access capital through balance-sheet funding. Additionally, they can tap into green grants available that cover diverse areas such as building energy efficiency schemes and electric vehicle charging facilities.

**Key risk and returns considerations:** The Local Authority as Project Sponsor bears the risk of funding, constructing and operating the project. The SPV assumes some of the financial and technical risks and rewards.

**Example case study:** [Mayor of London's Energy Efficiency Fund \(MEEF\)](#).



**Fig.12** Public owned ESCO delivery model showing funding flows as indicated by the arrows

**Overview:** The Project Sponsor establishes a wholly owned, stand-alone SPV that provides services to consumers and assumes the financial and technical risk involved. Local authorities may use this structure when they wish to retain complete control over the project, its financing and its outcomes.

# Joint Venture SPV

A joint venture involves a strategic partnership between a Local Authority and another party, sharing control, risks and rewards, with funding sourced from both public and private sources over a special purpose vehicle.

**Typical investment length:** Medium to long term.

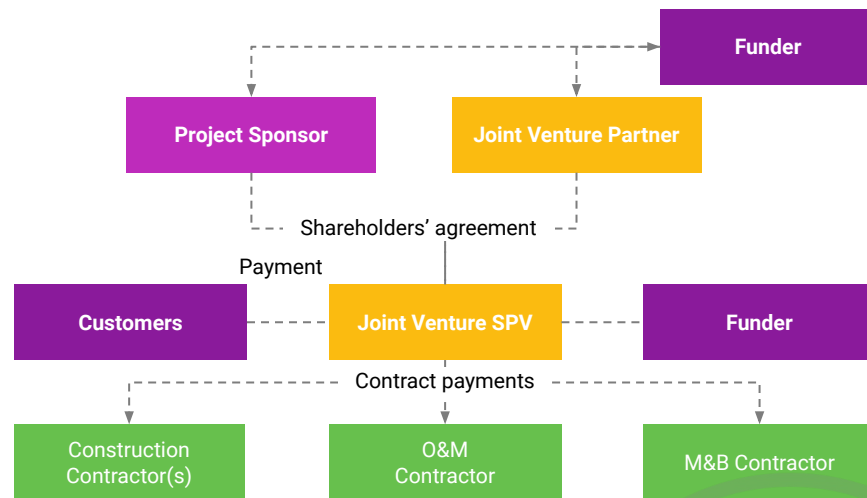
**Typical contractual structure:** It is likely the funder will contract directly with the Special Purpose Vehicle while the Local Authority and joint venture partner may provide their own balance sheet funds.

**Funding considerations:** The Local Authority and Joint Venture partner are responsible for securing funds under this structure. This means there is the potential to leverage both public and private sources of funding for the project. Green finance sources are also viable funding options, provided they meet the eligibility criteria and the project displays clear, transparent and auditable verification of its environmental benefits and carbon emissions management during delivery stages.

**Local net zero project asset considerations:** These structures are typically deployed on more complex projects that require significant private sector expertise or funding.

**Key risk and returns considerations:** In a Joint Venture structure, control is shared between the Local Authority and one or more external partners. The risk of funding, constructing and operating the project are also shared. This means shared decision-making, which can lead to delays if consensus cannot be reached or if partners have differing objectives or perspectives.

**Example case study:** [Bristol City Leap](#).



**Fig.13** Public-private joint venture delivery model showing funding flows as indicated by the arrows.

**Overview:** A special purpose vehicle jointly in partnership between a Local Authority and another party (private or public entity) set up for the purpose of delivering a local net zero energy project. The partners share control, risks and the rewards of the project with the structure of the joint venture typically depending on the nature of the project and the capabilities and resources of the partners.

## Third-party Delivery (Example: 3rd Party ESCO)

The Project Sponsor enters into an energy service agreement with a 3rd party to deliver the project through an ESCO. The 3rd party ESCO is the asset owner and operator, and is responsible for funding the project.

**Typical investment length:** Short to medium term.

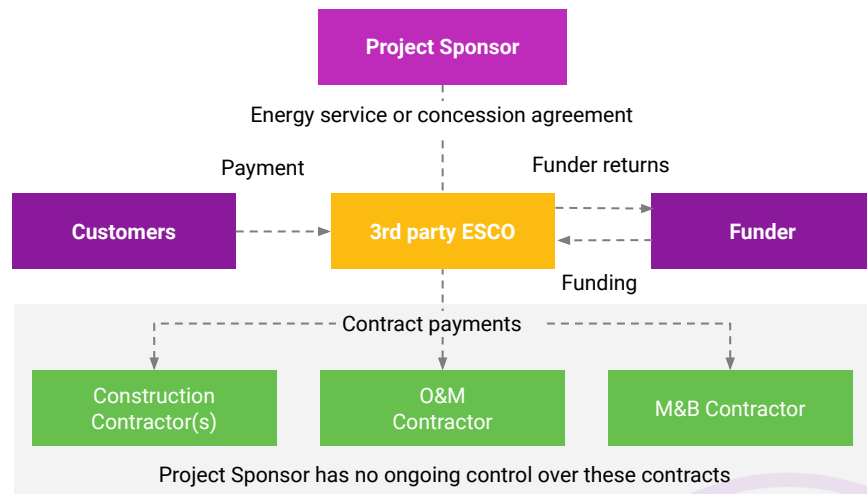
**Typical contractual structure:** The funder will contract directly with the third party.

**Funding considerations:** The 3rd party ESCO is responsible for securing funding for the project. The ESCO has the flexibility to seek funding from various sources, which may include grants, loans and equity investments from both the public and private sectors. 3rd Party ESCOs may also take advantage of green finance, such as green bonds and green loans, which are specifically designed to fund projects with environmental benefits. Additional funding opportunities may be available from government net zero programs.

**Local net zero project asset considerations:** Private sector 3rd parties will typically have a business model centered on the delivery of the specific local net zero project. These will typically be those where revenue streams are easy to capture.

**Key risk and returns considerations:** In funding these types of projects, investors should be aware that there may be more challenges in obtaining planning permission. However, these will typically be more developed propositions delivered by the private sector.

**Example case study:** [Zero Carbon Rugeley](#).



**Fig.14** Private sector led (3rd Party ESCO) delivery model showing funding flows as indicated by the arrows.

**Overview:** The Project Sponsor enters into an energy service agreement with a 3rd party to deliver the project through an ESCO. The 3rd party ESCO is the asset owner and operator, and is responsible for funding the project. The project sponsor would not have ongoing oversight of contractors, expansion or tariffs.

# 4

## List of relevant policies and regulations



# National strategies

Different government departments and related entities develop and implement the policies, plans and programmes that build a pipeline of local net zero projects. The most prominent of these are outlined on the table below:

Name	Classification	Description
<a href="#">Net Zero Strategy: Build Back Greener</a> (2021)	Policy	Policies and proposals for decarbonising all sectors of the UK economy to meet net zero targets by 2050.
<a href="#">Mission Zero, Independent Review of Net Zero (Skidmore report)</a> (2023)	Policy	UK Government commissioned an independent review of net zero led by former energy minister Chris Skidmore. It provides 129 recommendations focused on ten priority missions including, grid and infrastructure, solar, and energy efficiency for households.
<a href="#">Responding to the Independent Review of Net Zero's Recommendations</a> (2023)	Policy	Response to the expert recommendations made in the independent review (see above). This was published alongside Powering Up Britain.
<a href="#">Powering Up Britain</a> (2023)	Policy	Plans setting out how the government will enhance energy security, seize the economic opportunities of the transition and deliver on net zero commitments.
<a href="#">Green Finance Strategy 2</a> (2023)	Policy	Refreshed in 2023, this is the government's strategy to harness the financial services sector to support climate and environmental objectives.
UK Green Taxonomy (not yet developed)	Legislation	This is expected to set out classifications for 'green' financial activities in the public and private sector. The publication date of the Taxonomy is pending.
<a href="#">Local Area Energy Planning (LAEP) national framework</a> (2022)	Guidance	Guidance that sets out the change required to transition an area's energy system to net zero in a given timeframe.
<a href="#">Planning and Energy Act</a> (2008)	Act	Enables local planning authorities in England and Wales to set requirements for energy use and energy efficiency in local plans.
<a href="#">Levelling up white paper</a> (2022)	Policy	A programme of systems change, including 12 UK-wide missions to anchor the agenda to 2030, alongside specific policy interventions that build on the 2021 Spending Review to deliver social and economic change and spread opportunity across the UK.
<a href="#">Transport decarbonisation plan</a> (2021)	Guidance	Plan including the pathway to net zero transportation in the UK, the wider benefits that net zero transport can deliver and the principles that underpin the approach to delivering net zero by 2050.



# Transport

The table below outlines the key powers delegated to Local Authorities that are associated with transport and could facilitate the drive for net zero surface transport emissions.

Name	Classification	Description
<a href="#">Highways Act</a> (1980)	Act	Enabled powers for highways improvements, including walking and cycling routes.
<a href="#">Transport Act</a> (2000) <a href="#">Transport Act</a> (2008)	Act	Requirement to produce Local Transport Plans (LTP), Transport Authority structures, Clean Air Zones (CAZ).
<a href="#">Equalities Act</a> (2010)	Act	Accessibility requirements affecting pavement furniture including EV charging.
<a href="#">Public Services (Social Value) Act</a> (2013)	Act	Before starting the procurement process, commissioners are required to think about wider social, economics and environmental benefits.
<a href="#">National Planning Policy Framework (NPPF)</a> (2021)	Policy framework	Ability to place requirements on developers to incorporate or pay for sustainable transport in new developments, including walking and cycling provisions.
<a href="#">Bus Back Better</a> (2021)	Policy paper	A national strategy that sets out the vision and opportunity to deliver better bus services for passengers across England, through reform of how services are planned and delivered.



# Buildings

Although Local Authorities have limited power to affect the energy performance of existing buildings, they can have more influence on the emissions associated with new buildings in their area, subject to national planning policy.

Name	Classification	Description
<a href="#">Town and Country Planning Act</a> (1947) <a href="#">Town and Country Planning Act</a> (1990) <a href="#">Planning and Compulsory Purchase Act</a> (2004) <a href="#">Localism Act</a> (2011) <a href="#">Neighbourhood Planning Act</a> (2017)	Act	Frameworks requiring Local Authorities to develop local plans and give permissions for developments.
<a href="#">Planning and Energy Act</a> (2008)	Act	Set energy standards above building regulations and require on-site renewables for new developments.
<a href="#">Town and Country Planning Act</a> (1990)	Act	Planning Act 2008 Introduced s.106 agreements and the CIL to provide developer contributions to supporting infrastructure. Also planning consent for district heating schemes and for electricity storage schemes.
<a href="#">Local Government Act</a> (1988) and <a href="#">Localism Act</a> (2011)	Act	Loan capital to other organisations to build homes (for example, Housing Associations).
<a href="#">Land Compensation Act</a> (1973), <a href="#">Acquisition of Land</a> (1981), <a href="#">Planning and Compensation Act</a> (1991), <a href="#">Neighbourhood Planning Act</a> (2017)	Act	Compulsory purchase of land to enable own development.
<a href="#">Localism Act</a> (2011); <a href="#">General Power of Competence</a>	Act	Power to do anything an individual may do, unless specifically prohibited. Enables commercial activities including setting up development companies, making loans to other organisations.
<a href="#">Local Authority Land Act</a> (1963)	Act	Enable Local Authorities to acquire land, build and fund those activities.
<a href="#">The Limits on Indebtedness (Revocation) Determination</a> (2018)	Act	Removed cap on council borrowing for house building.

## Buildings (continued)

Although Local Authorities have limited power to affect the energy performance of existing buildings, they can have more influence on the emissions associated with new buildings in their area, subject to national planning policy.

Name	Classification	Description
<a href="#">Local Authority Land Act</a> (1963)	Act	Enable Local Authorities to acquire land, build and fund those activities.
<a href="#">The Limits on Indebtedness (Revocation) Determination</a> (2018)	Act	Removed cap on council borrowing for house building.
<a href="#">Energy Efficiency (Private Rented Property) (England and Wales) Regulations</a> (2015)	Act	Minimum Energy Efficiency Standards (MEES) for rented properties.
<a href="#">Energy Performance of Buildings (England and Wales) Regulations</a> (2012)	Legislation	Energy Performance Certificates (EPCs) on sale or rent of property.
<a href="#">Building Act</a> (1984), <a href="#">The Building Regulations</a> (2010) and <a href="#">(Amendment) Regulations</a> (2021)	Legislation	Building Control functions relating to energy performance of new buildings and changes to existing buildings, and contractor compliance schemes.
<a href="#">Local Government Act</a> (2003)	Act	Grants for central heating in private homes.
<a href="#">Regulatory Reform (Housing Assistance) (England and Wales) Order</a> (2002)	Act	Home improvement grants.
<a href="#">The Environmental Permitting (England and Wales) Regulations</a> (2010), <a href="#">Environment Act</a> (1995) and <a href="#">Clean Air Act</a> (1993)	Act	Enforcing emissions standards in industrial and commercial premises.
<a href="#">Future Homes Standard</a> (2019)	Legislation	Sets requirements for new buildings regarding improvements in heating, hot water systems and heat waste through, for example, using low-carbon technologies and materials. From 2025 compliance will be mandatory.
<a href="#">(Scotland's) Heat in Buildings Strategy</a> (2021) and Local Heat and Energy Efficiency Strategies (in development)	Strategy	Strategy setting out locally-led planning to decarbonise heat in buildings across Scotland. Local Heat and Energy Efficiency Strategies will be the principal mechanism for locally-led heat planning.
<a href="#">Welsh Housing Quality Standard</a> (to be updated in 2023)	Standard	This sets out the requirements for housing associations and Local Authorities with social rented homes. A new Welsh Housing Quality Standard will be finalised in 2023. The <a href="#">Optimised RetroFit Programme (ORP)</a> , which supports home decarbonisation measures, is an example of a programme supporting this standard.

# Energy infrastructure and markets

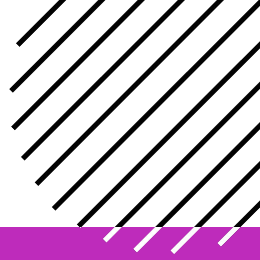
Although electricity generation has seen swift action towards decarbonisation, the heat supply system has seen less change. Through integrating planning in this area with that of power and transport it is possible to build local net zero energy systems.

Name	Classification	Description
<a href="#">Planning Act</a> (2008)	Act	Set energy standards above building regulations and require on-site renewables for new developments. Consenting renewable generation <50MW.
<a href="#">Planning and Compulsory Purchase Act</a> (2004)	Act	Preparation of local development documents that support decarbonised heat, district heat networks, heat pumps and smart energy systems.
<a href="#">National Planning Policy Framework</a> (2019) <a href="#">revision: s.151 and 153</a>	Policy framework	Plans should increase the use and supply of renewable and low carbon energy and heat; developers should comply with policies on decentralised energy supply unless they can prove it is not viable/feasible.
<a href="#">Electricity Act</a> (1989) (Amended by the <a href="#">Utilities Act 2000</a> ) and the <a href="#">Electricity (Class Exemptions from the Requirement for a Licence) Order</a> (2001)	Act	Selling small scale electricity.
<a href="#">Sale of Electricity by Local Authorities</a> (2010)	Legislation	Permitting the sale of renewable electricity generated.
<a href="#">Local Government (Miscellaneous Provisions)</a> (1976)	Legislation	Production and sale of heat.
<a href="#">Energy Bill</a> (2023) (not yet enacted)	Act	A bill currently under passage, which will make provision for energy production and security and the regulation of the energy market.
<a href="#">Public Contracts Regulations</a> (2015)	Legislation	Production and sale of heat.
<a href="#">Review of Electricity Market Arrangements (REMA)</a> (2023)	Consultation	Government consulted on a range of issues and options related to electricity market reform, and published a summary of responses and announced a further consultation with a narrower scope for 2023.
<a href="#">Energy Efficiency Regulations</a> (2015)	Legislation	Introduces measures to improve the energy efficiency of certain private rented property in England and Wales.
<a href="#">Wales' Ynni Cymru policy &amp; local energy planning development</a>	Policy	Creation of a publicly-owned energy company for Wales (Ynni Cymru) and detailed <a href="#">guidance and services</a> for energy planning policy and guidance within Wales.



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