Financing Local Net Zero Projects

A Guide for Local Authorities

December 2023

UKRI Innovate UK

In association with:

pwc

Contributors

To strengthen the integrity of the report's findings, we consulted a range of stakeholders, including active participation from the following working group members, who have played a crucial role in shaping the direction and content of the report. We are grateful for their time, commitment, independent challenge, practical experience and technical input.

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About this report

This report was commissioned by Innovate UK (IUK) as part of a wider project into unlocking investment into local net zero projects across the UK. It has drawn on insights from Working Group sessions and engagement with investors. 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 to support the delivery of 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.

Disclaimer

This guide provides points for consideration to help Local Authorities and investors collaborate in the most effective way. It does not advocate a course of action or constitute legal or financial advice. All parties must seek appropriate legal, financial and commercial advice for any project in which they are involved.

Contents

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Introduction

This section includes:

- **Local net zero projects:** What they are and why we need them.
- **Call to action:** Understanding why Local Authorities should act.
- **How to use and navigate this guide:** What it is and what it isn't, and where this guide sits in the local net zero journey.

Local action is vital to support net zero delivery

If we want to meet the UK's 2050 climate targets, we need to increase our investments in local net zero projects.

There is broad consensus for the need to transition to net zero. In June 2019, the UK Government set a legally binding climate change target to reduce emissions by 78% by 2035 and 100% by 2050.[1] Since then the Mission Zero' Independent Review of Net Zero by Chris Skidmore highlighted the economic imperative, while in March 2023, the Government published its plan for delivering the energy transition, Powering Up Britain. Published the same day, The Green Finance Strategy includes plans to mobilise the capital needed to meet the UK's ambitious targets.

There are many pathways to achieve net zero, each prioritising investment into different sectors and technologies. Whichever pathway we choose, substantial investment is needed. The UK needs to invest around £50bn a year through to 2050 to meet its net zero commitments. Whether action is at the national or local level, the relationship between policy, planning, finance and implementation is critical to success.

Decarbonisation of buildings and transport is falling behind. Current policy and delivery efforts have succeeded in decarbonising a significant proportion of our national electricity supply, primarily driven by phasing out coal. But despite this rapid success, progress has flatlined in buildings and transport. To deliver on its commitments, the UK must rapidly scale up and accelerate decarbonisation efforts in these sectors.

(1) Compared to 1990 levels.

Many of the critical actions we need to deliver net zero in buildings and transport are local. Electrifying our places will increase demands on the grid. And to transition to renewable energy, we'll need to generate power on a large-scale alongside local decentralised alternatives. Balancing the supply and demand of this new energy system will call for storage solutions and smart technologies at the local level to manage fluctuations and enable greater resilience. Reducing energy demand by improving energy efficiency and retrofitting will also be necessary.

A local approach increases adoption and cost savings. The UK Government increasingly recognises the important role that Local Authorities will play in delivering the UK Net Zero Strategy.[2] To get consent from citizens and encourage people to adopt net zero initiatives, we need more local engagement. Harnessing local knowledge, engaging with communities, and tailoring actions to specific places, can also lead to significant cost savings. UKRI/PwC analysis showed that a place-based approach to net zero could save £137 billion in investment to cities while generating an additional £431 billion in energy savings and wider social benefits.

As we accelerate our ambition to deliver net zero, local delivery of local net zero projects will play a critical role.

(2) See, for example, *MISSION ZERO: Independent Review of Net Zero*, Rt Hon Chris Skidmore MP (2023).

What are local net zero projects?

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

What are local net zero projects?

A local net zero project (LNZP) focuses on decarbonising energy, heat, buildings and transport*. The project combines parts of the local and national energy system in a more cost-effective way. Local Authorities and innovators can design their projects with a local lens at the start – for example, a waste heat plant and solar farm that power a new build development. Or they can build local linkages in retrospectively, either in one project or incrementally – for example, capturing waste heat from the Underground to use in local buildings.

Why are LNZPs so important to climate and wider objectives?

We cannot reach net zero without taking a systemic, cross-sector view on how to decarbonise. Decarbonisation planning develops a pipeline of structured and strategic LNZPs across project types and sectors. These plans act as a common hymn-sheet that can increase the ambition an effectiveness of net zero progress. They also deliver value to the local community in many ways:

01 **Reducing local emissions** supporting the transition to net zero.

02 **Creating financial opportunities** for investors and lowering bills for end users.

03 **Building resilience and diversity into the energy system,** dampening the impact of future price changes and extreme weather events.

04 **Accelerating the transition** by fostering better community engagement and consent for change. Tailoring projects to reflect local opportunities, needs and priorities is ultimately more cost effective.

05 **Improving health and wellbeing** from cleaner air and better living conditions and mobility.

06 **Enabling local growth** in jobs, training and enterprise.

There are six main types of local net zero projects:

Energy

- Renewable electricity generation
- Private wires & Heat networks
- Energy storage and flexibility services

Buildings

- Building energy efficiency and retrofit

Transport

- EV infrastructure
- Public transport and mobility services

* See separate 'Market analysis methodology' for details on the sectors and subsectors included in our research

Why Local Authorities are central to accelerated net zero delivery

Local government has the strategic vision and accountability to ensure that investment meets local needs.

- Their **democratic accountability and convening power** mean Local Authorities can engage with their population and encourage them to build a consensus to bring about democratic change.
- **They are increasingly reliant on business rates due to reduced government grants** and a greater demand on their services. This gives them a strong incentive to work with business to increase local economic activity.
- Local Authorities **own and operate a wide range of local buildings and transport infrastructures**. They purchase large amounts of energy, so there is an incentive to proactively engage with the energy system to reduce long term costs.
- Local Authorities have significant **local powers and responsibilities which include planning, procurement and service delivery**. They have housing and transport responsibilities and they can extend these through devolution deals.
- **They can act across the economy.** By integrating different parts of the energy system they can solve more than one problem at a time, such as tackling air quality, improving public spaces and saving money for local residents.
- **Local Authorities know their communities.** They have the best view of the opportunities, needs and priorities in their place. No other actor has this view of the issue.

How to use this guide

This guide is designed to support users at Local Authorities to structure LNZPs to minimise risk and attract investment. This includes officers, project managers or heads of departments, such as climate change, planning, housing, transport and finance.

The objectives of this guide

- To provide structured information about project and pipeline development that can help Local Authorities to structure LNZPs to minimise risk and attract investment
- To provide common terminology used in LNZPs and by the investor community when developing the investor case.

What it is and what it isn't

This guide provides points for consideration to help Local Authorities and investors collaborate in the most effective way. It does not advocate a course of action or constitute legal advice. All parties must seek appropriate legal, financial and commercial advice for any project in which they are involved.

Similarly this isn't a technical feasibility or detailed business case framework. Rather it will support the reader in understanding common challenges and considerations, primarily in the development of the commercial case. While it has been developed with Local Authorities in mind, many of the issues identified will also be relevant to other public bodies or net zero innovators.

How to use this guide

The information in this guide is presented in sequential chapters, and it is advised that they are read and understood in the order they are presented. Project development is an iterative process and it is unlikely that your journey is necessarily sequential. We do not intend this guide to be prescriptive or mandate a single course of action.

The guide is broadly structured as follows:

Section 2 sets out key policy drivers for net zero action and what powers Local Authorities have to deliver LNZPs.

Section 3 describes the steps from a net zero pathway plan to an investible portfolio by building the business model for individual projects.

Section 4 provides an overview of the typical options a Local Authority has in determining the right commercial structure.

Section 5 outlines implications of the commercial structure from an accountancy, tax and legal perspective.

When to use this guide

The process of implementing a LNZP begins with a well-defined strategy and progresses through various stages leading to expansion. This guide provides a roadmap for Local Authorities to move from concept to commercialisation.

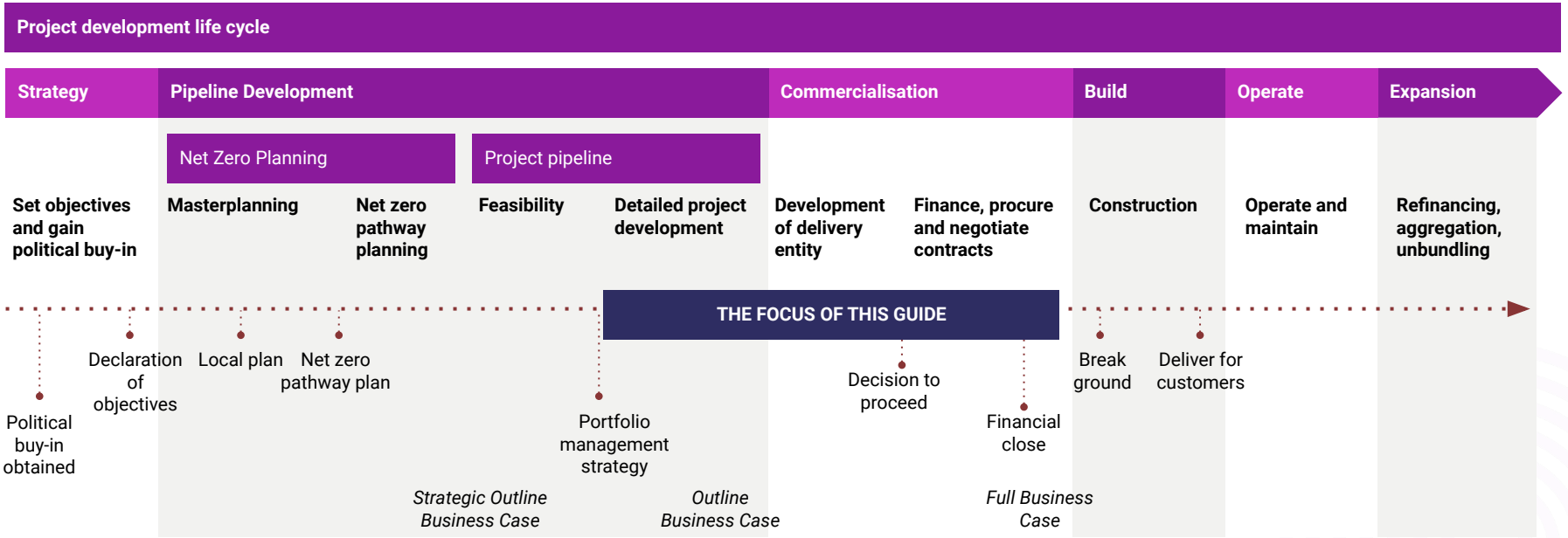


Fig.1 project development life cycle diagram

How to navigate this guide

This guide focuses on the project pipeline and commercialisation stages of the life cycle and each section aims to provide further detail on these stages.

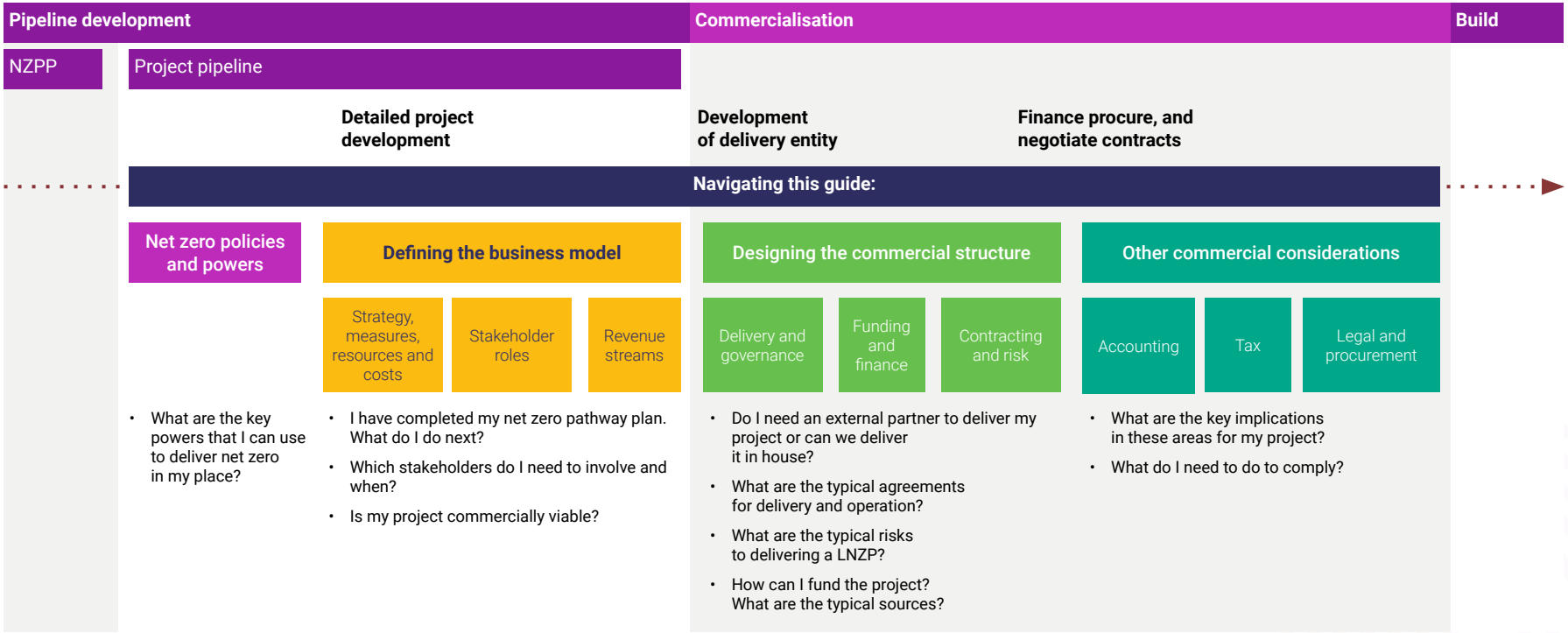


Fig.2 Guide sections mapping to the project development life cycle diagram

2

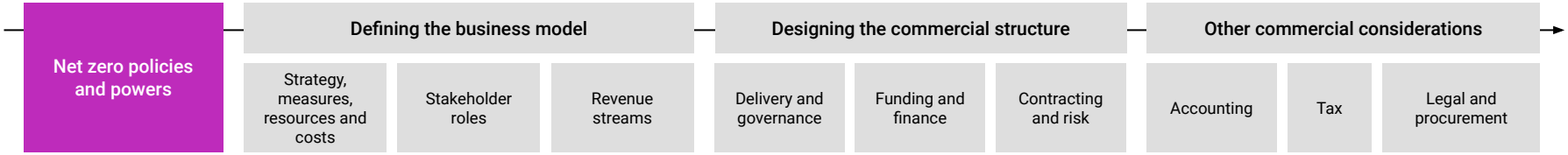
Net zero policies and powers

This section includes:

- **Net zero policies and strategies:** Key policy drivers for net zero action and influential announcements.
- **Overarching powers and devolution:** What powers Local Authorities have to deliver LNZPs.

Net zero policies and powers

With climate change long on the national political agenda, more recently national bodies have been focusing their attention on the essential role of local delivery.



What Local Authorities can and cannot do is determined by the legal framework of duties, powers and policies. Powers can be provided through primary legislation, such as General Power of Competence (GPoC) or in Statutory Guidance such as the Minimum Energy Efficiency Standards (MEES) Regulations.

In this section, we have outlined the key policy drivers for net zero action and upcoming influential announcements. We then set out what powers Local Authorities have to deliver local net zero projects as well as their powers to borrow, invest, procure and commission.

There is further detail in Annex 2, which lists key UK and regional legislations as well as policies and strategies that are relevant to LNZPs.

This section is structured as follows:

Key national policies and strategies: provides an overview of the UK Government net zero policies which impact LNZPs.

Influential announcements: lists key upcoming announcements relevant to LNZPs.

Overarching powers: identifies areas in which a Local Authority's powers can be used to support LNZPs.

Devolution: sets out the history of devolution of powers and how this impacts Local Authority control and decision-making.

See Annex 2 for a list of relevant sector specific legislation and policies.

Relevant and influential policy and market developments

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

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; in particular governance arrangements. System reform will involve investment and engagement opportunities for private investors.

Ofgem Consultation on Distributed Flexibility (2023): Ofgem is seeking industry input to envision the world's first distributed energy 'super' marketplace. The focus is on optimising demand and supply of renewable electricity through a common digital platform, facilitating the trade of surplus electricity from low-carbon sources and smart devices. The standardisation and increased market liquidity are anticipated to lower barriers and mitigate risks for investment in local net zero projects (LNZPs).

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. The tool is a huge opportunity for investors to be sure their investments are 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 with consultation expected in Autumn 2023.

UK100: Powers in Place: The handbook of Local Authority Net Zero powers explores the existing powers of Local Authorities for achieving Net Zero. It identifies challenges and advocates for enhanced legislative support, aimed at equipping local leaders to drive Net Zero initiatives effectively amidst regulatory barriers.

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 lead to many new opportunities for private sector financing.

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) which aims to help simplify the funding landscape for Local Authorities among other aims. OFLOG will primarily serve to provide authoritative data and analysis on local government performance. In line with this, it has committed to facilitating easier access to financing for Local Authorities, blending private with public financing to reduce investment risk. This initiative is expected to result in more local net zero projects (LNZPs) for investors to engage with.

Accelerating electricity transmission network deployment ('Winser Review', 2023): Recommendations from the Electricity Networks Commissioner on how to accelerate the deployment of electricity transmission infrastructure. These include recommending future work to understand the scale and pace of local energy initiatives so that their materiality in the context of transmission (and distribution) networks can be considered.

Mission Zero Net Zero 'Skidmore' Review (2023): review of UK net zero strategy and recommendations. The independent review highlights the importance and opportunity of private and public sector collaboration. It provides key recommendations to facilitate the transition to net zero, including the introduction of a Local Net Zero Charter to ensure ownership in delivering action plans and fostering improved partnerships among the UK Government and devolved and local governments.

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

Keeping up to date

The survey of legislation, policy and strategy for this guide is relevant as of September 2023. The information provided in this guide should be checked before use to ensure that it is still relevant and has not been superseded. Key sources include Gov.uk, Ofgem, Energy Systems Catapult, Innovate UK and industry publications.

Key national policies and strategies

Along with increasing detail on how the UK will meet its climate commitments, the Government recognises the various roles that Local Authorities and other local actors will play in the effective delivery of the UK Net Zero Strategy.

Recently, there have been a number of important policy and regulatory developments that help lay the foundations for the net zero transition in the UK,
(see Annex 2 for a long-list of policies), including but not limited to:

Net Zero Strategy (2021, updated 2023, see below) **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 the 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.

Powering Up Britain: Net Zero Growth Plan **(2023,** update to the NZS).

Further commitments include Government-funded research through 3Ci and Innovate UK to help identify opportunities for local governments to work with the private sector to finance profitable net zero projects.

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 is also actively exploring areas where blended finance structures could have maximum impact, working alongside the Green Finance Institute and industry leaders in the finance sector to develop a forward-looking analysis of blended finance models for better deployment in the UK.

Transitioning to a net zero energy system: Smart Systems and Flexibility Plan **(2021): sets out a vision, analysis and work programme for delivering a smart and flexible electricity system that will underpin the UK's energy security and the transition to net zero.** The plan outlines approaches for advancing a smart energy system by enhancing flexibility for decarbonisation, supporting consumer participation, addressing grid policy barriers, reforming market structures, digitalising the energy system and establishing a monitoring framework to track progress.

Powering Up Britain: Energy Security Plan **(2023): sets out the UK's energy security and net zero plan and includes** proposed changes to planning policy in England for onshore wind to deliver a more localist approach that provides Local Authorities more flexibility to respond to the views of their local communities.

Trailblazer Devolution Deals for West Midlands and Greater Manchester Combined Authorities (2023). The Government has agreed in principle to devolve a series of functions to two major combined authorities with proposals for others to follow. Functions will be devolved on a negotiated basis but net zero is a major area of discussion with housing decarbonisation funding likely to be an early goal. Others include: minimum energy efficiency standards; planning the future energy system; network investment; heat network zoning; engagement in industrial decarbonisation; transport and adaptation. See page 16 for further information.

Powers to deliver, borrow and invest in LNZPs

There are several areas where Local Authorities can use its powers to directly procure, finance or support local net zero projects.

General Power of Competence (Section 1) of the Localism Act 2011

The General Power of Competence (GPoC), allows a Local Authority to do anything an individual can do, extending to commercial activities. This is particularly useful for innovative projects that may not traditionally fall under the remit of local government. For example, Warrington Borough Council leveraged GPoC to establish wholly-owned companies for solar farms and housing developments. However, it's crucial to note that GPoC comes with its own set of limitations. While it allows for trading, any surplus or profit cannot be made on discretionary services unless a company is established. Legal checks are also essential to ensure that the activities do not contravene existing laws. Therefore, while GPoC offers a broad canvas, it requires careful navigation to ensure compliance and effectiveness.

Devolution

Devolution deals offer an opportunity to expand the range of powers available to Local Authorities, particularly in areas like transport and planning. However, the extent of these powers can vary significantly depending on the specific terms of the devolution agreement and the region in question. For example, the Greater London Authority has a more comprehensive set of powers compared to other Local Authorities. It may be beneficial for Local Authorities to engage proactively in these deals to maximise your authority's scope for action on LNZP, as they can offer significant financial and regulatory leeway.

Spending

Local Authorities have a certain level of discretion when it comes to allocating funds towards LNZP. However, this is often constrained by budget limitations and the overarching need for prudent financial management. The governance frameworks within which Local Authorities operate include legal duties like the Best Value Duty, which mandates securing economy, efficiency, and effectiveness in spending. Therefore, while there is room for manoeuvre, spending is constrained by both budgetary and legal considerations.

Borrowing and Investing

Under the Local Government Act 2003, Local Authorities have the latitude to borrow and invest for any purpose relevant to their functions. While Public Works Loan Board (PWLB) loans are commonly used, it is crucial to diversify funding sources to mitigate the risk of reaching PWLB borrowing caps. The Act requires Local Authorities to set an affordable borrowing limit and adhere to the Prudential Code. Recent changes to PWLB terms also require a three-year capital spending plan to be in place. This necessitates a strategic approach to borrowing and investment, ensuring that it aligns with long-term Net Zero objectives while maintaining financial prudence.

Procurement and Commissioning Powers

Procurement and commissioning represent a strong lever that Local Authorities can use to drive down emissions and support growth and innovation in their supply chains. However, this is a complex area that is subject to legal challenges. Local Authorities must adhere to the rules and regulations under the Public Contracts Regulations 2015. Early scoping, careful specification, key performance indicators, and robust contract management are essential for delivering emissions savings through procurement. Changes in procurement law may necessitate additional resources and capacity building within Local Authority procurement and legal teams.

Further information

- Sections 3 and 4 lay out the specifics of the business and commercial models available to Local Authorities in supporting LNZPs.
- See **Annex 3** for a longer list of the powers and regulations that impact Local Authorities in the UK.

Devolution

Devolution transfers powers and responsibilities from central government to Local Authorities. This may enable Local Authorities to have more control and decision-making powers over their energy systems and sources.

1980

Local Government and Land Act 1980: This act introduced Urban Development Corporations, which were used to lead the renewal of former industrial areas in many English cities. These helped create thriving new areas such as Canary Wharf in London and Royal Albert Dock in Liverpool.

1981

New Towns Act 1981: This act allowed for the creation of New Town Development Corporations, which were established to deliver over 20 new towns across England, such as Telford and Milton Keynes.

2011

Localism Act 2011: This act introduced Mayoral Development Corporations (MDCs), which are established by elected mayors in consultation with their combined authorities. Once the Secretary of State has been notified of the designation, they must lay a statutory instrument establishing the MDC.

2023

Devolution Deals: Further devolution deals for the Greater Manchester and West Midlands have been agreed, with work being done towards a 2025 launch. Though different in scope and detail, these deals transfer additional powers and policy levers, spanning fiscal, transport, educational and housing areas, to the respective combined authorities. Additional deals are being discussed for at least 20 other CAs, including York and North Yorkshire (YNY) and East Midlands. Gordon Brown's 2022 Labour Party devolution report also demonstrated political consensus on the direction of devolution, but called for additional transfer of powers - meaning recent deals are not at threat of being scaled back under a change of government.

2023

Levelling Up and Regeneration Act: Legislation that includes measures to empower Local Authorities by ensuring that local development plans will take precedence over National Development Management Policies in the event of conflict. The bill supports Local Authorities in setting planning fees at a local level, enhancing their control over planning services. It also confirms the direction of travel towards further devolution to combined authorities outside of London.These provisions collectively contribute to the government's commitment to further devolution by 2030.

Recent devolution deals are increasingly centred around action on climate and delivering a net zero economy. For example, the Cornwall devolution deal, first accepted in 2015, underwent subsequent expansions with a notable agreement in 2022. The level 3 devolution deal was intended to transfer additional powers and a £360 million investment fund over 30 years to Cornwall Council, aiming to address regional priorities. These include growing a creative and innovative carbon zero economy, addressing the housing crisis and improving Cornwall's transport connections.

Although the proposed deal was rejected in April 2023, the journey towards this proposal allowed Cornwall to secure significant funding for affordable housing, heritage projects, and natural capital investment. Moreover, the council will pursue a Level 2 deal that seeks to retain as many of the elements of the Level 3 deal as possible. Officers aim to present a Level 2 Deal to Cabinet and Council for consideration in September 2023.

Greater Manchester and West Midlands Transport Agreements

The two trailblazer deals for Greater Manchester and West Midlands Combined Authorities include provisions, following in the style of London's transport agreement, to transfer policy-making and other powers to the CAs. These include partnerships with rail operators to deliver a more integrated transport system. The two deals include piloting the devolution of net zero funding from 2025 onwards.

In addition, Greater Manchester CA's single department-style settlement includes activity across the energy system. The CA provides funding for building retrofit through allocation rather than competition and further work on standards, green finance and advice to increase household energy efficiency.

Development Corporations including Mayoral Development Corporations

Development Corporations (DCs) are typically constituted as a SPV, set-up to manage the development of public land, property and infrastructure on a long term basis, with regeneration or other objectives.

Development Corporations were originally constituted in the postwar period to allow for the growth of New Towns. Mayoral Development Corporation (MDC) legislation was established in the 2010s to grant London and Combined Authorities more extensive powers to set up MDCs. Government has recently consulted on the future legislative framework for DCs. Based on this feedback, the **Levelling-up and Regeneration Bill** (2023) includes a package of reforms to ensure community representation and to make it easier and faster for Local Authorities to use compulsory purchase orders. **Further consultation** on reforms to the Land Compensation Act (1961) are underway.

Mayoral Development Corporations (MDCs) are often used to accelerate regeneration in a specific area. They are usually a publicly owned 'arms-length' body with powers to acquire, develop, hold and dispose of land and property, as well as powers to provide infrastructure.

A recent government consultation revealed that many feel the existing MDC models, especially outside mayoral areas, do not have enough breadth of scope, powers or private sector involvement. Government has responded by creating a Locally-led Urban Development Corporation model via the Levelling-up and Regeneration Bill[1]. Once passed, these reforms will ensure communities are appropriately represented on the board of the MDC. It will also ensure all forms of development corporations can access plan-making and development management powers.

Case study: Stockport Town Centre West Mayoral Development Corporation

The MDC is spearheading regeneration in Stockport. Stockport Council's £100m investment facility has given the MDC significant influence in its discussions with developers and landowners to unlock sites and bring forward the types of schemes that fit with the MDC's vision and ambition for Town Centre West. For example, they have identified the opportunity for commercially viable district heat powered by renewable energy. Funding has been secured from the Head Network Delivery Unit (in DESNZ) to begin a Detailed Project Delivery study to establish the optimal technical and commercial delivery models for the network.

3

Define the business model

This section includes:

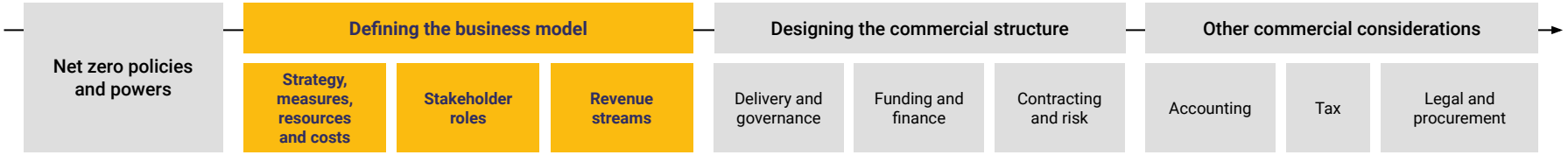
- **Defining the LNZP(s):** The Strategy, measures, resources and costs required to deliver LNZPs.
- **Stakeholder roles:** A Local Authority will likely need to partner to deliver the roles required to deliver a LNZP.
- **Revenue streams:** The commercial incentive for investment into a LNZP.

At this stage you will have:

- **Set your strategic objectives:** Assess which objectives are most important based on the local context and stakeholder input. This may take the form of a Climate Action Plan or Local Climate Strategy.
- **Conducted a local area analysis and decarbonisation plan:** Understand the distinct characteristics and requirements of your local area, including aspects such as energy profiles, geographical location, climate conditions, and community characteristics
- **Identified potential projects:** Identified and prioritised a list of potential projects to support your strategic objectives with preliminary assessment of the feasibility and technical viability of these projects.
- A **Local Area Energy Plan (LAEP)** is one way to bring these aspects together.

Define the business model

This section discusses the main building blocks involved in defining a business model for local net zero projects to make a compelling case for private sector engagement.



The following chapters provide an overview of the typical questions a Local Authority should consider in structuring LNZPs.

This guide assumes that you have already completed some level of net zero pathway planning. This might be a full techno-economic plan or LAEP for your region to reach net zero, or simply a project that will support your place to decarbonise.

There are a range of measures and actors required to transition an area's energy system to net zero. The first step to attracting private investment and partners to deliver projects is to clearly lay out what needs to be done, by who, and how it will return investment.

Building blocks of a business model

Delivering LNZPs

Strategy
What are your key objectives?

Measures
What are the projects that you are delivering?

Resources
Who/what are your key resources?

Costs
What costs will be incurred and when?

Key stakeholder roles

Partners: Who will be your key partners in delivering the scheme?

Customers: How will you interact with customers and capture revenue? Who will be the customers?

Revenue streams

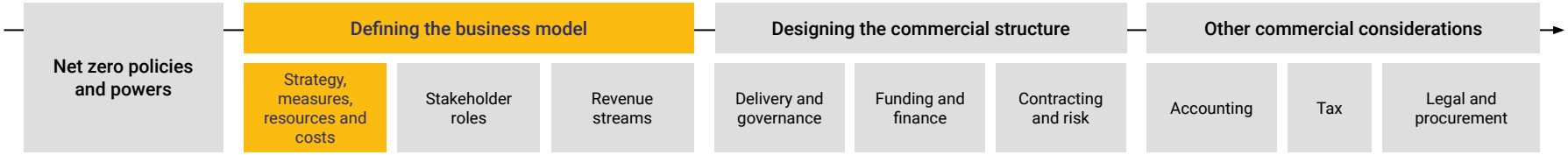
Private investors will only invest when they can see how they will be able to generate an acceptable return. This requires stable revenue streams to repay their investment. Where these do not exist the project will need to be supported by public funding.

3a

Strategy, measures, resources and costs

OVERVIEW | Defining local net zero project(s)

This section provides guidance on how to identify the foundational aspects of your local net zero project(s)



There are four important questions to consider when developing local net zero projects:

1 **STRATEGY | What is your strategic objective?** You need to clearly understand your overall objectives and where they fit into the organisation's wider portfolio. Without a well-defined objective and buy-in from senior leadership, it will be challenging to implement plans and attract support from the private sector.

2 **MEASURES | What measures are you delivering to meet that objective?** Identify the specific actions and initiatives that align with your strategic objective. These will be the core components of your Net Zero pathway plan and drive progress towards your goal.

3 **RESOURCES | Who or what do you need to deliver those measures?** Determine the necessary resources, partners, and stakeholders to carry out the identified measures. Net zero cannot be delivered by a single entity. Collaboration and buy-in across all stakeholders is vital for successful delivery.

4 **COSTS | What are the costs of implementing those measures?** It is essential to have a full schedule of costs associated with the delivery and operation of the project to set prices appropriately and assess the funding gap.

STRATEGY | Defining the strategic objective and constraints

A clear strategy is critical to building buy-in across a diverse range of stakeholders.

To be successful, net zero strategies ought to understand the wider and local contexts in building their case for change.

The energy system of 2050 will be much more decentralised than that of today. LNZPs will be key to achieving this, but it is still unclear who will play the key roles in the ownership, financing and delivery of LNZPs, when most net zero policy is currently set nationally.

While the overarching objective is clear, there are still many competing priorities within Local Authorities - adult social care, skills, waste removal, financial sustainability. Hence, it's important to clearly make the strategic case for change for LNZPs. To do this, you need to clearly understand the rationale, drivers and objectives for the spending proposal. You need to make the proposal SMART – Specific, Measurable, Achievable, Relevant and Time constrained. It must also recognise risks, dependencies and trade-offs as uncoordinated investments in net zero infrastructure could increase consumer bills more than is required for a net zero transition.

At all phases of a Local Authority's Net Zero journey you should be clear on the answer to these strategic questions:

1. How will further intervention and spend on key 'inputs' deliver 'outputs' that drive better outcomes and benefits to stakeholders and customers, while recognising the associated risks?
2. Do the proposed solutions meet the Local Authority's constituents' needs? Is this evidenced through stakeholder engagement and supported by service demand and capacity planning?
3. Do the proposed solutions align the with the Local Authority's broader strategic objectives and drivers?
4. What is the level of political support for the LNZP within the LA, regionally and nationally?
5. Where does my project sit in the organisation's wider portfolio?

The importance of building buy-in

It can take many years to implement the change required to transition to net zero. For example, **Bristol City Leap** took over 10 years of planning before a successful procurement in 2023. Stable political buy-in from the cabinet and community was critical for the success of the launch.

Another main pre-feasibility risk is the lack of network capacity, often overlooked by Local Authorities developing renewables or housing. Early engagement with the Distribution Network Operator (DNO) or National Grid is vital to determine availability and to find the best locations for connections.

Stakeholder risks are key for private investors and will be priced into the cost of capital. Hence, stable political buy-in and early consideration of grid connection risks are essential to expedite the process.

STRATEGY | **Portfolio management strategy**

As well as *doing projects right*, it is also important to *do the right projects*.

This guide aims to help Local Authorities to develop good local net zero projects. Portfolio management strategy is not the focus of this guide but it is important to note that any LNZP will form part of a Project Sponsor's wider portfolio and so it must be strategically aligned.

It is worth reflecting on the differences between developing projects and managing portfolios. Diversified portfolios have lower risk which helps attract private investment. But portfolio management can also be used to achieve other strategic objectives.

Portfolio management strategy

Portfolios set out to achieve part of a Project Sponsor's strategy, for example decarbonisation. Within a portfolio, projects are typically structured into smaller programmes, depending on their delivery readiness and alignment to various factors:

1. **Category**: projects can be grouped simply by sector (housing) or size (>£50m).
2. **Wider strategic prioritisation**: projects can be grouped according to their strategic importance, based on emission reductions or other strategic goals. A portfolio might be split further into **(a)** projects that the LA is statutorily obliged to deliver (housing health and safety) **(b)** projects that are needed to 'keep the lights on' (grid maintenance) **(c)** projects that have high benefit cost ratios **(d)** projects that create high social value overall or in a specific area, e.g. fuel poverty alleviation.
3. **Aggregation**: projects can be tagged if they could be packaged and financed together. Certain LNZPs could be cost-optimal if delivered together; for example, laying electricity (or broadband) cables and heat networks in the same trench.
4. **Cross-subsidisation:** active portfolio management can be used to encourage investment in projects with high social value but lower social returns, avoiding 'investor cherry picking'. An example is Bristol LEAP, which combines retrofit with onshore wind, heat networks and other projects. This approach is dependent on the overall profitability of the portfolio, as well as the contractual relationship between LA and investor - in Bristol's case a long-term SPV and concession.

Portfolio management processes

Governance: Leadership structures should be set up to govern portfolio management and operational teams tasked to manage tasks such as data, risk and stakeholder engagement. Project appraisal committees and processes should also be put in place.

Most portfolios are longer term which means it is worth considering:

(a) Internal structural changes: for example making the Portfolio Lead a cabinet level position within the Local Authority

(b) External structures that can help to deliver the portfolio, for example SPVs (see Delivery and Governance), and Development Corporations (see Net Zero Policies and Powers).

Portfolio appraisal and monitoring: A portfolio committee should regularly meet to consider which projects should be prioritised - or cancelled - at which stage to keep the portfolio in line with its intended strategy.

Risk management: the policy, operational, market, legal, ESG and technical risks of each project should be considered, as well as the interdependency of projects on each other. Diversification of projects of different types or risk profiles can be used to minimise overall portfolio risk, but risk should be viewed alongside other strategic objectives which may justify a less diversified approach.

Data management: Once a portfolio strategy has been agreed, a long list of projects (from Net zero Pathway Plans or existing data) can be categorised and included or excluded from the portfolio. As each project advances in the project development life cycle, it should be updated in the portfolio database. Project appraisal / stage-gate processes are a good way of standardising the type of information that a project should have documented at a given stage.

MEASURES | There are a diverse range of measures

A LNZP can be made up of one or more of the following initiatives. These will be specific to your local area but some introductory considerations have been included in Annex 5.

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 that are not part of the National Grid. Electricity and heat may be generated from a range of renewable energy sources.

Energy storage and flexibility services

Technologies that store energy - mainly batteries - as well as services that enable and incentivise the balancing of energy supply and demand, such as smart tariffs and vehicle-to-grid technology.

Buildings

Building energy efficiency and retrofits

Installing measures that improve the energy efficiency of existing buildings - such as insulation - and/or replace fossil fuel heat sources with low carbon technologies such as heat pumps.

Transport

EV infrastructure

The infrastructure and services required to charge electric vehicles, predominantly EV charging points

Public transport and mobility services

The infrastructure and services required to enable the adoption of active and low-carbon public and private mobility, including car sharing, cycle lanes and traditional public transport.

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

MEASURES | **Defining local needs**

Net Zero Pathway Planning approaches such as LAEPs are important to understand the change required to transition an area's energy system to net zero in a given timeframe. Such approaches identify the most cost-effective plan of sequenced initiatives, considering a range of technologies, scenarios and stakeholder needs.

Net zero pathway planning sets out the change required to transition an area's energy system to net zero. To do this, you need a detailed techno-economic analysis to explore a range of technologies and scenarios. When you combine this with thorough stakeholder management, you can identify the most cost-effective path to net zero. This analysis will also allow you to identify the social and environmental co-benefits associated with your plan, and avenues for coordination across local, regional and national state actors. The Planning for energy decarbonisation at a local level report recognises that plans will vary based on unique circumstances of the Local Authority and provides recommendations and key considerations to support with developing your net zero pathway plan.

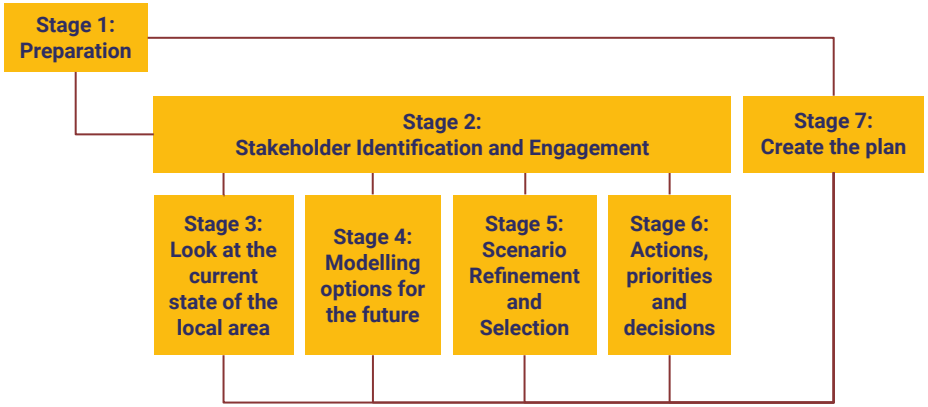


Fig.3 Overview of the process to develop a Local Area Energy Plan

Net zero pathway planning approaches, such as Local Area Energy Plans (LAEPs), are evolving rapidly. Although guidance exists to support with planning, a Local Authority may wish to develop a more bespoke pathway that suits its scale and cost profile. The Welsh Government has committed to a major programme of LAEPs so that every part of Wales will have a plan, while the Scottish Government requires all Local Authorities to publish a Local Heat Energy Efficiency Strategy (LHEES). The Energy System Catapult's **LAEP Guidance** outlines seven stages below to address the whole energy system (see detailed guidance here).

Stage 1: Identify the geographical scale, roles and responsibilities, resources and scope.

Stage 2: Map who stakeholders are and define engagement activities to involve them in plan development.

Stage 3: Baseline the local area and its energy system with relevant data sources and validate with stakeholders.

Stage 4: Model the options to decarbonise the local area.

Stage 5: Refine scenarios and select a pathway through techno-economic analysis, evaluation of wider factors, and engagement with stakeholders.

Stage 6: Define actions and initiatives and projects to deliver net zero.

Stage 7: Create the plan.

An investor-ready pipeline: The outputs of a typical net zero pathway plan DO NOT provide an investor-ready pipeline of projects. For this, both public and private investors will need a technical and financial feasibility study including full engineering and architectural documents and a full financial model for project delivery and operationalisation. For public investment, HMT provides comprehensive business case guidance.

RESOURCES | Tackling barriers in both the near and longer term

As well as funding, what other resources will be required to deliver both near and longer term initiatives?

'Resources' are wider than just funding requirements

While a priority action for all projects will be securing funding, there is also a need to unblock several other non-technical barriers, such as planning permission, land acquisition or political consent. (see Innovate UK's Net Zero Living programme for more detail on these barriers).

The presence and difficulty of these barriers determine the resources that will be required for each initiative, *and when.*

Near vs Longer Term initiatives

Best practice Net Zero Pathway Planning will prioritise and sequence initiatives. Initiatives that are more certain and subject to fewer or less-challenging barriers may be categorised as near-term, while less certain initiatives and those that face more significant barriers might be programmed for the longer term:

- **Near term** - Initiatives that can be delivered in the next 3-5 years on a low regrets basis, using well-established technologies with few obstacles to implementation. Examples include buildings retrofit and solar farms. Near-term initiatives should also fit with the longer-term direction of the plan, avoiding any interventions with short-term benefits that compromise longer-term objectives.
- **Longer term** - Initiatives that often require an enabling action to remove barriers, such as changes in physical infrastructure or planning policy. They might also require key decisions based on national policy, changing technology, economic developments and public opinion. Examples include establishing a local energy market.

Many near term projects also have significant longer term value as they demonstrate the longer-term case for change.

The focus of this guide is projects that require public or private investment, so it mostly applies to near-term projects.

It is also important to note that different interventions are better suited to being delivered by different levels of government, with Local Authorities often, but not always, better suited than central government [1].

(1) The principle of subsidiarity states that a central authority should perform only those tasks that cannot be performed at a more local level.

COSTS | Establishing the cost structure/profile of the project

Cost structure refers to the various types of fixed and variable costs that make up the scheme's overall expenses. It is essential to have a full schedule of costs associated with the delivery and operation of the project. This will help you to set prices appropriately and assess the funding gap.

There are broadly four categories of cost to consider:

- **Project development costs** – Staff time devoted to developing the project. Also consider expenses incurred on consultancy services, establishing monitoring frameworks or stakeholder engagement. Grant funding can be an important source of capital for project development activities and feasibility studies, however access to such funds tends to be limited. As such, it is beneficial to consult knowledge hubs for learnings on similar projects to reduce reliance on grant funding and seek alternative sources of capital where appropriate. The more upside a private investor anticipates from a project, the more incentivised they will be to provide project development resources themselves. Concession agreements, such as Bristol City LEAP or Coventry Strategic Energy Partnership shift the burden of project development to private sector partners in return for preferential rights to develop energy projects that are in line with the LA's strategic objectives.
- **Construction and installation costs** – Costs incurred during the implementation of the project, such as installing equipment, energy efficiency measures, charging infrastructure and applying for grid connection.
- **Operation and maintenance costs** - The cost of running and maintaining equipment, paying for ongoing services and staff time over the project's lifetime. Schemes should also consider the effect of business rates, VAT and other taxes, installing a grid connection or connecting to new customers.
- **Finance costs** - Some projects may have access to finance through the Public Works Loan Board, at rates as low as 3%. However, borrowing costs from private investors are likely to be significantly more and will increase with higher risk schemes. It is important to take a pragmatic approach to blending finance from different sources (see section 4).

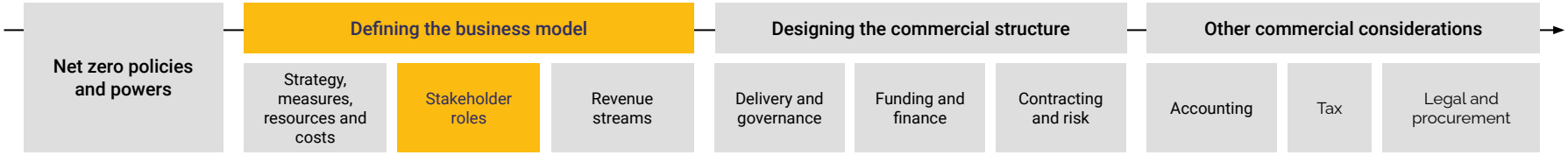
The revenue streams are the principal mechanism for meeting delivery costs and paying back investors. A scheme is considered commercial when the revenue exceeds the cost. These are explored further in the following section.

3b

Stakeholder roles

Stakeholder roles

It is unlikely that a Local Authority will be able to deliver a LNZP on their own. The roles described in this section are essential to the successful implementation of a LNZP.



There are many roles that are critical to delivering a LNZP and Local Authorities are unlikely to deliver them all alone. It's important to distinguish the party from the role. Stakeholder roles can be performed by a variety of actors such as the Local Authority, a standalone entity, DNOs and others. In many cases, one party will take on multiple roles, and multiple parties might fill the same role. For example, consultant may provide expert advice for strategic planning and portfolio development to a Local Authority in its role as a Project Sponsor.

Each role is driven by distinct motivations, ranging from financial returns, environmental stewardship and regulatory compliance, to community development. Understanding these motivations is key to fostering effective collaboration and ensuring that you meet each stakeholder's needs and expectations.

Ultimately, the responsibilities and rights of each role form the basis of the project's commercial structure. In most instances, once all of the roles have parties assigned to them, the Project Sponsor will be able to make well-informed decisions regarding the suitable structure.

This section outlines the typical roles that are needed to deliver a LNZP. The structure is as follows:

Overview of different roles and descriptions

The importance of the customer for the delivery of a LNZP

See Annex 4 for a one page summary of each role stakeholders can take.

An overview of the roles in a LNZP

The table below describes the main roles that need to be performed to successfully implement a LNZP. Each project has a broad range of actors, who may take on one or many of these roles. The number of roles the Local Authority takes on will help to determine the delivery model that is most suitable for the project.

Roles	Description
Project Sponsor	The Project Sponsor is a party with the motivation to establish a successful LNZP, and takes responsibility for driving delivery and managing the network. This role will include setting objectives, prescribing policies and overseeing performance.
Customer	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.
Funder	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.
Asset Owner	The Asset Owner owns the physical assets of the local net zero project. Ownership might be split across different parties and different classes of assets.
Land Owner	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 installing, operating and maintaining any physical assets.
Installer	The Installer designs and installs any physical assets.
Operator	An Operator is responsible for operating and maintaining the LNZPs to ensure that energy of suitable quality and quantity can be delivered to customers.
Sale of Services Supplier	The Sale of Services role is distinct from the physical delivery of energy to customers. A supplier must operate a 'round-the-clock' customer call centre. To note, without a licence, generation, delivery and sales in electricity and gas must be delivered separately. This relationship is managed by Operation & Maintenance agreements.
Supplier of Last Resort	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.
Network Operators	There are two key Network Operators: Distribution System Operators (DSO) are responsible for managing the distribution networks that deliver electricity to customers; Electricity System Operators (ESO) are responsible for the real-time balancing of supply and demand on the national electricity system.
Community Engagement Partner	The Community Engagement Partner facilitates dialogue and collaboration between the project stakeholders and the local community, ensuring that the community's interests and concerns are addressed while promoting awareness and understanding of the local net zero project's objectives and benefits.

Involvement through delivery

The matrix below shows when each of the stakeholders are involved in a LNZP. It should be noted that these are general guidelines; each project will vary in practice. It will often be possible to identify actors for particular roles at an early stage, even if their direct involvement in the project does not commence until a later stage.

	Strategy	Pipeline Development				Commercialisation		Build	Operate	Expansion
		Net Zero Planning		Project pipeline						
	Set objectives and gain political buy-in	Masterplanning	Net zero pathway planning	Feasibility	Detailed project development	Development of delivery entity	Finance, procure and negotiate contracts	Construction	Operate and maintain	Refinancing, aggregation, unbundling
					THE FOCUS OF THIS GUIDE					
Project Sponsor	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
Funder				✔	✔	✔	✔	✔	✔	✔
Asset Owner				✔	✔	✔	✔	✔	✔	
Land owner					✔		✔		✔	
Installer						✔	✔	✔	✔	
Operator							✔		✔	
Sale of Services Supplier						✔	✔	✔	✔	
Supplier of Last Resort					✔	✔	✔	✔	✔	
Network Operators						✔	✔	✔	✔	
Customers				✔	✔	✔	✔	✔	✔	✔

Fig.4 Stakeholder involvement matrix

The importance of customers

There are two key considerations when it comes to customers. The first point is customer offtake, which is critical for the success of any project. The second point is the vulnerability of each customer and how this affects their purchasing power.

Does the project have enough customer offtake[1] and community support?

Securing a robust customer base and fostering community engagement are key for the success of your local net zero project. The initiative should not only tailor its services to meet the distinct needs of the customers but also actively involve them in a bid to ensure a high level of sign-up. The resonance of the services with customer needs significantly drives the demand, which in turn, underpins a steady revenue stream, ultimately bolstering the financial viability of the project.

Moreover, gaining the trust and consent of the local community is instrumental, especially when navigating through requisite planning permissions. The role of a **community engagement partner** is particularly useful in this regard, bridging the project's objectives with the interests, concerns, and insights of the community, thereby fostering a conducive environment for project delivery.

Investors often gauge the potential of a project through the lens of 'offtaker risk', closely scrutinising the projected revenue streams and the level of confidence in achieving the expected customer offtake. Hence, a well-planned customer engagement and sign-up plan, that is finely aligned with the community's needs, stands as a compelling proposition for investors, significantly enhancing the project's appeal.

Will the scheme connect to vulnerable customers?

It is important to consider vulnerable customers. Services such as heating and electricity are essential for people's living and you should consider this when looking at the social benefits of the project. Sometimes there will be vulnerable customers that the Local Authority may wish to protect.

For the project to be socially beneficial, you should consider more than the commercial KPIs. In some instances, there is a need for low cost heat and electricity to alleviate fuel poverty. This particularly applies when heat or electricity is being provided via private networks, outside of Ofgem's jurisdiction. But it also applies where ESCO's are selling energy on regulated tariffs and may choose to offer discounted, or **social energy tariffs**, in lieu of these potentially being adopted nationwide.

Establishing a **supplier of last resort** is key to guarantee customers' rights in the event of a system failure. The Local Authority or another stakeholder has the responsibility to the customers to provide the service through another route for example, landlords. Moreover, there are reputational risks if the scheme goes wrong, and so the supplier of last resort is key to mitigate further damage. As such, there should be processes in place to quickly change suppliers in the event that a service is unable to be delivered by a given supplier.

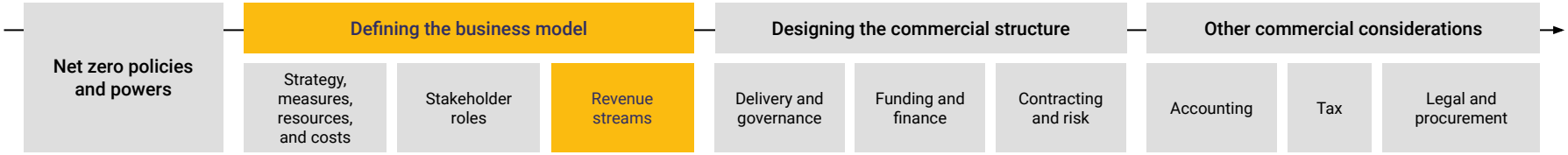
(1) 'Offtake' refers to demand for or sales of energy while an 'offtaker' is a party who will pay a provider for energy.

3c

Revenue streams

OVERVIEW | **Revenue streams**

Revenue streams are the various sources from which a business earns money from the sale of goods or the provision of services. This is a key factor in all projects, as it directly impacts the total revenue and hence the overall return of the project.



Different investors have different investment strategies, and attitudes towards rates of return, risk levels, tenure and capital structure. But all private investors are ultimately motivated by risk-weighted returns. **As a result, identifying ways to monetise revenue sources is a critical task for an early stage project.**

This can be challenging for local net zero projects for various reasons:

1. **Some assets that form part of a LNZPs have no revenue streams** (for example bike lanes, green infrastructure).
2. **Many assets have revenue streams that are difficult to monetise** (energy savings from retrofit).
3. **The revenue streams associated with each measure are different:** Electricity sales (RE), flexibility services (batteries), fares (public transport). Diversification reduces risk at the portfolio level, but at the project level, each revenue stream requires contracts and often commercial negotiation so transaction costs and risks increase (see next page).

That said, there are a host of potential revenue streams available to LNZPs, which this section explores.

This section is structured as follows:

Overview - Outlines key concepts.

Revenue streams - Heat, Power, Mobility, Energy Flexibility, other.

Government Subsidies - National and local governments.

Annex 9 sets out a detailed summary of the revenue streams available to a LNZP.

OVERVIEW | Diversifying and optimising project revenue streams

It is often possible to create multiple complementary sources of revenue within a project. This varies by project and there are advantages and drawbacks to having more or less diversified revenue streams.

Opportunities to diversify revenue vary widely depending on the project, its location and the regulations it is subject to. Enabling multiple sources of revenue can be a key enabler to make sure the project is financially viable. However, it may also increase risk and complexity for financing. To help manage this risk, LNZPs may initially target two to three revenue streams to reduce complexity and undertake thorough due diligence.

The benefits of revenue diversification:

- **Mitigating the risk of a single revenue stream:** Reduces dependence on one revenue source, so that if any stream faces a downturn or disruption, the project can rely on other sources.
- **Increasing revenue potential:** New opportunities and markets with different customer segments can increase revenue generation.
- **Ensuring financial stability:** Reduces cash flow fluctuations by reducing dependence on one revenue stream.
- **Reducing costs:** Synergies between different propositions might increase efficiency and reduce costs.
- **'Revenue stacking':** that is, generating multiple revenue streams from the same capacity.

Despite these benefits, it is important to note that additional revenue streams typically result in increased transaction costs and complexities which will require additional resources or expertise to manage effectively.

Fig.5 Example of revenue streams for a solar PV project

Solar PV: sale of energy via PPAs, private wire, or other energy markets

Battery storage and flexibility services: Ancillary services or demand response revenue

Cash flow: Revenue streams are often highly variable over time. This is why it is important to build a financial model that considers cash flow at all stages of the project life cycle and to have strategies and mechanisms in place to manage cash flow. Multiple revenue streams do not necessarily mean less risk of negative net cash flow - most revenue streams are low at the start.

Case study: Clayhill Solar Farm, in Bedfordshire, has 10 MW of solar PV, and is co-located with five 1.2MW batteries. Anesco is in charge of the operations and maintenance for the farm over a 20-year period and has identified multiple avenues for revenue stacking for the project.

Energy Storage Agreements: EDF Energy, in partnership with Upside Energy, signed a deal with Anesco to optimise 10 MW of solar and battery assets at Clayhill. EDF Energy provides a guaranteed floor price for storage, The stored electricity will be sold though EDF's proprietary demand-side response platform, PowerShift.

Flexibility Services: Clayhill's entry into the Balancing Mechanism (BM) 2018 via LimeJump's Virtual Power Plant marked a first for aggregated units in the BM. This entry opens additional revenue streams and presents and opportunity for batteries to profit from differences in energy prices. It also reduces the financial uncertainty that suppliers might face due to fluctuating prices within the energy system.

Sale of Energy: The deal with EDF Energy also allows Clayhill to generate revenue through direct access to wholesale markets. The partnership between EDF Energy, Upside and Anesco aims to connect additional Anesco assets to the PowerShift platform, enhancing the efficiency and profitability of the Clayhill assets.

OVERVIEW | Managing cash flow across the project life cycle

Effective cash flow management, including tracking expenses, aligning drawdowns and diversifying funding, ensures project liquidity and sustainability which safeguards financial integrity and optimises return on investment.

Managing cash flow effectively ensures that there is enough liquidity to cover expenses and avoid financial strains.

It is essential to budget and estimate costs accurately to ensure that the project has sufficient funding to progress smoothly. Establishing a realistic timeline and identifying potential sources of funding are critical steps in this phase. Careful financial forecasting and scenario analysis can help anticipate cash flow needs and identify potential risks and bottlenecks. Typically, when the interest on debt or asset finance becomes payable before the project starts generating revenue streams (such as during the build phase), a mismatch between outgoing and incoming cash flows occurs. This can potentially reduce the overall return on investment or impact the sustainability of the project.

To avoid this mismatch:

- **Track actual expenses against the budget** and re-adjust the financial plan where necessary.
- **Agree drawdowns in line with spending needs** to avoid holding uninvested cash.
- **Agree revolving facility debt** where you can borrow money when needed and pay it back when you have the cash available (up to an agreed limit). There will be fees for the unused portion of the borrowing to acknowledge the bank's willingness to lend, but these fees should be much lower than the interest costs on the actual borrowed amount.
- **Accumulate interest during the build phase** so that it increases the total amount of the loan rather than requiring repayment.
- **Use short term debt** to meet short term needs.
- **Balance payments to suppliers and contractors** with timely construction and continued service.
- **Explore multiple sources of capital** like loans, grants, equity investments or public-private partnerships to help diversify funding and manage cash flow more efficiently.

Case study: Community for renewables

Community for Renewables (CFR) is a not-for-profit company dedicated to assisting communities, councils and charities in establishing clean energy businesses. Since its establishment in 2012, CFR has played a significant role in developing and financing community-owned solar projects with a total capital value exceeding £60 million. One of CFR's primary objectives is to support communities in obtaining the necessary financing for large-scale community energy projects. Setting up such projects can require substantial investment, often exceeding £100,000 for risk investment, planning, land acquisition, grid connection agreements and transaction costs. CFR supports community projects through a combination of long-term bank debt, community investment and bridge loans (which are useful in alleviating cash flow challenges).

OVERVIEW | **Mechanisms to capture revenue**

Revenue capturing mechanisms are required to turn modelled revenue (for example, the projected price per kWh of solar energy) into actual revenue (the revenue received per kWh for that solar farm when it opens). Successful revenue capture requires sound pricing strategy, forecasting, contracting, payment systems and processes (for example, PPA between the solar farm and a customer at an agreed price per kWh).

Revenue Capturing Mechanism	Definition
Pay per use	Where revenue is generated through the sale of a good or service (for example, the kWh of electricity used by a customer in their home or at an EV charging point, or mobility as a service).
Power Purchase Agreements	PPAs are contractual agreements between energy buyers and sellers. They come together and agree to buy and sell an amount of energy which is or will be generated by a designated renewable asset (generally over long-term periods, 5-20 years).
Virtual Power Purchase Agreements	A virtual PPA, also known as Synthetic PPA or Contract for Differences, is a financial contract that does not involve the physical delivery of energy from vendor to the customer and provides a financial hedge against future energy fluctuations through agreeing on a price for electricity.
On-bill financing	On-bill financing allows customers to finance energy efficiency and renewable energy upgrades through charges on their utility or property bills, rather than through a traditional loan.
Tax or charges	Relates to taxes or charges that are applied specifically in relation to a LNZP (for example, lower council tax on homes that have been retrofitted or conjunction charges as part of e-mobility services).
Subscription services	This includes all “as a service” models, in which the customer enjoys the benefits of a product without having to purchase or manage it (for example, rooftop solar panels or a heat pump is installed at no upfront cost with the customer then paying a monthly fee to cover the use and maintenance).
Export payments	A support mechanism designed to ensure small-scale generators are paid for the renewable electricity (solar PV panels, wind turbine, anaerobic digestion and micro-CHP) they export to the grid. These can be facilitated by the Smart Export Guarantee.
Flexibility services	Flexibility services are sold through agreements between electricity system users (or via aggregators) and the National Grid (acting as the electricity system operator) and/or Distribution Network Operators, to allow them to balance grid demand/supply.

REVENUE STREAMS | **Operating revenue**

Consistent operating revenue streams will be a focus during any financial due diligence by potential third-party investors.

Consistent revenue will be a key focus to potential investors. The following are the likely characteristics that will be viewed positively by investors.

- Long term supply agreements with customers.
- Minimum provisions or a significant proportion of revenue represented by fixed charges.
- Creditworthy customers.
- Public sector commitment to the subsidise project.
- Ability to align revenue streams in line with costs or the wider market.
- Transparent pricing structures.
- Opportunities to increase and/ or diversify revenue streams.
- Analytical assurance on future market revenues.

In the case of heat and electricity revenues, funders are likely to assess the demand risk in three areas:

- **Connection/demand build out risk:** Delays in, or non-occurrence of, construction/occupation of the anticipated demand reduce potential heat volume.
- **Heat/power demand volume risk:** The uncertainty in expected demand levels for heat or power, which can impact revenue and profitability.
- **Counterparty risks:** Funders will look to see signed contracts/heads of terms to support such revenue streams and understand the creditworthiness of the counterparty.

The diversity of LNZPs is reflected in the available operating revenue streams. We have provided detailed examples on each in Annex 9 but in summary they are:

Revenue Streams	Definition
Heat	Revenue generated by selling produced or stored heat to customers within the region or exported to nearby regions.
Power	Revenue generated by selling electricity via PPA or to the wholesale market.
Flexibility services	Revenue generated by supporting normal grid operating conditions through ESO or DNO services.
Mobility	Revenue generated from public transportation and electric vehicle infrastructure.
Others	Revenue generated from irregular transactions such as customer connection charges and the sale of components.

REVENUE STREAMS | **Flexibility Services**

Revenue generated by offering services to balance demand and supply on the grid. The value of these services is currently marginal but will be an increasingly important part of the future energy system. Flexibility also offers the opportunity for revenue stacking.

Flexibility Services in a LNZP

As more homes and vehicles transition from fossil fuels to electric power there will be a surge in electricity demand. The grid will need to handle these increased loads efficiently. Distributed Energy Resources (DERs) such as rooftop solar and battery storage allow a LNZP to offer flexibility services. These services help to balance supply and demand in the electricity network to support its efficient use. Key system actors include:

- **Generators** (this can range from people in their homes through to large solar parks and power stations) can offer to increase or decrease their generation level.
- **Energy consumers** (from individuals to industry) can increase or decrease their consumption level.
- **Energy storage** such as batteries or heat/cold stores can increase or reduce their level of storage.
- **Aggregators** - they aggregate supply and demand from multiple stakeholders to a scale where it is useful for the system as a whole and can be purchased by the grid operator or another user. Generators and energy users can also trade *capacity* – the contracted rights they may have – to import or export a level of electricity at any one time between themselves.

Local Authorities would typically access flexibility revenue via an aggregator.

Flexibility services are generally traded through markets that use auctions to match buyers and sellers. There are two main markets through which a Local Authority can provide flexibility services:

1. **Electricity System Operator[1] (ESO) market** balances national demand and supply in real-time, ensuring the security and quality of Britain's electricity supply. It is a well-established market, having reduced entry barriers to increase participation and liquidity. It continues to evolve with new services like Dynamic Containment.
2. **Distribution System Operator[2] (DSO) market** consists of six independent DSO groups. The operator of your local distribution network (DNO[3]) may buy flexibility services to address system constraints and maintain electricity supply quality across distribution networks. In the longer term, as the DNO transitions to its new role as a DSO, it may use flexibility services to avoid additional investment in new equipment, enable more renewables to connect to the network and support the decarbonisation of heat and transport.

See **Annex 6** for more details on the range of flexibility services offered to both ESO and DSO markets.

01 **The Electricity System Operator**, or ESO, manages the electricity system and ensures supply meets the required demand. The ESO performs several important functions; from second-by-second balancing of electricity supply and demand, to developing markets and advising on network investments.

02 **A Distribution System Operator,** or DSO, plays a key role in coordinating and managing the operation of the distribution electricity system. It securely operates and develops an active distribution system comprising electricity networks, electricity demand and generation management, and other flexible distributed energy resources.

03 **The Distribution Network Operator**, or DNO, is responsible for owning, operating and maintaining the electrical network in a geographical licence area and delivering electricity to communities and customers throughout the licence area, including, homes, businesses and industry. A DNO also maintains upkeep and investment in the electricity network to ensure it is functioning and capable of handling electricity demand.

REVENUE STREAMS | **Other revenue**

Consistent operating revenue streams will be a focus during any financial due diligence by potential third-party investors.

Additional income sources can provide significant cash to cover the project's financing needs. However, the timing of this income might not align perfectly with the timing of expenses, which could create a temporary funding gap. To address this, short-term financial arrangements might be necessary to 'bridge' the gap in funding.

Developer contributions

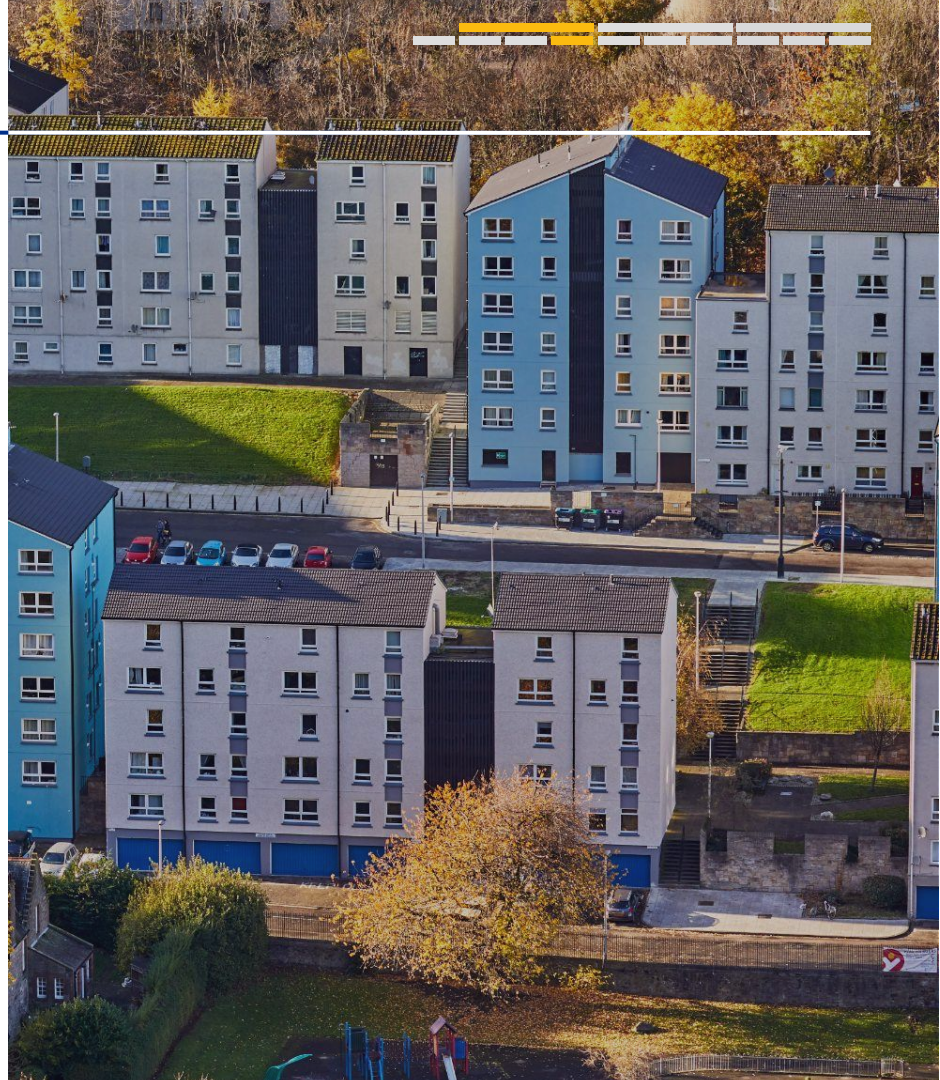
Developer contributions are a form of connection charge paid by a property developer, rather than the customer. Although paid by the developer, the outlay is likely to be passed through to the first owner of the dwelling/property via the initial purchase price. For example, a developer will incur a capital cost to ensure the development has a heat source. If they can connect to a heat network to avoid outlay on individual boilers, they may be willing to pay this avoided cost as a contribution.

Community Infrastructure Levy (CIL) and Section 106 (S106) agreements

All Local Authorities in England & Wales are empowered to charge a levy on new developments in their area to reflect the increased requirement for infrastructure as a result of the development. Although S106 planning obligations will continue with some developments, reforms have been introduced to restrict their use.

Customer connection charges

Connection charges can recover a portion of the costs associated with installing and maintaining connection assets which connect individual users. This could be the marginal cost of connecting a particular customer or a percentage of the total capital spend. Where the LNZP is replacing an existing solution, customers will be particularly sensitive to their ‘avoided cost’. For example, if the customer’s boiler is nearing the end of its life and would need replacement, they may be willing to pay (up to) this budgeted spend. Customers are likely to be more willing to accept a connection charge in exchange for a lower tariff throughout the service period.



REVENUE STREAMS | **List of operating revenue streams**

The table below presents a comprehensive list of operating revenue streams, detailing the various sources of income for a LNZP. Click the revenue stream for further detail in Annex 9.

Revenue streams	Description
Heat Sales	Selling heat to consumers or businesses within the area of the project.
Heat Storage	Storing excess heat generated during peak hours and selling it during periods of high demand.
Cooling Sales	Selling cooling to consumers or businesses within the area of the project.
Power Sales	Selling electricity via Power Purchase Agreements or to the wholesale market.
Power Exports	Exporting surplus electricity generated to neighbouring areas or districts.
Ancillary Services	Services that support the transmission of electricity from producers to consumers to maintain reliable operations of the power system.
Aggregator Services	Aggregating and optimising distributed energy resources (DERs) such as solar PVs, battery storage and EV infrastructure to provide demand flexibility services to the grid.
Demand Response	Reducing or shifting energy usage during peak hours to help balance the grid.
Microgrid Services	Selling energy from a local energy market (microgrid) to the wholesale market.
Public Transportation	Providing public transportation to customers, usually with a focus on electric buses and other electric vehicles.

REVENUE STREAMS | **List of flexibility services revenue streams**

The table below presents a comprehensive list of revenue streams from flexibility services. These represent minor supplementary revenue streams with limited assurance regarding the requisition of the service. Click the revenue stream for further detail in Annex 9.

Revenue streams	Description
Short-Term Operating Reserve (STOR)	Providing reserve energy to the National Grid to address unexpected mismatches in supply and demand.
Optional Downward Flexibility Management (ODFM)	Reducing or increasing renewable generation output to manage the electricity system during particularly low demand times of high generation.
Sustain Peak Management (SPM)	Providing capacity or energy to address a forecasted need to prevent a critical asset (such as a transformer) from becoming overloaded due to excess demand.
Sustain Export Peak Management (SEPM)	Providing capacity or energy to address a forecasted need to prevent a critical asset (such as a transformer) from becoming overloaded due to excess generation.
Secure - DSO Constraint Management (SDCM)	Providing flexibility to help address emerging issues that could result in an unplanned outage if not addressed.
Dynamic - DSO Constraint Management (DDCM)	Offering flexibility after an unplanned outage or fault has occurred.
Balancing Mechanisms	Participating in a real-time market used by the National Grid to balance electricity supply and demand.
Capacity Market	Ensuring there is sufficient capacity to manage peaks using either generation increase or demand reduction.
Dynamic Containment	Providing fast-acting frequency response when frequency breaches operational limits (+/- 0.2Hz).

REVENUE STREAMS | **List of Other revenue streams**

The table below presents a comprehensive list of other revenue streams which are often less regular than other streams discussed but may provide additional channels of income for the Local Authority. Click the revenue stream for further detail in Annex 9.

Revenue streams	Description
Carbon Offsets	Selling a carbon credit which represents a certain volume of emissions reductions.
Customer Connection Charges	Irregular transactions such as customer connection charges and the sale of components.
Sale of Components	Direct sales and/or installation of physical components, such as heat pumps, smart meters, insulation and retrofit parts.
Sale of Services	Providing consultancy and tailored advice to consumers including around retrofitting and energy efficiency measures.

Government Subsidies

Government subsidies offer financial assistance by offsetting costs to promote the development and implementation of projects.

Subsidies cover direct or indirect payment from the national government to offset market failures and externalities that impede the efficient uptake of LNZPs. **Where reliable revenue streams do not exist or this cannot be achieved, projects will need to be part-guaranteed by public subsidy or grant funding.** This is usually in the form of targeted tax cuts or grants. Some examples of national government subsidies in the UK are:

- **Contracts for Difference scheme:** The scheme is the main mechanism for supporting the generation of low-carbon electricity. The scheme provides project developers with the high upfront costs of the projects and protects them from volatility of wholesale prices. The scheme also protects consumers when prices are high.
- **Energy Company Obligation (ECO4):** The scheme works by placing a Home Heating Cost Reduction Obligation (HHCRO) on medium and large energy suppliers. ECO4 applies to measures installed from 1 April 2022 and will cover a four-year period until 31 March 2026.
- **Industrial Energy Transformation Fund (IETF):** The fund supports development and deployment of technologies that enable businesses with high energy use to transition to low-carbon alternatives. Funding through the IETF is available until 2027.
- **Heat Networks Investment Project (HNIP):** The project provides grants funding and guidance to Local Authorities for heat network projects. Round 13 of the project is open from 15 May 2023 until 31 December 2023.
- **Public Sector Decarbonisation Scheme (PSDC):** The scheme provides grants for public sector bodies to fund heat decarbonisation and energy efficiency measures.
- **Social Housing Decarbonisation Scheme (SHDF):** The fund provides £800m for social housing landlords to be used to improve energy performance of social housing. Local Authorities, Combined Authorities and Registered Providers of social housing may apply directly for SHDF Wave 2.1 funding.
- **Boiler Upgrade Scheme:** The scheme provides upfront capital grants to support the installation of heat pumps and biomass boilers in homes and non-domestic buildings in England and Wales. £450 million of grant funding is available over three years from 2022 to 2025.
- **Green Homes Grant Local Authority Delivery (LAD) scheme:** The LAD scheme provides £500m in funding to Local Authorities through Local Net Zero Hubs to improve the energy efficiency of low income and low energy performance homes with a focus on Energy Performance Certificate (EPC) ratings of E, F or G.

Net Zero Go has more examples of government subsidies and schemes for Local Authorities and innovators.

4

Design the commercial structure

This section includes:

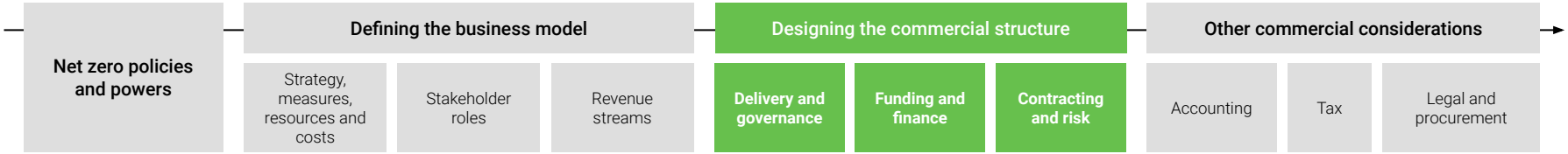
- **Delivery and governance:** The roles and relationship between the Project Sponsor and other actors.
- **Funding and finance:** The potential sources and flow of funding into and out of the project.
- **Contracts and risk:** How risks can be allocated within contracts at each stage of the project life cycle.

At this stage you will have:

- **Developed a clear understanding of the capital requirements for the project(s):** This includes both up-front capital expenditure and ongoing operational costs.
- **Developed detailed project plans:** For each project, a detailed project plan should be in place which includes scope, objectives, timeline, milestones, resources, risks and contingencies.
- **Identified revenue streams:** Mapped out potential revenue streams for each project and identified potential for revenue stacking and synergies between projects.
- **Conducted preliminary stakeholder engagement:** Consulted with key stakeholders and key roles required for delivering the project.

Design the commercial structure

Commercial structure is used as an overarching term which incorporates the delivery, governance, contracting, risks, funding and financing structure of the project.



There is a wide range of language used to discuss commercial structures. In this guide, we have referred to commercial structures as an overarching term which incorporates delivery, funding and contracting of a project as shown in the diagram to the right. Given the range of projects and stakeholders, the development of LNZPs can vary greatly. There is no one size fits all. These building blocks should be designed to ensure the strategic objective of the LNZP is met.

The following chapters provide an overview of the typical options a Local Authority has in determining the right commercial structure for their local net zero projects. It also provides a link between the strategic planning in developing the business model and the practical considerations for implementing a LNZP.

Please note that it is not possible to give definitive guidance that can be applied across the broad range of local net zero projects. Project Sponsors should seek specific advice tailored to their project to optimise the delivery structure adopted.

Building blocks of a commercial structure

Delivery and governance

The roles and relationships between the Project Sponsor and other actors.

Funding and finance

The potential sources and flow of funding into and out of the project.

Contracts and risks

How risks can be allocated within contracts at each stage of the project life cycle.

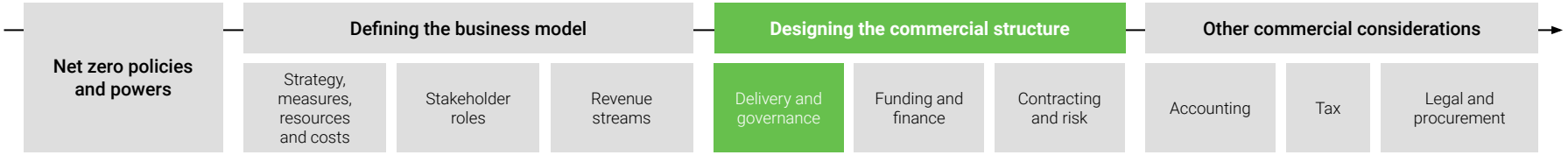
Fig.6 Building blocks of a commercial structure

4a

Delivery and governance

Delivery and governance

Choosing the right structure is an important decision that has to take into account many factors and consultation.



The stakeholders undertaking the roles in a LNZP can vary greatly. As such, there is no 'one size fits all' when it comes to delivering, contracting and financing a local net zero project. It is more like a continuum of options; from a wholly private sector solution to a scheme entirely funded, owned and operated by the public sector. There are several guidance documents available that recommend whether government should deliver projects in house or outsource, including the Cabinet Office Sourcing Playbook, which includes guidance on how to assess and select the right delivery model.

The process to determine the delivery structure is inherently iterative, dependent on contractual structures and procurement routes. It is important that proposed parties are engaged and their appetite tested before commitment is made to a particular delivery structure. In some instances a delivery structure might involve formal corporate entities for the purpose of local net zero delivery (for example, a Joint Venture or Special Purpose Vehicle), or they may make use of existing organisational structures.

This section first outlines the key consideration in determining the right delivery approach before introducing four illustrative delivery structures that are commonly seen in the market.

This section is structured as follows:

Overview - Sets out the high level considerations in developing designing the commercial structure for a LNZP.

Decision trees - Intended only as a guide, they support the reader in determining the appropriate delivery structure.

Delivery structure deep dives - The remainder of this section sets out four delivery structures which are commonly seen in the market in more detail.

OVERVIEW | Choose the appropriate delivery structure

There are a number of key factors a Project Sponsor would need to consider when selecting an appropriate delivery structure for local net zero projects.

Those best placed to manage each activity and the risks associated with it should do so. In practice, choosing the appropriate delivery structure for a project requires a careful evaluation of various factors. These are summarised in the table to the right but include the desired level of involvement from the Project Sponsor, the attractiveness of the project to third parties, the extent of control sought by the Project Sponsor, and the project's risk and reward exposure.

Consultation and engagement should happen early on:

- **Within the Project Sponsor** - those responsible for project development should have a view on what they think the right delivery structure is and why.
- **Within the Local Authority (if different)** - if the LA is not the Project Sponsor, then there should be early engagement to make sure the LA is on board and accepts its role.
- **With the market** - it is a good idea to test your thinking with the market early on to understand views on its deliverability and on market capacity (this can usually be done through established LA procurement channels).

Theme for consideration	Description
Control	Does the project align with your medium and long term objectives? What level of control is required? Where a scheme has been contracted with the private sector it can be difficult and costly to revert back to the public sector.
People and assets	Where are the capability and resources that are best placed to undertake the role? Also consider the risk of not having or losing internal capabilities and infrastructure. A clear understanding of any TUPE considerations or asset transfer considerations is essential. Ensure you have sought legal and commercial advice on any issues, and considered potential pension liabilities.
Delivery	Who is best placed to undertake each role to deliver the LNZP and maintain the continuity of service? The delivery model does not need to be fixed for all phases of the scheme. Consider alternative models when appropriate.
Market & Suppliers	Is there a viable supply chain capable of delivering the LNZP?
Risk	Consider how you can best minimise the overall risk and which risks can be reasonably allocated to a third party. Reputational risks can never be outsourced and appropriate management and mitigation are needed.

OVERVIEW | Common delivery structures

In the following pages, we consider four illustrative delivery structures with varying degrees of public and private involvement.

For illustrative purposes, the remainder of this section sets out the **four delivery structures which are commonly seen in the market** to support you in determining which delivery structure might be most appropriate for your project.

The nature of delivery - whether the project is private-led, public-led or some form of public-private partnership (PPP) - will determine who takes the role of Project Sponsor and funder. Alongside these considerations, further commercial factors such as the accounting, tax, State aid and procurement implications will feed into the decision.

While this guide provides a general overview for LNZPs, it is not exhaustive due to the diverse and bespoke nature of different structures. There are an infinite number of different models available.

It is common for projects to involve multiple funders, in which case arrangements are required to govern how finance should be blended and returned to the ultimate financiers.

Some projects also have multiple project sponsors, in which case it is necessary to define governance and decision-making processes in more detail.

We strongly recommend that Local Authorities seek tailored advice for each specific scheme when developing their business case.

Illustrative delivery structures	Description
In-house Delivery	The Project Sponsor, typically a Local Authority, will be both the asset owner and the operator without establishing a stand-alone delivery vehicle.
Public-owned SPV	The Project Sponsor establishes a stand-alone vehicle to own and operate the assets.
Joint Venture	The Project Sponsor establishes a stand-alone vehicle with a partner. They will share control over delivery and operation. A shareholder agreement will determine decision-making.
Third-party Delivery	The Project Sponsor enters into an energy services or concession agreement with a third party. The party is both the asset owner and operator, retaining liability for the asset. The third party may outsource operations and maintenance.

OVERVIEW | Control, opportunity, risk & reward

The delegation of roles and responsibilities to relevant parties is partly based on each party's desire for risk and reward.

The delegation of key roles and responsibilities is the next step after a delivery structure has been selected. Key areas that the Project Sponsor may want to control are: operating contracts, future expansion and tariffs. Generally, the more control required, the higher the level of risk and potential reward faced by the Project Sponsor.

Issues with funding, project development timelines, design or operational delivery can occur. When allocating responsibility to parties to undertake each of the roles, it's important that risks are allocated to those most able to manage that risk. As a result of taking on risk, parties will want to benefit from the opportunities of the scheme, such as revenues, loan or equity repayment(s), carbon reduction and other social benefits.

The In-house Delivery and the Public-owned SPV models give the Project Sponsor high levels of control over the project, however, they will also expose the Project Sponsor to more risk/ reward. Setting up a Public-owned SPV has the effect of ring fencing project operations so the Project Sponsor is slightly further removed from the project risk than through In-house Delivery, but many risks still flow to the ultimate Project Sponsor.

A Joint Venture divides control between partners in line with a shareholders' agreement. The Joint Venture partners will also share in the risk and reward of the project.

The Third-party Delivery model passes risk to the private sector, at the cost Of a reduced (or removed) share in any project rewards. It could either be a service agreement or concession agreement.

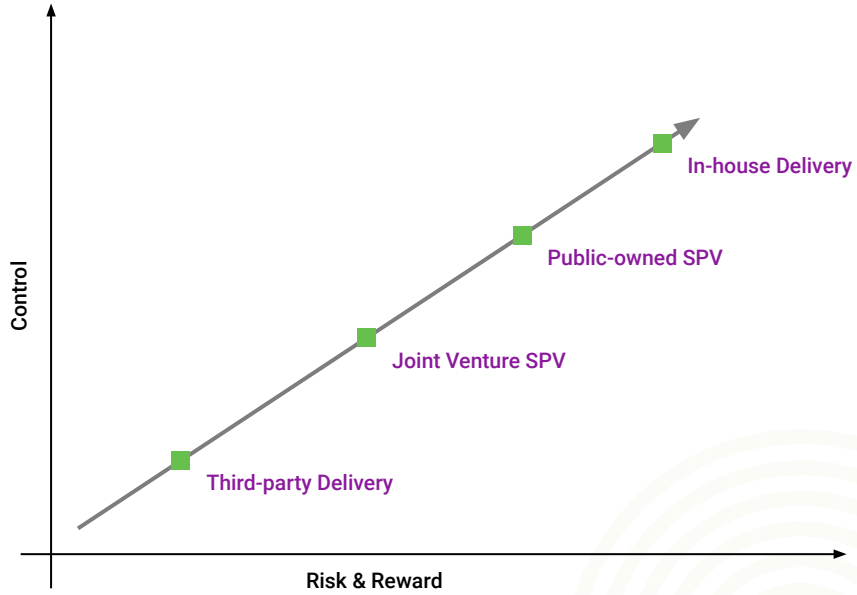
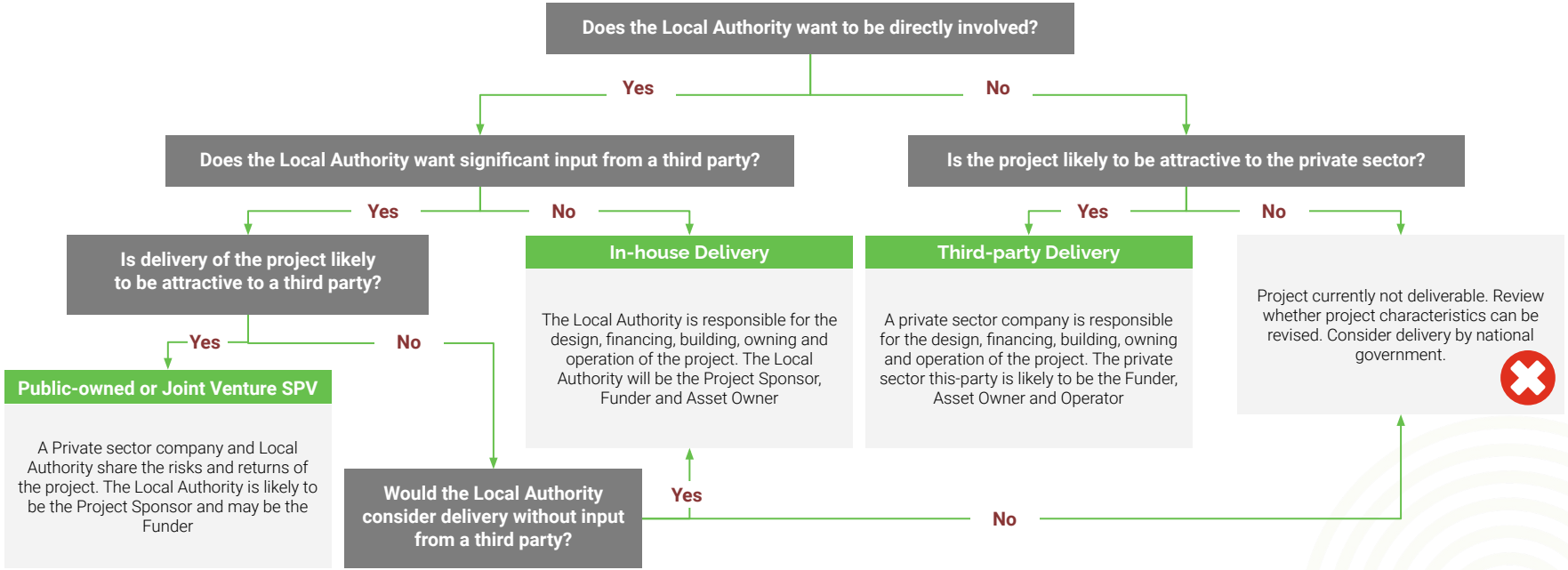


Fig.7 Control x Risk & Reward matrix

DECISION TREE | **Determine public-private involvement**

Determine the delivery structure options based on the Local Authority's intentions and the attractiveness of the project to delivery by the private sector.

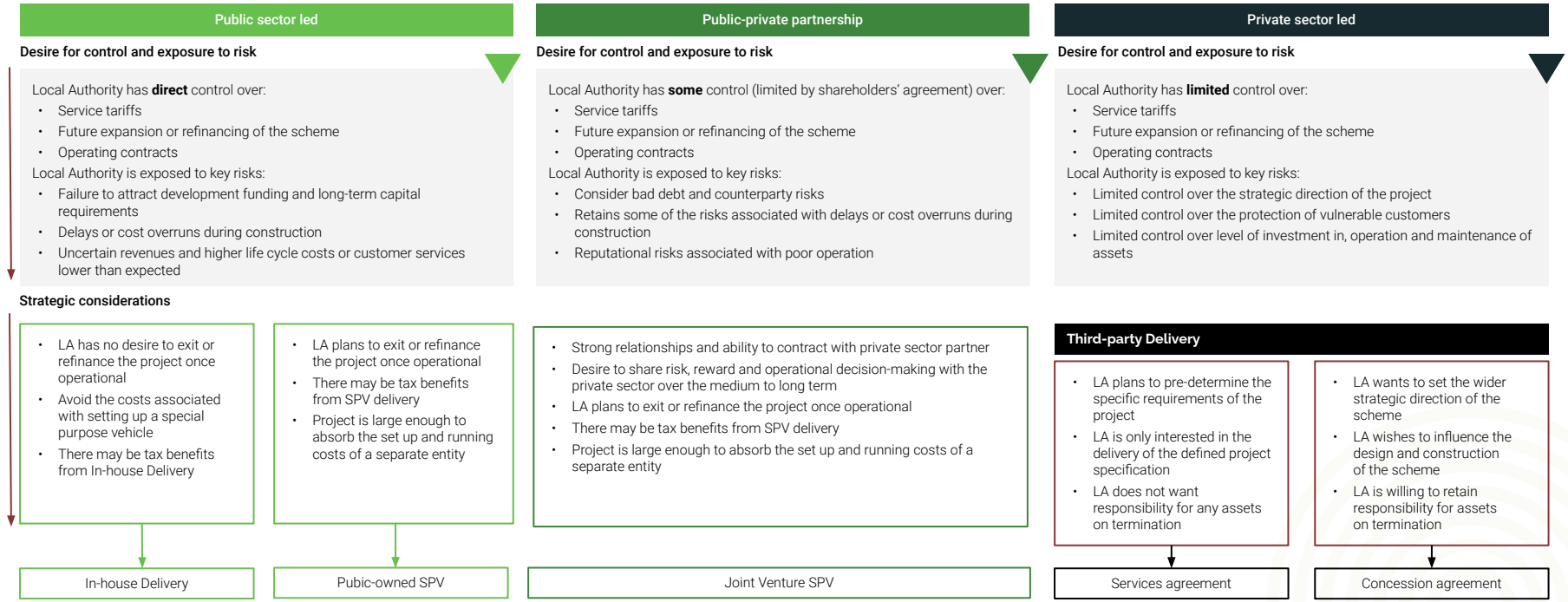


Note: This decision tree is intended as a guide only, to explore some of the issues which are likely to impact a choice of delivery structure. It is not prescriptive and the flow of decisions may not fit every project or portfolio.

Fig.8 Public-private involvement decision tree

DECISION TREE | **Preferred delivery structures**

Determine the potential preferred delivery structure based on project characteristics, control, risk and reward.



Note: This decision tree is intended as a guide only, to explore some of the issues which are likely to impact a choice of delivery structure. It is not prescriptive and the flow of decisions may not fit every project or portfolio.

Fig.9 Preferred delivery structures decision tree

In-house Delivery

The Project Sponsor, typically a Local Authority, will be both the asset owner and the operator without establishing a stand-alone delivery vehicle.

IN-HOUSE DELIVERY | **Overview**

The In-house model involves the Project Sponsor using its own resources and expertise to implement LNZPs, with funding primarily sourced from public sector loans and green finance instruments.

Description

The Project Sponsor uses its own resources, expertise and personnel to implement and oversee LNZPs without establishing a stand-alone delivery vehicle. In-house Delivery can allow for a deeper integration of the project within the Project Sponsor's operations, but it is important to consider its organisational readiness to deliver the scheme including experience, resource availability and flexibility to change.

Funding

Public sector loans, such as those from the Public Works Loan Board (PWLB), are commonly used by Local Authorities. However, they come with conditions that the borrowed funds must primarily and directly support public services like housing, regeneration or preventative action. For larger projects (>£5 million) that align with net zero and local economic growth objectives, the UK Infrastructure Bank (UKIB) provides an alternative.

The Project Sponsor can also explore green finance which includes instruments like green bonds, green loans and grants that are specifically designed to fund sustainability projects. Additionally, the Local Authority can use equity funding from reserves and property assets, or even make use of various green grants that target diverse areas such
as building energy efficiency or electric vehicle charging facilities. Further detail can be found in Section 4b. Funding and Financing.

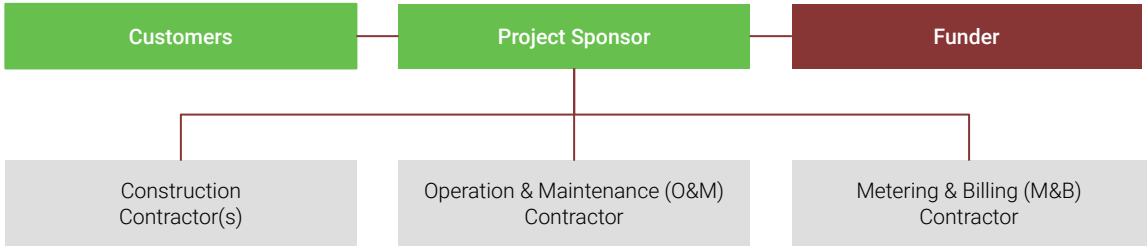
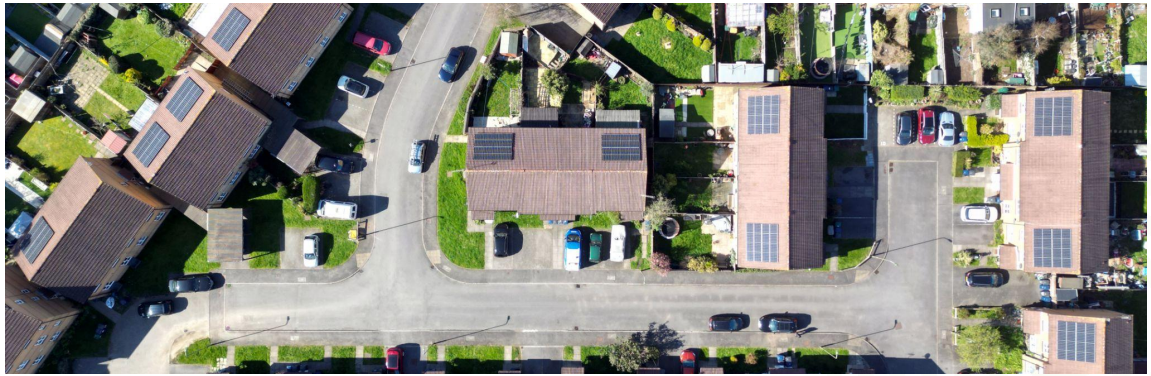


Fig.10 In-house model structure

Note: The lines represent a contractual relationship. The only exception to this is in relation to funding provided through internal reserves, for which a contract may not be required. The equivalent diagram from a cash flows perspective can be seen in **Annex 6**.



IN-HOUSE DELIVERY | **Control and exit strategy**

The Project Sponsor retains full control and bears all risks, reaping the direct financial rewards of successful projects, but exit strategies are limited due to the lack of a separate entity.

Control versus risk and reward

The Project Sponsor maintains complete control over the project. They make decisions about hiring contractors, setting prices for heat and power, and deciding how the project should expand. However, having this level of control also means they have to take on certain risks.

The Project Sponsor is responsible for securing funds, overseeing construction and operating the project. If these activities are not sub-contracted, the **Project Sponsor is exposed to risks at all stages of the project's life cycle** such as connection difficulties, fluctuating energy prices, insurance issues and uncertain heat or power demand volumes. There are also risks that arise from dealing with third parties and, in extreme situations, bankruptcy of subcontracted operators or suppliers.

Where the scheme is successful, the Project Sponsor gets to enjoy all the financial benefits. They can reinvest these gains back into the community or use them for other initiatives. This way, they balance out the risks and potential rewards while having more control over the project.

Exit strategy

There are limited exit strategies for In-house Delivery as there is no separate entity to sell shares or refinance. Assets could be sold to a third party (subject to novation of any operating contracts).

Alternatively, a SPV could be set up retrospectively and operation transferred into this SPV to enable divestment of the project.

IN-HOUSE DELIVERY | **Advantages and disadvantages**

An in-house deliver structure allows for strategic control and avoids the costs of establishing a SPV, but it exposes the Project Sponsor to all project risks and requires them to secure funding.

Advantages

- Project Sponsor retains all strategic control over the project (for example, future expansion, setting energy tariffs).
- Costs of establishing and running a separate entity are avoided.
- Creation of new jobs in the community with learnings and/or skills retained and developed in-house.
- All revenue generated is retained locally and can be re-invested in other initiatives.

Disadvantages

- Project Sponsor is exposed to all project risks (if not passed down to contractors).
- Responsibility for securing funding lies with the Project Sponsor.
- Project Sponsor may not have the expertise to deliver the scheme as efficiently as the private sector.
- It can require a significant amount of resources to deliver effectively.
- Opportunities to exit are limited.

IN-HOUSE DELIVERY | Peterborough Integrated Renewables Infrastructure

The Peterborough Integrated Renewables Infrastructure (PIRI) project, led by Peterborough City Council, aims to integrate electricity, heat and transport systems in the Peterborough area. The In-house Delivery model was chosen to retain control and align with local initiatives.

Overview

The PIRI project aims to deliver an integrated system design for electricity, heat and transport. The project will be owned and delivered by the Peterborough City Council (PCC), which is the Project Sponsor.

Funding

Initial Investment Cost

PIRI was awarded £14.5m funding from the Green Heat Network Fund (GHNF) and may be able to access other concessional options, such as loans provided by the PWLB or UKIB. Financial constraints and revenue pressures make significant investment from PCC reserves extremely challenging in practice, as such the project expects the investment required to convert the gas distribution infrastructure to be covered wholly or partly by the Industrial Energy Transformation Fund (IETF) or similar funds. Commercial bank loans may also be needed to plug remaining funding gaps.

Revenue Streams

The integration of revenue streams from the PIRI heat and electricity services was essential for the project's commercial success. Given electricity generation is not estimated to exceed local demand, V-PPA, export payments and flexibility revenue are unlikely. Power purchase agreements provide an alternative option for electricity sold to customers via private wire. Heat as a service subscription is likely to be most appropriate for heat with other mechanisms unlikely to be relevant.

Control versus risk and reward

PIRI considered 1) Private sector concession model, 2) Joint Venture model and 3) Council (In-house) delivery model. The **In-house Model (Option 3) was the preferred option** for the PIRI Project because it provided PCC with full control over the project's implementation and strategic alignment with other local initiatives and regeneration plans.

This allowed PCC to **prioritise socio-economic objectives** and support its net-zero targets effectively. Despite the financial risks associated with self-funding, the model offered flexibility and opportunities for mitigating risks through grant support and efficient resource planning. By directly owning and delivering the project, PCC could retain maximum value within the region, reinvesting returns from the project's success into other initiatives. Additionally, PCC's leadership in the project enhanced credibility and trust among stakeholders, making it an appealing choice for the delivery structure.

Exit Strategy

As an In-house Delivery structure, the PIRI project's exit strategy may involve the **PCC gradually divesting its ownership** and control in the project over time, allowing private investors to take on a more significant stake. The specifics of the exit strategy would depend on the terms agreed upon at the project's inception and the mutual interests of the stakeholders involved.

Public-owned SPV

The Project Sponsor establishes a stand-alone vehicle to own and operate the assets.

PUBLIC-OWNED SPV | **Overview**

The Project Sponsor establishes a wholly owned SPV to deliver the LNZP and assumes financial and technical risks, with funding sourced from traditional public financing options and green finance mechanisms.

Description

The Project Sponsor establishes a wholly owned, stand-alone SPV that **provides services to consumers and assumes the financial and technical risk** involved. This might be the case if the Project Sponsor wishes to retain complete control over the project, its financing and its outcomes. Note, the SPV may contract out the construction, O&M or M&B of the LNZP in the diagram to the right.

Funding

Traditional public financing options such as the **Public Works Loan Board (PWLB) and the UK Infrastructure Bank (UKIB)** are also accessible under this structure. Public-owned SPVs can also explore green finance mechanisms including **green bonds and green loans,** which are specifically designed to fund projects with clear environmental benefits.

The SPVs can leverage their recognised stand-alone entity status to **access capital by selling shares of the entity to third-party investors.** Additionally, they can tap into the wide array of green grants available that cover diverse areas such as building energy efficiency schemes and electric vehicle charging facilities. However, any such funding source will require clear, transparent and auditable verification of the project's environmental benefits and carbon emissions management during delivery stages.

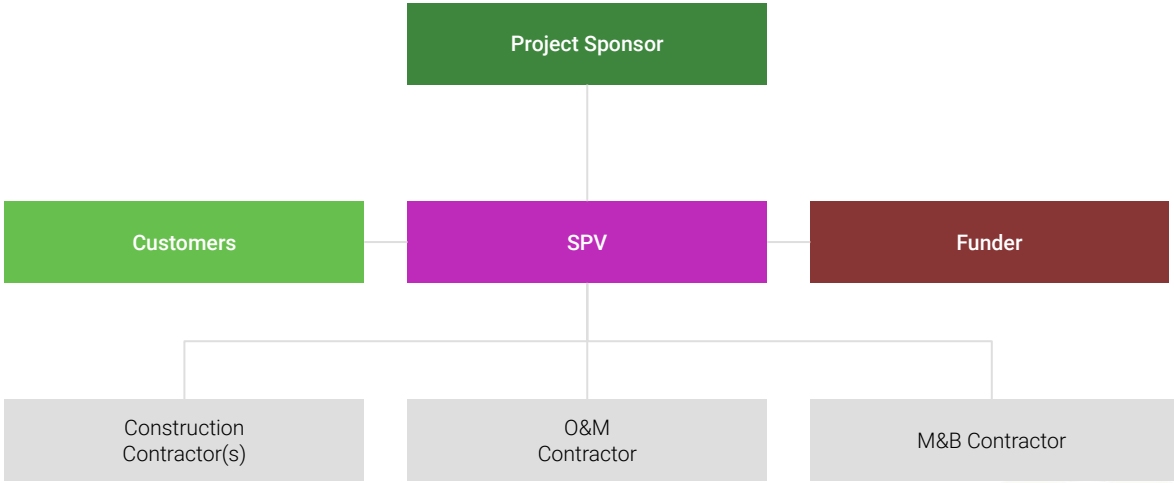


Fig.11 Public-owned SPV model structure

Note: The lines represent a contractual relationship. The only exception to this is in relation to funding provided through internal reserves, for which a contract may not be required. The equivalent diagram from a cash flows perspective can be seen in Annex 6.

PUBLIC-OWNED SPV | **Control and exit strategy**

The Project Sponsor retains control and bears the risks, but the separate legal entity provides an additional layer of protection and more flexible exit strategies.

Control versus risk and reward

In the Public-owned SPV model, the **Project Sponsor retains control over delivery** including the procurement of contractors, future expansions and setting the energy tariffs and service level agreements (SLA).

The Project Sponsor **bears the risk of funding, constructing and operating the project,** similar to the In-house Delivery structure. However, in this case, the SPV is a separate legal entity set up by the Project Sponsor, which may provide an **additional layer of protection against risk** while also reaping the financial rewards from the project's success, with the potential for profits to be reinvested back into the community or on other strategic objectives.

In the event that a service is unable to be provided or the SPV fails, it is likely that the Project Sponsor will need to step in to maintain operations, either through arrangements with a supplier of last resort or by directly assuming responsibility for the service, implementing contingency plans and securing alternative resources or partnerships as necessary.

Exit strategy

The exit strategies for a Public-owned SPV are **more flexible compared to the In-house Delivery approach.** As the SPV is a distinct entity, the Project Sponsor has the option to sell shares or refinance the SPV. Another option is the sale of the asset to a third-party. The Project Sponsor is also able to divest the project by transferring the operations to another SPV or entity with a similar structure.

PUBLIC-OWNED SPV | **Advantages and disadvantages**

This model allows the Project Sponsor to retain control and financial benefits, but requires significant investment and exposes the Project Sponsor to all project risks.

Advantages and disadvantages

Advantages

- Project Sponsor retains all strategic control of the project and receives all the financial benefit generated from the project.
- Project Sponsor can accumulate expertise and knowledge within the SPV which could be utilised on future projects.
- Project Sponsor may exit the SPV through sale of shares and could also refinance the project debt.

Disadvantages

- Project Sponsor may need significant investment for the project which may strain its capital resources.
- The SPV is exposed to all the project risk, if not passed down to contractors.
- Managing a SPV requires human and financial resources which could divert attention from the Project Sponsor's other priorities.

PUBLIC-OWNED SPV | **Gateshead District Energy Scheme**

The Gateshead District Energy Scheme, funded and owned by Gateshead Council, leverages a wholly-owned Energy Services Company (ESCo) and heat networks to offer energy services at reduced rates to the local community.

Overview

The Gateshead District Energy Scheme is based on two gas-fired combined Heat and Power (CHP) engines located at the Gateshead energy center. The scheme is delivered through a wholly-owned Energy Services Company (ESCo).

Funding

Initial Investment Cost

The Gateshead District Energy Scheme was funded by Gateshead Council, with an initial investment of £18 million and the project is expected to make an 8% return over a 40-year period.

Revenue Streams

The project also stacks revenue by providing grid services to National Grid and through cost avoidance. The scheme participates in the Capacity Market auction, yielding £60,000/year, and has a 10-year contract with Centrica to manage the 3MW battery, providing flexibility services.

Control versus risk and reward

Gateshead Council is the owner and funder of the project, having set out initial plans in 2011. The Council established and wholly owns the Gateshead Energy Company (ESCo), which acts as the scheme operator and supplies customers with energy and heat.

The objectives of the project include reducing carbon emissions, lowering energy bills for consumers, strengthening the Council's financial position and creating business growth in Gateshead. The Council's control over the project has allowed for innovation, cost reduction and alignment with local sustainability goals.

Exit Strategy

Given the long-term nature of the project and the Council's ownership and control, the exit strategy would likely be aligned with the broader urban redevelopment and sustainability goals of Gateshead. Any potential exit or transition would need to consider the ongoing commitments to consumers, the local community and the various revenue streams and contracts associated with the project.

Joint Venture SPV

The Project Sponsor establishes a stand-alone vehicle with a partner. They will share control over delivery and operation. A shareholder agreement will determine decision-making.

JOINT VENTURE SPV | **Overview**

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.

Description

A Joint Venture is a strategic partnership between the Project Sponsor and another party (private or public entity) set up for the purpose of delivering a LNZP. 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. Further guidance on forming a Joint Venture can be found in the HM Treasury - Joint Ventures.

Funding

The Project Sponsor shares responsibility for securing funds with the Joint Venture Partner under this structure. **This means there is the potential to use both public and private sources of funding for the project.** Public sources of funding would be similar to those in the Public-owned SPV, with the addition of private sector sources of finance such as third-party debt and equity.

Green finance sources such as green loans and grants are also viable funding options, provided they meet the eligibility criteria and the project displays clear, transparent and auditable verification of the environmental benefits and carbon emissions management during delivery stages. Further detail can be found in Section 4b. Funding and Financing.

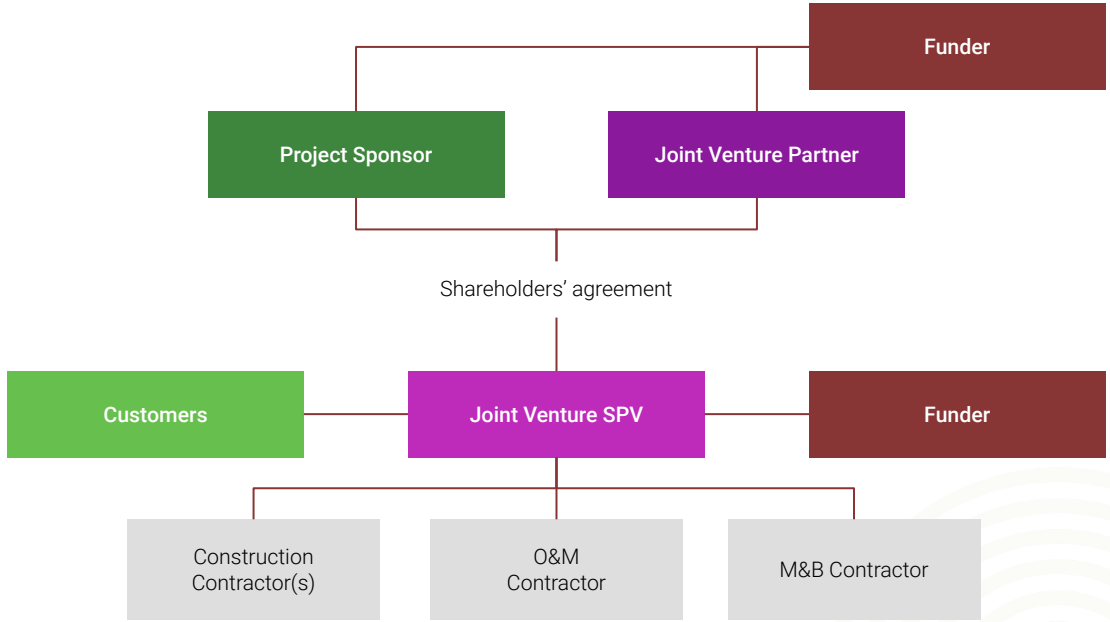


Fig.12 Joint Venture SPV model structure

Note: The lines represent a contractual relationship. The only exception to this is in relation to funding provided through internal reserves, for which a contract may not be required. The equivalent diagram from a cash flows perspective can be seen in Annex 6.

JOINT VENTURE SPV | **Control and exit strategy**

Control, risk and rewards are shared between the Project Sponsor and external partners, providing the potential for better project outcomes but also for delays due to shared decision-making.

Control versus risk and reward

In a Joint Venture structure, control is shared between the Project Sponsor and one or more external partners, often through a collaborative approach that allows for the sharing of resources, knowledge and expertise. This can potentially lead to better project outcomes and more efficient delivery of initiatives. **The risk of funding, constructing and operating the project are also shared, reducing the burden on the Project Sponsor but also limiting the extent of direct financial rewards.**

Certain issues may require participants' approval, often known as "reserved matters" or "veto rights." These typically include approval of business plans, budgets, material contracts, changes in distribution policy and introduction of new funding or participants.

Considerations for risk and reward sharing in a Joint Venture	
Legal Form	A company structure may offer **more protection against liability but may limit flexibility in decision-making.** The legal form of the entity will impact the finance it can access, tax exemptions and the level of control each of the shareholders may have.
Governance	Effective governance ensures that **conflicts of interest, confidentiality and dispute resolution are handled in a way that aligns with the shared goals of risk and reward.** This is crucial for maintaining trust and collaboration between the Project Sponsor and partners.
Control	The **balance of control affects how risks and rewards are shared.** Too much control by one party may hinder collaboration, while too little may expose the project to risks which may impact the overall direction of the project or prevent delivery on specific objectives of the Project Sponsor.

Exit strategy

For a Joint Venture structure, exit strategies require coordination and agreement with the Joint Venture partners. **The shareholder's agreement tends to be flexible, allowing for the Project Sponsor and other external partners to sell their shares in the project.**

One option could be for the Project Sponsor to **buy or sell its shares in the Joint Venture to the other partner or a third party.** Once the project is operational, there may also be the potential to refinance any debt extended to the SPV at a lower cost of funding, as design and construction risks would no longer be material.

Alternatively, the Joint Venture could be dissolved, with assets distributed according to the original agreement.

JOINT VENTURE SPV | **Advantages and disadvantages**

Joint Ventures allow for risk sharing and resource pooling, but decision-making can be complex and time-consuming due to multiple stakeholders.

Advantages and disadvantages

Advantages

- Project Sponsor is able to **share risks** associated with the project which can reduce the financial burden on each party.
- Partners in the Joint Venture can **combine their respective knowledge**, technologies and resources to enhance the overall delivery and operation of the project.
- **Project Sponsor retains some strategic control** with the option to exit the Joint Venture through sale of shares.

Disadvantages

- Decision-making can be more **complex and time-consuming** due to multiple stakeholder being involved.
- Different objectives and priorities among the partners can lead to **conflict and disagreement.**
- **Burdensome legal and policy challenges** with setting up the Joint Venture and negotiating exit options.

JOINT VENTURE SPV | **Bristol City Leap**

The City Leap Energy Partnership between Bristol City Council and Ameresco Ltd utilises private sector investment, with Ameresco assuming greater risk, to drive £1 billion into Bristol's energy system.

Overview

The City Leap Energy Partnership is a 20-year Joint Venture between Bristol City Council (BCC) and Ameresco Ltd that aims to enable the delivery of over £1 billion of investment into Bristol's energy system.

Funding

Initial Investment Cost

Ameresco estimates a total investment of approximately £631 million over the initial 5-year business plan period. This investment is profiled to focus on various areas such as Council operational buildings, social housing, large-scale renewables and strategic heat main planning. The plan includes a ramp-up in capital investment in years 3, 4, and 5, focusing on social housing, private residential properties, the development of the Strategic Heat Main and wind generation.

Revenue Streams

The Bristol Leap has a range of revenue streams which are underpinned by the various technologies and market segments. These include - sale of heat and energy through heat network zones and renewable electricity generation respectively. There are also savings associated with the energy efficiency projects.

Control versus risk and reward

BCC concentrated on three main options for the delivery of the City Leap - a) Third-party Delivery, b) Joint Venture SPV,
c) Public-owned SPV . Some of the factors considered when deciding include; integration with current council energy service, optimising the council's renewable energy assets and the extent of influence and control.

Given the scale of the Leap and potential risks, the council concluded that it has a strong preference to share these risks and rewards with potential partners but to retain a strong interest and an element of control of the City Leap. The council's view emphasised the need for a central relationship between the council and a more strategic partner that can act as the cornerstone and catalyst for City Leap.

Exit Strategy

The 20-year duration of the Joint Venture and the commitment to a rolling five-year business plan, means that there are decision points every 5 years and time to plan for an exit strategy that is aligned with the long-term goals of the partnership.

The exit strategy might involve gradual changes in ownership, control or strategic direction, depending on the evolving needs of the city, technological advancements, regulatory changes and other factors influencing the energy landscape.

It may also involve a diversification of private company involvement, either through different JVs or as partners in the existing City LEAP vehicle.

Third-party Delivery

The Project Sponsor enters into an energy services or concession agreement with a third party. The party is both the asset owner and operator, retaining liability for the asset. The third party may outsource operations and maintenance.

THIRD-PARTY DELIVERY | **Overview**

The Project Sponsor contracts a third party to deliver the project, with the third party responsible for funding the project.

Description

The Project Sponsor enters into a Services or Concession agreement with a third party to deliver the project. The third party is the asset owner and operator, and is responsible for funding the project.

Funding

Under this arrangement, the **third party (supplier) is responsible for securing funding for the project.** The supplier has the flexibility to seek funding from various sources, which may include grants, loans and equity investments from both the public and private sectors.

Where a concession agreement is used, there are two methods of funding:

- **Assets are funded by the third party**: The third party is responsible for funding the project and then receives an agreed payment from the Project Sponsor and/or customer.
- **Third party adopts assets:** The Project Sponsor is responsible for funding/securing funding for the project through internal reserves, lease funding and/or grants. The third party would then pay the Project Sponsor for rights to use ('adopt') the assets.

Further detail can be found in Section 4b. Funding and Financing.

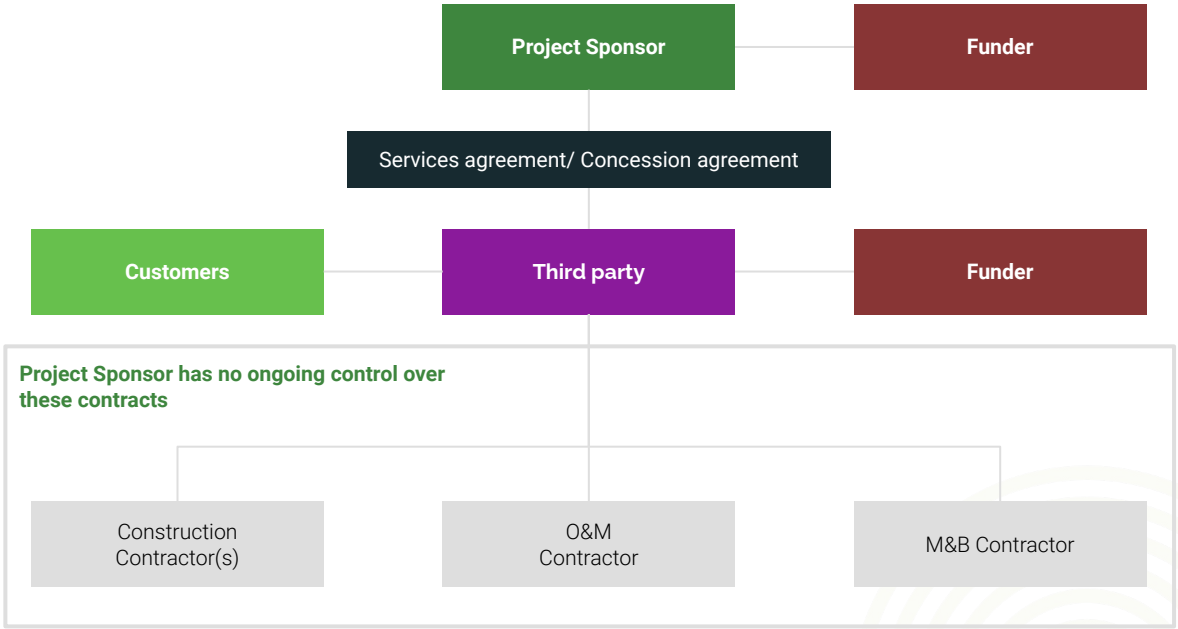


Fig.13 Third-party Delivery model structure

Note: The lines represent a contractual relationship. The only exception to this is in relation to funding provided through internal reserves, for which a contract may not be required. The equivalent diagram from a cash flows perspective can be seen in Annex 6.

THIRD-PARTY DELIVERY | **Control and exit strategy**

The Project Sponsor relinquishes control to the third party, reducing risk but also limiting control over project outcomes and financial rewards.

Control versus risk and reward

In a Third-party Delivery model, the Project Sponsor relinquishes control over the project's delivery to a private sector third party. The private sector body takes on the responsibility of funding, constructing and operating the project.

While this reduces the risk for the Project Sponsor, it also means the Project Sponsor has less direct control over the project outcomes and **benefits less from the financial rewards of the project**. This model can be beneficial if the Project Sponsor lacks the resources or expertise to undertake the project themselves.

Under Third-party Delivery, there are various ways that risk and reward can be managed. Common examples include concessions, service agreements and franchises. Each arrangement grants different rights in return for different levels of reward for the concession holder/franchisee. **The choice of arrangement determines how the Project Sponsor can influence the services delivered by the third party.** As such, it is important that the Project Sponsor considers what level of ongoing control they want to retain over the project.

For example, **under a concession agreement, the Project Sponsor has an opportunity to retain some level of control over the construction contractor(s)**. In this way, the Project Sponsor will be exposed to some level of funding and construction risk. However, it is sheltered from the risk of operating the project and will not see any direct financial rewards from the success of the project.

Exit strategy

Energy services agreement

The exit strategy will depend on the terms of the contract with the Project Sponsor (Local Authority). Typically, after the energy service agreement (usually up to 25 years), the service provision to the Project Sponsor will cease. At this point the Project Sponsor can choose to either renew the contract with the existing third party, appoint a new third party or change the delivery structure entirely to either In-house or a Joint Venture.

The Project Sponsor could also negotiate an early termination of the contract, which would likely involve compensating the third party for any financial losses.

Concession

At the end of the concession agreement (often 20–40 years), the Project Sponsor will be able to either become the operator, enter into a new concession agreement or sell the assets.

THIRD-PARTY DELIVERY | **Advantages and disadvantages**

Third-party Delivery transfers project risks to the external company and preserves the Project Sponsor's capital, but limits control over the project and may lead to conflicts or suboptimal outcomes.

Advantages and disadvantages

Advantages

- Contracting a third party transfers many of the project risks to the external company, shielding the Project Sponsor from direct exposure.
- The third party could bring in specialised knowledge and experience in implementing energy solutions.
- The Project Sponsor can preserve capital by not having to make large initial investments, as the third party typically finances the projects.

Disadvantages

- Project Sponsor has limited control over the project, as decisions are primarily made by the third party.
- The third party's interest in maximising their profit may result in higher heat and power tariffs which might not always align with the Project Sponsor's objectives, leading to potential conflicts or suboptimal outcomes.

THIRD-PARTY DELIVERY | **Trafford EV charging infrastructure**

Trafford Council's partnership with Be.EV leverages Third-party Delivery and expertise to accelerate the rollout of its EV charging infrastructure.

Overview

Trafford Council has engaged with Be.EV (Iduna), appointed by Transport for Greater Manchester (TfGM), **to accelerate the rollout of its EV charging infrastructure across Trafford.** The project aligns with the Greater Manchester strategy and aims to develop a widespread network of EV chargers, including Fast, Rapid and Ultra-rapid chargers.

Funding

Initial Investment cost

Be.EV, as the supplier, has invested an initial £1 million and is responsible for the **purchase and installation costs and ongoing operation and maintenance costs** under the Supplier Owned Infrastructure model. Trafford has £500k in the existing approved capital program to invest and support the rollout of the EV charging infrastructure.

Revenue Streams

The key revenue streams for the project are obtained from the mix of fast, rapid and ultra-rapid charging points.Trafford council and Be.EV are engaged in a profit share arrangement in which Be.EV returns a share of the profits generated from the various charging sites to the Council and retains the rest internally.

Control versus risk and reward

Delivery of Trafford's EV infrastructure is currently managed by TfGM on behalf of all the Greater Manchester Local Authorities. GM appointed Be.EV as the EV Charging Infrastructure Service Provider to deliver a range of EV charging infrastructure solutions through a seven-year contract to expand, upgrade, re-brand and maintain the existing publicly owned EV charging infrastructure.

Trafford Council explored various delivery options with Be.EV, including a) Supplier Owned Infrastructure, b) Publicly Owned Infrastructure, and c) Joint Venture. To accelerate the roll out of the infrastructure, **the recommended approach was to enter into a lease arrangement initially**, with no capital investment required from Trafford.

The Council will retain ownership of the site and the chargers will be owned, installed and maintained by Be.EV, who will also provide Trafford Council with a share of the site's profits.

Exit strategy

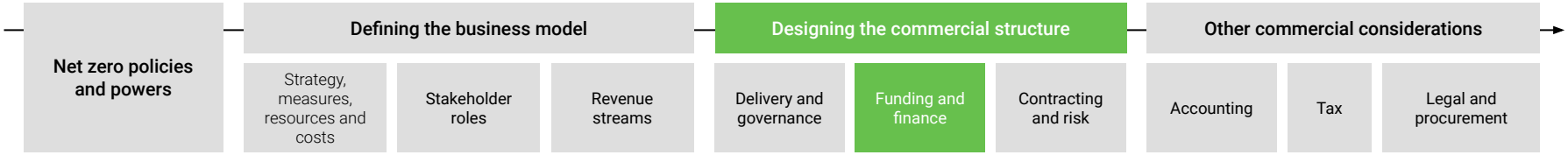
Future options which maximise income opportunities to Trafford council will be explored - including a public-owned SPV and Joint Venture SPV options - to allow for the possibility of Trafford to receive a return on any potential investment.

4b

Funding and finance

Funding and finance

This section provides an overview of the various sources of funding and finance available for LNZPs.



In this section, we provide details about the types of funding and finance which might be available to a LNZP. We explore the **implications of each type of funding and finance and the delivery structure that they are most suited to.**

Funding for a LNZP may come from a variety of sources and can be extended to the project in different ways. Please note, we have focused on **long-term capital sources that can fund the initial investment cost rather than short term sources** for working capital requirements. In many instances, the biggest blocker to project delivery is the gap in funding for project development. Where relevant, we have highlighted where sources may be used to support the earlier phases of the project life cycle.

Please note that it is not possible to give definitive guidance that can be applied across the broad range of local net zero projects. Project Sponsors should seek specific advice tailored to their project to optimise the financial structure adopted.

The structure of this section is as follows:

Overview of the funding and finance landscape - Sets out the diverse range of capital sources we have considered in this guide.

Accessing low cost funding - Provides an overview of what you can do to reduce the cost of funding.

Deep dives on sources of capital - These seven sub-sections provide a deep dive on different types of capital that can be used to fund a project.

OVERVIEW | **Timeline for engaging funding sources**

The timeline below shows the various funding sources for different stages of the project's life cycle. These sources will vary depending on the stage of the project and risks associated with each stage.

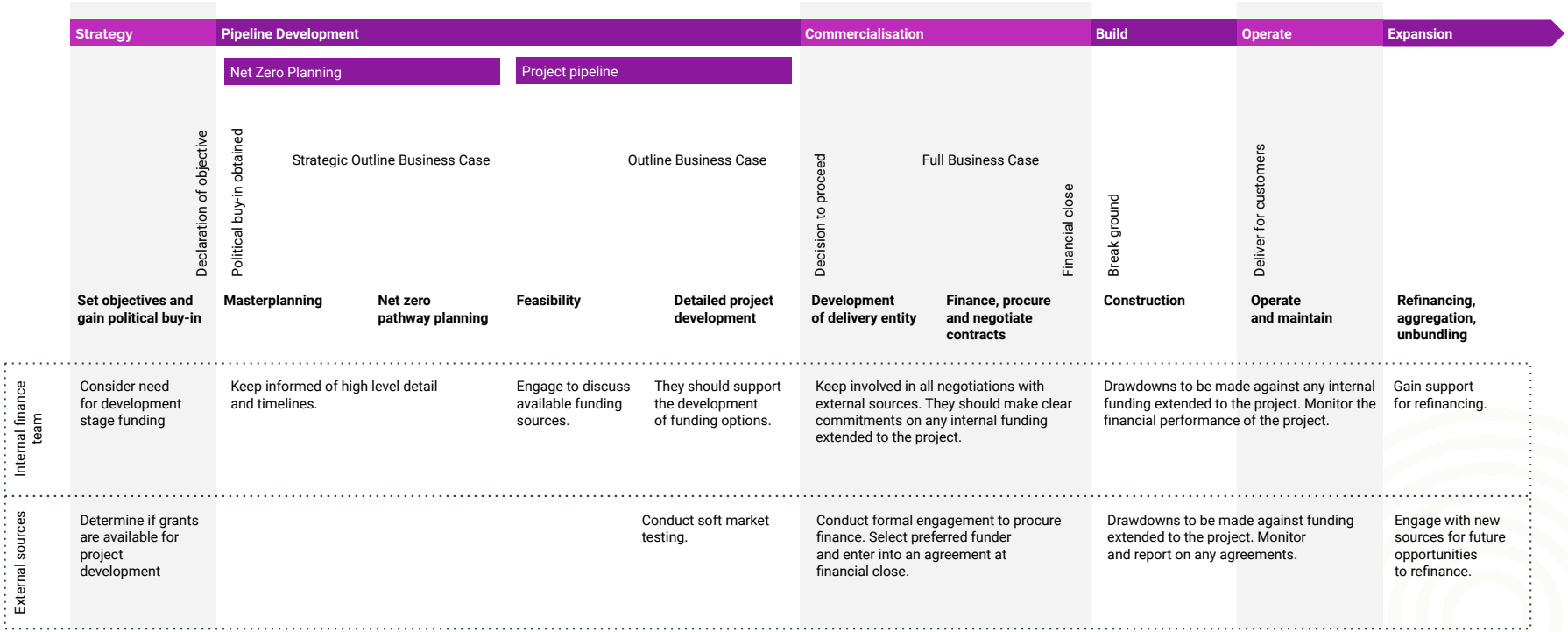


Fig.14 Timeline for engaging funding sources

OVERVIEW | **Diversify sources of capital**

Current funding for infrastructure is almost exclusively sourced from PWLB. Other sources are available but these will require careful planning.

Funding for a LNZP can come from a variety of sources and can be extended to a project in different forms. The UK government guide for business cases encourages Local Authorities to "consider innovative sources of funding and financing". However, **many Local Authorities have yet to tap into the full suite of financial products.** As a result, current funding for infrastructure is almost exclusively sourced from the Public Works Loans Board (as shown in the diagram to the right). While a cheap source of capital at ~3%, the PWLB's capacity to lend is quickly decreasing. This section presents other available sources of finance.

To accelerate delivery, it is important that LAs are able to match projects with other suitable funding sources. However, Local Authorities have limits on the overall amount of funding they can raise, the types of counterparty, and the purpose the funds are being used for, and these rules are set to tighten[1]. Local Authorities need to carefully plan and secure appropriate funding and financing for their projects. The **suitable funding sources are influenced by the choice of delivery structure, type of project and risk profile.** It is important to recognise that private investors will only invest when they can see how they will generate an acceptable return. Investment will need to be underpinned by revenue streams to repay that private sector investment; and where these are insufficient, grant funding will be required.

Local government long-term borrowing sources (2022)[2]

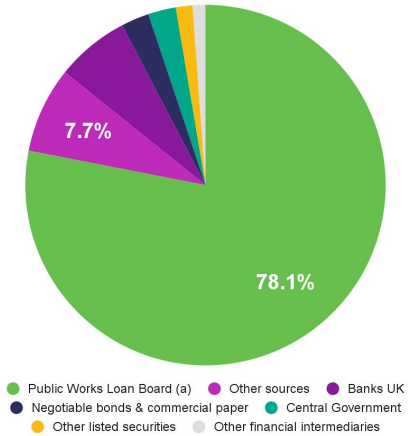


Fig.15 Local government long-term borrowing sources

(1) **The Levelling up Bill (2022) is set to introduce stricter limits on these factors.** At the same time, the current interpretation of IFRS16, which comes into effect fully in April 2024, requires certain outsourced assets to be treated as 'on-balance sheet', decreasing the amount of headroom available for other projects.

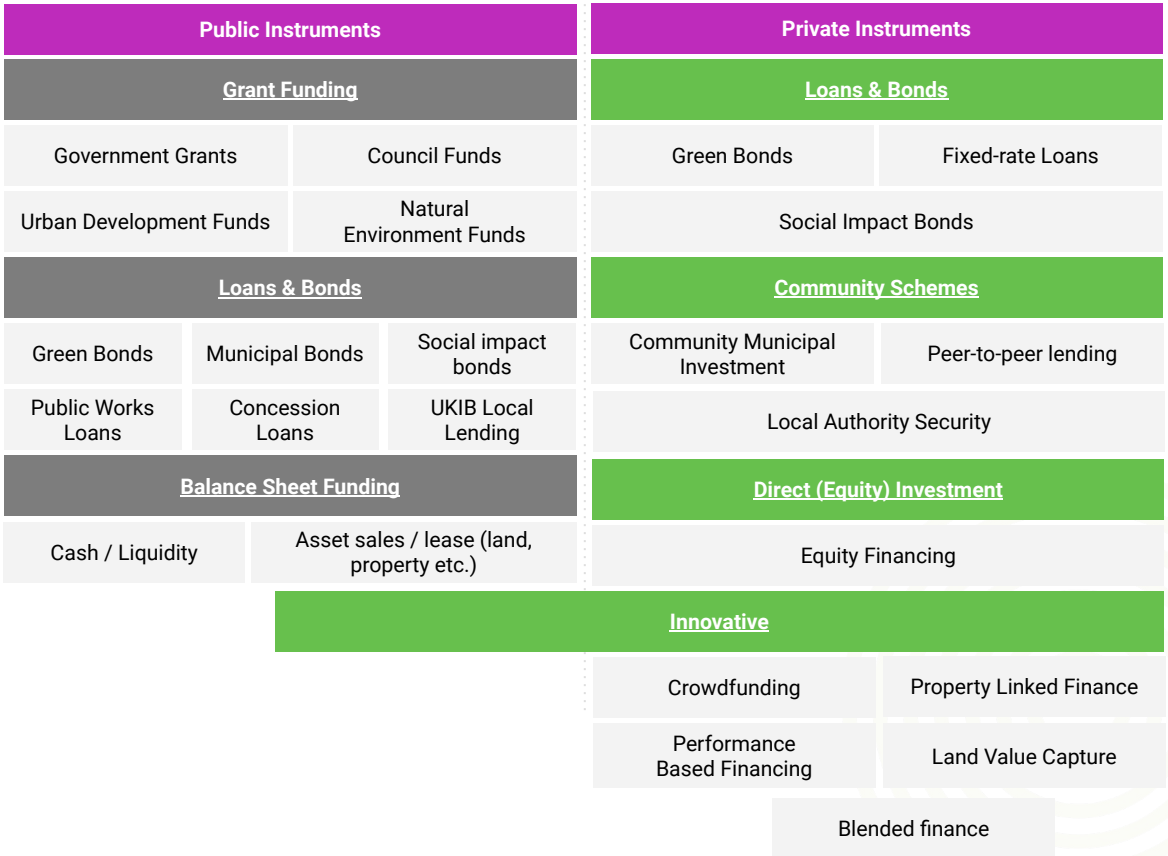
(2) All our figures are as reported by Local Authorities so they may differ from levels published by other sources. The PWLB figure includes Northern Ireland authorities' borrowing at PWLB-equivalent rates from the Department of Finance and Personnel.

OVERVIEW | **Landscape of funding and financing**

The instruments of capital are the means through which a local net zero project is financed or funded and involve both private and public sources of finance.

The diagram to the right presents an overview of the **common instruments that allocate investment from public and private sources for a LNZP.** The remainder of this chapter sets out the key considerations for each of these sources (navigate to relevant sources by clicking the diagram). **Each deep dive offers detailed examples of the funding and financing sources,** outlining their advantages and limitations, and assessing their suitability for the four delivery structures discussed in the previous section.

It is important to note that the **information provided is based on current market conditions and regulatory frameworks.** These can change over time, and Local Authorities should always seek professional financial advice tailored to their specific circumstances and projects. Also, the suitability of a particular funding source or delivery structure will depend on a variety of factors, including the nature of the project, its financial viability, the risk profile, degree of ownership desired by the Local Authority and the strategic objectives of the Local Authority.



OVERVIEW | **Funding options to explore**

This schematic highlights the funding and financing options suitable for different delivery structures, including repayment terms and flow of funds.

	Public sector led		Public-private partnership	Third-party Delivery	
	In-house delivery	Public-owned SPV	Joint Venture SPV	Services agreement	Concession agreement
Responsibility for project development	Local Authority	Local Authority	Local Authority	Local Authority to define services required	Local Authority to define services required
Responsible for seeking funding and finance	Local Authority	Local Authority	Shared between Local Authority and Joint Venture partner	Third party	Third party unless funding requirements exist beyond agreement
Applicable sources of capital					
Public capital: Grants	✔ subject to conditions	✔ subject to conditions	✔ subject to conditions		
Public capital: Loans and bonds	✔ subject to conditions	✔ subject to conditions	✔ subject to conditions		
Public capital: De-risking	✔ subject to conditions	✔ subject to conditions	✔ subject to conditions		
Private capital: Balance sheet	✔ direct spend by LA	✔ provided to SPV via debt or equity	✔ provided to SPV via debt or equity		
Private capital: Loans and bonds	✘ No entity to raise debt	✔ provider may require equity share	✔ from Joint Venture partner or 3rd party investors		
Private capital: Community schemes	✘ No entity to raise capital	✔ may be eligible	✔ could require formation of Community Interest Company (CIC)		
Private capital: Direct investment	✘ No entity to raise equity capital	✘ LA funds assets	✔ subject to shareholder agreement		
Private capital: Innovative	✔ subject to scope of project	✔ subject to scope of project	✔ subject to scope of project		

Third party responsible for sourcing funding

Note: This is intended as a guide only to explore some of the issues which are likely to impact a choice of delivery structure. It is not prescriptive and the flow of decisions may not fit every project or portfolio.

ACCESSING FUNDING | Sharing project details with investors

An information memorandum is a document designed to engage with investors broadly, while due diligence is a detailed investigation conducted by a potential investor, representing a subsequent step in the investment process.

Information memorandum

Many Local Authorities **approach sources of finance with projects that are either too underdeveloped or framed with objectives that do not align with the expectations of financiers.** To avoid these challenges, a robust information memorandum should be provided for the funder to review.

As a minimum, the information memorandum will include:

- Brief project description (no more than 50 words).
- Size of project.
- Location of project.
- Key capital expenditure items.
- Technology employed (including technology providers and guarantees offered).
- Profile of project beneficiaries.
- Project readiness (including planning permissions, legal/environmental permits).
- Anticipated useful life of project.
- Key outputs of financial modelling showing project viability.
- Project Sponsor credit history (past transactions on the performance).
- Alignment with national / global agendas and development goals.

Due diligence

Third-party investors will want to ensure that the project is commercially viable and capable of providing returns that align with their expectations. To this end, they will require detailed due diligence which focuses on several key areas.

Financial and commercial due diligence is a fundamental aspect of the process which involves the project's financial profitability and financial risks. They will be interested in examining the financial projects, revenue streams, cost estimates and overall commercial viability.

Technical due diligence involves a detailed assessment of the project's technical aspects. This can include an examination of the project's proposed technologies' reliability, grid connection requirements, maturity, efficiency, design and implementation plan, as well as the technical capabilities of the project team.

Legal due diligence relates to the project's compliance with relevant laws and regulations. It also considers any legal risks associated with the project, such as obsolescence, and the robustness of contractual arrangements.

Investors may also focus on other aspects such as the status of the planning application, the project's insurance arrangements, regulatory environment and expected changes, as well as the project's risk register. See Annex 8 for a diagram that sets out the typical considerations in a financial model.

Note, where external due diligence is taking place on the project, it is important to establish which party will bear the cost of this both in the case the project does, or does not, ultimately go ahead.

ACCESSING FINANCE | **Reducing the cost of funding**

The cost of funding is likely to be lower when the level of risk is perceived to be lower by the funder.

Generally, the cost of funding will be lower when the scheme is perceived to be lower risk. The following factors are likely to reduce the perceived risk and therefore funding costs:

- A high proportion of (long term) guaranteed revenues from a creditworthy entity.
- Index-linked revenues.
- Guarantees from a creditworthy parent company, Local Authority or a development bank
- Strong collateral in the event of default (in the case of recourse/limited recourse debt).
- Fixed price contracts (for example, D&B, O&M) with performance guarantees.
- A defined commercial structure.
- Appropriate risk distribution.
- Access to established secondary markets.
- Compliance with market standards.
- Tried and tested technology.
- Scale of project/opportunity to expand/multiply project potential warrants investment in due diligence.
- Other funding already secured suggesting project viability.
- Project readiness.
- Funder priorities shared by the Project Sponsor (for example, securing revenue certainty).

Consider refinancing post construction. The construction phase is typically the period with the highest level of risk within a project's life cycle. And so, the expense cost of funding during this phase, or including it, is likely to be higher. Once all planning uncertainties have been addressed, assets have been commissioned and offtake established, a broader array of potential financiers might express interest in the project. **This situation could create an opening for reevaluating project financing to achieve a reduced cost of capital.** Such a move could permit current investors to access funds or even exit the project.

If refinancing is desirable, it is sensible to set up the project's strategy to allow for it. **Such as using a SPV to segregate refinancing-eligible operations or considering shareholder loans to preserve flexibility.**

Grant funding

Non-repayable funds provided by governments or foundations

GRANT FUNDING | **Overview**

Grant funding is non-interest bearing and non-repayable. It is usually provided by the public sector to support the development of projects that meet certain social or environmental objectives.

Grants are issued by Government or philanthropic organisations. They are non-interest bearing and non-repayable. Grants are generally awarded to fund activity that is aligned with certain social or environmental objectives and often come with extensive reporting requirements.

Different grant programmes might provide funding for different measures. For instance, Project Sponsors may be able to access the Natural Environment Investment Readiness Fund to support the development of nature projects until they are able to attract private investment. The Social Housing Decarbonisation Fund provides grants to cover capital costs and administration costs. The Green Heat Network Fund provides funding for commercialisation and construction costs. Many programmes will combine different measures. Some examples can be found on the following table.

Grants can be used to support project development. Many Local Authorities lack the development capacity for a pipeline of LNZPs. A well developed feasibility study is critical to attracting investment but these can be costly. Pre-transaction costs can be as high as £10 million and few sources are prepared to commit funding for feasibility assessments. Grants can be leveraged to support these.

Examples

UKRI Funding: A non-departmental public body that directs research, innovation and skills funding. Examples of this are the PFER and Net Zero Living programmes.

Social Housing Decarbonisation Fund: The fund provides grant funding and aims to deliver energy-efficient homes, reduce carbon emissions and tackle fuel poverty.

Green Heat Network Fund: Grant programme with over £288 million in funding to award to projects focused on heat networks with low carbon heat sources.

Public Sector Decarbonisation Scheme: This scheme provides grants for public selector bodies to fund heat decarbonisation and energy efficiency measures. Phase 3 of this project will provide over £1.425 billion of grant funding.

Low Carbon Skills Fund: The fund provides over £80 million in grants funding for public sector organisations to engage the expert advice and skills required to develop a heat decarbonisation plan.

Horizon Europe Funding: This is an EU research and innovation programme, with €95.5 billion in available funding. UK-based applicants can continue to apply to this programme. Funding is available for research in climate, energy and mobility.

Heat Networks Delivery Unit (HNDU): The programme provides grant funding and guidance to Local Authorities in England and Wales for heat network project development. HNDU has run 12 funding rounds since 2013, awarding £33.8 million to over 300 projects from 188 Local Authorities.

EIC Accelerator: The accelerator offers up to € 2.5 million for projects such as energy storage, engineering and construction digitalisation, among others. UK projects can apply for “grant-only” support.

GRANT FUNDING | **Delivery structures**

Grant funding is a suitable funding option for all delivery structures. Grants can also be used during the project development stage for surveys and feasibility studies.

Appropriate delivery structures

Governance structure	Applicable	Comment
1 In-house Delivery	YES	Subject to grant conditions
2 Public-owned SPV	YES	Subject to grant conditions
3 Joint Venture	YES	Subject to grant conditions
4 Third-party Delivery	NO	Subject to grant conditions, third party may be eligible for funding. If not, a grant could used before third party involvement.

Flow of funding

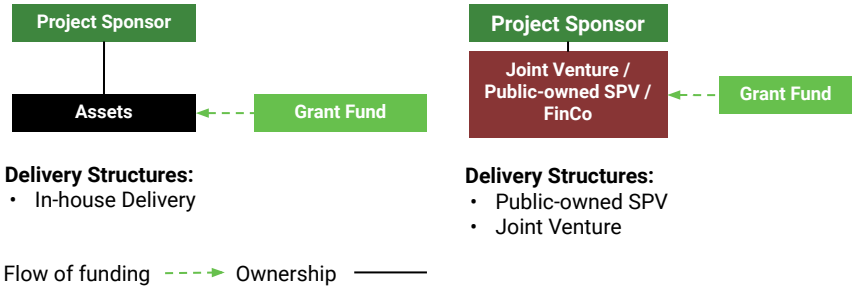


Fig.16 Grant funding flows

Worcestershire County Council (WCC) received **£885,687 in grants** from the government's Salix Public Sector Decarbonisation Scheme (PSDS) to wholly fund 34 energy efficiency and renewable energy projects across WCC's estate. Without this grant, WCC would not have been able to fund this project as it does not have any scope to provide attractive returns on investment. However its societal benefits through decarbonisation and saving the council £55,000 a year are significant. Hence, **grants are helpful to realise socially beneficial projects that are not commercially viable.**

WCC also secured additional 100% grant funding from Salix's Low Carbon Skills Fund (LCSF) to undertake decarbonisation surveys of buildings within its own estate. **Survey and feasibility studies are essential groundwork for most decarbonisation projects,** yet they are expensive and do not generate revenue in their own right. This makes them difficult to finance through commercial avenues and therefore the right type of activity to fund through a grant.

GRANT FUNDING | **Key considerations**

Grant funding can be an effective way to finance aspects of a local net zero project. It is important for Local Authorities to consider their advantages and limitations when adopting this instrument.

Advantages:

- Grants provide a significant advantage in that they do not need to be repaid, thereby freeing up resources for other initiatives.
- They can cover a wide range of costs and stages of development, from feasibility studies to installation, making them a **versatile source of funding.**
- They can support innovation and growth by providing **financial support for novel ideas.**
- They may be used to subsidise non-commercial projects where there is a broader socio-economic good

Limitations:

- There are a limited number and scale of grant funding schemes available
- The process of securing them can be **highly competitive and is not guaranteed,** making it a potentially unreliable source of funding and - if bids are not successful - a cost, rather than a source of funding[1].
- They can be restrictive in terms of what the funds can be used for, potentially limiting the scope of the project that can access funding.
- They often require detailed application processes and ongoing reporting, which can be **time consuming and resource intensive.**

Key Considerations:

The Project Sponsor needs to be aware of the **terms and conditions attached to the grant.** These can include requirements around how the funds are used, the timeline for spending the funds and the outcomes that need to be achieved. Non-compliance with these conditions can result in the grant being withdrawn or the Project Sponsor being required to repay the funds.

Eligibility criteria is another important consideration. Grants are often targeted at specific projects or types of organisations. As such, the Project Sponsor needs to ensure the project meets these criteria. Furthermore, grant funding typically involves reporting on the outcomes of the project by grant providers which may require additional resources to comply with.

Some grant options require match funding. This means that the **Project Sponsor will have to provide its own funds to match the funding.**

(1) LGA research found that the average cost of bidding for a competitive grant was around £20-30,000, while University of Sheffield research found that Local Authorities spent an estimated £63.5 million bidding for just three HMG funds

Public loans and bonds

Debt instruments issued by government entities to raise capital for public projects, which are repaid over time with interest.

PUBLIC LOANS AND BONDS | **Overview**

Public debt is the most used form of financing for Local Authorities. It is issued by governments to finance public projects and requires a fixed return over a specified period.

Public loans and bonds are a common form of debt financing for Local Authorities. The Prudential Code for Capital Finance now stipulates that borrowed funds must primarily and directly support public services like housing, regeneration or preventative action. The update to the Code means borrowing must be primarily and directly for public services relating to the function of the Local Authority.
This applies to most forms of public borrowing sources, including Public Works Loan Board (PWLB) and other providers of debt such as banks, bond issuers or investment funds.

Borrowed funds can be used in-house or lent to a SPV. When lent to a SPV, the margin between the borrowing interest rate and the interest rate charged to the SPV becomes an income stream for the public sector. However, the interest rate charged to the SPV may need to be at a commercial or arm's length rate.

Public loans and bonds offer favourable terms, including lower interest rates and longer repayment periods, making them an attractive option for financing local net zero projects. However, they come with specific conditions and requirements, such as demonstrating public benefit or complying with certain regulations.

Examples

UK Infrastructure Bank (UKIB): UKIB has £22 billion of financial capacity. It was set up to support infrastructure development in projects that are aligned with government's net zero objectives. It provides the cheapest form of lending to Local Authorities for most LNZPs. To complement that, UKIB also offers expert advisory services to help Local Authorities develop and finance projects.

Public Works Loan Board (PWLB): The PWLB provides low-cost loans to Local Authorities in the UK for capital projects. This could include local net zero projects aimed at reducing carbon emissions.

Green Bonds: Green bonds are a type of bond designed to fund projects with environmental benefits. They can be issued by public entities, such as Local Authorities or public banks, or by private companies.

Municipal Bonds: Municipal bonds are bonds issued by Local Authorities or other public entities to finance public projects. They are similar to green bonds but are not exclusively meant for green projects.

Concession Loans: Concession loans, also known as soft loans, are loans provided on favourable terms, often by public entities or development banks, to support projects with social or environmental benefits. For example, Salix is a non-departmental public body that administers loans and funding schemes on behalf of DESNZ for reduction of carbon emissions.

PUBLIC LOANS AND BONDS | **Delivery structures**

Public loans and bonds are suitable for all delivery structures except Third-party Delivery, in which the private sector party is responsible for securing funds.

Appropriate delivery structures

Governance structure	Applicable	Comment
1 In-house Delivery	YES	Subject to loan conditions
2 Public-owned SPV	YES	Subject to loan conditions
3 Joint Venture	YES	Subject to loan conditions
4 Third-party Delivery	NO	Third party funds assets

Flow of funding

Delivery Structures:
- In-house Delivery

Delivery Structures:
- Public-owned SPV
- Joint Venture

Flow of funding
Ownership
Security

Fig.17 Loans and bonds funding flows

Westminster City Council launched the Westminster Green Investment scheme on 13 March 2023, **aiming to to raise £1 million through Local Climate Bonds (LCB) bought by the local community.** The proceeds will be used to finance carbon reduction measures within Westminster. To enable this, Westminster City Council included a provision within its Treasury Management Strategy Statement, allowing the use of Local Authority Security as a means of raising funds from multiple sources, including individuals. Westminster also developed the Westminster Green Finance Framework, which is aligned to the Loan Market Association's Green Loan Principles - making it the first LCB to do this. The **Green Finance Framework outlines eligible green projects,** how they consider a project's contribution to the just transition and the process through which every project will be assured by an external party to ensure its eligibility for the scheme. These **robust mechanisms are intended to provide investors with confidence against greenwashing risks.**

PUBLIC LOANS AND BONDS | **Key considerations**

Public loans and bonds offer lower interest rates and longer repayment periods, providing cost-effective funding and financial flexibility for projects. However, they require extensive approval processes and are regulated to support specific Local Authority objectives.

Advantages

- Public loans and bonds typically offer lower interest rates compared to private sector alternatives, making them a more cost-effective source of funding.
- Borrowing is secured against the authority rather than specific projects, providing greater flexibility and security.
- They often have longer repayment periods, which can provide more financial flexibility for the project.

Limitations

- Securing public loans or bonds typically requires an extensive board and council member approval process for projects, which can be time-consuming and delay project implementation.
- The use of public loans and bonds is regulated, and lending cannot be primarily for yield and must support Local Authority objectives, potentially limiting their use.

Key Considerations

Pubic loans need to be repaid over time with interest. This can increase the overall cost of the project and put pressure on the Project Sponsor or project's operational finances. As such, it is important to have a clear plan for how the bonds and loans will be repaid.

Prudential loans also come with conditions around how the funds can be accessed, especially in the early stages since limited revenue might make repayments challenging. The **updated Prudential Code for Financial Capital requires Local Authorities to provide demonstrable proof the finance from the loan will go towards supporting the Local Authorities core functions and not just for yield.**

It is also important to consider the priority of claims associated with accessing this type of funding. In the event of default, public loans are treated as debt and are therefore repaid before equity shareholders receive any remaining assets.

Balance sheet funding

Financing provided through an organisation's balance sheet

BALANCE SHEET FUNDING | **Overview**

A financing method where the Project Sponsor uses its balance sheet assets, such as inventory or internal reserves, to secure loans or provide other types of financing.

Balance sheet funding refers to when a Local Authority uses its own assets and reserves to finance a project. This can include actions such as leveraging capital from internal reserves or providing loans which are recorded on the Project Sponsor's balance sheet. This financing method offers the Project Sponsor considerable control and flexibility, as they can **dictate the terms of contracts or maintain full authority over the project's direction.**

Balance sheet funding is commonly used for high priority or innovative projects where the Project Sponsor wishes to maintain some or complete control over the project's operations. A Project Sponsor is able to use balance sheet funding to provide a loan to a Joint Venture SPV. The **project would then repay the Local Authority over time, providing a return on the investment.** This would sit as a liability on the Local Authority's balance sheet but the profit and loss from the project would not.

Examples

Internal Loans: A Local Authority may decide to finance a renewable energy project by providing a loan to a SPV created specifically for the project. This **loan would be recorded on the Local Authority's balance sheet** and could be structured with terms that align with the project's goals and the Local Authority's strategic objectives. The SPV would then repay the loan to the Local Authority over an agreed period, providing a return on the investment.

Cash/Liquidity: Local Authorities can use their available cash from internal reserves to fund local net zero projects. This could include reserves built up through taxation, fees and charges, or other income. Using cash reserves can provide a significant degree of control and flexibility, as the Local Authority does not need to comply with the conditions or repayment schedules of external funders. However, it also **exposes the Local Authority to a higher level of financial risk, as it reduces the amount of cash available for other purposes.**

BALANCE SHEET FUNDING | **Delivery structures**

Balance sheet funding is suitable for all delivery structures except for Third-party Delivery and Public-owned SPVs. For Third-party Delivery the private sector party is responsible for securing funds, while Public-owned SPVs are off-balance sheet transactions.

Appropriate delivery structures

Governance structure	Applicable	Comment
1 In-house Delivery	YES	Direct spend by Project Sponsor
2 Public-owned SPV	YES	SPVs may lease assets on balance sheet or provide cash and liquidity
3 Joint Venture	YES	Provided to SPV via debt or equity
4 Third-party Delivery	NO	Third party funds assets

Flow of funding

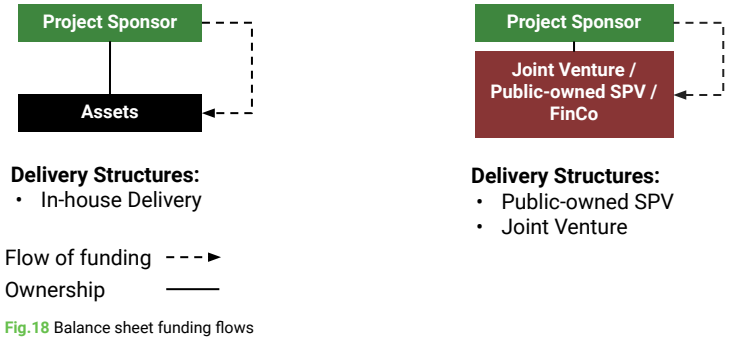


Fig.18 Balance sheet funding flows

Energetik is a heat network company set up by Enfield council to eventually serve more than 15,000 properties. This is a public-owned SPV, that aims to provide better value and low carbon heat to residents.

The delivery of the Energetik business plan will see the realisation of an £85 million capital project. Due to Energetik essentially being a 'start up business' with no financial history, it **could not pass the various financial tests to access cheap borrowing from financial institutions.** The Council will be investing around £55-60 million in Energetik through two tranches of delivery, and the remainder will be covered by the company's own generated revenue.

As sole shareholder, the Council has the ability to exercise controls over the company, and board appointments. **As lender, the Council is exposed to the potential failure of Energetik if it is unable to repay the money** it owes. This is mitigated by the terms of the loan agreement and the oversight Enfield has over the running of the business.

BALANCE SHEET FUNDING | **Key considerations**

Balance sheet funding is typically the cheapest form of financing. However, important choices need to be made as it uses resources that could be allocated elsewhere, potentially impacting the Project Sponsor's financial health and limiting capital for other income-generating initiatives.

Advantages:

- Typically the cheapest form of financing barring grants, as there is no required payback or interest associated.
- No requirement to comply with conditions stipulated by external sources of funding.

Limitations:

- Need to prioritise spending as capital would not be available for other income generating initiatives.
- Asset values may fall below the amount at which they are recorded due to obsolescence, underperformance and other factors, which could lead to financial difficulties for the Project Sponsor.

Key Considerations

Balance sheet funding can be an expedient way to fund a LNZP, as it bypasses the need to secure external funding or comply with external funding conditions. It involves using the Project Sponsor's own resources, which might otherwise be allocated to other essential purposes. It's crucial to ensure that capital provided through balance sheet funding aligns with the wider strategic objectives of the Local Authority and does not compromise other core initiatives.

Particularly for large projects, using balance sheet funding could have a significant impact on the Project Sponsor's financial health, **making it vulnerable to unexpected costs or financial shocks.** Most Local Authorities operate with finite resources so large-scale balance sheet funding is rarely a first option and would be highly scrutinised. The decision to use this funding method must be made with a clear understanding of the potential risks and benefits, considering the specific context and needs of the Local Authority.

Corporate Loans and Bonds

Debt instruments issued by corporations to raise capital for business operations or expansions, which are repaid over time with interest.

CORPORATE LOANS AND BONDS | **Overview**

Debt instruments issued by corporations to an entity or directly to a project to finance its operations or expansions, offering investors a fixed return over a specified period.

Corporate loans are a form of debt financing provided by financial institutions. They could either be provided to a SPV entity (corporate debt) or directly to the project (project debt). **Corporate debt is typically assessed based on the creditworthiness of the parties forming the SPV.** Project debt is the long-term financing of infrastructure projects based upon the projected cash flows of the project with debt terms assessed based on the specific project and counterparty risk.

Both public sector and private sector entities (including SPVs) have access to debt funding. This section deals with debt funding from third-party intermediaries into a SPV; debt funding extended to a Project Sponsor which is on-lent to a SPV is dealt with in balance sheet funding.

Debt can be arranged such that it is drawn down in line with the capital expenditure requirements of the project, including potential to roll up interest until the project is revenue generating.

Corporate loans can be beneficial for financing large projects as they can provide **significant capital for the project, without diluting the Project Sponsor's control or ownership.** However, the requirement of regular repayments can put pressure on the SPV's cash flow which may lead to financial difficulties in the event of a default. It is therefore important that Project Sponsors engage with their relationship banks to understand the terms and interest rates applicable to new corporate borrowing.

Examples

Green Bonds: Green Bonds are a type of corporate bond specifically designed to fund projects with environmental benefits. The proceeds from the bond issuance are ring-fenced for green projects, which could include local net zero projects such as renewable electricity generation or energy efficiency measures.

Social Impact Bonds: Social Impact Bonds are a type of bond where the return on investment is linked to the achievement of social outcomes. In the context of local net zero projects, these outcomes could include reductions in carbon emissions, improvements in air quality or increases in local employment.

Fixed-Rate Loans: Fixed-rate loans are loans with an interest rate that remains the same for the entire term of the loan. They can be provided by banks or other financial institutions to businesses, including Local Authorities and their entities. The fixed interest rate provides certainty over the cost of the loan, making it easier to plan and budget for the project.

CORPORATE LOANS AND BONDS | **Delivery structures**

Corporate loans and bonds are suitable for all delivery structures except Third-party Delivery, in which the private sector party is responsible for securing funds and In-house Delivery, as there is no standalone entity to raise corporate debt.

Appropriate delivery structures

Governance structure	Applicable	Comment
1 In-house Delivery	YES	Project Sponsor can raise debt to fund the project in-house as long as they secure it and are liable to pay back
2 Public-owned SPV	YES	Provider may require equity shares as well which could necessitate the formation of a Joint Venture
3 Joint Venture	YES	From Joint Venture Partner or third-party investor
4 Third-party Delivery	NO	Third party funds assets

Flow of funding

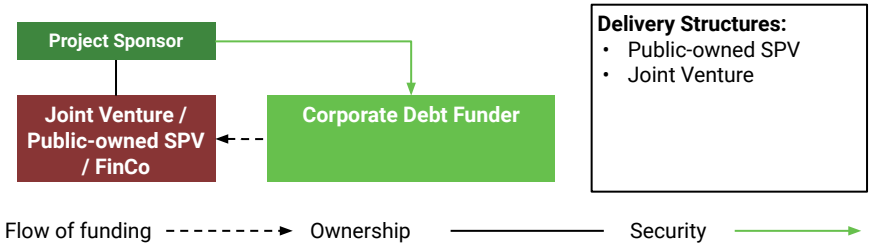


Fig.19 Corporate loans and bonds funding flows

Energise Barnsley is a registered Community Benefit Society whose main project partner is the Barnsley Metropolitan Borough Council. The Joint Venture has been set up to deliver energy solar PV and battery storage in Barnsley. The £2 million project costs were raised through a retail bond of £800,000 and a £1.2 million loan from Charity Bank. The 'Barnsley Solar Bond' is a five-year bond, and the investors have received three years of interest to date of 5% per annum. This bond was also offered to the local community.

As the Project Sponsor and key partner, the Barnsley Metropolitan Borough Council is also the Custodian Trustee of the project. However, the security to the lender and bondholders is also guaranteed by a social impact fund that secured a £2 million underwriting loan.

CORPORATE LOANS AND BONDS | **Key considerations**

Project Sponsors can access significant capital from corporate loans and bonds, reducing equity requirements and enhancing financial viability. However, terms, including interest rates, repayment schedules and potential penalties, can impact overall costs and increase the Project Sponsor's debt which may affect future borrowing capacity.

Advantages:

- Private loans and bonds can provide significant funding for projects, enabling the implementation of larger and more ambitious projects.
- They can be used to reduce the amount of equity required to fund a steady state project, potentially improving the project's financial viability and attractiveness to investors.

Limitations:

- Private loans and bonds often require collateral or guarantees, which can increase the risk for the Project Sponsor.
- In many cases there is a minimum ticket size to access these loans and bonds, so aggregation of projects might be important to secure this type of funding .
- They typically come with a higher interest rate to reflect the higher level of risk, which increases the overall cost of funding.
- Corporate loans generally tend to be more expensive in the construction phase of the project due to relatively higher risks associated with this stage of the project's life cycle.

Key Considerations

Project Sponsors need to be aware of the terms and conditions of the loans, including the **interest rate, repayment schedule and any penalties for late repayment.** These factors can significantly impact the overall cost of the loan and should be carefully considered before taking on corporate loans. Additionally, taking a corporate loan **increases the Project Sponsor's debt, which can affect its credit rating and ability to borrow more capital in the future.**

In the event of default, corporate loans are repaid before equity shareholders receive any remaining assets. Default could be in relation to late, partial or total lack of payment of interest or principal. It may also include the violation of a covenant which applies to the loan - for example the requirement to meet certain financial ratios, such as Debt Service Cover Ratio. When default occurs, the lender may have some recourse in the form of security provided, for example assets or financial guarantees, to fulfil the legal obligations of the loan. It is therefore important to pay close attention to the terms and conditions of the debt offering as each agreement will vary in terms of what constitutes default and what level of security is provided to the lender.

Community schemes

Funding initiatives where local communities pool resources, often through cooperative structures, to finance and benefit from local projects

COMMUNITY SCHEMES | **Overview**

Community schemes are a useful funding tool for engaging local communities in local net zero projects. The amount of capital raised through this instrument tends to be limited, hence they are often used in combination with other sources of funding and financing.

Community schemes involve the local community in financing the development and operations of the project. **These schemes are often used for local net zero projects**, as they provide a way to engage the community, distribute benefits locally and leverage local resources.

These schemes not only provide financial resources but also build community engagement and support, which can be crucial for the success of local net zero projects. However, the **benefits of community involvement should be weighed against the challenges of managing a large number of small investors** and meeting the diverse expectations of community members.

While community schemes can be a powerful tool for funding local net zero projects, they require **significant effort to set up and manage, and the amount of funds that can be raised may be limited.** Therefore, they are often used in combination with other forms of funding and financing.

Examples

Community Shares: A form of equity investment used by co-operatives and community benefit societies. They allow individuals to invest in the project and become part-owners of the enterprise.

Community Bonds: A form of debt investment that can be used by non-profit organisations and co-operatives such as community interest companies. They work in a similar way to traditional loans with investors lending money to the project in return for regular payments and return of their capital at the end of the bond term.

Grants and donations: Community schemes may be eligible for various grants and donations available from government bodies, foundations and organisations. These can provide valuable funds as they often do not need repayment nor do they dilute the Project Sponsor's control of the project.

Community Municipal Investment (CMI): A financial tool designed to facilitate prudential borrowing for councils, funded by local residents. CMI is now issued solely as Green Loans or Green Bonds in compliance with the Green Loan Principles.

Local Authority Security: Similar to Community Municipal Investment, Local Authority Security is a newly coined term by the FCA for a financial product that facilitates prudential borrowing for councils via peer to peer loans or crowdfunding bonds. It provides a low-cost borrowing alternative to PWLB while aligning with Green Loan Principles, engaging the community in the delivery of local net-zero projects and generating wider social and environmental benefits.

COMMUNITY SCHEMES | **Delivery structures**

Community schemes are suitable for all delivery structures except Third-party Delivery, in which the private sector party is responsible for securing funds, and In-house Delivery, as there is no entity for the capital to flow to.

Appropriate delivery structures

Governance structure	Applicable	Comment
1 In-house Delivery	NO	No entity to receive funding
2 Public-owned SPV	YES	SPV may be eligible for certain community grants and bonds
3 Joint Venture	YES	This could be through the formation of a community interest company
4 Third-party Delivery	NO	Third party funds projects

Flow of funding

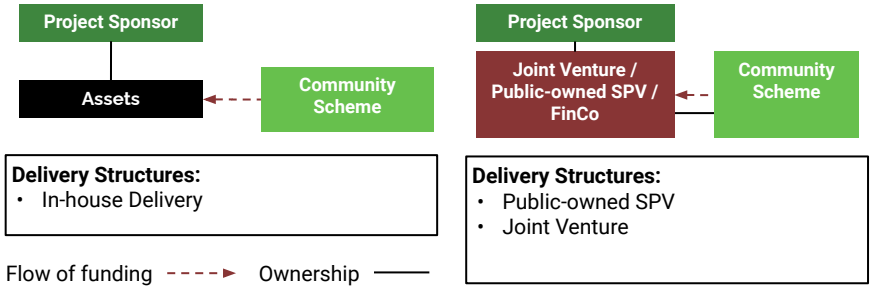


Fig.20 Community schemes funding flows

Chase Community Solar Limited (CCS) is a community benefit society which is managed by unpaid volunteers. CCS is composed of 180 people from the Cannock Chase community who invested in the scheme to fit solar panels on social housing properties in the Cannock Chase district. **Investors received equity in CCS and get an annual return**. Additional funds were provided by an ethical provider which expanded the size and impact of the project. Together, these financial mechanisms raised over £1 million. The scheme has a planned life of 20 years and is eligible to receive a subsidy from the government's 'Feed-In-Tariff'. This forms the income required to provide a return on investment along with selling excess energy back to the grid. **Any surplus funds are directed into a community fund for local benefit.**

COMMUNITY SCHEMES | **Key considerations**

Community schemes can enhance local support for projects and contribute to local development, providing both social and financial returns. However, they require significant resources for setup, management and regulatory compliance. The amount of funding that can be raised may be limited, often requiring combination with other sources of funding.

Advantages:

- Community schemes can foster community engagement and ownership, increasing local support for the project and potentially improving its long-term viability.
- They can provide social as well as financial returns, contributing to local development and wellbeing.

Limitations:

- They can be challenging to manage and coordinate due to the number of participants providing capital, which requires significant resources to manage effectively.
- They may require extensive community engagement and support which may not always be a given and can be time consuming and resource intensive.
- They are not suitable for raising large amounts of capital, therefore they are not typically used as standalone financing options.

Key Considerations

Community schemes can be a powerful tool for funding local net zero projects, but they also require significant effort to set up and manage. Project Sponsors need to consider the resources required to engage the community, manage the scheme and ensure compliance with any regulatory requirements. This can include costs for staff time, marketing and communication efforts, legal and financial advice, and ongoing management and administration.

While community schemes can provide a source of funding, the amount that can be raised may be limited and may not be sufficient to fully fund a large or complex project. Therefore, community schemes are often used in combination with other forms of funding. Project Sponsors also need to consider the expectations of community members, who may expect to see direct benefits from the project or have a say in how it is run.

Direct (equity) investment

Capital provided to a project in exchange for controlling interest in the project

DIRECT (EQUITY) INVESTMENT | **Overview**

Direct investment involves the purchase of a controlling interest in a company or sector, often by a larger corporation or an investment firm, with the aim of influencing its operations or strategic direction.

Direct investment involves the Project Sponsor or a third-party investor providing capital directly to a project in return for an equity stake. It can provide large sums of capital for larger projects, but is accompanied with the trade-off of reduced control for the Project Sponsor over the project's operations if third-party direct investments are utilised.

Project Sponsors could use direct investment through its internal reserves to provide funding for a SPV that is either wholly owned or part of a Joint Venture delivery structure. This typically involves the Local Authority taking an equity stake in the SPV - providing it with either a portion or all of the necessary capital to undertake its operations. In the case of a Joint Venture, the third-party investor provides funding and assumes a level of control over the project's operations which is proportional to its stake in the project.

This funding approach could allow for third-party expertise to be used in the project and could provide a significant amount of funding for large or complex projects. However, it is important to consider the extent to which control of the project's operations is shared with external parties.

Equity financing involves raising capital by selling shares in the project or business. This can be done through private placements or public offerings. For a LNZP, equity financing could involve selling shares in a SPV set up to deliver the project.
This financing approach can provide a significant source of funding but also means that the third-party investor will have a degree of control over the project's operations and share in the profits. The Local Authority is still responsible for raising funds to cover their portion of the equity, and this guarantees they will retain some control over the project.

Equity financing is usually a good option for larger or more complex projects that require significant upfront investment.

DIRECT (EQUITY) INVESTMENT | **Delivery structures**

Direct Investment is suitable for all delivery structures except Third-party Delivery in which the private sector party is responsible for securing funds.

Appropriate delivery structures

Governance structure	Applicable	Comment
1 In-house Delivery	NO	No standalone entity to raise equity capital
2 Public-owned SPV	NO	Project Sponsor funds assets
3 Joint Venture	YES	Subject to shareholder arrangement
4 Third-party Delivery	NO	Third party funds assets

Flow of funding

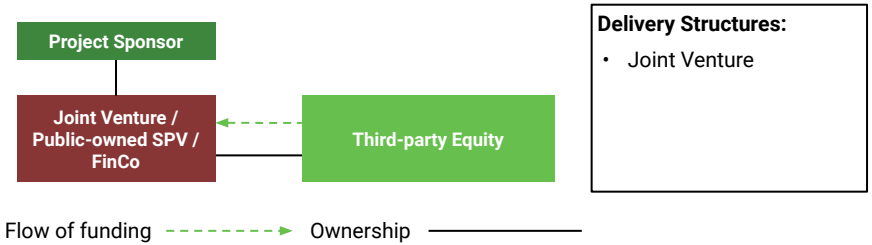


Fig.21 Direct investment funding flow

Zero Carbon Rugeley received £1.5 million in direct investment from the consortium that leads the programme. Staffordshire & Cannock Chase Council are **minority investors in the project and therefore have ceded control of it to the third-party consortium.** Uncertain revenue streams meant that the Local Authority had little appetite to fund Zero Carbon Rugeley. Hence, direct investment from third parties was the most viable option for delivery.

Private sector participation may increase financing available and allow for the project to be delivered more effectively by leveraging private sector expertise. However, it comes with the risk of differing priorities because while the **Local Authority focus may be on providing societal benefit, the private sector will seek to maximise profits from the project.** As such it is important to align on these/agree on the scope and services being delivered. In cases where the scope of the project is rigid, using direct investment can be a great way to get funding for projects which would otherwise struggle to do so.

Innovative financing mechanisms

Non-traditional financing mechanisms which can access otherwise unavailable capital for projects

INNOVATIVE FINANCING MECHANISMS | **Overview**

Innovative financing mechanisms can provide flexible, outcome-based financing for LNZPs. They leverage private capital and incentivise sustainable practices.

Innovative financing refers to the use of non-traditional or bespoke financing mechanisms to raise funds for LNZPs. Often this involves finding innovative ways to capture revenue streams that are traditionally difficult to monetise (such as land value, or socioeconomic benefits) or ways to transfer risk (such as energy price risk) to unlock large investment flows. Innovative financing mechanisms are usually used to supplement or unlock - rather than instead of - traditional sources of finance.

Innovative financing options might allow local net zero projects to:

- Leverage private capital that cannot be accessed by traditional finance mechanisms;
- Simultaneously drive community engagement and participation;
- Align long-term incentives across project sponsors, funders and other stakeholders
- Better align long-term revenues with repayment schedules
- Recognise and incentivise the achievement of social outcomes such as emissions reduction, health and regeneration

Because of their bespoke nature, innovative finance mechanisms are typically less 'boilerplate' and require more design work upfront, but tend to be longer term in nature.

Examples

Crowdfunding: Crowdfunding is a method of raising capital through the collective effort of members of the community or individual investors. This approach taps into the collective efforts of a large pool of individuals—primarily online via social media and crowdfunding platforms—and leverages their networks for greater reach and exposure.

Performance-based Financing: This is a financing mechanism where payments are contingent on the achievement of agreed-upon results. The focus is on achieving outputs or outcomes, rather than inputs, for example PPAs and CfDs.

Property-linked Finance: These instruments are directly tied to real estate properties and encompass financial instruments such as green mortgages, which offer favourable terms for purchasing or retrofitting properties to enhance their environmental performance. These instruments incentivise property owners to invest in energy-efficient upgrades by offering them more attractive financing terms.

Land value capture and similar mechanisms like Tax-Increment Financing monetise the increase in land or rental value resulting from infrastructure development. Projects can capture revenue through a range of mechanisms, including taxes, development rights or land sales with conditions attached. For example, E-rail and Northumberland County Council (NCC) secured between 25% and 30% of the capital funding required for a new passenger rail line.

Impact investing: These are investments that alongside financial return also have the intention to generate positive, measurable social and environmental impact. They can be delivered through different financing mechanisms, but are considered innovative since they measure impact as well as financial returns.

Blended finance: The 'blending' of below market-rate loans (usually from government or development banks) with market loans to create a finance mix that is lower cost and bigger in scale than either source alone. Blending may also involve the use of government guarantees or first-loss capital to reduce risk, and therefore cost, of market capital. Blended finance instruments are established internationally but less so in UK local net zero projects.

INNOVATIVE FINANCING MECHANISMS | **Blended finance**

Blended finance leverages a mix of public and private capital to reduce costs and enhance the viability of LNZPs.

Most infrastructure projects have many different sources of capital - debt, equity, grants - of varying cost. **Blended finance approaches seek to increase the mix of lower cost finance in order to bring the overall cost of capital down**. This is usually done by blending commercial loans with government funding such as grants and below-market rate capital such as loans from the Public Works Loans Board or the UK Infrastructure Bank. Government capital can also be used to reduce the cost of private capital by reducing the risk to the lender, or by bridging a finance gap to make a project feasible: The UKIB offers financial guarantees, credit-enhancement guarantees and first-loss guarantees, each of which protects lenders against a different aspect of investment underperformance. The GFI find there is strong investor appetite for blended finance.

Blended finance can provide lower cost capital to an individual project or can be structured as a fund that aims to provide capital to multiple projects, with the fund manager responsible for keeping the overall rate low. Such funds are often designed to be 'revolving' so that the proceeds of the projects funded are returned to replenish the fund. An example is the New York City Energy Efficiency Corporation (see Case Study). **Revolving funds allow for blending in another way**: projects with higher returns, such as solar, can be subsidised by projects with lower returns such as retrofit (see next page).

The main drawbacks of blended finance approaches involve their complexity and, paradoxically, cost: the more sources of capital, investments, rates of return and risks that have to be managed, the more management the facility requires. These costs are relatively fixed, so if the fund does not scale, they can be a drain on capital that could otherwise be used for lending to projects. The UK Government's Green Deal, launched in 2013, ultimately failed because of its inability to scale relative to its underlying cost.

Blended finance is underdeveloped in the UK relative to other markets but the government's recent Green Finance Strategy (2023) commits to working *"with the GFI and industry leaders in the finance sector to develop a forward-looking analysis of blended finance models and where they could be better deployed in the UK."*

Most current products are aimed at a particular sector - for example, the UKIB's guarantees and the GFI's proposed Battery Investment Facility. However, the **Net Zero Neighbourhoods** concept (see opposite) is being driven by local authorities in the UK.

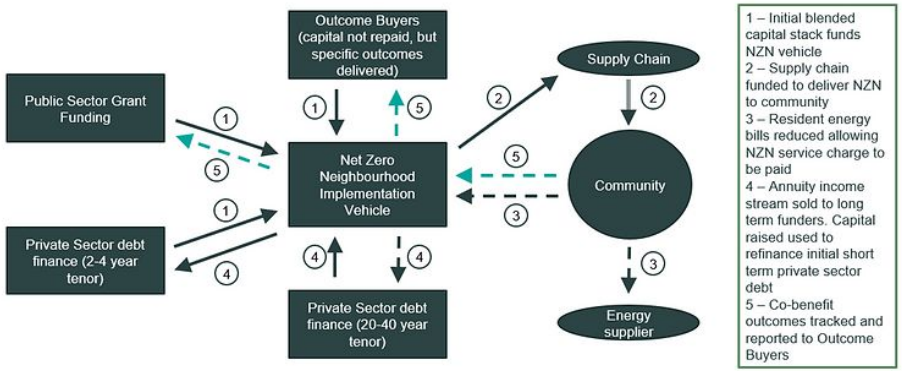
Example: 'Net Zero Neighborhoods' (NZN) is a model currently being trialled in several UK towns and cities. It combines a blended finance model (see Fig 23 below) with a hyperlocal community engagement model to tackle major issues in the UK retrofit finance market:

(1) **Demand is low:** there is low household demand for retrofit due to factors including high cost, disruption, low perceived benefits and lack of trust in suppliers. In NZN, community engagement and investment in local green infrastructure aims to increase buy-in.

(2) **Cost of capital is too high**: Retrofit is costly, particularly relative to future payback and house-price values. High finance costs dissuades homeowners further. NZN aims to blend market finance with concessional government and impact funding to reduce the cost.

(3) **Social benefits are not captured:** According to PwC/UKRI research (2022), retrofitting the UK's housing stock could create >£100bn of social benefits for the country through reduced emissions, cleaner air and warmer homes, but this value is not captured. NZN seeks to engage 'outcome buyers' such as impact investors to buy these social returns.

Fig.22 Net Zero Neighbourhoods: Funding Flow



Source: Bankers without Boundaries: Whitepaper: Net Zero Neighbourhood Funding Model

INNOVATIVE FINANCING MECHANISMS | **Property-linked Finance**

Property-linked finance offers a solution for the UK's retrofit finance market by linking loan repayments to property ownership to address long payback periods and budget constraints.

A central issue in the UK retrofit finance market, which cannot be solved by blended finance approaches (see previous slide) is the **economics of retrofit.**

PwC research with UKRI (2022) found that payback periods for some types of insulation were well over 50 years. As we noted at the time:

"This creates a market failure: insulation does eventually have a positive NPV (50 years is an acceptable time horizon for government). It also has the added social benefits of reduced carbon emissions and warmer homes, both of which are of value to government. In theory, government could provide homeowners with a 0% loan, with repayments based on projected energy savings. In practice government, and particularly local government, do have budget constraints: the place-agnostic scenario requires £50bn investment across UK towns and cities in insulation alone".

Owner-occupiers in the UK currently stay in their homes for an average of 17 years, with many staying for far shorter periods of time. **Property-linked finance** (PLF) links the cost of loans for retrofit to the home, meaning that when a home is sold, the new buyer who benefits from the more energy-efficient home, also takes on the obligation to pay the remainder of the loan. Because the loan is spread over a long time, monthly costs should be low. This approach, in theory, solves both the problem of long payback periods and limited government funding.

However, the novelty of property-linked finance introduces complexities in execution and market acceptance. It is unclear whether such products are permitted under current financial and property markets regulations. It is also not clear how much demand there is from consumers who might fear the loan might impact their ability to sell their house. The Green Finance Institute (GFI) are currently carrying out research to understand the these issues and to pilot the UK's first PLF product.

PLF has been successful in other markets (see opposite), but to reach scale in the UK it needs to be underpinned by a definitive legislative framework and accompanied by customer support and education on the benefits and operational details of the scheme.

Example: Home Run Financing provides long-term, low, fixed interest rate loans for residential energy efficiency projects in the U.S. The initiative offers insights for implementing PLF in the UK market specifically around the aspects of:

(1) **Financing model and consumer benefits:** By providing long-term, low, fixed interest rate loans that cover up to 100% of project costs, PLF can make energy efficiency upgrades more financially feasible for a wider range of property owners. This model not only eases the immediate financial burden but also aligns the cost with the benefit period of energy-saving measures, thus offering direct economic benefits to consumers.

(2) **Legislative challenges and market adaptation**: The development of PLF in the UK needs to address legislative compatibility and practical operationalisation within the current landscape. The experience from the U.S. highlights the importance of adaptable and flexible PLF designs that can cater to different building tenures, geographies, and capital providers. This approach can ensure customer-centric solutions that align with the UK's property and financial systems.

(3) **Growth and market viability:** The introduction of PLF in the UK has the potential to unlock significant private capital, estimated between £52 billion and £70 billion, for upgrading energy efficiency in homes. This transformation echoes the impact of PACE in the U.S., which enabled over $13 billion in investments and improved energy efficiency in over 325,000 homes and buildings.

Source: Green Finance Institute: Property-linked Finance (2023)

INNOVATIVE FINANCING MECHANISMS | **Key considerations**

Innovative financing mechanisms can mobilise resources and help to internalise social and environmental costs. However, they require clear strategic objectives, rigorous monitoring, risk management and technical expertise due to their novel and often complex nature.

Advantages:

- Innovative financing mechanisms can mobilise resources for LNZPs that otherwise may have been unavailable and can help to align financial flows with sustainable development objectives.
- They can incentivise sustainable practice and behaviours, addressing the potential principal-agent problem between Project Sponsors and service providers.
- They can help embed environmental and social costs in the decision making process by factoring public interest which could make the project more attractive to potential sources of capital.

Limitations:

- Innovative financing mechanisms are novel and often complex in nature. As such, they may require significant technical expertise to design which can be costly.
- They may be subject to market risks, and their success often depends on broader economic conditions.
- There are limited systems to ensure/enforce the capital raised through innovative funding mechanisms, which could pose challenges to payments in the event that they do not raise the capital required. Hence, they should not be relied upon to fulfil crucial tasks.

Key Considerations

Innovative financing mechanisms should be designed and communicated with a clear strategic objective in mind. They should be **tailored to the specific context of the intended initiative.** These mechanisms should be subject to rigorous monitoring and evaluation to ensure that they are achieving their intended results.

It is also important to **manage the risks associated with these mechanisms closely due to how novel they are in most cases.** These risks include financial risk, operational risk and reputational risk, amongst others.

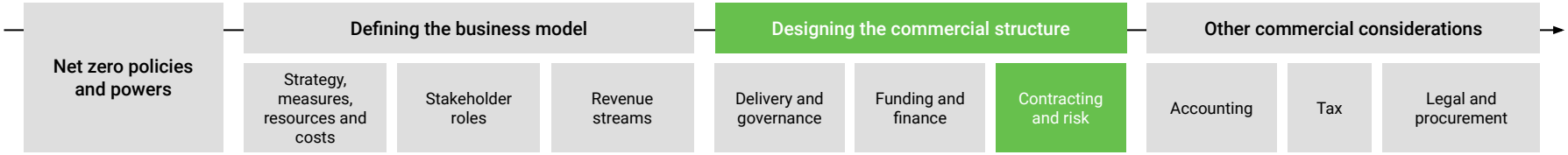
Additionally, the legal and regulatory implications of these mechanisms should be carefully considered, as they can have significant impacts on the feasibility of the source, and consequently the success of the LNZP.

4c

Contracting and risk

Contracting and risk

This section provides an overview of the various sources of funding and finance available for LNZPs.



The contractual structure establishes **how project risks are allocated and how payments are made within contracts.** This section outlines the typical arrangements needed to deliver a LNZP as well as some of the key risks each party should consider. The selection of a particular contract structure should reflect the particular circumstances of the project, its delivery structure and the type of consumers.

Please note that it is not possible to give definitive guidance that can be applied across the broad range of local net zero projects. As such, **this guide summarises typical agreements involved but is no substitute for taking full advice**. In preparing this, we have assumed that Local Authorities will take advice specific to the scheme for which they are developing a business case.

The structure of this section is as follows:

Overview of contracting - Introduces high level considerations for how project risks are allocated within contracts.

Contractual arrangements - Sets out the typical contractual arrangements between the Project Sponsor and key stakeholders.

Managing risk - Provides a description of the typical risks faced by a LNZP during the project's life cycle.

See Annex 7 for a high level summary of typical contracts required to deliver a LNZP.

OVERVIEW | **Contracts and risk**

Defines how project risks are allocated and payments are made.

The contractual structure establishes how project risks are allocated and how payments are made within contracts. The Project Sponsor, Funder and other parties will need to carefully consider the risks that they are exposed to.

At the Outline Business Case stage during the development of a LNZP, the Project Sponsor should consider the following contract related issues at a conceptual level:

- How will the functions of design, build, operation and maintenance of infrastructure and assets be delivered?
- What are the installation costs and how they will be funded?
- What property rights are required to enable works to proceed and, subsequently, assets to be operated and maintained?
- What types of customers will there be, and what are their property interests and the applicable supply arrangements for each?
- Who are potential counterparties, contractors, concessionaires and partners?
- What is the approach to procurement?

It is unlikely that contract forms will need to be determined at this stage, but Local Authorities may find it useful to be aware of the likely content of the contracts they may be negotiating further down the line.

OVERVIEW | Typical arrangements

Understanding the risks associated with a LNZP will be a key area of consideration for Project Sponsors, funders and contractors.

During the project life cycle there is a wide range of suitable arrangements at each phase. Some agreements are used in many contexts while others are unique or uniquely applied to a specific project type. **This section sets out generic arrangements and typical risks that each party should consider in the delivery and operation of a LNZP.**

Throughout this section, some analysis applies to all project stages from Strategy to Expansion, and some only applies to one or more stages, as indicated by the arrow below:

The diagram to the right indicates some of the broad arrangements but these will vary significantly from project to project and under different delivery structures.
Note for In-house Delivery, there would be no SPV sitting between the Project Sponsor and other contractors. This section summarises the key arrangements below.

- **Governance** - Sets objectives, prescribe policies and rules of conduct and oversee performance.
- **Design & Build** - Sets out the requirements of the design, installation and commissioning works for the project.
- **Operate & Maintain** - Sets out how the asset will be operated and maintained.
- **Customers & Supply** - Supply agreements with offtakers including tariffs, fares and service level agreements. For initiatives with no revenue streams, such as cycling and walking infrastructure, customer and supply agreements will not be applicable.
- **Land and asset ownership** - Considers the use and transfer of assets and obligations to land owners.
- **Funding and financing** - Flow of capital into the project and the expected returns on investment.

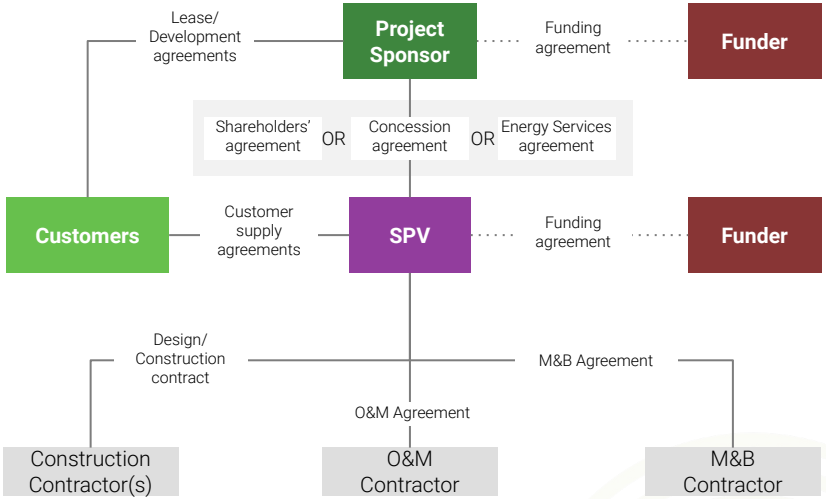


Fig.23 Typical project arrangements

Contractual arrangements

Typical contractual arrangements between the Project Sponsor and key stakeholders

CONTRACTUAL ARRANGEMENTS | **Governance**

The governance agreements set objectives, prescribe policies and rules of conduct, and oversee performance.

To ensure good governance, it is important to have **fair and impartial contractual arrangements in place.** These contracts define the roles, rights and responsibilities of each party involved. The specific type of contract used will depend on the project's structure, such as a Joint Venture agreement, shareholders' agreement or a customised governance agreement.

For Local Authority-led schemes such as an In-house or a Public-owned SPV, governance issues are more straightforward as these projects are wholly owned by the LA. They can be addressed through the LA's or the vehicle's constitution and decision-making processes. Formal contracts may not be necessary.

Where there are multiple parties, **a Memorandum of Understanding (MoU) serves as the basis for facilitating discussions regarding governance.** An MoU is a non-binding agreement between two or more parties that outlines their intentions and mutual understanding regarding a specific project. From a governance perspective, it is used as an early stage agreement that sets the overall tone of the relationship by agreeing on matters such as **dispute resolutions and confidentiality.** Often they are used to form the basis of legally binding governance agreements further down the line.

In public-private partnerships, governance can be addressed through a Joint Venture agreement and/or a shareholders' agreement. These agreements outline the governance structure and provide guidelines for decision-making. The governance structure of a Joint Venture depends on whether it is recognised as a company or a partnership, with each having a different approach for dealing with conflicts of interest, confidentiality and dispute resolutions.

Shareholders' agreements outline the rights and obligations of individuals or entities that hold shares in a company and are usually used in Joint Ventures. They define the:

- Allocation of voting rights based on share ownership and what percentage of votes are required to make major decisions.
- Board representation from all parties in the agreement and outline the process for nominating and removing directors.
- Rules regarding the transfer of shares, including defining whether existing shareholders have the right to purchase shares before they are offered to third parties (pre-emptive rights).
- Procedures for addressing exit scenarios, such as buy-sell provisions and selling the entire company.

Some projects, such as limited partnerships, may have a bespoke governance agreement which establishes an unincorporated governance body to oversee the project.

CONTRACTUAL ARRANGEMENTS | **Governance**

Where a project is delivered by the private sector, the Local Authority may wish to retain some control.

In cases of Third-party Delivery, the LA will often retain the right to set the objective, prescribe policies and oversee performance of the programme. These **rights and obligations of the third party are typically set out in a concession agreement or an energy services agreement.**

Energy service agreements outline the specific energy-related services to be provided. Governance arrangements are much more specific in this context. At a high level they include the following:

- Outline of the specific energy services to provided (for example energy supply levels, maintenance, installation).
- Detail of the pricing structure, payment schedules and any penalties for performance shortfalls.
- Defining data sharing and privacy rules, particularly in the context of smart energy solutions.

Concession agreements grant certain rights to the third party to operate and manage the project. The governance focuses on:

- Defining the standards and quality of the service the private entity must deliver.
- The revenue-sharing mechanisms or fixed fees the private entity pays to the Local Authority.
- Provisions to ensure that the Local Authority retains regulatory authority over the private entity's operations.
- Defining the terms under which the agreement can be renewed, extended or terminated.

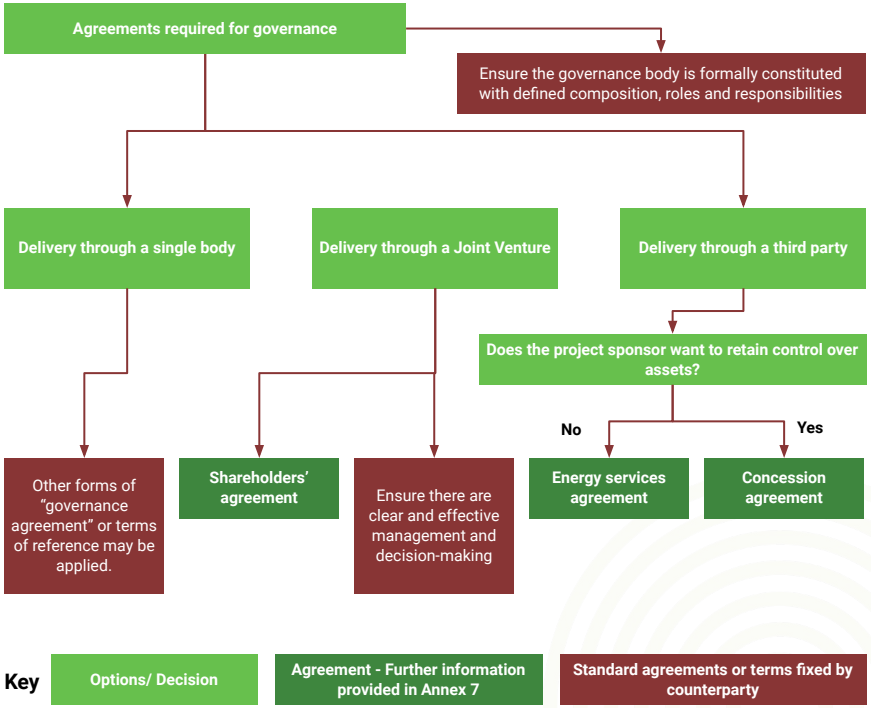


Fig.24 Project governance structure

CONTRACTUAL ARRANGEMENTS | **Design and build**

Design and build contracts are an efficient way to manage the construction phase of the project. The structure may also be adapted to deliver the operational aspect of the project as with a Design-Build-Operate-Maintain structure.

Strategy | Pipeline Development | Commercialisation | Build | Operate | Expansion

Depending on the nature and context of the LNZP, it may be part of a wider building contract for example, as part of a new development. However, where the design construction is being undertaken separately there are a number of industry standards such as JCT and NEC3 which are typically used. In some instances a more bespoke Design-Build-Operate-Maintain (DBOM) contract may be awarded.

Design-Build-Operate-Maintain

Where appropriate, construction can be combined with operation. Sometimes the investor in the SPV will want exclusive DBOM contracts to ensure that what is installed is operated efficiently and is priced on a life cycle basis and not simply the lowest capital cost. This approach is particularly useful for long-lived infrastructure systems where inherent deficiencies can be difficult to fix. It is possible to enable **best value through a DBOM contract by inserting payment-linked key performance indicators and performance guarantees.** Additionally, DBOM contracts reduce the interfaces between contractors, which results in less disputes and increases project delivery speeds.

Contractor Performance Security

Security can be obtained from a contractor through a number of mechanisms, including contract specification clauses (for example, commissioning plans, acceptance tests and defects liability periods), performance guarantees (for example, performance bonds) and extensions of security.

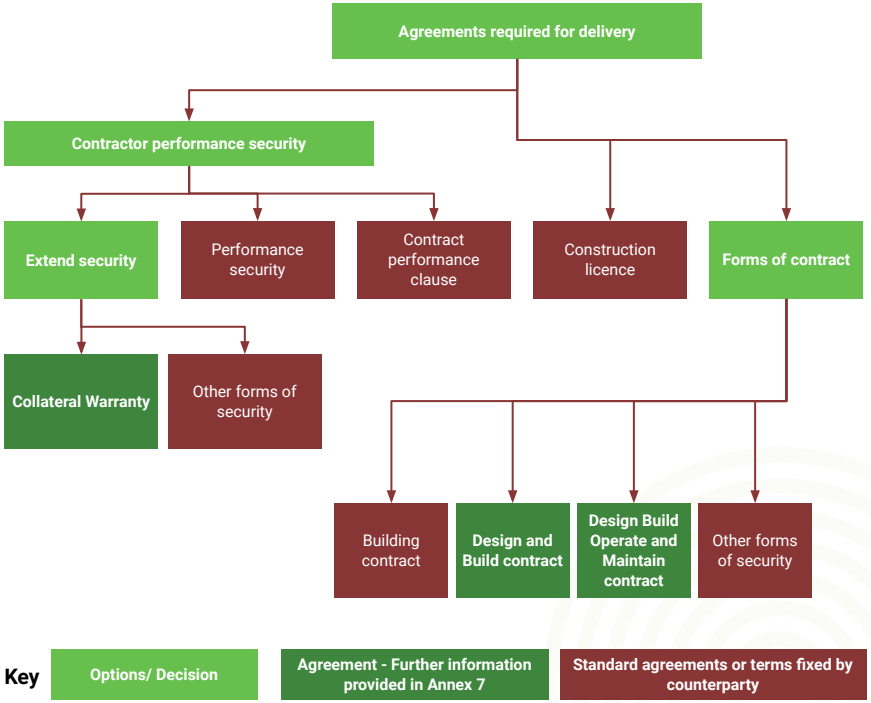


Fig.25 Project design and building agreements

CONTRACTUAL ARRANGEMENTS | **Operate and maintain**

Operate and maintain contracts are helpful for aligning objectives and incentivising a long-term view

Strategy | Pipeline Development | Commercialisation | **Build** | **Operate** | **Expansion**

Combining the roles of operation and maintenance can **help to align incentives and ensure that the operator takes a long-term view of assets.** As discussed on the previous slide, it may also be combined with design and build.

For example, electricity generation and the network of a private wire project are usually operated by, or for, the seller of that energy. **However:**

- **If generation is operated separately, the heat or electricity would be sold under a bulk supply agreement** (typically referred to as a Power Purchase Agreement for electricity generation).
- **If private networks are operated separately, the private wire operator will charge fees for the right to use the private network.** Alternatively, the project vehicle may need to make a connection agreement with the distribution network operator - and in some cases, fees to join both private wires and the grid will be required

Mobility services have a diverse range of operation agreements. These typically take the form of a franchise or concession agreement with the Local Authority.

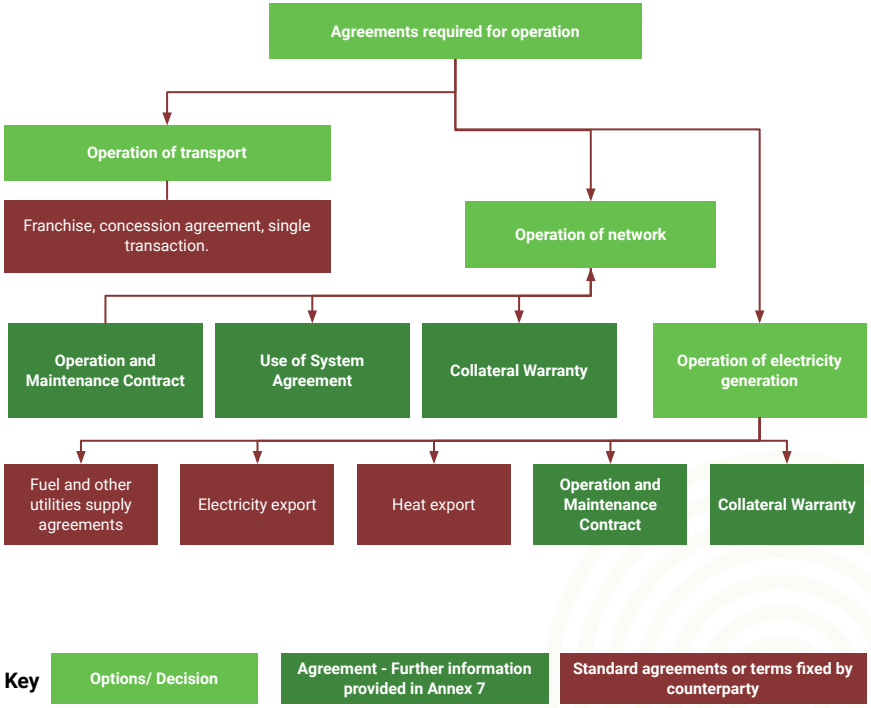


Fig.26 Project operation agreements

CONTRACTUAL ARRANGEMENTS | **Land and asset ownership**

Land and asset ownership entails various contractual risks, structures and obligations

Strategy | Pipeline Development | Commercialisation | Build | Operate | Expansion

Asset ownership will have associated contractual risks arising from the use of the asset for its particular purpose. **Failure to comply with use of asset agreements could result in damages.** For example, a Local Authority may own an energy centre but procure operation and maintenance. They will retain obligations such as granting access where failure to do so could result in a claim. When a client commissions the construction of a LNZP, contracts will typically contain an expressed or implied term that **legal ownership of those assets passes to the client when delivered to site, installed or paid for.** During a sale assets may be transferred under a normal asset transfer agreement. Rights to use assets may be granted under an express or implied licence to use those assets in another agreement. Occasionally, a right to use assets might be granted under a specific asset lease.

Land ownership gives the opportunity to impose conditions on a sale, grant, lease, licence or easement. Leases will contain various obligations relating to access and restrictions on undertaking activities. Such restrictions may prevent certain types of development near or over assets.

Section 50 Licence - In most cases LNZPs do not constitute a statutory undertaking. Section 50 of the New Roads and Street Works Act 1991 gives an SPV permission to "(a) place, or to retain, apparatus in the street, and (b) thereafter inspect, maintain, adjust, repair, alter or renew the apparatus, change its position or remove it."

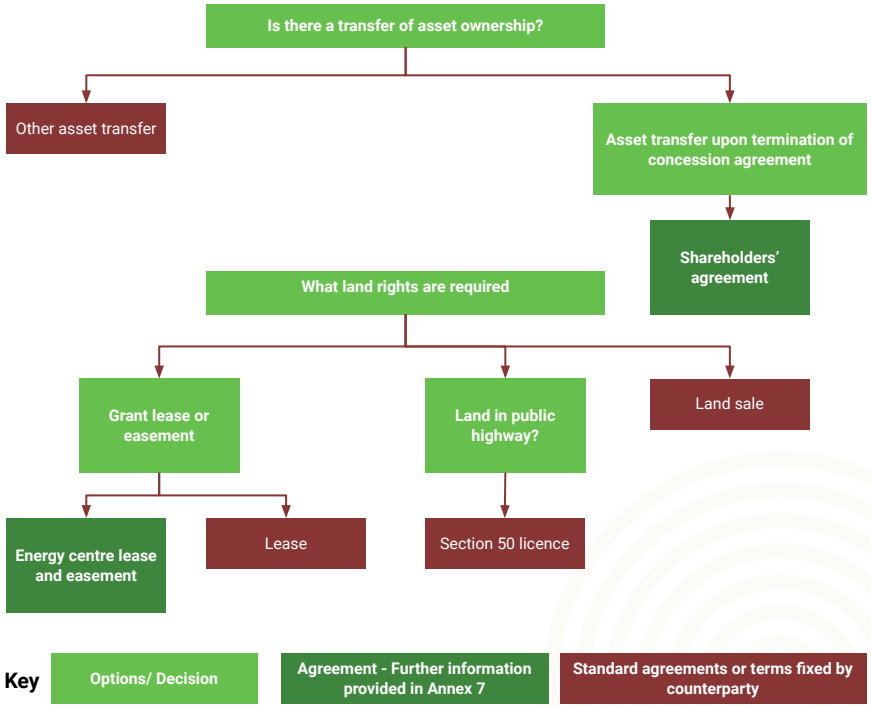


Fig.27 Land asset and ownership agreements chart

CONTRACTUAL ARRANGEMENTS | Customers and supply

Although most LNZPs will include a variety of project types, the sale of energy will be the principal source of revenue for many LNZPs and is separated from the physical delivery of supply from a regulatory context. This differs from retrofit, mobility services and infrastructure projects. A Project Sponsor should carefully consider the commercial case for projects involving the sale of energy.

Strategy | Pipeline Development | Commercialisation | Build | **Operate** | **Expansion**

The diversity of LNZPs means there are many different arrangements. Typically the **most onerous contractual terms from a project delivery perspective are in the supply of heat or electricity.** For services that involve a small transaction, like public transport, or that are free at the point of use, such as cycling infrastructure, the agreement tends to be more straightforward.

Heat or electricity supply may be delivered under a commercial or residential supply agreement. Where there is a landlord you may need to consider other arrangements to allow the landlord to supply residents, or direct billing to end users. **It is best practice to provide a mechanism for continued delivery of heat or electricity, even where a supplier fails.** Similarly a supplier is required by law to provide 24-hour customer service; this can be outsourced.

Typically an **anchor customer is required to make a private wire or heat network financially sustainable.** These may be supplied through a bulk supply agreement.

Connection to a private network may be catered for under a separate connection agreement or, more commonly, will be incorporated within a supply agreement.

Customer debt from delayed payments can have a significant impact on cash flow. This risk may be reduced through pre-payment agreements. Debt management, as well as metering and billing, can be outsourced.

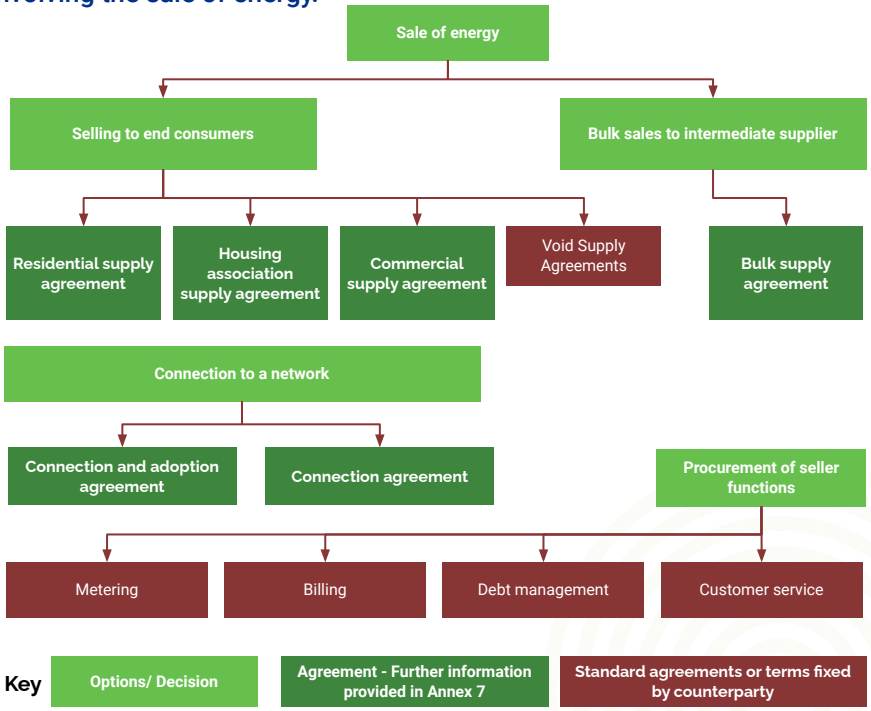


Fig.28 Customer and supply agreements

Managing risk

Overview of risk management over the life cycle of the project

MANAGING RISK | **Overview**

The higher the level of risk an actor is exposed to, the higher the reward they will expect. This will be reflected in their required return/reward increasing the overall cost of the project and ultimately the cost to consumers. The risks faced by each actor will change during the life cycle of the LNZP. However, contracts are agreed in advance to define where each risk lies. In principle risk should lie with the party most able to manage it.

The diagram below shows some of the major risks and how they are spread between the major stakeholders over the project life cycle. The rest of this section elaborates on these risks.

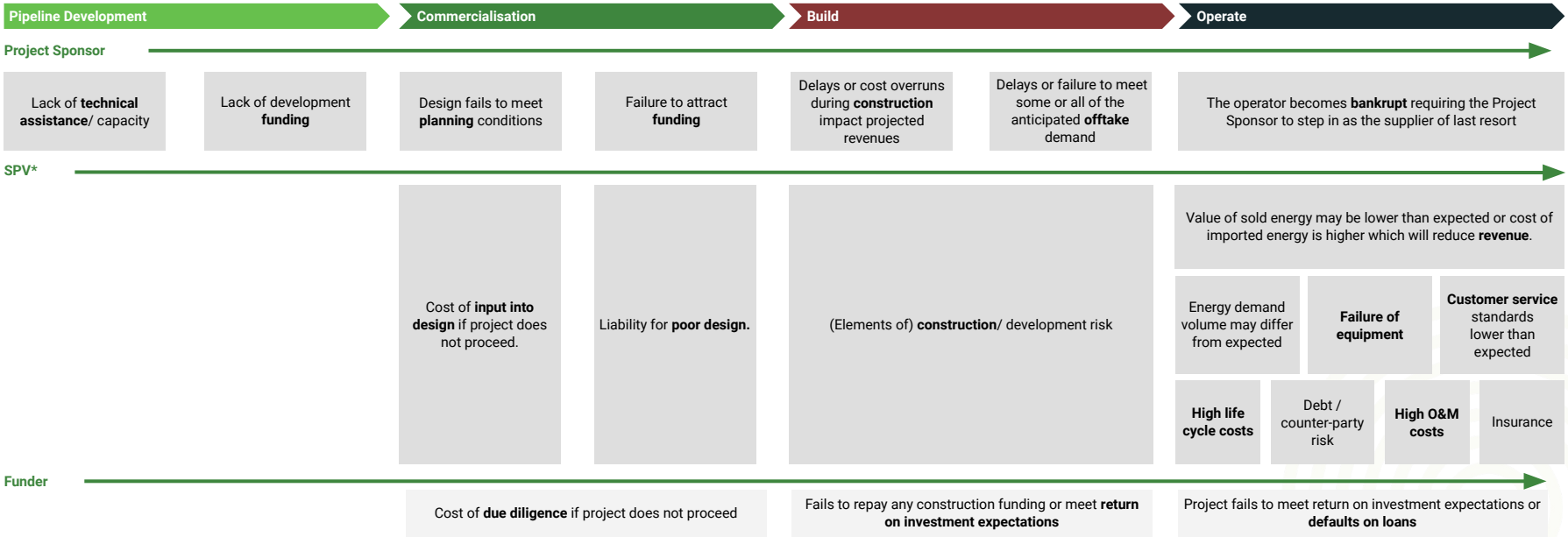


Fig.29 Risk across the project timeline

*These risks are owned by the Project Sponsor under an In-house Delivery model.

MANAGING RISK | **Project Sponsor risk**

This table outlines typical risks for the Project Sponsor over the project life cycle and potential mitigation strategies for managing them.

Project stage	Risk	Description	Mitigation
Development	Funding	The Project Sponsor cannot afford the project development costs (typically £5 million is needed for every £100 million investment)	Explore grant-based instruments to support project development.
	Technical assistance	The Project Sponsor does not have suitable technical capacity to undertake the detailed technical and financial feasibility work.	Explore support provided by regional net zero support. There may also be opportunities to partner with, or procure skills from, the private sector.
Commercialisation	Planning	Designs fail to meet planning requirements.	Ensure design team are appropriately qualified and experienced alongside appropriate quality assurance.
	Funding	The project fails to attract long-term capital requirements.	Timely engagement with internal and external funding sources. See 4b. Funding and financing for further details.
Build	Construction	Delays or cost overruns during construction impact projected costs and revenues.	Ensure design team are appropriately qualified and experienced alongside appropriate quality assurance. Agree fixed price construction contracts.
	Offtake	Delays in, or non-occurrence of, construction/occupation of the anticipated demand, reducing potential offtake.	Develop operational agreements such that they come into force based on demand build out. Delay risk can be shifted to the developer where this is a separate body from the Project Sponsor.
Operate	Bankruptcy of the operator or the private partner in a Joint Venture SPV.	The operator becomes bankrupt requiring the Project Sponsor to step in as the supplier of last resort.	Rigorous selection criteria for operator and effective monitoring of ongoing financial health of operator. Business model that is based on anchor loads that are signed up in advance of the project.

MANAGING RISK | **SPV risk**

This table outlines typical risks for the SPV over the project life cycle and potential mitigation strategies for managing them. These risks are owned by the Project Sponsor under an In-house Delivery model.

Project stage	Risk	Description	Mitigation
Commercialisation	Input into design	Cost of input into design if project does not proceed.	Perform project viability assessment prior to engaging in design work. Employ experienced and qualified design team.
	Poor design	Liability for poor design.	Procure experienced and qualified design team.
Build	Construction	An element of the construction risk will be passed to the SPV.	Procure experienced and qualified construction team. Pass down liquidated damages to any sub-contractors.
	Offtake	Some of the offtake risk will be passed to the SPV (see Project Sponsor).	Develop operational agreements such that they come into force based on demand build out.
Operate	Life cycle costs	Life cycle costs higher than expected.	Pass risk to O&M contractor via pricing mechanism.
	Revenue	Value of exported power is lower than expected or cost of imported power is higher than expected.	This risk may be transferred to the customer through fixed charges or 'take or pay' arrangements. Consider length of power import/supply agreements in line with expectations of the market. Consider bulk supply agreements with an element of fixed charge/'take or pay' arrangements.
	Technical	Failure of equipment.	Pass risk to O&M contractor via O&M contract key performance indicator regime.
	Customer service	Customer service standards lower than expected.	Include of guaranteed service standards following industry best practice in contracts, MoU or KPIs if managed internally.
	O&M costs	O&M costs higher than expected	Pass risk to O&M contractor via pricing mechanism.

MANAGING RISK | **Funder risk**

This table outlines typical risks for the Funder over the project life cycle and potential mitigation strategies for managing them.

Project stage	Risk	Description	Mitigation
Commercialisation	Due diligence	Cost of due diligence where project does not proceed.	Perform project viability assessment prior to commencing due diligence work. Many investors will typically have a minimum “ticket size” they are willing to review. A Project Sponsor should be aware of this before approaching an investor.
Build	Return on investment	Project fails to repay any construction funding.	Proper due diligence and ongoing monitoring of any covenants. Funders will typically look for existing anchor customers (these should be established, with a current demand for the service) during due diligence.
Operate	Return on investment	Project fails to meet return on investment expectations.	Proper due diligence and ongoing monitoring of any covenants. Funders will typically look for assurances of market demand during due diligence, for example, anchor customers.
	Default on loans	The project defaults on its loans.	A guarantee of debt repayments from the Project Sponsor. A public sector Project Sponsor will need to consider providing this guarantee using available recourse finance. A Project Sponsor may consider approaching a public finance body to provide this guarantee separately.

MANAGING RISK | **Government de-risking instruments**

De-risking instruments transfer financial risk to central government, making investments lower risk and more attractive to other investors.

LNZPs can carry high levels of operational, regulatory and financial risk. Many of these risks can be reduced through good project development and management. However, various financial instruments exist which can reduce the level of financial risk by transferring it to another party - usually the government. Financial risks include lower or later revenues than expected, higher costs or project failure. **The way the project's capital is structured will determine who faces losses first, but typically those with higher risk will demand a higher cost of capital:** by removing a degree of financial risk, the project can access both a lower cost of capital and a wider range of investors.

Government can de-risk investments in various ways including funding for project development (for example, PFER, UKIBs LA Advisory Service) or acting as an anchor customer (solar PPAs). But the main financial instruments used by governments are (1) Financial/credit guarantees and (2) Performance guarantees

Financial guarantees transfer risk for all, or first-loss, capital, to the government. They are often used in large infrastructure projects (see case study).

Performance guarantees cover targeted risks but typically demand, revenue and price risk. **Contracts for Difference (CfD)** schemes are the government's main mechanism for de-risking the price risk of large-scale low-carbon electricity generation (i.e. risk of volatile wholesale prices and of falling renewable prices; note that CfDs are not accessible by LNZPs), while Feed-In-Tariffs guaranteed prices for local renewables until 2019.

De-risking can be a highly effective way to attract private investment into LNZPs, but instruments often require a high level of expertise, **meaning LAs have to invest in additional resources to manage them effectively.** This is particularly true of private finance de-risking instruments, such as hedging and insurance which are typically used to reduce specific, limited risks, for example, insuring physical asset risk or hedging against currency risk.

The UK Government provided a £1 billion financial guarantee in 2012 to support the extension of London Underground Northern Line into Battersea, a key regeneration project. This financial guarantee allowed the Mayor of London to **borrow the funds from the private sector at a lower borrowing cost. This was essential to the project's financial viability.**

The guarantee was part of the broader UK Guarantees scheme, under which the Government provides up to £40 billion in guarantees to enable "priority projects in the infrastructure pipeline" to raise the necessary finance. The Northern Line extension represented a collaboration between the Mayor of London, key London Boroughs, and the private sector.

Management of the UK Guarantees Scheme has since moved to the UK Infrastructure Bank. **UKIB is able to issue up to £10 billion of financial guarantees overall and up to £2.5 billion in guarantees in any given year.**

MANAGING RISK | **Wider risks**

This section highlights the spectrum of risks in a LNZP as well as the role of technology readiness level in gauging the maturity of various technologies. Annex 5 gives a detailed overview of different LNZP components with the most prominent risks for each.

Common risk categories found in

- **Policy risk** reflects the full range of incentives or disincentives that are within the control of the government. Policy risk plays a crucial role in investment decision making, particularly where subsidies or guarantees are required to raise the rate of financial return to attract private sector investors.
- **Operational / Delivery risk** arises from unexpected outcomes in the day-to-day running of the asset.
- **Market risk** is typically associated with the volatility of expected revenue and expenses, and whether that volatility can be hedged.
- **Legal and regulatory risk** include the cost of compliance with rules and regulations, the risk of litigation and robustness of the law. This also includes any permits, licences and any expected changes.
- **ESG risk** includes the impact on the environment, health and local communities, as well as the risk of poor governance.
- **Reputational risk** includes unmitigated risk factors, in particular ESG risks, being made public and the impact on the project.
- **Technical risks** are inherent to most projects and could cause construction cost overruns, engineering failures and poor integration. Combining multiple immature technologies in a novel system architecture, and their interaction with complex markets and unproven consumer behaviour create significant levels of uncertainty in future performance and revenues.

Technology risk

Most of the technologies used in LNZPs are well established, even they are relatively new in the context of local projects. For example, vanadium flow batteries or hydrogen buses. However, technology in this space is changing fast and some LNZPs will be piloting these new technologies.

The Technology Readiness Level (TRL)[1] helps to provide an indication of technology risks by evaluating the maturity of a particular technology, ranging from conceptualisation to full commercial deployment. Use of this scale aids LNZPs in assessing the risk associated with a newer technology.

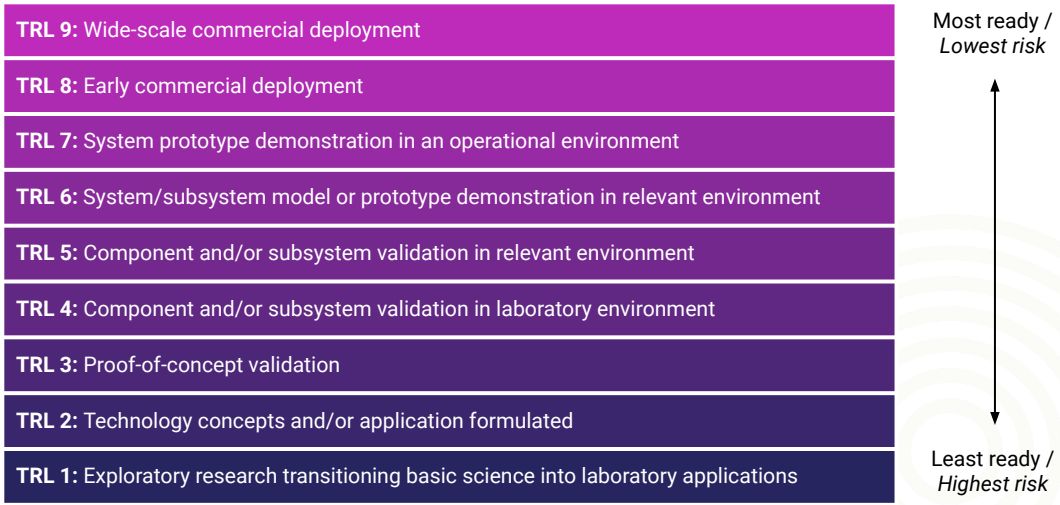


Fig.30 Technology readiness level (TRL) scale

1. See Annex 5 for a description of common LNZP technologies and their associated TRLs

5

Other commercial considerations

This section includes:

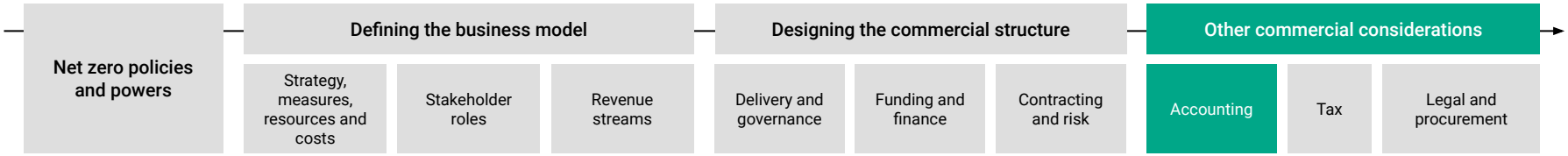
- **Accounting:** Financial reporting consequences of project-related transactions, including how they are recorded, reported and disclosed in the Local Authority's financial statements.
- **Tax:** Potential tax liabilities or benefits that may arise from the implementation of a LNZP.
- **Legal and procurement:** Legal obligations and risks associated with LNZPs, including contractual obligations, compliance with energy and environmental regulations

5a

Accounting

Accounting

The way a project impacts the financial statements of Funders and Project Sponsors can be an important consideration when developing the commercial structure for a project.



Regardless of project structure, it is important to understand how a project will impact the financial statements of funders, Project Sponsors and potential private sector partners, as well as the impact on any private vehicles. Proper recognition is necessary to: (a) comply with accounting rules (b) comply with public sector rules, e.g. on borrowing limits or types of spending (c) assess financial sustainability (d) access financial markets: Levels of cash flow, revenue, profitability and financial ratios are often used by funders and credit rating agencies both to evaluate creditworthiness pre-transaction, and as loan covenants during a lending relationship.

This section introduces the relevant financial reporting frameworks; Financial Reporting Standard (FRS) 102 and the International Financial Reporting Standard (IFRS). It sets out the key considerations when developing the commercial structure for a project. Note the focus of these considerations are the four delivery structures.

Note: This section is up to date as of September 2023. Accounting frameworks can be complex and subject to frequent modifications; it's essential to stay up-to-date with the latest regulations that apply to your specific project. Seeking professional advice will help you navigate the accounting landscape effectively and make informed decisions about project financing options.

This section structured as follows:

Financial reporting frameworks provide a set of guidelines and rules for preparing financial statements to ensure consistency, transparency and comparability in financial reporting.

Reporting treatments summarises the key accounting implications which may be relevant to the illustrative commercial structures.

Financial reporting frameworks

Financial reporting frameworks provide a set of guidelines and rules for preparing financial statements to ensure consistency, transparency and comparability in financial reporting.

All companies must comply with the Companies Act 2006. This allows companies, other than charities to prepare their individual and/ or consolidated financial statements with either **UK Generally Accepted Accounting Practice (UK GAAP)** or **International Financial Reporting Standard (IFRS)**. Local Authorities are required to report against IFRS, subject to adaptations from the Chartered Institute of Public Finance and Accounting (CIPFA) and the LASAAC Code of Practice on Local Authority Accounting in the United Kingdom.

Note, where a company has been set up as a charity (see legal form) it must prepare its financial statements in accordance with UK GAAP.

International Financial Reporting Standard (IFRS)

IFRS is a set of international accounting standards that determine how certain types of transactions and other events should be reported in financial statements. While Local Authorities in the UK primarily follow the CIPFA Code of Practice, they may also need to consider IFRS. This is particularly true if they are seeking to attract investment from international investors or if they are involved in complex transactions that are not covered by the CIPFA Code.

UK Generally Accepted Accounting Practice (UK GAAP)

UK GAAP are the accounting standards published by the UK's Financial Reporting Council. Under this framework, FRS 102 is the reporting standard applied to all entities that are not applying IFRS, FRS 101 (relevant only to individual company accounts of parents and subsidiaries of a group which prepares consolidated financial statements under IFRS) and FRS 105 (designed for 'micro-entities').

Therefore, the accounting implication described in the following section has focused on IFRS and FRS 102. This is because they are the most common accounting standards to be used by entities reporting in the UK.

Consolidation requirements for SPVs

Consolidating an entity involves bringing all its assets, liabilities, profits and losses (with consolidation adjustments) into the group's financial statements. It will impact the entity's financial ratios and may impact its borrowing potential.

When a delivery model uses an SPV, all assets, liabilities, profits and losses must be brought into into the group's financial statements (subject to consolidation adjustments). Consolidation is only relevant to the public-owned SPV and the Joint Venture SPV. Under a public-owned SPV, the Local Authority will require consolidation.

Where there are multiple parties, you must consider which partner controls the SPV. The controlling partner is the one who should consolidate the SPV into their group financial statements. **Where consolidation is required, this will impact an entity's financial ratios and may have an impact on its borrowing potential.**

FRS 102 - Section 9 'Consolidated and separate financial statements'

Whether or not a parent entity is required to consolidate all of its investments as subsidiaries (including SPVs) depends on whether control exists.

There are two criteria for control:

- Power over the financial and operating policies; and
- Benefits from the entities' activities that will be gained from that power.

FRS 102 provides a list of circumstances that may indicate that the entity controls an SPV.

IFRS 'Consolidated Financial Statements'

Under IFRS 10, an investor controls an entity when it possesses the following:

- Power over the entity.
- Exposure or rights to variable returns from its involvement with the investee.
- The ability to use its power over the investee to influence the investor's returns.

Where an investor achieves control by holding the majority of voting rights, such as being a majority shareholder, and no other agreements impact this control, the assessment of control is straightforward. However, in many instances the assessment of control could require careful judgement. If it can be clearly demonstrated that owning the majority of voting rights does not equate to control, consolidation will not be necessary.

Note an SPV under FRS 102 may not always be an SPV under IFRS.

To determine whether one of the Project Sponsors controls an SPV, judgement is essential. This assessment should take into account all legal and commercial agreements.

Joint Venture SPV

If the control of the SPV by any Joint Venture partner is not evident, it is essential to determine whether the situation qualifies as a Joint Venture. If the entity does function as a Joint Venture, the accounting treatment will vary from that of a fully consolidated entity.

FRS 102 - Section 15 'Investments in Joint Ventures'

FRS 102 defines a Joint Venture as 'a contractual arrangement whereby two or more parties undertake an economic activity that is subject to joint control.' Joint control is defined as 'the contractually agreed sharing of control over an economic activity.' It exists only when the strategic, financial and operating decisions require 'unanimous consent' of the parties sharing control. None of the parties should have the casting vote that enables it to resolve a deadlock decision. There are three forms of Joint Venture:

1. **Jointly controlled operations** include the use of assets and other resources rather than the establishment of another entity. Each partner recognises the assets that it controls, as well as the liabilities, expenses and share of income that it incurs.
2. **Jointly controlled assets** include the joint control - and often ownership - of the asset(s). Each partner recognises its share of the assets it controls, as well as the liabilities, expenses and share of income.
3. **Jointly controlled SPV**, where each partner that holds an interest, will use the equity method to record investments on their consolidated financial statements. Under the equity method, the investment in the Joint Venture is initially recognised at cost. In cases where the Joint Venture involves multiple jointly controlled interests, the partner has the option to account for these entities using either the cost or fair value model. The investment is subsequently adjusted for changes in an investor's share of or Joint Venture post-acquisition. The profit or loss of an investor includes its share of the profit or loss of the Joint Venture.

IFRS - 'Joint Arrangements'

IFRS 11 introduces two categories of joint arrangements (excluding jointly controlled assets):

- **Joint Ventures**: The definition of a Joint Venture aligns with that of FRS 102. Under IFRS, these are accounted for using the equity method of accounting in both the consolidated and individual parent accounts. It is worth noting that FRS 102 allows Joint Ventures in the individual parent accounts to be accounted for using either the cost model or the fair value model.
- **Joint operations**: The accounting treatment for joint operations follows the guidelines set forth in FRS 102.

The key to determining joint control is to ensure that no single Joint Venture Partner has the authority to make the final decisions. This is usually evident in the legal agreements or incorporation documents.

Government grants

The source of a grant does not impact the way it is recognised within your financial statement. The accounting implications depend on the reporting framework you choose and how you measure recognition.

FRS 102 - Section 24 'Government Grants'

Grants are recognised at fair value. This excludes government assistance that cannot reasonably have a value placed upon it. Grants related to assets may not be deducted from asset costs. Instead, the grant should be recognised as deferred income.

The accounting treatment of government grants will depend on the policy chosen; the **performance** model vs the **accrual** model. This choice should be disclosed alongside the nature and amounts of grants, as well as any unfulfilled conditions and contingencies attached those grants. Any other forms of government assistance from which the entity has directly benefited should also be disclosed.

- The **performance model** recognises income when grant proceeds are received or receivable, or when performance-related conditions are met. For example, a solar farm project delivered through a public-private partnership may leverage an SPV to receive government grants to subsidise the costs of constructing solar farms. Under the performance model, the grants would be recognised when the renewable electricity generation targets are met. The SPV would disclose the nature of the grants (For example, for wind farm construction), amounts of grants, any unfulfilled conditions and other forms of government assistance (For example, tax incentives).
- **The accrual model** classifies grants as either related to assets or revenue. Grants received before meeting revenue recognition criteria are recognised as a liability.

It is worth noting that the Social Housing Statement of Recommended Practice requires the accrual model to be used when a social landlord accounts for its housing properties at cost, while the performance model must be used when the social landlord accounts for its housing properties at valuation.

IFRS - IAS 20 'Accounting for Government Grants and Disclosure of Government Assistance'

IFRS allows non-monetary government grants to be recorded at a nominal amount as an alternative to fair value. The two approaches for handling grants under this standard are the capital approach and the income approach.

- The **capital approach** recognises grants outside profit or loss, as they are not expected to be repaid. They are not earned but represent incentives provided by the government without related costs.
- The **income approach** recognises government grants in profit or loss, as they are earned by complying with conditions and meeting obligations. Since they compensate for related expenses and are an extension of fiscal policies, it is logical to deal with them in profit or loss.

Government grants should be recognised in profit or loss systematically, reflecting the related costs they are meant to offset. Disclosure must include the chosen accounting policy; details of the grants recognised; information on other direct government assistance; and any conditions or contingencies linked to recognised government aid.

Debt (borrowing) costs

Debt (borrowing) costs are interest and other costs that an entity incurs in connection with borrowing funds to finance any stage of a project's life cycle.

FRS 102 - Section 25 'Borrowing Costs'

Under FRS 102, borrowing costs include:

- interest expense calculated using the effective interest method,
- finance charges relating to finance leases, and
- exchange differences arising from foreign currency borrowings which are considered as an adjustment to interest costs.

Borrowing costs can be handled by applying a policy of capitalisation or recognising them as expenses.

1. The Capitalising borrowing costs approach recognises borrowing costs directly related to the acquisition, construction or production of a qualifying asset[1] as part of that asset's cost. This approach can lead to higher asset values on the balance sheet. For example, a Local Authority may borrow capital to finance an in-house delivered retrofitting project for public buildings. If the Local Authority chooses to capitalise borrowing costs, they can include the interest and other finance charges as part of the asset's cost.

2. The Expenses approach recognises borrowing costs as an expense in the period in which they are incurred. They are reported on the income statement. This would mean that for the Local Authority example, instead of adding the interest costs to the cost of the building, it would immediately deduct them from its income in the financial statement of the period they occur.

Under IFRS IAS 23 the scope for borrowing costs is similar to FRS 102 and covers interest expense, interest in respect of lease liabilities and exchange differences arising from foreign currency borrowings. Similar to FRS 102, borrowing costs can be handled by applying a policy of capitalisation or recognising them as expenses. The borrowing costs of capitalisation criteria vary slightly from FRS 102.

Both FRS 102 and IFRS IAS 23 require disclosure of accounting policies related to borrowing costs. Under FRS 102, entities must disclose the total interest expense (using effective interest method), for financial liabilities that are not at fair value through profit or loss. Where a policy of capitalisation is adopted, entities should also disclose the amount of borrowing costs capitalised in the period and the capitalisation rate used.

1. *A qualifying asset is an asset that necessarily takes a substantial period of time to get ready for its intended use or sale.

Financial guarantee contracts

A financial guarantee contract is a commitment by one party to a lender to take responsibility for another entity's borrowings. A guarantee might be required to enable commercial debt funding for a SPV.

A common example of financial guarantee contracts are where a parent (for example Project Sponsor) guarantees the borrowing of a subsidiary or arms length entity. This may be relevant for public-owned or Joint Venture SPVs. Guarantees from a creditworthy parent such as a Local Authority or central government are often required to enable debt funding into a SPV. The Project Sponsor will need to account for the financial guarantee.

FRS 102 Section 21 'Provisions and Contingencies'

Section 21 of the FRS 102 framework applies to provisions (that is, liabilities of uncertain timing or amount), contingent liabilities and contingent assets, except for those provisions covered by other sections of the FRS.

Financial guarantees are recognised when there is a probable obligation (more likely than not) that the entity will be required to transfer economic benefit due to a past event, and the amount can be reliably estimated. They are measured at the best estimate of the settlement amount. If time value of money is significant, the provision is the present value of the expected settlement amount.

Entities should disclose the nature and business purpose of the financial guarantee contracts they have issued. The information related to financial guarantee contracts must be presented clearly, and any connections to insurance contracts, contingent liabilities and contingent assets must be handled as per the specific FRS requirements.

How IFRS differs from FRS 102

Under FRS 102, when it is unlikely that economic benefit will transfer, financial guarantee contracts can be disclosed as contingent liabilities in the notes to the accounts. However, IFRS doesn't have this exemption. Instead there is an accounting policy choice. If the contracts issuer has previously explicitly stated that it views the contracts as insurance contracts and has used accounting applicable to these, the issuer may apply either IAS 39 or IFRS 4 to the contracts in question.

Entities that issue a financial guarantee under the scope of IAS 39 must initially recognise the guarantee at fair value. Its fair value at inception is likely to equal the premium received, unless there is evidence to the contrary. Subsequently, the issuer should measure the contract at the higher of the amount determined in accordance with IAS 37 'Provisions, Contingent Liabilities and Contingent Assets' and the amount initially recognised less - when appropriate - cumulative amortisation recognised in accordance with IAS 18.

IFRS 4 allows entities to continue with their existing accounting policies subject to a 'liability adequacy test'.

See IAS 39 'Financial Instruments: Recognition and Measurement', IAS 37 'Provisions, Contingent Liabilities, Contingent Assets' and IFRS 4 'Insurance contracts' and IFRS 9 'Financial Instruments' for further detail.

Case study: Development bank guarantees

State-owned development banks in many countries provide loan guarantees to enable local projects to borrow with creditworthiness that is closer to that of the central government. In the UK, the largest scheme is administered by the UK Infrastructure Bank. This facility allows for the deployment of up to £10 billion of sovereign-equivalent guarantees to crowd-in private sector financing on qualifying projects that are in line with UKIB's investment principles of net zero and levelling up. The UKIB has released a legal overview for projects that seek to be involved in any aspect of a project with loan guarantee funding.

Service Concession Arrangements (SCA)

A service concession arrangement is where a public sector body (the grantor) contracts with a private sector entity (the operator) to construct (or upgrade), operate and maintain infrastructure assets for a specified period of time (the concession period).

Service concession arrangements (SCAs) only apply to LNZPs with a concession delivery structure. An example of this would be where a Local Authority grants a private operator the rights to operate and maintain a public transportation system. The operator may receive both a financial asset (for example, guarantee of payment for the construction, upgrade or maintenance of the service) and an intangible asset (for example, right to charge the public for using the transportation system).

FRS 102 Section 34 'Specialised Activities'

For an arrangement to be an SCA, the grantor must control or regulate what services the operator must provide using the infrastructure assets, to whom, and at what price. The grantor must also control any significant residual interest in the assets at the end of the arrangement. If the infrastructure assets have no significant residual value at the end of the arrangement, then it is accounted for as a service concession, provided that the grantor controls or regulates the services provided.

There are two categories of service concession arrangements **(a) The operator receives a financial asset (b) The operator receives an intangible asset**. Sometimes, a single arrangement may contain both types. To the extent that the grantor has given an unconditional guarantee of payment for the construction (or upgrade) of the infrastructure assets; the operator has a financial asset. To the extent that the operator receives a right to charge the public for using the service; the operator has an intangible asset. Both the operator and grantor must disclose information that evaluates the SCA's nature and risks. This typically includes a description of the arrangement. The operator discloses the amount of revenue, profits or losses and other income recognised in the period on exchanging construction services for a financial asset or an intangible asset.

IFRS - IFRIC 12 'Service Concession Arrangements'

IFRIC 12 contains the same control criteria as FRS 102 Section 34 for deciding if an arrangement falls under an SCA. For construction or upgrade services, the operator recognises revenue following IFRS 15. The grantor's concession may be in the form of:

- A financial asset - this is recognised by the operator when there's an enforceable right to receive cash from the grantor.
- An intangible asset - this is recognised if the operator obtains a right to charge users of the service.

Another example would be when a third party enters into an SCA with a Local Authority to construct and operate a wind farm. Under the SCA, the Local Authority maintains control over the services provided, the pricing structure and the residual interest in the infrastructure after the SCA ends. The third party will recognise revenue as per IFRS 15 for the construction, upgrade, operation and maintenance of the wind farm. The concession may include financial assets (for example right to receive cash from the grantor) or intangible assets (for example right to charge end users for the energy supplied). The operator must disclose how it recognises revenue for the various services provided under the concession. If it recognises a financial asset, details of the enforceable rights must be disclosed. Similarly, it must also explain the rights and methods used for intangible assets.

Share-based payments

Share-based payments involve transactions where an entity acquires goods or services by issuing equity instruments or incurring liabilities for amounts based on the price of the entity's shares.

FRS 102 - Section 26 'Share-based payments'

This section explains how to handle share-based payment transactions.
These transactions involve giving employees or partners shares or the choice between money and shares as part of their compensation. When using a share-based payment arrangement, the entity must disclose:

- The type of share-based payment arrangement,
- Its terms and conditions, such as vesting requirements, maximum term of options granted and the method of settlement,
- The number and weighted average exercise prices for all relevant share options during the reporting period.

For example, say you engaged with a private sector company to develop private wire infrastructure. The infrastructure would enable more localised energy distribution, and you offer the company shares in a municipal energy corporation. This would be a share-based payment. Since the company is receiving shares (equity-settled share-based payment), the value of services is recognised in equity, increasing the equity of the municipal corporation. You would need to disclose details about this arrangement, including the nature of the share-based payment, vesting requirements, terms and conditions, and any other relevant information about the share options provided to the company for the reporting period.

IFRS 2 'Share-based payments'

IFRS applies to all kinds of share transactions, whether they involve giving shares, money, or a choice between the two. It also covers cases where one group helps another with their deals. But it doesn't include situations like employee shares, certain business mergers and some financial deals.

In these transactions, goods or services are recognised when received, leading to an increase in equity or liability. If these don't qualify as assets, they are recognised as expenses. When disclosing these transactions, you must include:

- the total expense recognised,
- the carrying amount, and
- the intrinsic value of liabilities from these transactions.

Property, Plant and Equipment (PPE)

PPE are tangible assets such as plant, machinery and land used in the production or supply of energy. They are typically used for more than one accounting period and include components such as solar panels and energy storage systems.

FRS 102 Section 17 'Property Plant and Equipment'

PPE are recognised as an asset when it is probable that future economic benefits will flow to the entity, and the cost can be measured reliably. PPE are initially measured at cost. This includes purchase prices, costs directly attributable to delivery and installation of the asset, and initial estimates of dismantling and removing costs. The costs of maintenance or repair are excluded.

For example, say an entity undertook the construction of a wind farm. The wind farm, including its construction, installation, dismantling and land costs, would all be recognised. Each component may have a different useful economic life. And so, each component should be depreciated separately. Land typically has an unlimited useful life and is usually not depreciated. The entity would then disclose the measurement bases used for determining the gross carrying amount; depreciation methods used; useful lives or depreciation rates used; gross carrying amount and the accumulated depreciation; as well as the reconciliation of the carrying amount - at the beginning and end of the reporting period. Note, land and buildings are separable assets and must be accounted for separately, even when bought together.

IFRS Treatment: IAS 16 'Property Plant and Equipment'

The principles and guidance in FRS 102 and IAS 16 are very similar. However, a distinction arises regarding the treatment of directly attributable borrowing costs. Unlike FRS 102, where the choice exists, IFRS mandates the capitalisation of directly attributable borrowing costs. This requirement holds true even if borrowings are not procured solely for the purpose of financing a singular asset; a portion of financial costs linked to overall borrowings must still undergo capitalisation. The method for determining the capitalisation rate involves calculating the 'weighted average of the borrowing costs pertinent to the entity's outstanding borrowings over the period, excluding borrowings acquired explicitly for the intent of acquiring assets.'

At the beginning and end of the reporting period, entities should disclose, for each class of PPE: the measurement bases used for determining the gross carrying amount; depreciation methods used; useful lives or depreciation rates used; gross carrying amount and the accumulated depreciation; as well as the reconciliation of the carrying amount.

Leases

Leases are contracts outlining the terms under which one party agrees to transfer the right to use assets owned by another party. These are either classified as finance leases or operating leases.

FRS 102

Lease classification is based on how risks and rewards relating to ownership of a leased asset sit with the lessor or the lessee. These are classified into the following:

- **Finance lease:** if the arrangement transfers substantially all risks and rewards relating to ownership. You need to show a capitalised asset and corresponding liability on the balance sheet for this type of lease. This will increase the assets and liabilities recognised on the balance sheet and lead to depreciation. In recognising finance leases, if debt is linked to assets, liabilities or EBITDA[1], debt ratios will be impacted.
- **Operating lease:** if it does not transfer substantially all risks and rewards relating to ownership. It isn't necessary to show capitalised assets and corresponding liabilities on the balance sheet and the expense charge is not labelled as depreciation.

  For example, if a Local Authority enters a 15-year lease for a waste to energy plant under FRS 102 guidelines, if the lease qualifies as an operating lease, the Local Authority won't show the asset or liability on its balance sheet. Instead it will record the annual lease payment as an annual expense. If it is a finance lease, the Local Authority would show the waste to energy plant and lease liability on its balance sheet, depreciate the asset and recognise interest expenses.

IFRS 16

The new standard, IFRS 16, will greatly impact financial ratios and performance metrics in the corporate world. This could affect loan covenants, credit ratings, borrowing costs, and may lead to changes in behaviour.

For Local Authorities, IFRS 16 will influence capital financing requirements, minimum revenue provisions and borrowing limits. **The practical impact on Local Authority accounts preparation will be significant, requiring considerations of new or revised processes, data gathering and management systems, and the measurement of "right of use assets" calculations.** These changes may also extend beyond financial reporting to impact alternative business operational models, including outsourcing.

CIPFA is expected to introduce "practical expedients" or exemptions for items of relatively low value, which may not need to be recognised on the balance sheet as a leased asset.

While lessor accounting remains mostly unchanged from IAS 17, lessors are anticipated to be affected by altered customer needs and behaviour, impacting their business models and lease products.

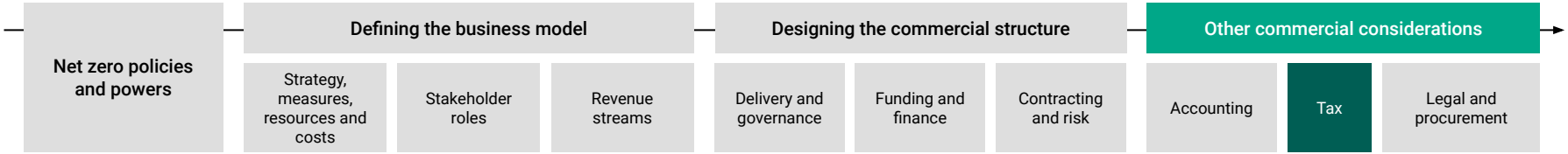
1. Earnings before interest, tax, depreciation and amortisation

5b

Tax

Tax

This section provides an overview of the various tax considerations for LNZPs.



The UK tax system is complex, with various legislation and practice that is constantly evolving. This section provides an overview of the main taxes and incentives that should be considered in relation to the development, ownership and operation of a LNZP. The delivery structures set out in this guide, together with any refinements that may be made at the time of implementation, will each have a unique tax profile. It will be important for investors, developers and operators to take their own detailed professional advice before committing to transactions.

Note the information presented in this section assumes no knowledge of the potential tax implications.

Tax laws can be complex and subject to frequent modifications. It is essential to stay up-to-date with the latest regulations that apply to your specific project. Seeking professional advice will help you navigate the tax landscape effectively and make informed decisions about your net zero project's financial aspects.

This section sets out guidance regarding the following taxes:

- **Corporation tax**
- **Value added tax**
- **Stamp duty tax**
- **Construction industry scheme**

Corporation tax

The main rate of corporation tax is 25% (as of April 1 2023). Local Authorities are not subject to this tax, therefore the delivery model will affect a project's exposure.

The corporation tax profile of the chosen delivery structure for a LNZP will depend on the tax status of individual investors or the legal form of the delivery body.

Corporation tax is applicable to corporate bodies and unincorporated associations, including private and public limited companies, unlimited liability companies and trade associations. **If an SPV is established as a private limited company, it will be subject to corporation tax.** However, certain entities are exempt from corporation tax, such as partnerships, limited liability partnerships and Local Authorities. This means **if a LNZP is delivered through an In-house Delivery structure there will be no corporation tax.**

Registered charities are also exempt from corporation tax. **A community interest company cannot register as a charity**, so it is subject to corporation tax and cannot benefit from gift aid planning.

Limited liability partnerships can offer tax efficiencies for projects delivered through a Joint Venture SPV model. Profits are attributed to the partners, who are then taxed based on their own tax profile. This can be useful in a Joint Venture SPV model where one partner, such as a Local Authority is exempt from corporation tax.

The Mutual Trading Exemption may apply if an entity only trades with its members (shareholders) or has minimal external trading. This exemption from corporation tax will apply where a Local Authority sets up an SPV, and the SPV trades only with the Local Authority that controls it. An application for this exemption must be made to HMRC.

A company resident in the UK will be subject to UK corporation tax on its net property business profits at the normal corporation rate, which is 25% from April 2023. Generally, the profits of a LNZP will be comprised of the income from the sale of energy, or other services, less deductible expenses, capital allowances and tax allowable interest. Expenditure that is met through grant funding will not be deductible for tax purposes.

The period of assessment will be the same as the company's accounting period, so long as this period does not exceed 12 months. If the accounting period exceeds 12 months, then it will be split, for tax purposes, into two separate periods: the first period consisting of the first 12 months of the accounting period; the second period consisting of the remainder of the accounting period.

Corporation tax

Investment in LNZPs presents an opportunity for investors to claim capital allowances, but each delivery structure will need to be carefully considered to determine who can claim and how much.

Capital allowances are a tax relief for capital expenditure. Accounting depreciation (including impairment of fixed assets) is generally not deductible for UK tax purposes. Instead, a tax deduction for capital allowances is permitted in computing the taxable income (on the basis the property will be held on investment account).

Qualifying capital expenditure is generally split into main pool plant and machinery allowances (PMA) (18% writing down allowances) or special rate pool PMA (6% writing down allowances), based on the nature of the expenditure. In general, qualifying expenditure is capital expenditure for the ownership of PMA for a qualifying activity. Note, most plant or machinery in an energy centre will be considered 'fixtures'.
These are PMA that are installed and fixed to a building or land and so in law they are part of the building or land. For an energy project, it is important to consider whether there is relevant interest in the land on which the fixtures are installed. There are special provisions for 'Energy service providers' who may be treated as owning fixtures on land without having an interest in the land.

Relief is also available at a rate of 3% straight line for expenditure qualifying as structures and buildings allowances.

A temporary measure called 'Full Expensing' was introduced in the Spring 2023 Budget. This applies to new expenditure incurred between 1 April 2023 to 31 March 2026 on qualifying for main pool or special rate pool PMA. Qualifying main pool expenditure will receive a 100% (normally 18%) first year deduction while special rate pool expenditure will receive a 50% (normally 6%) first year deduction. Exclusions apply.

Additionally, the Spring 2023 Budget extended the availability of 100% first year allowances on electric vehicle charging points to 1 April 2025.

Corporation tax

The main rate of corporation tax is 25% (as of 1 April 2023).

Under **transfer pricing rules**, interest paid to, or guaranteed by, a non-resident parent or related person, will only be deductible where the rate of interest and the amount of the debt are on an 'arm's length' basis. This restricts the deductibility where a company is financed by a disproportionate amount of debt.

Transfer pricing can mean no corporation tax deduction for some or all of the interest. Where interest is payable to a non-resident person who is not within the scope of UK corporation tax in respect of the interest receipt, a deduction may only be available once interest has been paid. This effectively means that interest payments are re-characterised as distributions and so there would be no corporation tax deduction.

These rules become significant when capital expenditure requirements are high and funding is provided between related parties, such as Joint Venture SPV. Any impacts of restrictions to the tax deductibility of interest should be consulted on and included into financial models to support the financial viability of a project.

Interest is also subject to the corporate interest restriction introduced in April 2017 in accordance with the OECD's base erosion and profit shifting (BEPS) project. These rules are complex and not discussed in detail here. However, the starting point is to restrict finance cost deductions to 30% of tax EBITDA.

There is also a £2 million **de minimis**[1] and the option of using an alternative group ratio or a public infrastructure exemption if this will provide a better result. In addition, the net interest deduction of the UK group cannot exceed the net interest shown in the worldwide group's consolidated financial statements.

Other potential restrictions include:

- Hybrid mismatch rules which implement the OECD BEPS Action 2 proposals can deny interest relief (and potentially other payments) where there are hybrid instruments and/or hybrid entities;
- Reclassification of interest as a distribution where the debt has certain equity characteristics; and
- Denial of relief where a loan relationship of a company has an "unallowable" purpose (broadly, a purpose that is not within the business or commercial purposes of the company).

The rules are complex and prescriptive and tax advice should be sought at all phases of the transaction.

1. De minimis is a legal principle which allows for matters that are small scale or of insufficient importance to be exempted from a rule or requirement. It can be used by the courts as an exclusionary tool to dismiss trivial matters from litigation.

Value added tax

There are three key VAT considerations: the VAT liability of the income received or activities undertaken; the VAT recovery position on costs incurred; and the VAT impact on other parties in the supply chain.

VAT at 20% is payable by UK and non-resident investors on the cost of many goods and services purchased in the UK. VAT at 20% is also chargeable by UK and non-resident investors carrying on a business in the UK, who make taxable supplies of at least £85,000 a year for a UK investor or at any level for a non-resident investor (fixed to April 2026). A business can register voluntarily if the taxable turnover is below this figure. A property developer or investor can also register for VAT on the basis of clear intentions to make taxable supplies in the future – this facilitates recovery of VAT on initial investment appraisal, acquisition and development costs at an early stage.

Types of supply

There are four different liabilities of supplies for VAT purposes:

- For standard-rated supplies, the supplier charges VAT at 20%, and can recover VAT charged on supplies received that directly relate to the standard rated supply made by the supplier.
- For reduced rate supplies, the supplier charges VAT at 5% and can recover VAT on supplies received that directly relate to the reduced-rated supply. The reduced rate relates to domestic fuel and utilities, and certain works related to renovating and converting buildings for use as dwellings.
- For zero-rated supplies (equivalent to the EU exempt with right of refund), the supplier does not charge VAT on supplies, but still recovers VAT charged on supplies made to it that directly relate to the zero rated supply made by it.
- For exempt supplies, the supplier does not charge VAT, and cannot recover VAT on supplies directly related to the exempt supply.

Certain supplies, broadly speaking exported services, are outside the scope of VAT, with or without right of recovery of the VAT on related costs. For practical purposes, such supplies can be treated as zero-rated or exempt, respectively.

The government keeps an up to date list of VAT rates on different goods and services

VAT on expenditure

Entities must consider whether the VAT they incur on their expenses is recoverable or not. The standard VAT recovery rules depend on how the expenditure is used:

- VAT directly linked to an entity's taxable activity is fully recoverable.
- VAT directly linked to a VAT exempt or non-business activity is not recoverable.
- VAT not directly linked to taxable, exempt or non-business activity needs to be apportioned, and a portion of the VAT can be recovered.

Value added tax

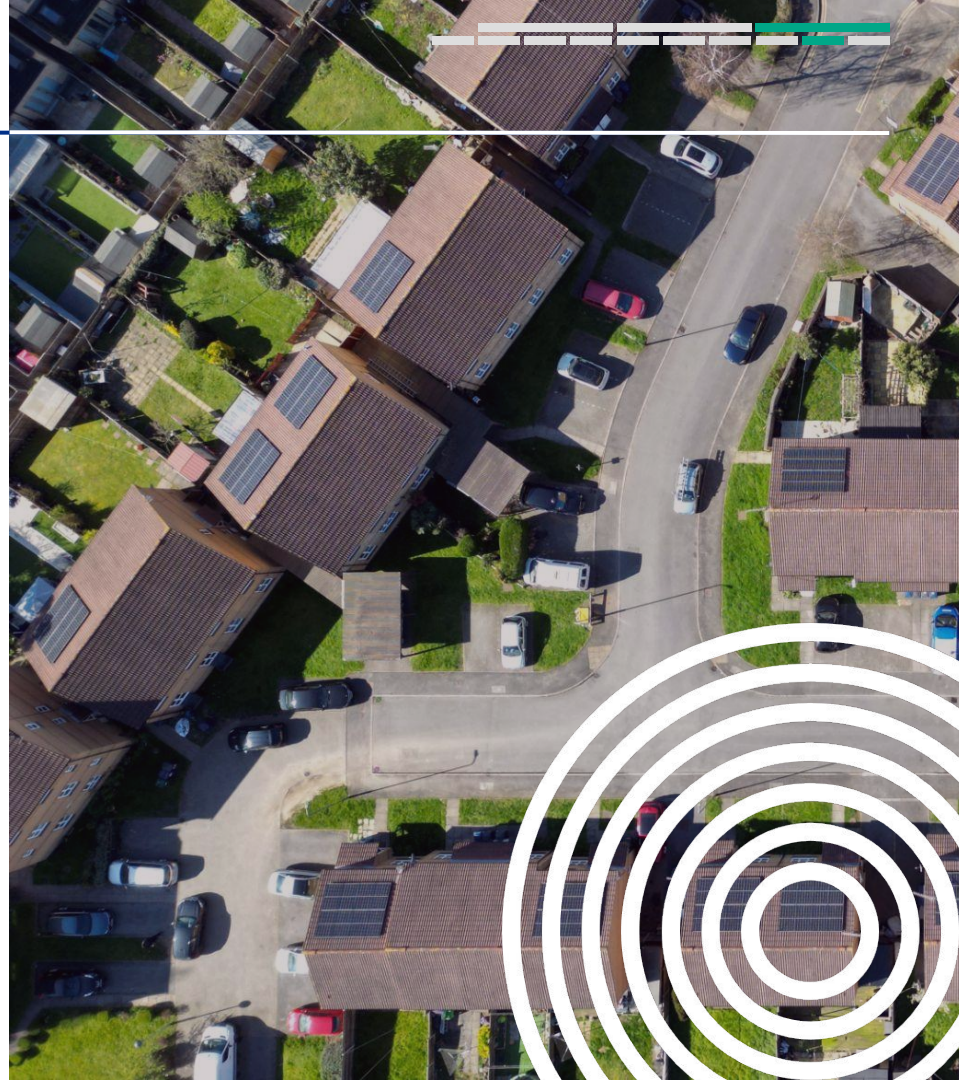
Consider the recoverability of VAT to minimise transaction costs.

VAT position of your customers

It is also important to determine whether VAT should be charged to your customers and where they can recover the VAT incurred. The table below provides a summary but specific tax advice should be sought.

Customer	Recoverable
Domestic users	⊗ No
Local Authorities	✓ Yes
Universities	⊖ Not in full
Public sector (government departments/ NHS trusts)	⊖ Specific conditions apply
Commercial	✓ Yes

Suppliers are typically expected to apply VAT to the majority of their supplies. The one significant transaction where an entity might not encounter VAT is during a land acquisition. However, the VAT treatment of land supply is intricate and can involve substantial VAT amounts due to the land's value. Therefore, it's crucial to carefully consider the transaction to minimise any potential irrecoverable VAT.



Stamp duty land tax

Where an interest in land is being acquired under a LNZP, then Stamp Duty Land Tax needs to be considered carefully.

Stamp duty land tax (SDLT) is a transaction tax payable by purchasers of chargeable interests in land in England and Northern Ireland. The Scottish and Welsh equivalents (Land and Buildings Transactions Tax and Land Transactions Tax, respectively) operate in a broadly similar way, although with differences in details and tax rates. For simplicity, only SDLT is discussed in this guide.

The cost of SDLT is transaction dependent and can affect the financial viability of the project. Purchases of chargeable interests attracting SDLT include the transfer of freehold land, the grant of assignment of a lease, or a right in or over land such as an easement. As such, SDLT costs will need to be considered in a number of scenarios when land interests are transferred to implement a project. For example, under a concession agreement it is important to determine the exact legal interest transferred. SDLT will apply to a lease interest but not to a licence.

SDLT is due on the consideration given for the chargeable interest acquired (including, where a new lease is granted, the net present value of rent). The net present value **(NPV) of rent** refers to the current value of all future rental payments, discounted at a specified rate.

The rate at which SDLT is payable depends upon whether the land in question consists solely of one or more dwellings (in which case the '**residential**' rates apply), or consists of non-dwellings, or a mix of dwellings and non-dwellings (where the '**non-residential**' rates will apply).

Where the non-residential rates apply, SDLT is payable on consideration other than rent at the following scale of rates:

Relevant consideration	Rate
Up to £150,000	0%
Between £150,000 and £250,000	2%
The remainder (if any)	5%

NPV of rent	Rate
Up to £150,000	0%
Between £150,000 and £5,000,000	1%
The remainder (if any)	2%

Stamp duty land tax

Where an interest in land is being acquired under a LNZP, then Stamp Duty Land Tax needs to be considered carefully.

Where the residential scale of rates applies, SDLT is prima facie payable on consideration other than rent at the following scale of rates:

Part of relevant consideration	Rate
Up to £125,000	0%
Between £125,000 and £250,000	2%
Between £250,000 and £925,000	5%
Between £925,000 and £1,500,000	10%
The remainder (if any)	12%

The scale of rates for the net present value of rent on new lease grants is:

NPV of rent	Rate
Up to £125,000	0%
The remainder (if any)	1%

There are a number of provisions which can alter the rate of SDLT payable on dwellings, however. These include:

- A high value dwellings rate of 15% for purchases of dwellings for over £500k by companies except where specific exemptions apply;
- The additional dwellings charge, which increases the SDLT payable by companies (and certain individuals) purchasing dwellings by 3%;
- Multiple dwellings relief, which allows the number of dwellings purchased to be taken into account in calculating the marginal SDLT rate when more than one dwelling is purchased; and,
- Non-residential treatment, which allows the non-residential SDLT rates to be applied on purchases of 6 or more dwellings.

There are no SDLT reliefs specifically targeted at LNZPs. However, the following reliefs may potentially be applicable:

- **Licences:** The grant and assignment of non-exclusive licences to occupy does not incur SDLT.
- **Group relief:** On transfers of property from a Local Authority to a wholly owned SPV, group relief may be available to eliminate SDLT;
- **Charities relief:** Where charities acquire land to further their charitable purposes or as an investment to fund charitable purposes, an exemption from SDLT may be available;
- **Registered social landlords:** Certain acquisitions of land by 'registered social landlords' may in some cases be exempt from SDLT. This relief may in particular be available to Local Authorities where the acquisition is funded by specified public subsidies.
- **Freeports:** Some purchases of land within freeport areas are exempt from SDLT. There are a number of conditions, including that land must be used for commercial purposes rather than as a dwelling.

Construction Industry Scheme (CIS)

The operation of CIS will be particularly relevant during the build phase of the LNZP.

The Construction Industry Scheme (CIS) is designed to prevent tax evasion by subcontractors working in the construction industry. It applies primarily during the construction phase of a LNZP, rather than its operational phase.

A contractor is a business or entity that pays subcontractors for construction work. Under CIS, a contractor may be required to withhold tax from payments made to subcontractors for construction operations. Construction operations broadly include almost any work done on buildings or structures, civil engineering or installations. Therefore, during the build phase, the Project Sponsor and/ or ESCo should consider the CIS obligations.

Under the In-house Delivery model the Local Authority will be responsible for CIS. Under other models it can be more complex and will be determined by the contractual obligations between the Local Authority and the SPV, Joint Venture Partner and the subcontractors engaged to provide constructions services.

Contractors must verify the payment status of each subcontractor with HMRC before making the first payment. If a subcontractor doesn't have gross payment status, the contractor must withhold tax (at 20% or 30%) from the labour element of the payment and remit it to HMRC monthly. Deductions are not applied to the cost of materials incurred by the subcontractor; they only apply to the labour element of an invoice. However, where no breakdown is provided in the invoice, it is made against the full value (excluding VAT).

The scheme recognises two types of contractor; **mainstream** and **deemed**.

- **Mainstream contractors** are those whose primary business is construction and pay subcontractors for construction work.
- **Deemed contractors** are those whose primary business isn't construction but spend an average of £1 million per year on construction over a three-year period.

The registration requirements under CIS depend on these distinctions.

Payments made by an entity (deemed contractors only) related to property used for business purposes of that entity's purposes do not fall under CIS. This relief could apply to an SPV in the build phase, but these rules are complex so clarification should be sought from HMRC.

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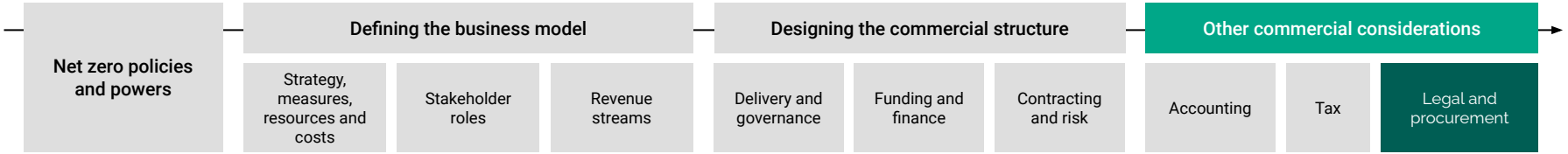
Legal and procurement

Legal and procurement

This section provides an overview of the key legal and procurement considerations to ensure compliance and alignment with public and economic interests.



Some delivery structures, such as Joint Venture SPV, can require a legal entity to be set up. The **legal form** of this will impact many areas, such as the rights and responsibilities of the owners, taxation rules, liability and governance structure. The delivery structure and legal form will also impact the **procurement strategy** available for project execution.

In the UK, the **Subsidy Control Act 2022** came into effect in January 2023 to replace the State Aid Act. The legislation aims to ensure that public funds are used in a manner that is fair, transparent and aligned with the best interests of the economy. This section provides an overview of the common legal forms available, the role and applicability of various procurement regulations and the implications of the Subsidy Control Act 2022.

Navigating the interplay between legal forms, procurement strategies, and the Subsidy Control Act requires a deep understanding of the regulatory landscape and its potential impact on Local Authorities. As such it is essential to seek professional legal advice to ensure compliance with the rules and regulations, and to make informed decisions that align with the strategic objectives and values of the community.

This section is structured as follows:

Legal form of your LNZP: Choosing a legal form is a strategic decision that sets the direction for liability protection, tax considerations and operational flexibility. Further detail on each legal form has been provided in **Annex 10**.

Procurement: This subsection covers three key procurement regulations for LNZPs. These should be considered to mitigate legal and financial risks.

Subsidy Control Act: Sets out the impact of recent legislation designed to replace previous State aid rules.

LEGAL FORM | **Overview**

If a corporate entity is created to deliver a LNZP, there are several legal forms this could take. Each form can impact the governance and financial viability of the project.

Some delivery structures may require a corporate entity to be created for delivering the LNZP. For example, this applies to the Public-owned SPV and Joint Venture SPV. Choosing a legal form is a key strategic decision. It provides a structure in which the project operates, and defines key legal factors such as liability, taxation and governance. The table below summarises the most common legal forms. See **Annex 10** for further detail on each. *Specific advice should be sought to determine the legal form that is best suited for your project.*

Legal form	Description
Partnership*	A Partnership is a relatively simple way for two or more legal persons to set up and run a business together with a view to profit. Partners share the risks, costs and responsibilities of being in business.
Limited Partnership*	A Limited Partnership has two types of partner: general partners and limited partners. The form is similar to a Partnership, but the main differences are that the limited partners may not be involved in the management of the business and their liability is limited to the amount that they have invested in the partnership.
Trusts*	Trusts are legal devices for holding assets so as to separate legal ownership from economic interests. A trust holds assets on behalf of an individual or another organisation and governs how they are to be used.
Limited Company	A Limited Company is the most common legal form for running a business. Companies are incorporated to form an entity with a separate legal personality - allowing the organisation to do business and enter into contracts in its own name.
Limited Liability Partnership (LLP)	Similar to a Company, an LLP is a separate legal entity but unlike a normal Partnership, the members of an LLP enjoy limited liability. Each member takes an equal share of the profits, unless the members' agreement specifies otherwise.
Community Interest Companies (CIC)	Community Interest Companies (CIC) are a form of Company that are either limited by shares or by guarantee. They are created for social enterprises to use their profits and assets for community benefit. They are easy to set up and have all the flexibility and certainty of the Company form, but with additional requirements to ensure they serve a community interest.
Charitable Incorporated Organisations (CIO)	Charitable Incorporated Organisations (CIOs) are designed specifically for charitable groups. This allows them to register just once with the Charity Commission as an incorporated form of charity which is not a Company.
Co-operative Society (Co-op)	A Co-operative Society (Co-op) is a membership organisation run for the mutual benefit of its members - serving their interests by trading with them or providing goods, services and facilities - with any surplus reinvested back into the organisation. Profits may also be distributed to members.
Community Benefit Society (BenCom)	A Community Benefit Society (BenCom) is similar to a Co-op, with the exception that it conducts business for the benefit of the community, rather than the members of the society. Profits are not distributed between members or external stakeholders but returned to the community.

** Examples of unincorporated legal forms which have no separate legal entity.*

PROCUREMENT | **Overview**

Local Authority procurement in the UK is essential to not only manage economic and societal challenges, but also to leverage opportunities to innovate, collaborate and create social value.

The UK government sets out the National Procurement Strategy for Local Government in England to support local government procurement. Depending on the structure of the scheme and who is carrying out the procurement, different regulations are relevant. These include The Public Contracts Regulations 2015, The Utilities Contracts Regulations 2016 and The Concessions Contracts Regulations 2016. Local Authorities may also be considered a "utility" for the purposes of the Utilities Contracts Regulations 2016.

For any scheme, a procurement strategy and programme are essential. These would address what elements of the project are subject to procurement law, how other strategies of the council may need to be linked, what procurement routes will be used, overall timescales for each relevant procurement, and how and when soft market testing will be carried out.

Public Contracts Regulations 2015 (PCR)

The Public Contracts Regulations 2015 are applicable to contracts for services, works and supplies awarded by public bodies, including both central and Local Authorities. These regulations are relevant to a broad range of procurement activities carried out by Local Authorities. They apply when the estimated value of the contract exceeds the relevant financial threshold, and when the contracts are not associated with a prescribed relevant utility activity and are not a concession.

Even for contracts to which the regulations do not fully apply, they must still be led in accordance with Treaty Principles. These principles include non-discrimination, a level playing field, and a transparent tender process where there is likely to be cross-border interest.

Concessions Contracts Regulations 2016

The Concessions Contracts Regulations 2016 distinguish concessions by the fact that they involve the transfer to the concessionaire of an operating risk of economic nature. This means that there is a possibility that the concessionaire will not recoup its investments and costs incurred in operating the works/services awarded under normal operating conditions, even if some of the risk remains with the contracting authority. A principal benefit in awarding a concession rather than a services/works contract is the ability to carry out a flexible procurement, based primarily on Treaty Principles. Although the maximum term for a concession contract is five years, LNZPs are unlikely to face difficulty justifying a longer contract period. However, that justification will need to be written up and included in the business case.

Utilities Contracts Regulations 2016

The Utilities Contracts Regulations 2016 apply to the award of a contract when three conditions are satisfied. First, the utility awarding the contract must be a "contracting authority", "public undertaking" or must have "special or exclusive rights". Second, the contract must be for works, services or supplies associated with a prescribed relevant utility activity. Third, the estimated value of the contract must exceed the relevant financial threshold.

These regulations apply to "contracting authorities" and "public undertakings" that carry out an activity referred to in Regulations 9 to 15. This includes the provision or operation of fixed networks intended to provide a service to the public in connection with the production, transport or distribution of heat/power, and the supply of heat/power to such networks. The regulations also apply to entities that are not contracting authorities or public undertakings but carry out such activities on the basis of "special or exclusive rights" granted by a competent authority.

PROCUREMENT | **Implications**

Procurement rules for delivery structures relevant to LNZPs.

Delivery structure	Procurement rules
In-house Delivery	The purchase of equipment and/or maintenance is likely subject to the full scope of rules under the Utilities Contract Regulations if the procurement is above the threshold. Compliance with public procurement rules is likely required under external funding arrangements from public funds.
Public-owned SPV	If the PCR threshold is met, then the Regulation 12 'controlled persons test' may apply. However, if the Local Authority is procuring these services or works in the course of its activities as a utility, Regulation 29 of the Utilities Contract Regulations (contracts awarded to an affiliated undertaking) will likely apply.
Joint Venture SPV	The procurement of the private sector partner depends on whether the partner is investing, or providing works, supplies or services. If the latter, public procurement rules will apply (subject to thresholds). If the former, public procurement rules generally won't apply, but a competitive route can help to demonstrate that no illegal State aid has been provided.
Third-party Delivery	This structure may constitute a concession, depending on the level of risk transfer and rights of exploitation, and if so, should be handled under the Concessions Regulations. Compliance with public procurement rules and additional competitive tendering for below-threshold procurement is likely required, especially for central Government or EU-derived funding. Treaty Principles of transparency may still apply in cases of cross-border interest. It may be prudent to procure the private sector partner via a competitive tender to minimise or eliminate any risk of State aid, particularly when there is grant funding to the private sector body.

SUBSIDY CONTROL ACT | **Overview**

The Subsidy Control Act represents a development of the UK subsidy control regime that came into effect at the end of 2020 as part of the implementation of the UK's commitments in the EU-UK Trade and Cooperation Agreement (TCA).

Overview

The Subsidy Control Act 2022 came into effect on 4th January 2023, replacing the State Aid Act that applied while the UK was a member of the European Union - marking a significant shift in the regulatory landscape.

The Act is designed to ensure that public funds are used in a way that is fair, transparent and in the best interest of the economy. It aims to prevent distortions of competition and trade that could arise from the indiscriminate use of subsidies, while still allowing for necessary interventions to correct market failures, address social difficulties or support strategic objectives.

It sets out a series of principles and requirements that must be adhered to when giving subsidies. These include the need for subsidies to pursue a specific policy objective - such as the UK's 2050 Net Zero Commitment - to be proportionate and necessary and to bring about a change in economic behaviour that would not occur without the subsidy.

Subsidy Control Act for Local Authorities

According to the Subsidy Control Act 2022, any financial assistance given directly or indirectly from public resources by a public authority that confers an economic advantage on one or more enterprises can be considered a subsidy. This includes LNZPs involving public authorities or the use of public funds.

Furthermore, the Act states that even financial assistance given by a person who is not a public authority can be considered a subsidy if the decision to give the assistance is, in substance, the decision of the public authority. Therefore, it's crucial for Local Authorities and other entities involved in local net zero projects to carefully consider the implications of the Subsidy Control Act when planning and implementing their projects.

The rest of this section provides an overview of the principles, applicability and prohibitions of the new Act. We strongly recommend that Local Authorities seek professional legal advice beyond this to ensure compliance with the rules and regulations of the Act.

SUBSIDY CONTROL ACT | **Principles**

The Subsidy Control Act provides the following principles which are found in Section 9 of the Act. They are provided to ensure subsidies are used effectively and efficiently but do not distort competition or trade.

A. **Common interest**: Subsidies should pursue a specific policy objective to remedy an identified market failure or address an equity rationale (such as local or regional disadvantage, social difficulties or distributional concerns).

B. **Proportionate and necessary**: Subsidies should be proportionate to their specific policy objective and limited to what is necessary to achieve it.

C. **Design to change economic behaviour of the beneficiary**: Subsidies should be designed to bring about a change of economic behaviour of the beneficiary. That change, in relation to a subsidy, should be conducive to achieving its specific policy objective, and something that would not happen without the subsidy.

D. **Costs that would be funded away**: Subsidies should not normally compensate for the costs the beneficiary would have funded in the absence of any subsidy.

E. **Least distortive means of achieving policy objective**: Subsidies should be an appropriate policy instrument for achieving their specific policy objective and that objective cannot be achieved through other, less distortive, means.

F. **Competition and investment within the United Kingdom**: Subsidies should be designed to achieve their specific policy objective while minimising any negative effects on competition or investment within the United Kingdom.

SUBSIDY CONTROL ACT | **Prohibitions**

The Subsidy Control Act also provides prohibitions to ensure that subsidies do not distort competition or trade, and that they are used effectively and efficiently to achieve specific policy objectives.

Unlimited Guarantees (Section 15): A subsidy in the form of a guarantee of the debts or liabilities of an enterprise is prohibited if there is no limit as to the amount of the debts or liabilities that are guaranteed, or there is no limit as to the duration of the guarantee.

Export Performance (Section 16): A subsidy that is contingent in law or in fact, whether solely or as one of several other conditions, upon export performance relating to goods or services is prohibited. However, this does not prohibit a subsidy in the form of short-term export credit insurance against risks that are not marketable risks, or an export credit, export credit guarantee or insurance programme that is permissible in accordance with the Subsidies and Countervailing Measures (SCM) Agreement.

Use of Domestic Goods or Services (Section 17): A subsidy that is contingent, whether solely or as one of several other conditions, upon the use of domestic over imported goods or services is prohibited. This prohibition does not apply to subsidies given in relation to the audiovisual sector.

Relocation of Activities (Section 18): The Act also includes provisions related to the prohibition of subsidies that encourage the relocation of activities from one area to another within the United Kingdom.

Subsidies for Insurers that Provide Export Credit Insurance (Section 27): A subsidy to an insurer that provides export credit insurance is prohibited unless the subsidy is given subject to certain conditions.

Subsidies for Air Carriers for the Operation of Routes (Section 28): A subsidy to an air carrier for the operation of a route is prohibited unless certain conditions are met.

Annexes

A1

Case studies

Peterborough Integrated Renewables Infrastructure

In-house Delivery of an integrated energy system design for electricity, heat and transport.

Project overview: Peterborough Integrated Renewables Infrastructure (PIRI) aims to utilise electricity and heat produced by the existing 7 MW Peterborough Energy Recovery Facility (PERF). The plant is owned by Peterborough City Council (PCC) and operated by Viridor to create a local electricity system that will reduce strain on the local grid capacity. The proposed system scope would incorporate a heat network, private wire electricity network and EV infrastructure, which will explore the electrification of buses and other council vehicles and provide individual charging points. The system will use supply and demand balancing technology to meet the needs of Peterborough's businesses and homes.

Legal & Governance Structure: PIRI will be owned and delivered by the Peterborough City Council. The project is also supported by partners such as Smarter Grid Solutions and SSE Enterprises for expertise and skills.

Funding flows: The project has received £1 million funding from UKRI to support the delivery of the technical specification for the heat and electricity private networks. PIRI has also received £14.5 million from the Green Heat Network Fund to put this concept into practice. PCC will provide further off-balance sheet funding.

Funding flows

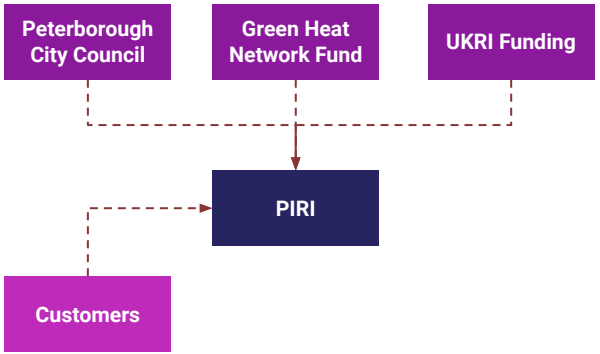


Fig.31 Funding flows in the PIRI project (grey arrows indicate the direction of capital flows).

Types of LNZP

- Private wires & Heat Networks
- Building energy efficiency and retrofit
- Energy storage and flexibility services
- Renewable electricity generation
- EV infrastructure

Revenue streams

- Heat and power sales
- Heat and power storage
- Charging infrastructure
- Public transportation

Delivery structure

In-house Delivery

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 investible projects that is 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.

Legal & Governance structure: Joint Venture (JV) special purpose vehicle 50% owned by Bristol City Council and 50% owned by Ameresco. Vattenfall Heat UK is an essential subcontractor. The JV has a concession agreement to decarbonise the city. Under the JV, Ameresco and Vattenfall get first refusal on climate projects planned by the council.

Funding flows: The project has secured £1bn and private sector partners are contributing capital funding, including £424 million for the first five years. Public capital has been used to de-risk investment. The project has also launched a community energy fund to provide £1.5 million to community initiatives through grants and interest free loans. There are opportunities for citizens to invest with an aim to raise £6m of local investment through crowdfunding. The community scheme is funded by both Ameresco and Vattenfall Heat UK and forms part of Bristol City Leap's ambitions to deliver a minimum of £61.5 million in social value over the first five years of its partnership.

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. The plan is ongoing and iterative, and is being delivered through multiple business models; for example, design-build or performance contracting for energy efficiency measures, and PPA models for renewables.

Funding flows

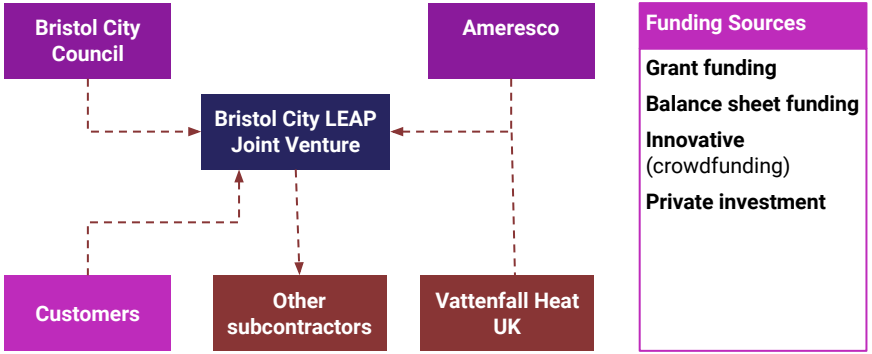


Fig.32 Funding flows in the Bristol City Leap (grey arrows indicate the direction of capital flows).

Types of LNZP

- Renewable electricity generation
- Private wires & Heat Networks
- Building energy efficiency and retrofit
- Energy storage and flexibility services

Potential revenue streams

- Heat and power sales
- Heat and power storage
- Sales of components
- Charging infrastructure

Delivery structure

Joint Venture SPV

Mayor of London's Energy Efficiency Fund (MEEF)

MEEF is a public-owned SPV and it is a £500m investment fund established by the GLA to help achieve London's ambition of being a net zero carbon city by 2030.

Project overview: The Mayor of London's Energy Efficiency Fund (MEEF) was set up by the Greater London Authority (GLA) to help London to reach net zero by 2030. The fund invests in small-scale renewable energy schemes, retrofitting and energy efficiency measures.

Legal & Governance Structure: The MEEF was set up by the GLA as an SPV. It is a Limited Partnership structure, and the GLA acts as an intermediate body between MEEF and the European Regional Development Fund (ERDF), and as a capital provider in the form of equity. Amber Infrastructure is the independent fund manager. They provide independent evaluation of projects and present them for approval, and they build the credibility and reputation of the fund among investors.

Funding flows: The GLA deployed £43 million using the ERDF, and the European Investment Bank has committed £100 million to the project. With the involvement of private capital, the fund was able to collect eleven times the initial public investment, totalling £456 million, which will maximise the impact delivered by public financing. This leverage effect of public capital attracting private capital ensures maximisation of the impact delivered by the project. The GLA and the Fund Manager have provided funding from the position of principal equity investors.

Expected Returns: The Fund Manager is expected to monitor the portfolio of projects and maximise the benefits defined by the MEEF's investment strategy, including financial and non-financial returns. The returns will depend on the success of projects selected, and the revenue stream changes according to the type of project the fund invests in.

Funding flows

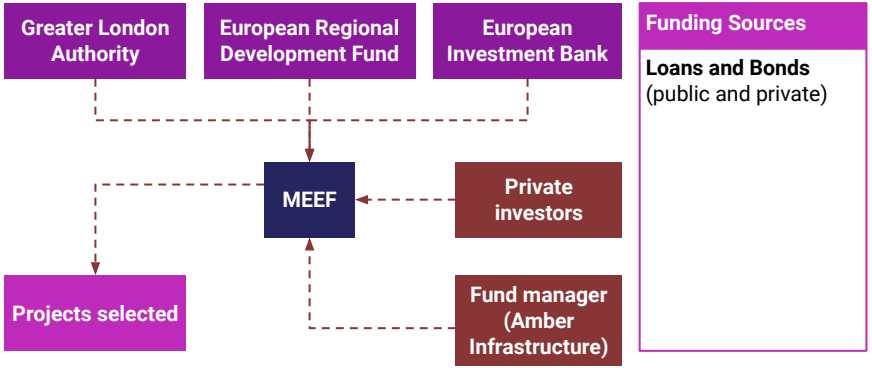


Fig.33 Funding flows in the MEEF (grey arrows indicate the direction of capital flows).

Types of LNZP

- Renewable electricity generation
- Building energy efficiency and retrofit
- Private wires & Heat Networks

Potential revenue streams

- Heat and power sales
- Ancillary services
- Sales of components

Delivery structure

Public-owned SPV

Zero Carbon Rugeley

Zero Carbon Rugeley is a £3 million Third-party Delivery project focused on the redevelopment of the old Rugeley Power Station in the West Midlands. This project aims to provide town-wide decarbonisation by bringing 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.

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 was boosted by £1.9 million from the UKRI's 'Prospering from the energy revolution challenge.' 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 retrofit.

Expected Returns: Zero Carbon Rugeley's commercial modelling has predominantly explored financing the retrofit program through community loans schemes which are repaid through the end users' energy bill. This approach has only been shown to be feasible with significant grant funding.

Funding flows

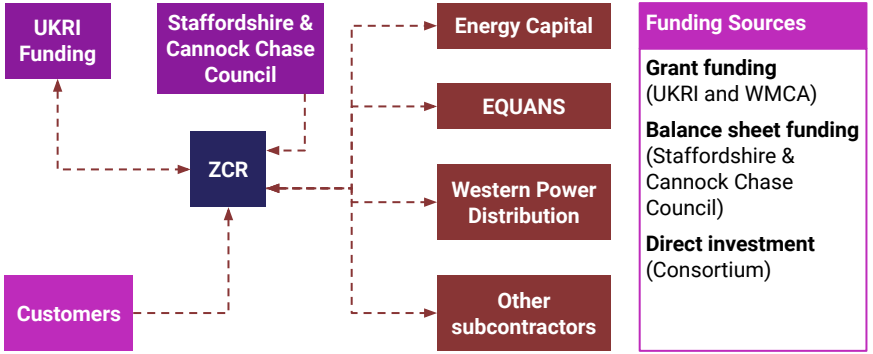


Fig.34 Funding flows in the Zero Carbon Rugeley (grey arrows indicate the direction of capital flows).

Types of LNZP

- EV infrastructure
- Building energy efficiency and retrofit
- Energy storage and flexibility services

Potential revenue streams

- Power sales
- Power storage
- Charging infrastructure
- Sales of components

Delivery structure

Third-party Delivery

West Midlands RESO (Coventry)

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

Project overview: The West Midlands RESO project looked to explore the advantages of a new kind of energy system operating at a city scale, using Coventry as the case study. The new system included local low carbon electricity generation, storage, 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, like that developed by the West Midlands Combined Authority.

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.

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.

Expected Returns: The modelling showed that a more localised smart energy system could generate a net present value of £720 million for the region, coming from more local opportunities, and will benefit citizens in the local areas too. This value is dependent on key enablers such as data, collaboration and regulatory change.

Funding flows

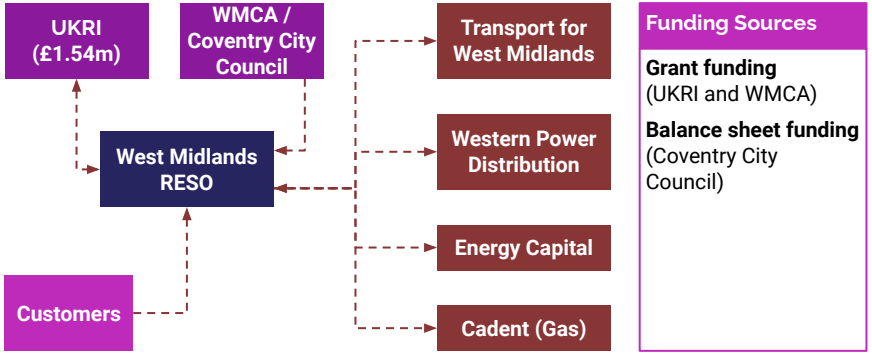


Fig.35 Funding flows in the West Midlands RESO (Coventry) (grey arrows indicate the direction of capital flows).

Types of LNZP

- Renewable electricity generation
- Energy storage and flexibility services
- Building energy efficiency and retrofit
- EV infrastructure

Potential revenue streams

- Power sales
- Power storage
- Charging infrastructure
- Ancillary services
- Sales of components

Delivery structure

Public-owned SPV

Coventry-E.ON Strategic Energy Partnership

The Strategic Energy Partnership focuses on decarbonisation of energy in Coventry. It uses many funding sources such as third-party investment, partner investment and, where appropriate, investment from the City Council.

Project overview: The partnership aims to support Coventry in reaching net zero carbon emissions. The focus is on carbon-neutral buildings, a zero-carbon circular economy, sustainable transport and resilient energy infrastructure. It also promotes public awareness and the enablement behavioural change across energy use (domestic and commercial) and transport throughout the city's residents, public and voluntary organisations and private businesses.

Legal & Governance Structure: The partnership is a Joint Venture, where the Energy Partner has first refusal rights on projects and will collaborate closely with the Council in reviewing the city's energy needs, authoring the energy infrastructure strategy, identifying and funding projects and engaging stakeholders. There is a strong emphasis on delivering social value and ensuring legal compliance as projects are developed and approved.

Funding flows: The partnership has funding sourced from debt, equity, or third-party fundraising, aiming to deliver projects with or without Council funding. The partnership also seeks to identify commercial opportunities to secure further resources that it will reinvest in energy infrastructure and services.

Expected Returns: The partnership aims to deliver substantial social value, environmental standards compliance, and economic benefits by driving various commercially viable green projects. The outcomes will be measured against the objectives of the One Coventry Plan, addressing climate change and fostering economic growth and social equality in Coventry.

Funding flows

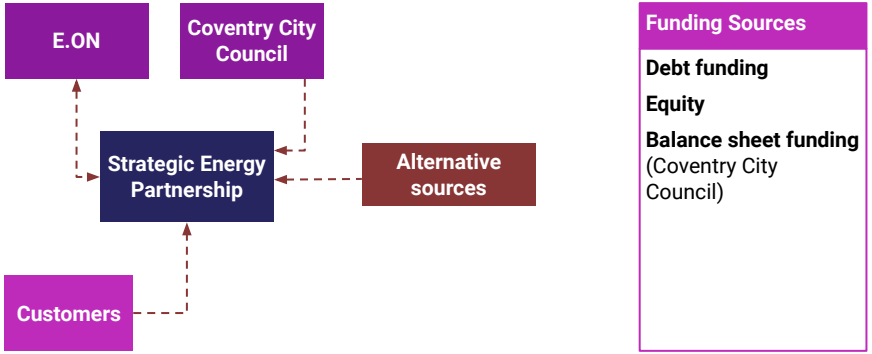


Fig.36 Funding flows in the Coventry - E.ON alliance (grey arrows indicate the direction of capital flows).

Types of LNZP

- Renewable electricity generation
- Building energy efficiency and retrofit
- EV infrastructure

Potential revenue streams

- Power sales
- Charging infrastructure
- Sale of components

Delivery structure

Joint Venture SPV

NYCEEC

A Joint Venture SPV, the New York City Energy Efficiency Corporation (NYCEEC) is structured as a revolving fund, and also provides credit enhancement mechanisms to encourage private sector lending.

Project overview: The NYCEEC works with building owners, contractors, project developers and SPVs to provide financing solutions that increase cash flow 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.

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 leverage 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.

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 subsidised NYSERDA (a state agency) loan and bridge-financing the incentives, which were staggered and dependent on project milestones.

Funding flows

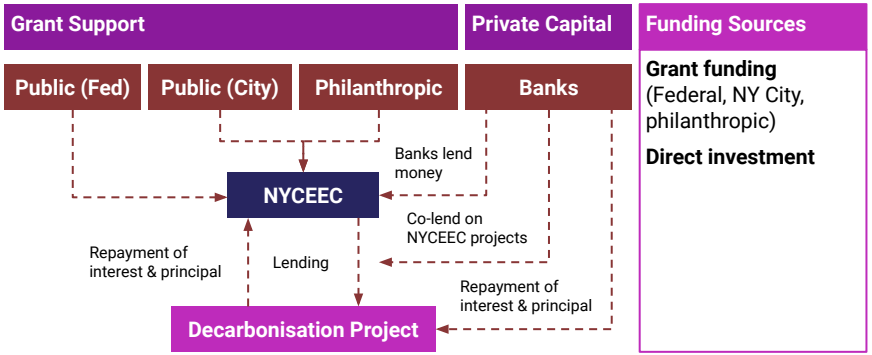


Fig.37 Funding flows in the NYCEEC (grey arrows indicate the direction of capital flows).

Types of LNZP

- Building energy efficiency and retrofit
- Renewable electricity generation

Potential revenue streams

- Sales of components
- Heat and power sales

Delivery structure

NYCEEC uses a range of delivery models, an example is the Roosevelts Landing project where a private sector led model was used.

EIT Climate-KIC Net Zero Cities (NZC)

The EIT Climate Knowledge and Innovation Community (KIC)'s Net Zero Cities programme focuses on climate innovation to mitigate and adapt to climate change.

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. NZC 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 plan to achieve their net zero targets, helping optimise capital allocation and secure funding and financing.

Legal & Governance Structure: 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.

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 City Pilots 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.

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.

Funding flows

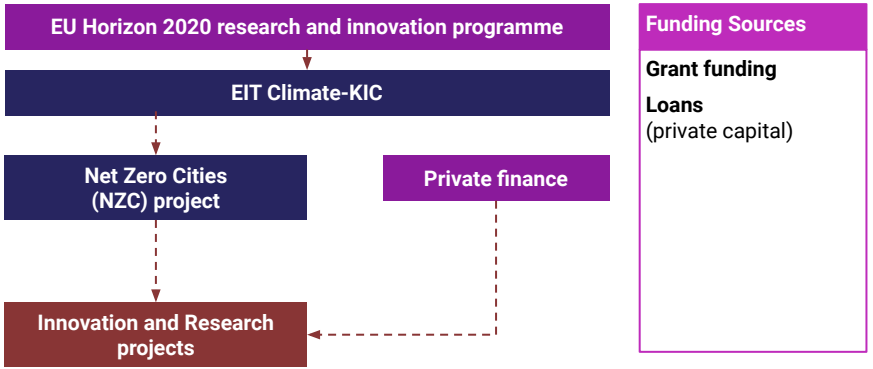


Fig.38 Funding flows in the EIT Climate-KIC Net Zero Cities project (grey arrows indicate the direction of capital flows).

Types of LNZP

- Energy storage and flexibility services
- Building energy efficiency and retrofit
- EV infrastructure

Potential revenue streams

- Heat and power sales
- Sales of components
- EV infrastructure

Delivery structure

Climate-KIC uses a number of delivery models depending on the project. It primarily uses public-private sector investments.

Nottingham Deep Retrofit Energy Model (DREeM) and Energiesprong

This public-owned SPV turns hard-to-heat council houses into ultra-low energy homes by doing a whole-house retrofit.

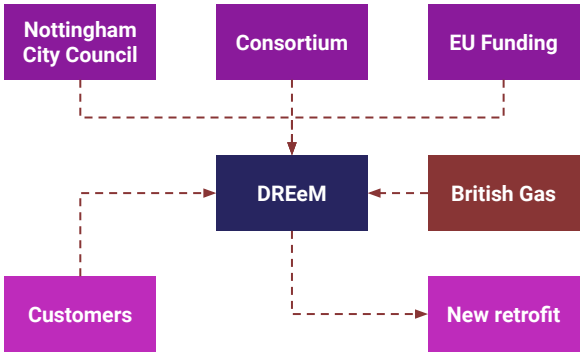
Project overview: The Nottingham Deep Retrofit Energy Model (DREeM) follows a full-house retrofitting approach that is commonly used in the Netherlands (Energiesprong retrofit >1,000 homes a year in this way). This consists of a full-house upgrade including solar PV roof, insulated wall panels, new windows, thermally efficient facades and in-house 'energy hub', which includes heat pumps and batteries. So far, 59 homes in the city have been retrofitted and funding is available to upgrade over 100 homes removing 513 tonnes of carbon each year, with the aim to expand the scheme thereafter.

Legal & Governance Structure: This scheme is owned by the Nottingham City Council and the consortium Energiesprong UK. The consortium does not deliver the retrofit directly, but they facilitate refurbishment solution providers and other stakeholders to do so.

Funding flows: The project received £4 million initial funding from the European Regional Development Fund (ERDF), £5 million from the Nottingham City Council and some contribution from Energiesprong UK. The project also received funding from British Gas' Eco-Demonstration Action Fund. The occupier of the household pays a flat tariff for heating, electricity and hot water as stated in their energy plan. The project then recycles these funds, by reinvesting revenues made from energy plans with already retrofitted homes to retrofit other homes.

Expected Returns: Once the retrofitting starts, an energy plan is set up so that the homeowner pays the landlord (Nottingham City Council) for the upgrades, and this is reinvested into other retrofits.

Funding flows



Funding Sources

Grant funding (ERDF, British Gas, Energiesprong UK)

Balance Sheet funding (Nottingham City Council)

Fig.39 Funding flows in DREeM (grey arrows indicate the direction of capital flows).

Types of LNZP

- Building energy efficiency and retrofit

Potential revenue streams

- Sales of components
- Heat and power sales

Delivery structure

Public-owned SPV

Energy Superhub Oxford (ESO)

This Joint Venture SPV is the largest EV hub project in the UK.

Project overview: Energy Superhub Oxford (ESO) is a project with an integrated approach to battery storage, rapid EV charging, low carbon heating (heat pumps) and smart energy management technologies. The electrification of heat and transport is possible because ESO is directly connected to the national high voltage electricity network. The project uses a giant hybrid battery (lithium-ion and vanadium flow systems) to help power the city with renewable energy. The battery will have a machine learning system to provide flexibility to the National Grid. The project will also install an EV charging network that will enable fast charging of electric cars, trucks, buses and taxis. The project already installed 60 heat pumps, the giant battery is operating, 40 EVs were added to the Council's fleet, and the EV charging superhub already has 42 ultra-rapid chargers. It is estimated that 25,000 tonnes of CO2 will be saved per year with this project.

Legal & Governance Structure: The project is delivered by a consortium led by EDF Renewables (formerly Pivot Power) in partnership with Oxford City Council.

Funding flows: The funding was a collaboration between Oxford City Council, EDF Renewables and the other stakeholders in the Consortium, totalling to £41 million. Moreover, the project has received £11 million in funding from UKRI as part of the PFER Programme.

Expected Returns: This project is expected to generate returns from multiple revenue streams. The main focus is on EV infrastructure, in which customers pay to use the charging hubs installed across the city. This project should be a standalone in the future and not rely on grant funding.

Funding flows

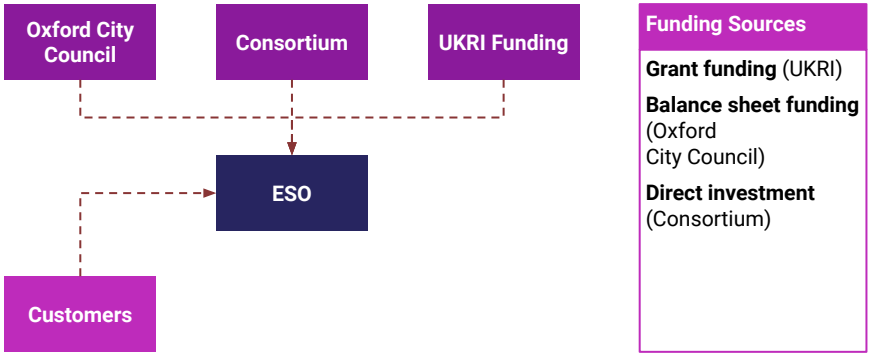


Fig.40 Funding flows in the Energy Superhub Oxford (grey arrows indicate the direction of capital flows).

Types of LNZP

- Energy storage and flexibility services
- EV infrastructure

Potential revenue streams

- Heat sales
- Charging infrastructure
- Public transportation

Delivery structure

Joint Venture SPV

Viking Wind Farm

This Joint Venture is a wind farm and aims to provide electricity and other co-benefits to the community of Shetland.

Project overview: The Viking Wind Farm will consist of 103 wind turbines set out around the central Mainland of Shetland. These will be 4.3MW turbines, and will provide electricity to over 400,000 homes and save 500,000 tonnes of carbon dioxide emissions each year. The turbines are currently under construction and should be ready in 2023 and connected to the National Grid in 2024.

Legal & Governance Structure: The Viking Wind Farm is a Joint Venture between SSE Renewables and the Shetland Island Council, via the development company called Viking Energy. The project is wholly owned by SSE and the Council retains interest on the management board. The community of Shetland is also represented in the board and it will receive an annual financial return on its historic investment once the wind farm is in operation.

Funding flows: The funding of the project has been split between SSE Renewables, Viking Energy Shetland and Community schemes.

Expected Returns: A share (around £2.2 million) of expected returns from the project will be invested in the Viking Community Fund, managed independently from the wind farm by the Shetland Community Benefit Fund, with an aim to benefit the Shetland community.

Funding flows

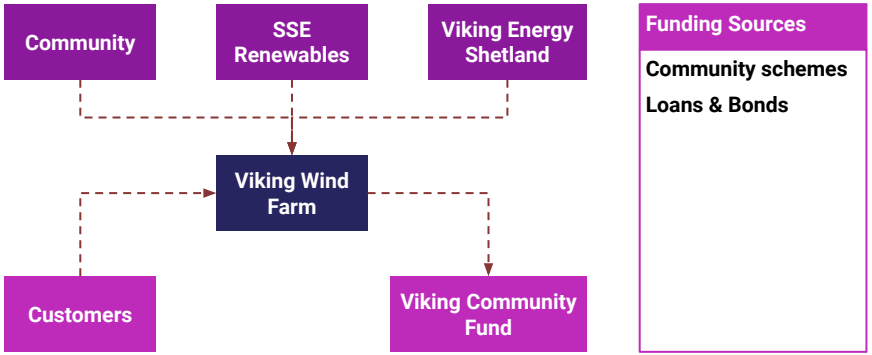


Fig.41 Funding flows in the Viking Wind Farm project (grey arrows indicate the direction of capital flows).

Types of LNZP

- Renewable electricity generation
- Energy storage and flexibility services

Potential revenue streams

- Power sales
- Demand response
- Renewable energy credit

Delivery structure

Joint Venture SPV

Energise Barnsley

Energise Barnsley is one of the largest community energy solar PV projects in the UK. It involves peer-to-peer energy trading and benefits the wider community of Barnsley.

Project overview: Energise Barnsley is a Local Authority and community energy solar PV and battery storage project. Over 300 buildings have received solar PV, including some schools and other community buildings. Battery storage has also been provided to some social homes. The ambition of this project is for surplus power generated in retrofitted houses to be sold at an agreed discount to households without suitable roofs for solar PV installation. This demand response helps with balancing the grid and reducing costs for residents.

Legal & Governance Structure: The project is led by Energise Barnsley, a registered community benefit society, and Barnsley Metropolitan Borough Council is a key partner and custodian trustee. The Council owns the properties where these solar PVs and batteries are installed. Energise Barnsley owns the solar PV assets and is signatory to the solar licence and lease between the project and the Council. There are sub-contractors that install the solar assets (Centrica and British Gas), and the batteries (Moixa).

Funding flows: The project has received £2 million in funding, £800,000 in the form of bonds (including community and retail bonds), and £1.2 million as a loan from an ethical lender, Charity Bank. An impact investment fund (Ignite) has made a £2 million underwriting facility available to Energise Barnsley, which will attract investment and help with project deployment.

Expected Returns: The retail bonds have provided 5% return to investors and some returns came from the Feed in Tariffs scheme before its end in 2019.

Funding flows

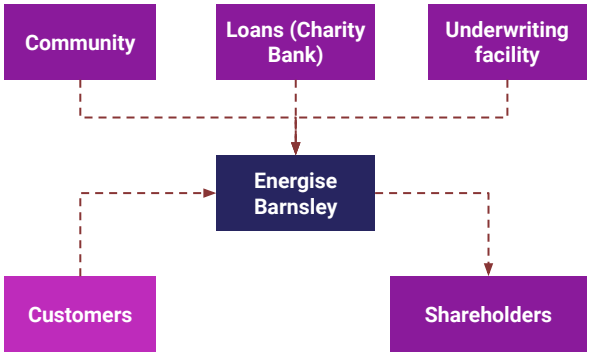


Fig.42 Funding flows in Energise Barnsley (grey arrows indicate the direction of capital flows).

Types of LNZP

- Renewable electricity generation
- Energy storage and flexibility services

Potential revenue streams

- Power sales
- Power storage
- Demand response

Delivery structure

Joint Venture SPV

Plymouth Energy Community

Plymouth Energy Community (PEC) is a charitable organisation limited by guarantee that aims to empower the local community and create a fair, affordable, zero carbon energy system.

Project overview: This project aims to empower the local community and create a fair, affordable, zero carbon energy system. The PEC organisation offers different projects, including renewable electricity generation from solar and wind. The project aims to tackle fuel poverty in the area, and offer household support to Plymouth residents.

Legal & Governance Structure: Plymouth Energy Trust is the trading name of PEC Trust, which is a charitable company limited by guarantee set up by Plymouth City Council. This is the overarching charitable organisation, and it has a two-tiered membership structure. As part of this overarching organisation, there are other charities, including PEC Renewables and PEC Homes.

Funding flows: The main funding sources are grants from different organisations, including Homes England, Energy Savings Trust, Big Lottery, Plymouth City Council and others. Some parts of the project are funded by crowdfunding. There are also funds flowing from PEC Trust to PEC Renewables and PEC Homes.

Expected Returns: The annual turnover of PEC Trust is over £2 million and this is delivered by different projects.

Funding flows

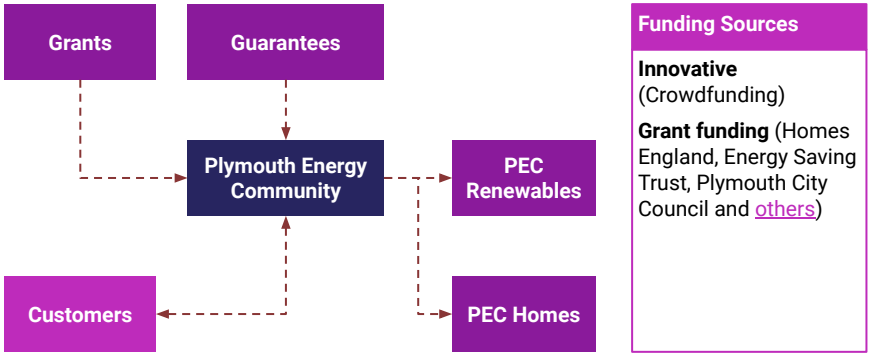


Fig.43 Funding flows in the Plymouth Energy Community project (grey arrows indicate the direction of capital flows).

Types of LNZP

- Renewable electricity generation

Potential revenue streams

- Power sales

Delivery structure

Public-owned SPV

A2

Links to other guidance

Links to other guidance

Title	Organisation	Description	Link
Net Zero Go	Energy Systems Catapult	Website with tools and features needed by Local Authorities to start their first net zero project, build a successful business case and deliver a portfolio of smart, successful local net zero projects.	LINK
Mobilising Local Net Zero Investment: challenges and opportunities for Local Authority financing	UKRI	Designed to help policymakers, Local Authorities and investors find some of the answers to unlocking the finance that will be needed on the local net zero journey.	LINK
Guide to developing the Project Business Case	HM Treasury	Provides a clear framework for thinking about spending proposals and a structured process for appraising, developing and planning to deliver best social value for money. The wider Green Book of which this guidance is a part also contains annexes with	LINK
The Green Book	HM Treasury	Government's core guide to appraisal and evaluation in central government; regularly updated and contains a series of supplementary annexes with further guidance on technical issues such as valuing greenhouse gases, transport analysis and natural capital.	LINK
Planning for energy decarbonisation at a local level	Regen	Outlines the findings and recommendations from a programme of stakeholder engagement on the role of local decarbonisation planning in delivering net zero.	LINK
Smart Local Energy System (SLES) toolkit for Local Authorities	EnergyREV	Provides Local Authorities with practical help and advice, as well as a set of useful tools to help scope, set up and implement SLES innovations to drive the Green Recovery.	LINK
Enabling Smart Local Energy Systems: Finance and Investment	Energy Systems Catapult	Report that sets out recommendations for national and local government, energy and financial sectors, and the UK Infrastructure Bank, to accelerate progress on SLES.	LINK
Local Energy Guide	Energy Hub	It explains the role of new local energy hubs (now 'Local Net Zero Hubs') that have been established across regions,, and how they will support public, private and community organisations to develop the business case for investment in energy schemes.	LINK
Financing Heat Networks in the UK	Grant Thornton	Outlines some of the issues, risks and opportunities around financing heat networks in the UK.	LINK
The Net Zero Delivery Vehicle Scoping Study	EP group	Explores approaches to facilitating flows of private capital for net zero programmes in South East England.	LINK
Zero Carbon Vote	Energy Systems Catapult	Website designed to help Local Authorities and businesses understand how people would prefer to cut their carbon emissions.	LINK
Local Net Zero Team	DESNZ / Apse	Team sitting within DESNZ, established to support Local Authorities (LAs), Local Enterprise Partnerships (LEPs) and Communities in England to play a leading role in delivering low-carbon economic growth.	LINK

Links to other guidance

Title	Organisation	Description	Link
Impact Community carbon calculator	Centre for sustainable energy	An estimator of a community's carbon footprint that works for parishes, wards, district councils and unitary authorities.	LINK
SCATTER	Anthesis Group	A Local Authority guide focused on emissions measurement and modelling.	LINK
OnGen: Renewable Energy Guide	OnGen	A software suite which equips organisations with the tools and knowledge needed to choose the best green energy improvements.	LINK
My Society Data Tool	mySociety	Helps people be active citizens with technology, research and data that individuals, journalists, and civil society can use openly and for free.	LINK
Delivering local net zero	WPI Economics	Sets out a business case for why councils are best-placed to locally deliver projects in three categories of low carbon infrastructure: buildings, transport and energy.	LINK
Local Energy Options - A Guidance Document for Local Government	Local Partnerships and Cornwall Energy	Provides local government with general guidance and a broader perspective as to their options for participating in the energy market.	LINK
Local Net Zero Hubs	Community Energy England	Five regional Net Zero hubs support community energy organisations, Local Authorities and groups in their areas.	LINK
Powers in Place: The handbook of Local Authority Net Zero powers	UK100 / Quantum	Considers the powers that Local Authorities have to deliver net zero in their places, and whether they can deploy these powers effectively to create change.	LINK
Place Net Zero Toolkit	Energy Systems Catapult	Place-based Net Zero Toolkit for Local Authorities, energy networks, businesses, communities and innovators to accelerate zero carbon solutions.	LINK
National Energy Category Strategy for Local Government 2022 - energising procurement	Local Government Association	Strategy to help Local Authorities optimise the way they manage energy. It includes good practice examples and case studies related to all areas of local government energy procurement.	LINK

Links to other guidance

Title	Organisation	Description	Link
Introductory guide: Community energy for Local Authorities	Pure Leapfrog	Aimed at Local Authority representatives, this guide is a summary of discussions held during a series of roundtables exploring various approaches that Local Authorities can take to establish, co-develop and facilitate community energy projects.	LINK
How Solar Energy can deliver for Climate and Communities: a guide for Local Authorities	Solar Energy UK	Explains the most common procurement options available to Local Authorities to support the deployment of high quality solar and energy storage projects across the public sector.	LINK
Local Authority models for developing renewable energy	Regen	A guide for Local Authorities and other organisations to bring together the latest thinking on how they can can support new renewable development in their areas.	LINK
Local Energy Accelerator	Greater London Authority	Extended until March 2024. Local Energy Accelerator is a £9m programme (including extension funding) providing funded expertise and support to organisations to develop clean and locally generated energy projects.	LINK
Local Government Support Programme	Energy Saving Trust	Range of support to help Local Authorities decarbonise transport, improve air quality and increase electric vehicle adoption.	LINK
Flexibility Products: Active Power Service definition and implementation plan	Energy Networks Association	Provides alignment in the procurement of active power services and simplifies participation in the market, making it easier for participants to understand products and offer services to multiple markets appropriately.	LINK

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Net zero policies and powers by sector

Relevant national strategies

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

Name	Classification	Description
Net Zero Strategy: Build Back Greener (2021)	Policy	Policies and proposals for decarbonising all sectors of the UK economy to meet net zero targets by 2050.
Mission Zero, Independent Review of Net Zero (Skidmore review) (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.
Responding to the Independent Review of Net Zero's Recommendations (2023)	Policy	UK Government response to the expert recommendations made in the independent review (see above). This was published alongside Powering Up Britain.
Powering Up Britain (2023)	Policy	A series of documents setting out how the government will enhance energy security, seize the economic opportunities of the transition, and deliver on net zero commitments. Includes the Net Zero Growth Plan, which updates the 2021 Net Zero Strategy
Green Finance Strategy (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.
Planning and Energy Act (2008)	Legislation	Enables local planning authorities in England and Wales to set requirements for energy use and energy efficiency in local plans.
Levelling Up White Paper (2022)	Policy	A programme of systems change, including 12 UK-wide missions to anchor the programme 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.
Transport Decarbonisation Plan (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.
Levelling-up and Regeneration Act (2023)	Policy	Legislation that includes measures to empower Local Authorities' planning functions and confirms the direction of travel towards further devolution to combined authorities outside of London.

Transport policy and regulation

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	Focus area	Description
Highways Act (1980)	Legislation	Highways	Enabled powers for highways improvements, including walking and cycling routes.
Environment Act (1995)	Legislation	Emissions	Established the system of local air quality management, instituted Air Quality Management Areas (AQMA) as well as measures to reduce emissions.
Local Transport Act (2008)	Legislation	Local transport systems	Requirement to produce Local Transport Plans (LTP), Transport Authority structures and Clean Air Zones (CAZ).
Road Traffic Regulation Act (1984) Local Authorities' Traffic Orders (Procedure) (England and Wales) Regulations (1996) Local Government Act (1985)	Legislation	Highway management, transport types	Traffic Regulation Orders (TRO) and Experimental TROs – restricting traffic in defined areas, to encourage walking and cycling, and manage parking.
Road Traffic (Vehicle Emissions) Regulations (2002) Civil Enforcement of Parking Contraventions (England) General Regulations (2007)	Legislation	Emissions, highway management	Penalties for vehicles left idling: can be used to support air quality measures. Allows Local Authority to enforce parking regulations, including in EV charging bays, bus stops and cycle lanes.
Equality Act (2010)	Legislation	EV infrastructure	Accessibility requirements affecting pavement furniture including EV charging.
Traffic Management Act (2004)	Legislation	Highway management	Enforcing moving traffic violations. Guidance added in 2020 regarding support for active travel, through re-allocating space to walking and cycling.
Local Government Act (1976)	Legislation	Emissions (taxi licencing)	Taxi licencing: can apply to emissions.

Transport policy and regulation (continued)

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	Focus area	Description
Air Quality (Taxis and Private Hire Vehicles Database) (England and Wales) Regulations (2019)	Legislation	Emissions	Collection of data on taxis and private hire vehicles.
Public Services (Social Value) Act (2013)	Legislation	Public services procurement	Before starting the procurement process, commissioners are required to think about wider social, economics and environmental benefits.
National Planning Policy Framework (NPPF) (2021)	Policy framework	Sustainable transport in new developments	Ability to place requirements on developers to incorporate or pay for sustainable transport in new developments, including walking and cycling provisions.
Bus Back Better (2021)	Policy paper	Buses	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 and planning policy and regulation

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. These powers are summarised below.

Name	Classification	Focus area	Description
Town and Country Planning Act (1947) Town and Country Planning Act (1990) Planning and Compulsory Purchase Act (2004) Localism Act (2011) Neighbourhood Planning Act (2017)	Legislation	Development	Framework requiring Local Authorities to develop local plans and give permissions for developments.
Planning and Energy Act (2008)	Legislation	Energy efficiency, electricity generation	Sets energy standards above building regulations and requires on-site renewables for new developments.
Town and Country Planning Act (1990)	Legislation	Development	Planning Act 2008 Introduced 106 agreements and the CIL to provide developer contributions to supporting infrastructure.
Localism Act (2011)	Legislation	Development	Established the General Power of Competence (GPoC) and set up own housing development organisations.
Local Government Act (1988) and Localism Act (2011)	Legislation	Financing	Loan capital to other organisations to build homes (for example, Housing Associations).
Land Compensation Act (1973), Acquisition of Land (1981), Planning and Compensation Act (1991), Neighbourhood Planning Act (2017)	Legislation	Land acquisition	Compulsory purchase of land to enable own development.
Town and Country Planning Act (1990)	Legislation	Unused buildings	Deal with abandoned buildings and spaces.
Homelessness Reduction Act (2017)	Legislation	Council housing development	Justification for building council housing.

Buildings and planning policy and regulation (continued)

Name	Classification	Focus area	Description
Local Authority Land Act (1963)	Legislation	Land acquisition	Enable Local Authorities to acquire land, build and fund those activities.
The Limits on Indebtedness (Revocation) Determination (2018)	Legislation	Financing	Removed cap on council borrowing for house building.
Energy Efficiency (Private Rented Property) (England and Wales) Regulations (2015)	Legislation	Energy efficiency	Minimum Energy Efficiency Standards (MEES) for rented properties.
Housing Act (2004)	Legislation	Health and safety	Housing Health and Safety Rating System (HHSRS) - Local Authorities keep under review the conditions of residential buildings in their area and take action where hazards are identified.
Homes (Fitness for Human Habitation) Act (2018)	Legislation	Renting standards	Supporting legislation setting standards for landlords and private housing that can be enforced under HHSRS.
Energy Performance of Buildings (England and Wales) Regulations (2012)	Legislation	Energy efficiency	Energy Performance Certificates (EPCs) on sale or rent of property.
Building Act (1984), The Building Regulations (2010) and (Amendment) Regulations (2021)	Legislation	Energy efficiency	Building Control functions relating to energy performance of new buildings and changes to existing buildings, and contractor compliance schemes.
A Decent Home: Definition and Guidance for Implementation, Department for Communities and Local Government in June (2006)	Legislation	Social housing standard	Decent Homes Standard for social housing – a duty to report.
Clean Air Act (1993) and Clean Air Strategy (2019)	Legislation	Pollution control	Limit pollution from burning fuels.
The Electricity and Gas Energy Company Obligation (ECO) Order (2018)	Legislation	Financing	Directing a proportion of ECO money to homes identified by the council.

Buildings and planning policy and regulation (continued)

Name	Classification	Focus area	Description
Warm Homes and Energy Conservation Act (2000)	Legislation	Fuel poverty	Through this act, authorities are required to prepare and publish, a report a strategy and targets to ensure that homes of people in fuel poverty are able to be kept warm at reasonable costs.
Local Government Act (2003)	Legislation	Household Financing	Grants for central heating in private homes.
Regulatory Reform (Housing Assistance) (England and Wales) Order (2002)	Legislation	Financing	Home improvement grants.
Home Energy Conservation Act (1995)	Legislation	Energy conservation	Reporting on energy conservation measures undertaken.
The Environmental Permitting (England and Wales) Regulations (2010), Environment Act (1995) and Clean Air Act (1993)	Legislation	Emissions	Enforcing emissions standards in industrial and commercial premises.
Future Homes Standard (2019)	Legislation	Building requirements	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.
Localism Act: General Power of Competence (2011)	Legislation	Development	Power to do anything an individual may do, unless specifically prohibited. Enables commercial activities including setting up development companies, making loans to other organisations.

Energy sector policy and regulation (continued)

Name	Classification	Focus area	Description
Energy Bill (2023) (not yet enacted)	Legislation	Energy systems	Powers to identify heat network zones and require buildings and energy sources within those to connect to the network.
Permitted Development Rights afforded to the Local Authority in Part 12 of the Town and Country Planning (General Permitted Development) Order (1995) (as amended)	Policy framework	Energy system	Local Authorities can bring forward a district heat network on land it owns or for which it is the Highways Authority.
Town and Country Planning Act (1990)	Legislation	Energy systems	Local Development Order for 'class based' planning permission for an area for district heating networks.
Sale of Electricity by Local Authorities (2010)	Legislation	Procurement	Procurement of Services Works and Supplies – for example, for procuring a district heat network.
Public Contracts Regulations (2015)	Legislation	Heat production and sale	Production and sale of heat.
Concessions Contracts Regulations (2016)	Legislation	Awarding concessions	Award of concessions by public bodies.
Section 59 of the New Roads and Street Works Act (1991) (NRSWA).	Legislation	Coordination of works	Local Authorities have a duty to coordinate Street Works.
Review of Electricity Market Arrangements (REMA) (2023)	Consultation	Electricity market reform	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.
Smart Systems and Flexibility Plan	Policy paper	Energy system	Plan that sets out a vision, analysis and suite of policies to drive a net zero energy system. There are four areas of focus: supporting flexibility from consumers, removing barriers to flexibility on the grid, reforming markets to reward flexibility and monitoring flexibility across the system.
Energy Efficiency Regulations (2015)	Legislation	Energy efficiency	Introduces measures to improve the energy efficiency of certain private rented property in England and Wales.

Energy sector policy and regulation

Although electricity generation has seen swift action towards decarbonisation, the heat supply system has seen less change. By integrating the planning of heat supply, power and transport it is possible to build local net zero energy systems. However, at present LA involvement in this sphere is piecemeal - the powers underwriting this are summarised below.

Name	Classification	Focus area	Description
Planning Act (2008)	Legislation	Energy standards	Set energy standards above building regulations and require on-site renewables for new developments. Consenting renewable generation <50MW.
Planning and Compulsory Purchase Act (2004)	Legislation	Development	Preparation of local development documents that support decarbonised heat, district heat networks, heat pumps and smart energy systems.
Town and Country Planning Act (1990)	Legislation	Energy and heat systems	Planning consent for district heating schemes and for electricity storage schemes.
National Planning Policy Framework (2019) revision: s.151 and 153	Policy framework	Development	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 .
Electricity Act (1989) (Amended by the Utilities Act (2000) and the Electricity (Class Exemptions from the Requirement for a Licence) Order (2001)	Legislation	Small scale energy	Selling small scale electricity.
Sale of Electricity by Local Authorities (2010)	Legislation	Energy sale	Permitting the sale of renewable electricity generated.
Local Government (Miscellaneous Provisions) (1976)	Legislation	Energy production	Production and sale of heat.
Local Government Act (2003)	Legislation	Financing	Financial borrowing and investment powers.
Co-operative and Community Benefit Societies Act (2014)	Legislation		Establishing a company or co-operative.
Local Government Act (1972)	Legislation	Land use	Powers to acquire and dispose of land; Local Authorities can own land (on which they can install renewable electricity generation/district heat networks).
Local Government Act (1972), (Section 123) General Disposal Consent (2003)	Legislation	Land use	Local Authorities can dispose of land including for less than the best consideration that can reasonably be obtained to secure the promotion or improvement of the economic, social or environmental wellbeing of its area.

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Key roles for successful delivery

Project Sponsor

The Project Sponsor is a party with the motivation to establish a successful LNZP, and takes overall responsibility for driving delivery and managing the project. This role will include setting objectives, prescribing policies and overseeing performance.

Strategy | Pipeline Development | Commercialisation | Build | Operate | Expansion

Description of role:

The role usually requires an individual person who is willing and able to champion the scheme is identified within the Project Sponsor organisation, ideally at the leadership level, with the ability to commit the organisation. Local authorities often take on this role because LNZPs align with their policy objectives and existing market failures mean they are unlikely to happen without public sector leadership. Local authorities also control key decisions, notably planning, and have unique convening power among local stakeholders.

Stakeholders typically taking on this role:

- Local Authority.
- Property developer.
- Housing association.
- A private sector body.
- Community organisation.
- DNOs.

Responsibilities

- Defines the scale, nature and phasing of demand for services.
- Arranges studies to establish the viability of the LNZP.
- Identifies funding options.
- Attracts developers, investors and operators.
- Is accountable for the progression of the scheme.
- Intervenes when the project stalls to solve problems.
- Responsible for stakeholder engagement.
- is often the first point of contact for external queries, communication and advocacy for the scheme.

Main costs and risks for the Project Sponsor

- **Staff resources and financial and political capital:** The time and cost invested in project development if the LNZP is not implemented.
- **Regulatory changes:** Changes to legal/regulatory framework can adversely impact the project or prevent it from proceeding.
- **Development windows of opportunity:** Potential energy connections may only be available for connection within a limited window, after which a new building developer will need to make alternative arrangements to supply heat or electricity to the building.
- **Offtake uncertainty:** Variances in anticipated demand for the network and its services for example, if loads fail to materialise or are significantly delayed, or are dropped on request from the process.

Critical success factors

- **Staff resources:** The time and cost invested in project development if the LNZP is not implemented.

Funder

The funder arranges finance and enters into agreements with the funding recipient. This Funder 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.

Strategy | Pipeline Development | Commercialisation | Build | Operate | Expansion

Description of role:

The role comprises of providing or arranging finance and/or funding from third parties for the project. The Funder will often mitigate the risk of financial losses by requiring security against the provided funding. The Funder will enter into an agreement with the recipient, and this role usually ceases to exist once the finance has been repaid. Where grant funding is involved, performance monitoring frameworks often have to be completed on an annual basis. Finance may be subject to restrictions such as loan covenants, in which case, the Funder will be responsible for monitoring the financial sustainability of the project (usually via financial ratios) or in the case of Green Bonds or other Impact instruments, ensuring that proceeds are used for the agreed purposes.

Stakeholders typically taking on this role:

- Local Authority.
- Private SPV.
- Property developer.
- Private financial institution (e.g. banks, asset managers)
- Development finance institution (e.g. UKIB)

Responsibilities

- Provide funding or arrange sources of finance.
- Ensure project risks are at an acceptable level
- Sign funding agreements, depending on the types of finance provided (for example, equity, debt or grant).
- Get appropriate security from the beneficiaries of the funding.
- Undertake due diligence on the project before committing funds.
- Undertake monitoring

Main costs and risks for the Funder

- **Demand or market risk:** The project needs an assured demand to justify initial investment. This can interfere with the future return of the project. This risk can be mitigated by including a guarantee in the contract with an anchor customer.
- **Financial risk:** The credit rating of the beneficiary of funding can be a risk for the Funder or to the finance provider.
- **Regulatory risk:** The evolving legal landscape, changes in environmental standards, planning permissions, or energy tariffs can significantly impact project viability and returns. Funders must navigate this by staying abreast of legislative developments and potential compliance costs. Financial institutions also have to comply with various ESG reporting requirements; this may require detailed project data.

Critical success factors

- **Security provision:** The security provision needs to be acceptable so the funding provider has some guarantee of being repaid. This can be in the form of charges, direct agreements, performance bonds, etc.
- **Rate of return and payback period:** These rates should meet an acceptable threshold to the Funder according to the risk the project poses.

Further considerations

- In some cases, the commercial thresholds might be below what is desired by the Funder, but the economic case can be positive and so the Local Authority or another public body might need to subsidise the project to improve commerciality.

Asset Owner

The Asset Owner owns the physical assets of the local net zero project. Ownership of different types of assets might be split across different parties.

Strategy | Pipeline Development | Commercialisation | Build | Operate | Expansion

Description of role:

The Asset Owner is the physical owner of the assets of the project. The Asset Owner can own different classes of assets, and different parts of the project might have different owners. This means that there might be more than one Asset Owner in the same project. Examples of assets are energy centres, transmission and distribution assets, equipment, etc.

Stakeholders typically taking on this role:

- Local Authority.
- Private SPV.
- Land owner or estate management company.

Responsibilities

- Secure an income stream to cover its risks and match its responsibilities.
- Insure or purchase insurance for the assets.
- Ensure assets are well maintained and replaced when necessary, either directly or through installers, maintenance providers and other service companies.

Main costs and risks for the Asset Owner

- **Contractual risks:** There are risks associated with the use of the assets for their particular purpose. Contracts for operators and users should contain obligations relating to maintenance, insurance, and other responsibilities.
- **Return:** Each asset generates a certain income stream, and this can be more or less than the cost to purchase or build the asset.

Critical success factors

- **Access to funding stream:** The Asset Owner needs access to funding streams that cover the costs of owning, maintaining and replacing the assets and also provide an acceptable return on investment for the organisation.

Further considerations

- **Tax:** The Asset Owner will have to pay tax on the asset. In some cases, such as on heat networks, the capital allowances on assets can be used to reduce the liability for corporation tax.
- **Insurance:** The Asset Owner should ensure that there is suitable insurance in place in case of damage to the asset.

Land Owner

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.

Strategy | Pipeline Development | Commercialisation | Build | Operate | Expansion

Description of role:

This role comprises of granting leases and easements for the siting of the assets. The Land Owner should also provide rights of access for installation, operation and maintenance of the project. It is a more passive role and multiple stakeholders can own different parts of the land.

Stakeholders typically taking on this role:

- Property developer.
- Local Authority.
- Arms length management organisation owned by LA.
- Housing association.
- Private land owner or estate management organisation.
- Community Interest Company.

Responsibilities

- Grant leases for infrastructure to be built.
- Grant access and easements for building.
- Provide access rights for installation, maintenance and replacement of infrastructure.

Main costs and risks for the Land Owner

- **Default on rent:** There is a risk for the Land Owner that there will be a default on rent or other compensation.
- **Tax:** Tax is paid by the Land Owner and it is subject to change if the land ownership changes.

Critical success factors

- **Long term security:** The Land Owner needs long term security that the rent or other compensation agreements for the use of the land will be paid.
- **Insurance:** It is important that adequate insurance or other security arrangements are put in place in case there is damage to the land or a third-party asset on the land.

Further considerations

- This role gives the Land Owner the opportunity to impose conditions when granting rights to install and operate assets. These can include obligations related to maintenance, repair and insurance of assets.
- The Local Authority might want to purchase the land from a third party if they are not the land owner. They would then have the ability to develop property on the land, and more control over the rights of access to assets. Local Authorities have limited rights to demand the sale of land through Compulsory Purchase Orders; these were strengthened in the recent Levelling Up Bill, particularly when exercised via Development Corporations

Community Engagement Partner

The Community Engagement Partner facilitates dialogue and collaboration between the project stakeholders and the local community, ensuring that the community's interests and concerns are addressed.

Strategy | Pipeline Development | Commercialisation | Build | Operate | Expansion

Description of role:

The Community Engagement Partner plays a pivotal role ensuring effective communication between the local community and the project stakeholders. They are responsible for ensuring that the interests, concerns and insights of the community are taken into account in the project planning and execution. They support the community's understanding and acceptance of the project by outlining the benefits and addressing any concerns.

Electricity transmission projects often face local opposition and are the subject of the Government's community benefits framework which is currently under consultation but is likely to set out a consistent framework by which communities are compensated financially for hosting critical infrastructure. LNZPs are not likely to be covered by this framework, which means that any compensation or other benefits (e.g. access to cheaper, renewable energy) would have to be negotiated by the Community Engagement Partner for each project.

Stakeholders typically taking on this role:

- Local Authorities.
- Community Engagement Agencies.
- Consultants.
- Non-profit Organisations.
- Community Leaders.

Responsibilities

- Facilitate dialogue and consultation processes between the project stakeholders and the local community.
- Promote awareness and understanding of the project among the local community.
- Collect and relay community feedback to the project stakeholders.
- Develop and implement community engagement and communication strategies.
- Handle conflict resolution and address community concerns in coordination with project stakeholders.

Main costs and risks for the Community Engagement Partner

- **Failure to engage:** There's a risk of failure in effectively engaging the community which may lead to opposition or delays in project implementation.
- **Miscommunication:** Miscommunication or misinformation can pose a risk to both the project's acceptance and its timeline.
- **Resource intensive:** Community engagement can be resource-intensive in terms of time, effort and financial resources.

Critical success factors

- **Effective Communication:** Ensuring clear, transparent and timely communication with the community.
- **Stakeholder Alignment:** Aligning the interests of stakeholders with those of the community to foster a collaborative environment.
- **Conflict Resolution:** Ability to address and resolve conflicts that may arise between the community and project stakeholders.

Further considerations

- A well-structured engagement strategy is pivotal; it could include community meetings, surveys and informative campaigns.
- Ensuring a feedback loop exists where community inputs are not just collected but acted upon and communicated back to the community.

Installer

The installer designs and installs any physical assets.

Strategy | Pipeline Development | Commercialisation | Build | Operate | Expansion

Description of role:

The Installer will design and install the physical assets of the project. In many cases, the Installer will subcontract the actual installation to a specialist construction company, but will remain responsible for the whole process.

Stakeholders typically taking on this role:

- Specialist construction company.
- Energy services company.
- Property developer.
- Local Authority.

Responsibilities

- Install infrastructure which complies with specifications and needs of the project.

Main costs and risks for the Installer

- **Design and specifications:** The determined design and specifications in the installation construct will determine the cost of installation.
- **Design risks:** Remedial works need to be undertaken if the performance is not in accordance with the contract. If this is due to design issues, the Installer will bear that cost.
- **Construction risks:** Contractors responsible for construction should be chosen and monitored carefully. Poor installation can have a significant impact throughout the whole project. Usually there will be contract clauses to secure performance.
- **Performance risks:** The Installer may have to bear any reimbursement costs if the performance is not up to the standards of the contract.

Critical success factors

- **Funding:** Funding should be available to cover the project capital cost in full.
- **Access to capability:** The success of installation and performance depends on access to knowledge and capability.

Further considerations

- In some projects, installation and operations contracts will be combined. This is a useful strategy for long term projects as it encourages the assets to be installed and operated as efficiently as possible and priced on a life cycle basis, rather than at the lowest purchase cost.

Operator

The operator is responsible for the operation and maintenance of the LNZP to ensure that energy of suitable quality and quantity can be delivered to customers.

Strategy | Pipeline Development | Commercialisation | Build | **Operate** | Expansion

Description of role:

The main role of the Operator is to operate and maintain the infrastructure in a way that ensures suitable and quality services to be delivered to customers. There might be different operators for separate parts of the system.

Stakeholders typically taking on this role:

- Specialist operation and maintenance company.
- Energy services company.
- Local Authority.
- Arms length management organisation owned by LA.
- Housing association or registered social landlord.
- Private land owner or estate management company.

Responsibilities

- Ensure the delivery of quality service to customers (for example, heat, energy, etc. depending on the project).
- Comply with requirements of licenses or power purchase agreements where relevant.
- Ensure performance standards are met.
- Undertake maintenance work, repair and replacement.
- Report to other stakeholders.

Main costs and risks for the Operator

- **Performance:** The Operator is usually subject to performance obligations outlined in the contract, and there might be penalties for non-compliance.
- **Operation risks:** If the equipment is built by a third party, the Operator should ensure detailed inspection of the equipment before purchasing.
- **Maintenance risks:** This can be a long term risk as assets go through their life cycle.
- **Future extension:** If the Operator is subcontracted, expansion might be difficult due to renegotiations. Ideally, extension plans should be included in the initial contract.

Critical success factors

- **Compatibility of systems:** System design and installation should be compatible with operational performance requirements.
- **Funding:** Funding should be available to cover the long-term system operational costs, including contingencies, renewals and replacement of assets.

Further considerations

- It is important to account for technological evolution and to ensure that the operator has the capacity and flexibility to adapt and integrate emerging technologies to maintain and potentially enhance system efficiency and sustainability over time.

Sale of Services Supplier

The Sale of Services Supplier is a distinct role from the stakeholder who provides physical delivery of energy to customers. The supplier must operate a 24 hour per day, 365 days per year customer call centre.

Strategy | Pipeline Development | Commercialisation | Build | **Operate** | Expansion

Description of role:

The Sale of Services is a different role from the physical delivery of this service. In many cases, both activities are done by the same stakeholder. Some of the responsibilities listed below can be subcontracted, depending on the commercial benefits of doing so. The supplier will focus on metering and billing, and selling of electricity, while network operators will be responsible for the delivery of the physical electricity.

Stakeholders typically taking on this role:

- Energy supplier.
- Energy services company.
- Local Authority.
- Housing association or registered social landlord.
- Private land owner or estate management company.

Responsibilities

- Procure service delivery.
- Meter and bill customers.
- Undertake price reviews.
- Attract new customers.
- Collect revenues.
- Manage customer debt and default.
- Communicate directly with customers.

Main costs and risks for the Sale of Services Supplier

- **Payment delay and default risks:** If customers are late to pay or do not pay at all, this can strain the project cash flows. This risk can be reduced with pre-payments or outsourced debt management, which adds extra cost.
- **Demand risks:** Low demand for the service is a risk for revenue generation.
- **Reputational risks:** Related to payment delay and default risks, terminating supply of key services such as heat and electricity could have severe reputational risks for the Supplier, particularly where vulnerable households are affected. Moreover, customer dissatisfaction can also contribute to reputational risks.

Critical success factors

- **Price:** It is key to get price levels right for different customers. This way the Supplier can ensure the project is commercially viable while protecting vulnerable customers.
- **Long-term reliability of service:** Demand risk must be priced in financial models or transferred to a third party.

Further considerations

- Suppliers should consider the differences between billing individual customers/ households and billing for bulk supply. Sale price will reflect this difference.
- Usually a local authority will not act as the supplier of electricity.

Supplier of Last Resort

The Supplier of Last Resort role involves providing energy to customers if the scheme's provider is unable or no longer required to do so.

Strategy | Pipeline Development | Commercialisation | Build | **Operate** | Expansion

Description of role:

This role is only triggered by an unplanned event that requires a quick change in the supplier role. Ideally, the Supplier of last resort will be quick to take over and minimise disruption to customers. This role is not necessary for all schemes, but is a regulatory requirement for the provision of electricity and heat.

Stakeholders typically taking on this role:

- Energy supplier

The following stakeholders can take on this role for other projects, such as heat networks.

- Local Authority.
- Energy services company.
- Housing association or registered social landlord.
- Private land owner or estate management company.

Responsibilities

- Take over operations and sales when required.
- Arrange for replacement of Operator and Sale of service supplier when needed.
- Monitor system performance and supplier activities to ensure rapid action if needed.
- Raise finance and continue to maintain the system if the initial supplier is not reinstated

Main costs and risks for the Supplier of Last Resort

- **Operational risks:** Similar to those of a normal supplier, as well as risks associated with the need for quick action and adaptation.
- **Reputational risk:** If the project completely fails and the Supplier of last resort needs to take over, this might generate a reputational risk to the overall scheme and customer dissatisfaction.

Critical success factors

- **Agreements for takeover:** In case of an event that triggers the need for the Supplier of last resort to come in, adequate rights and contingency arrangements are needed to guarantee a successful continuation of the project. This might include TUPE arrangements for staff transfers
- **Resources:** The Supplier of last resort needs access to the correct resources and capabilities to continue the supplier role in the project.

Network Operators

Network Operators manage the transmission and distribution of energy to the end users.

Strategy | Pipeline Development | Commercialisation | Build | **Operate** | Expansion

Description of role:

This role encompasses the activities carried out by the National Grid, Distribution Network Operators (DNOs) and Independent Distribution Network Operators (IDNOs). The National Grid is the largest electricity transmission and distribution business in the UK, and DNOs are licensed companies that own and operate the network of cables, transformers and towers that bring electricity from the national network to the end user regionally. IDNOs are similar, but do not have regional restrictions.

Gas network operators (GNO) are also key stakeholders that need to be consulted when engaging with LNZPs that might interfere with the normal operation of pipelines such as retrofit developments that require converting gas boilers to a ground source heat pump.

Stakeholders typically taking on this role:

- Distribution Network Operators (DNOs).
- Independent Distribution Network Operators (IDNOs).
- Gas Network Operators (GNO)

Responsibilities

- Own and operate infrastructure (network of cables, pipelines, transformers and towers).
- Deliver heat or electricity to end users.
- As local control increases, a future responsibility of the Network Operator will be to coordinate the national energy network, spatial planning and electricity infrastructure.

Main costs and risks for the Network Operators

- **Increased costs:** There might be increased costs for network operators to keep control over different Regional Energy System Operators (RESOs).

Critical success factors

- Local Authorities should engage with network operators when changing the energy system, to guarantee the projects are aligned with regional and national energy strategies, and don not affect the balance of the grid.
- The establishment of RESOs, such as the West Midlands RESO project, would give greater control for municipalities in energy system governance and could be a solution for inefficiencies in networks.
- Access to data at a local level from programmes such as Energy Data Taskforce can reduce system costs at a national level.

Customer

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.

Strategy | Pipeline Development | Commercialisation | Build | **Operate** | Expansion

Description of role:

The customer is the stakeholder who will pay for the service generated in the project. They are a key source of revenue for most projects and can greatly affect market demand for the services. In many cases, there will be an anchor customer, which will be contractually obligated to purchase what is leftover when market demand is low. The presence of an anchor customer reduces the risk profile of a project.

Stakeholders typically taking on this role:

- Operator of distribution pipework (for example., a landlord).
- Building owner.
- Residential tenant.
- Non-residential users (for example., offices).
- Local Authority.

Responsibilities

- Paying for the service provided on time.

Main costs and risks for the Customer

- **Supply:** A key risk to Customers is the possibility the Supplier will not be able to fulfil its obligations.
- **Performance risks:** Penalties may arise if the Customer fails to comply with standards set in the supply agreement, for example interactions between primary and secondary systems.
- **Demand risks:** If the Customer is the Anchor customer, the costs might be higher in case market demand is low.

Critical success factors

- **Price:** The billing reflects the actual energy consumption and incentivises efficient use, potentially through tiered pricing or performance-based discounts.
- **Long-term reliability:** The service provider should guarantee long-term reliability of the service. This is important to ensure Customer satisfaction.

Further considerations

- Key factors should be addressed in the supply agreement to ensure Customers will choose to engage in the relationship. These factors include price protection with a price review mechanism, long-term maintenance, processes to resolve disputes and complaints and contingency plans for system failure.

A5

Typical components for LNZPs

Renewable electricity generation

Use of renewable energy sources such as wind, solar, geothermal and waste to generate electricity.

Renewable electricity generation

Use of renewable energy sources such as wind, solar, geothermal, waste and organic materials to generate electricity.

Renewable energy assets are pivotal for achieving net zero targets. We've highlighted the technologies below due to their significant potential and widespread adoption compared to less mature technologies like wave or tidal, or hydro, where very few commercial sites remain in the UK.

Asset type	Description
Solar Photovoltaic (PV)	Harnesses sunlight using panels made of semiconducting materials. Deployments include ground-mounted arrays and roof-mounted installations.
Onshore wind	Utilises land-based wind turbines to capture energy from the wind. These installations range from singular turbines to vast wind farms.
Geothermal	Taps into the earth's inherent heat. While it offers consistent energy, it's limited to regions with significant geothermal activity.
Energy from waste (EfW)	Converts waste into usable energy forms. This includes electricity, heat, and transport fuels derived from waste incineration.
Bio-energy	Converts organic materials, such as plants and animal waste, into energy. Various technologies enable the production of electricity, heat, and transport fuels.

Investment potential

The UK government aims to decarbonise its power sector by 2035. This will be associated with a surge in distributed renewable electricity generation assets. The policy and price incentives and maturity of these technologies present an attractive proposition for investors.

There are a range of revenue streams associated with these projects. Depending on the location and size, these assets can generate income primarily from selling electricity directly to the wholesale market or through power purchase agreements (PPAs). Revenue streams may also be stacked by providing ancillary and flexibility services to the grid. However, to reach economies of scale these projects need to be sufficiently large.

These investments often require significant upfront capital, and the return on investment is highly dependent on market prices for electricity and regulatory policies, which can be uncertain and vary across regions. Operational considerations such as intermittency may also pose a challenge to financial returns, although there are several de-risking instruments that are available to hedge against this.

Solar Photovoltaic

TRL[1] 9

Solar photovoltaic (PV) systems are vital in the UK's transition towards a more sustainable and self-reliant energy future. These systems serve as a decentralised source of power, reducing reliance on the National Grid, and contribute to the decarbonisation of heat, power and mobility. They play a particularly important role in rural and remote areas.

Policy risks: The government has previously offered subsidies such as the Feed-in Tariff (FiT) to incentivise solar adoption. The discontinuation of the FiT scheme in 2019 has made it essential for new solar projects to be financially viable without subsidy. This change of policy creates uncertainty for investors. However, solar schemes are now very often profitable, and solar projects made up over half of the 2023 UK Government's Contracts for Difference (CfD) auction.

Operational risks: The UK's variable climate poses operational challenges, as solar yield can be inconsistent. Securing a grid connection is increasingly challenging due to the high demand, especially for larger commercial projects of 100 MW or more. In late 2023, the queue comprised 176GW of new generation and interconnector schemes, compared with a total connected capacity of 64GW. Delays or complications in grid connections can stall project commissioning, impacting return on investment.

Market risks: The solar PV market in the UK is mature but faces competition from other renewables, particularly offshore wind. With advancements in technology and economies of scale, the costs of solar PV installations have reduced. However, the challenge of procuring components, especially when reliant on imports from countries like China, can lead to unpredictability in project costs and timelines.

Legal and regulatory risks: Ground-mounted PV systems are generally cheaper than roof-mounted installations. This is mainly because roof-mounted systems can pose additional legal challenges, especially when the building user is different from the building owner. Complexities arise around lease agreements, maintenance responsibilities, and ensuring the structural integrity of the building to support the panels.

Environmental, Social, and Governance (ESG) risks: Environmentally, solar PV has a low impact, though concerns exist around the disposal and recycling of panels at the end of their life cycle. Socially, while large ground-mounted installations can be perceived as land-intensive, they offer opportunities for dual land use, such as agriculture.

Technical risks: Challenges in the supply chain, especially in procuring high-quality components, can impact the technical robustness of installations. Furthermore, as solar projects scale up, ensuring consistent performance and mitigating system failures become crucial.

Typical investment size range

Cost depends on the scale of the investment. A typical (0-4kW) household solar array costs ~£5-10,000 whereas larger installations (> 100MW) cost >£1bn. The levelised cost of energy (LCOE) from large and small arrays are similar, at around £45/MWh.[2]

Available revenue streams

- Selling to wholesale market
- Power Purchase Agreement
- Flexibility Services

Case studies

Project LEO (Local Energy Oxfordshire)

Common barriers

These include challenges in obtaining planning permission; immaturity or lack of readiness of supply chains; and difficulties in supply-demand matching due to intermittency. Planning issues can be overcome through informing and involving local stakeholders in the planning and implementation of the project, ensuring that benefits are translated to the local communities.

1. TRL = Technology Readiness Level; see section 4C in main report for more information
2. LCOE for household array: PwC calculations for a 3kW array producing 2,300kWh p.a. over 25 years. LCOE for large scale arrays from Contracts for Difference allocations

Onshore wind

TRL 9

Onshore wind systems already comprise roughly 10% of total electricity generation in the UK, and will continue to play a significant role in the UK's transition towards a more sustainable and self-reliant energy future. These systems serve as a decentralised source of power, reducing reliance on the National Grid, and contribute to the decarbonisation of heat, power and mobility.

Policy risks: Onshore wind has historically faced a mixed policy environment in the UK. After a period of limited support, the UK government reinstated onshore wind as an eligible technology for Contracts for Difference (CfD) auctions in 2020, leading to 24 successful bids in 2023 versus 10 in 2022. While this move is positive, sudden policy changes in the past have created uncertainties for investors and developers, making it essential to stay attuned to future policy directions.

Operational risks: Operational challenge for onshore wind in the UK include the lack of robust supply chains for component parts. Dependence on global suppliers, particularly for critical components, can result in extended downtimes during repairs or maintenance due to delays in parts availability.

Market risks: Onshore wind competes with other renewable technologies, notably its offshore counterpart, which has seen significant investment in the UK. While onshore wind is generally cheaper, the competition for suitable land, coupled with public opposition to onshore turbines in certain locales, can impact project feasibility.

After several years of price falls, high interest rates and cost inflation in 2023 led to a significant rise in the price of *offshore* wind power meaning that no projects bid for the auction. These forces could also affect onshore wind in future auction rounds.

Legal & Regulatory risks: Securing planning permissions for onshore wind farms can be complex, given the concerns around visual impact, noise, and potential effects on local wildlife. Local Authorities play a critical role in the approval process, and developers must engage effectively with the local communities to ensure smooth project progression.

ESG risks: Concerns exist around the impact of onshore wind on bird populations and local ecosystems. Socially, while wind farms can offer local employment, they can sometimes face opposition due to perceived noise and aesthetic disruptions.

Technical risk: Technical risks include those related to turbine technology, component failures, and ensuring consistent performance across the wind farm persist. The supply chain for turbine components, often sourced globally, can introduce delays and quality concerns, impacting project timelines and overall performance.

Typical investment size range

As with solar PV, the scale of investment is dependent on the number of turbines involved within each project. At higher economies of scale, an indicative cost would be **£42/MWh**.

Available revenue streams

- Selling to wholesale market
- Power Purchase Agreement
- Flexibility Services

Case studies

Viking Wind Farm, Shetland (wind farm)
Ambition Community Energy (single turbine)

Common barriers

- Obtaining planning permissions can be a lengthy and challenging process due to concerns around aesthetics, noise, and the potential impact on local wildlife.
- Connecting the wind farm to the grid can be technically challenging and costly due to a backlog of projects yet to be connected to the grid.

Energy from Waste (EfW)

TRL 8

The UK currently has 53 operational Energy from waste (EfW) plants, which contribute about 3% to the UK's total electricity generation. Although not zero-emissions, EfW has been been touted as a potential solution to the disposal of residual waste.

Policy risks: As the UK strives towards higher recycling targets and reduced residual waste, policy may shift to focus more on recycling and waste reduction at source, potentially impacting the volume of waste available for energy recovery.

Operational risks: The main operational challenge for EfW facilities is ensuring a consistent waste feedstock, both in terms of volume and calorific value. Fluctuations can impact energy output and operational efficiency. There's also a need for robust waste pre-treatment processes to remove non-combustible materials. Additionally, a robust supply chain for critical plant components and a limited pool of companies offering comprehensive O&M services can pose challenges.

Market risks: EfW projects face competition from alternative waste management solutions like recycling and biological treatments. The gate fees charged by EfW plants need to be competitive to secure waste supply contracts. Moreover, the revenue from energy sales can be influenced by the broader energy market dynamics and pricing.

Legal and regulatory risks: EfW plants must adhere to stringent emissions standards set by the UK and EU regulations. This requires continuous monitoring and potential investment in emissions control technologies. Planning permissions can be challenging to obtain due to concerns about emissions, traffic movement, and visual impact. Engaging with LAs and local communities is crucial to address concerns and secure permissions.

ESG risks: There may be concerns about emissions, including CO_2 and potential toxins. The project has to continually demonstrate its environmental credentials against recycling and waste reduction strategies. Socially, EfW facilities can face local opposition due to potential health concerns.

Technical risks: There are risks associated with the combustion process, flue gas cleaning systems, and electricity generation equipment. The longevity and efficiency of the plant hinge on the technology used, making selection and maintenance paramount. Technical failures can result in downtimes, affecting both waste processing and electricity generation.

Typical investment size range

~£50m+ for example, CoGen has 5 plants, representing c.£250m of investment. Each plant has a gross capacity of more than 50MW.

Available revenue streams

- Selling to wholesale market
- Power Purchase Agreement
- Flexibility Services

Case studies

PIRI Energy, Peterborough

Common barriers

- The viability of EfW projects often depends on gate fees charged to accept waste. These fees need to remain competitive against other waste disposal options. Additionally, fluctuating energy prices can impact the revenue from the sale of energy generated.
- EfW plants have to comply with rigorous emissions standards, which necessitates investment in advanced control technologies and continuous monitoring.

Geothermal energy

TRL 8

Geothermal energy offers a constant and reliable energy source, making it an attractive option for base-load power generation and district heating. While deployment in the UK is limited compared to other renewable sources, technological advancements and increased focus on diversified energy sources are pushing geothermal to the forefront of sustainable energy solutions.

Policy risks: Geothermal initiatives are limited when compared to other renewable sources. Although there is growing interest, the lack of a dedicated geothermal policy framework can impede investments and development in this sector.

Operational risks: Geothermal plants require extensive surveying and drilling to tap into the Earth's heat. The UK's geothermal resources, mainly located in the South West, can be challenging to reach. Operational challenges include the potential for drill malfunction, misestimation of reservoir capacity, and unpredictability in heat flow. There is also a risk of seismic activity triggered by deep drilling operations.

Market risks: Geothermal energy, though reliable, competes with more established renewable technologies that currently have a larger market share, such as offshore wind. Given the considerable upfront capital required for geothermal projects, securing financing might be challenging if the market perceives other renewables as more profitable or less risky.

Legal and regulatory risks: While there are clear regulations for drilling operations in the UK, these are not tailored for geothermal energy extraction. This can result in ambiguity when obtaining permits and ensuring compliance. The lack of dedicated legal framework for geothermal energy can also lead to uncertainties in land rights and reservoir access.

ESG Risks: The drilling process can lead to the release of greenhouse gases trapped beneath the Earth's surface. Socially, while geothermal plants have minimal visual impact, local communities might have concerns over induced seismicity. Governance risks involve ensuring transparent reporting of geothermal operations and their impacts, which is crucial for stakeholder trust.

Technical risks: The UK, though it has geothermal potential, doesn't possess an abundance of the high-temperature thermal heat found in regions with volcanic activity. This means that Enhanced Geothermal Systems (EGS) or other advanced technologies are required to efficiently extract energy. These technologies, though promising, are still in developmental stages, carrying inherent risks related to efficiency, longevity, and potential unforeseen challenges - as well as higher cost.

Typical investment size range

£15 million for 25 MW of baseload electricity and 100 MWh of heat energy.

Available revenue streams

- Selling to wholesale market
- Power Purchase Agreement
- Flexibility Services

Case studies

Eden Project, Cornwall

Common barriers

- The technical challenges associated with extracting energy from deep underground requires advanced drilling techniques and detailed information about local geology.
- The high initial costs and upfront investment required for exploration, drilling, and infrastructure can be prohibitive.

Bioenergy with carbon capture and storage

TRL 8

Bioenergy with carbon capture and storage (BECCS) could play an important role in renewable electricity generation. In rural areas bioenergy can utilise farming and forestry feedstocks and in urban areas, household waste, all of which could otherwise emit ethane, a much more potent greenhouse gas than CO_2. Bioenergy has supply chain and market integration challenges, but has the potential to provide a use for organic waste at scale, supporting the development of a circular economy. To contribute to the UK's net zero ambition, bioenergy LNZPs will need to be developed with carbon capture and storage which provides a further technological challenge.

Policy risks: The Government's Biomass Strategy (2023) reiterates the Government's commitment to a role for BECCS in its Net Zero Strategy (2021) and to increase the amount of food waste collected by local councils for use in Anaerobic Digestion (AD).[1] Biomass currently accounts for ~8% of the UK's energy supply, and the Government commits to *'monitor the levels of biomass supply to ensure the UK can secure the necessary supply for increasing biomass use across the economy'*. But this is not without opposition: Critics argue that a third of the biomass we use is imported and that CCS technology is not yet available at scale. The government is developing a cross-sectoral biomass Sustainability Framework which could lead to a shift in policy that limits the viability of future schemes.

Operational risks: There is currently insufficient planting and biomass farms to meet the demand for sustainable biomass. This is further compounded by an increase in demand due to new biomass power stations seeking to take advantage of green credentials.

Market risks: The biomass market faces supply chain limitations. Physical constraints include resource availability, both in terms of land and feedstocks. The market is further limited by the adoption of bioenergy technologies, in particular CCS.

Legal and regulatory risks: The scaling of carbon capture and storage is essential for the bioenergy sector to contribute to the reduction of CO_2 emissions, but this is hampered by delays and uncertainty in regulatory support and incentives.

ESG Risks: Bioenergy projects can lead to direct and indirect land-use changes (such as mono-species tree plantations) which cause loss of biodiversity, impairment of ecosystem services and competition with food production. Social risks may also include the impact of such projects on local communities and the effects of large-scale land conversion for bioenergy crop cultivation. Furthermore, biomass has a much larger impact on local air pollution than gas boilers so plants cannot be located near urban areas.

Technical risks: There are challenges associated with the conversion technologies, including the need for bioenergy carbon capture and storage. There may also be the reliance on foreign imports to supplement the large amounts of feedstock required to operate bioenergy power plants.

Typical investment size range

CAPEX: **£3.5 million /MW**

Available revenue streams

- Selling to wholesale market
- Flexibility Services

Case studies

Supergen Bioenergy Hub

Common barriers

- There is a lack of confidence in the long-term viability of bioenergy markets, which inhibits investment. Investors are cautious due to uncertainties around continuous support and the development of these markets despite current scale.
- Bioenergy has a relatively low land efficiency (amount of electricity generated per square meter) compared to other forms of renewable energy such as wind and solar. This coupled with the associated environmental impacts and competition with crop production serve as deterrents to investment in such projects.

1. The Environment Act (2021), mandates all local councils in England to arrange for the separate collection of food waste for recycling at least weekly from

Private wires & Heat Networks

Systems that distribute heat or electricity from a central source to multiple buildings.

Private wires & Heat Networks

Systems that distribute heat or electricity from a central source to multiple buildings locally, reducing energy losses and overcoming grid constraints

These assets include microgrids, local energy centers or district energy[1] systems that provide heat, cooling or electricity to a group of buildings or a specific geographic area. These networks often incorporate various energy sources including storage systems and they may include renewable combined heat and power (CHP) systems or energy from waste schemes to achieve greater energy efficiency and reduce carbon emissions. Networks can carry energy from renewable or fossil fuel sources, and in most cases if the underlying energy source changes, the networks can still be utilised.

Asset type	Description
Energy centre	Energy centres act as centralised assets that can supply heating, electricity and/or cooling to homes and businesses, thereby replacing the need for individual boilers.
Heat networks	Heat networks (also known as district heating) supply heat from a central source to consumers via a network of underground pipes.
Microgrid	A microgrid is a small-scale collection of distributed electricity generation sources, such as solar panels or wind turbines, and energy storage systems. It's interconnected by a 'local' grid which can run both connected to or in isolation of the main electrical grid as an 'island'.
Private wire	Private wires are dedicated electrical connections between generation sources and individual users. They bypass the public distribution network, enable more direct control and potentially lower transmission charges.

Market overview

Private networks & Heat networks integrate various forms of renewable energy production, energy storage and advanced energy management technologies, which are all at the forefront of the energy transition - offering substantial potential for investment growth.

These systems offers steady revenue streams, some of which may be stacked to improve attractiveness to investors. A solar-plus-storage microgrid might generate income from selling excess electricity to the grid, demand response programs, and potentially ancillary services such as frequency response.

The current regulatory environment for these systems can be complex and may in some cases impact the project's feasibility or returns. The technology and operational requirements for these systems also require expertise, which may increase the costs associated with operating them efficiently.

Case Study

Peterborough Integrated Renewables Infrastructure (PIRI) will incorporate a private network to connect customers and EV infrastructure, which will electrify buses and other council vehicles, as well as provide individual charging points. The system will use supply and demand balancing technology to meet the needs of the city's homes and businesses.

1. 'District energy' refers to energy production, storage and distribution that takes place in decentralised networks. It includes heating, cooling and electricity distribution.

Energy centre

TRL 9

Energy centres are an enabler for integrating low carbon technologies such as solar PV arrays, combined heat and power (CHP) units, battery storage systems, and efficient energy management on company and industrial sites. They present an effective avenue for generating and delivering heat or electricity to nearby buildings, thereby optimising usage and reducing reliance on conventional sources.

Policy risks: As many energy centres cater to specific areas like universities, housing developments, or local authority buildings, they will be subject to policies set by these local bodies. Changes to these policies may diminish or eliminate the ability of such centers to supply energy to the local area.

Operational risks: Key operational risks involve balancing local electricity or heat generation with demand. Ensuring a stable supply, especially when relying on intermittent sources like solar PV, requires a robust management system. Backup systems, typically the grid, must be seamlessly integrated for reliability.

Market risks: As with most local assets, both demand and supply are limited which limits the size of the market. Pricing for selling energy to end users on private networks must remain competitive against national grid prices. As energy prices fluctuate on the broader market, energy centres need to ensure their tariffs remain attractive. Additionally, with advancements in energy storage and microgrids, energy centres face competition from other localised energy solutions.

Legal and regulatory risks: Energy centres need to navigate myriad regulations, from securing permissions for infrastructure developments to adhering to safety standards for private wire networks and heat distribution. They must also be mindful of contractual obligations with end users and ensure compliance with any third-party agreements, especially when connected to the main grid as a backup.

ESG risks: Energy centres need to maintain trust with end users, ensuring consistent supply and addressing any concerns about infrastructure or pricing.

Technical risks: Technical challenges include ensuring the efficient operation of the energy generation equipment, be it CHP units, solar PV arrays, or other sources. The distribution network, both electrical and thermal, requires regular maintenance to avoid losses. Furthermore, integrating various energy sources, storage solutions, and the main grid backup demands a sophisticated energy management system.

Typical investment size range

Vary by project type and size, however Government guidance for CHP finance exists.

Available revenue streams

- Electricity sales.
- Heat and cooling sales.

Case studies

King's Cross energy centre

Common Barriers

- Energy centres, particularly those harnessing newer or more advanced technologies for enhanced energy management and optimisation often require significant upfront investment.
- Traditional financiers might view energy projects, especially those utilising novel technologies or in less developed markets, as high risk. This can lead to higher borrowing costs or difficulty in securing funding.

Heat networks

TRL 9

A heat network, or district heating system, supplies heat from a central source to end users, via a network of underground pipes carrying hot water. Most commonly used in high-density urban areas, they increase area-wide heating efficiency by optimising the use of heat in the local area, either from waste heat sources or local generation. These projects often span multiple sectors, such as domestic and commercial buildings as well as local industry and transport.

Policy risks: Current UK policy is aimed at supporting the growth of heat networks. Through the Heat Network Transformation Programme (HNTP) the Government is working with industry and Local Authorities, and investing over half a billion pounds in funds and programmes, such as the £288m Green Heat Network Fund (GHNF), to develop new heat networks and improve existing ones. However, changes in these incentive schemes or shifts in policy could impact the viability and profitability of current and future projects.

In addition, the Government is currently developing a methodology to identify and designate Heat Network Zones. This will provide certainty to the industry overall, but may disadvantage existing schemes that are designated as being outside of a zone.

Operational risks: These may arise from the release of Ofgem's technical standard for heat network design and operation, which is in development and is likely to extent to include minimum technical requirements for existing heat networks.

Market risks: Given large fixed costs per section of piping, heat networks rely on having as many customers as close as possible. Schemes are most profitable when contracting with a small number of 'anchor' customers (such as an office block or housing development) rather than negotiating with many individual households which is more time consuming.

Heat networks may face competition from standalone renewable solutions or efficient building designs negating the need for centralised heating. Fluctuations in fuel prices, upon which some heat networks might depend, can also affect costs and pricing structures.

Legal and regulatory risks: Heat networks might face challenges in obtaining permits, especially in densely populated areas or regions of historical significance. Evolving sustainability regulations could also necessitate system upgrades or alteration.

ESG risks: These involve the efficiency of the system and the sources of heat. Many heat networks still use fossil fuel heat sources. Socially, heat networks can also be perceived as intrusive, especially during installation phases in populated areas.

Technical risks: The integration of varied technologies within a heat network, from boilers to heat pumps, introduces technical intricacies. Ensuring consistent performance, mitigating heat losses in distribution, and incorporating future-ready technologies are imperative. The system's adaptability to incorporate emerging technologies, such as smart grid functionalities or innovative storage solutions, can also pose challenges.

Typical investment size range

Costs are dependent on the heat network size, with recent projects costing c.£50m. Government support is available for initial capital cost, particularly through the GHNF.

Available revenue streams

Heat and cooling sales.

Case studies

Leeds City Council partnership with Vital Energii

Common Barriers

- Lack of Supporting Infrastructure including utilities and services can present integration challenges.
- Securing land or property rights for network expansion can be challenging, especially in densely populated areas.

Microgrid

TRL 8

A microgrid is a set of small-scale generators interconnected to a distribution network that supplies electricity or heat to a small, localised group of customers. They can be good solutions in rural areas that lack electricity access from the National Grid.

Policy risks: The policy framework for microgrids is still evolving, which can cause uncertainty and hinder investment decisions.

Operational risks: These include the need for specialised maintenance and operational expertise, complexities in integrating with the existing grid, and the challenge of managing variable and intermittent generation from renewable sources.

Market risks: The initial capital costs for setting up microgrids are substantial, posing a significant barrier, particularly for smaller communities or organisations with limited financial resources. Moreover, in isolated areas, the scalability and economic viability of microgrids can be hindered by the high costs of infrastructure against low energy demand, affecting the attractiveness to investors.

Legal and regulatory risks: Outdated regulations or the absence of specific policies tailored for microgrids can impede adoption and operation, leading to legal and regulatory hurdles The lack of standardised designs and protocols for microgrids can result in interoperability issues, making it difficult to integrate various systems and share best practices.

ESG risks: The environmental impacts of energy storage systems, including resource extraction and waste management for components, present ESG risks that need to be managed.

Technical risks: The UK faces challenges in grid interconnection for microgrids, which requires careful management to ensure compliance with existing grid regulations and may necessitate infrastructure upgrades. Variable and intermittent generation from renewable sources necessitates careful management and storage and backup solutions to maintain a reliable electricity supply.

Typical investment size range

Microgrids vary dramatically in complexity and size - recent costs have ranged from £0.2-5.1 million.

Available revenue streams

- Electricity sales
- Ancillary services

Case studies

RMI Sharing the Power

MVV Mannheim-Wallstadt Microgrid

Common Barriers

- Scaling microgrids requires collaboration across the nexus of local, regional and national government to fully scale access to electricity for rural communities.
- To deploy at this scale, there will need to be a change in governance and policy incentives.
- Organisations such as the UN and World Bank are heavily involved in mini grid deployment and increasing access to electricity through these technologies.

Private wire

TRL 8

Private wires, representing direct electricity connections between a local generator and a local consumer, bypass the national grid entirely. This approach allows businesses and consumers to purchase electricity directly from renewable energy sources, often at fixed or predictable costs, outside of the wider, regulated electricity retail market.

Policy risks: Risks could arise from alterations to the existing benefits of private wires, particularly if there is a change in network cost charges and supplier levies. These 'green levies', which are imposed on the wider market to support schemes like the Renewables Obligation and the Capacity Market, have surged in recent years. This has bolstered the appeal of private wire arrangements which are not subject to such levies. Private wires are also not subject to the Ofgem consumer price cap. These arrangements could be subject to policy change.

Operational risks: The feasibility of a private wire is significantly impacted by its route with obstacles such as railway lines and rivers hard to bypass.

Many private wires have only one source of energy and one customer. However, risks increase significantly with the number of offtakers, with the need to align agreed service levels in PPAs or other contracts. Should the wire fail, most offtakers will have the ability to fall back on grid energy, but some may not. Additional operational risks exist when connecting to the national grid, including costs and conditions imposed by the DNO.

Market risks: Market risks could be triggered by a change in the economics of private wire supply, especially if the avoidance of certain grid charges and policy costs is revisited by the Government. Long-term PPAs may go from being a win-win today (for private wire operator and offtaker) to a lose-lose: Flexibility should be built into these contracts with major policy change allowing a renegotiation.

Legal and regulatory risks: Legal challenges in private wire arrangements may arise from contractual obligations between the generator and consumer, navigating property rights for infrastructure placement, and adhering to health and safety standards. On the regulatory front, compliance with electricity generation, distribution, and consumer protection standards is essential. The evolving regulatory framework, including network charging rules or adjustments in licensing exemptions, may impact private wire operations.

Technical risks: Key risks typically involve the operational aspects of establishing and maintaining a reliable and efficient energy system. These include the technical feasibility of on-site generation facilities, the integration of such systems with existing infrastructure, and the management of variable energy outputs. There are challenges related to ensuring the quality and safety of the private wires themselves, avoiding disruptions in supply, and maintaining the equipment over time.

Typical investment size range

Largely dependent on renewable energy source and distance to energy user.

Available revenue streams

- Electricity sales (usually through PPAs)
- Export to the grid

Case studies

Morrison hospital develops its own solar farm

Common Barriers

- A barrier to utilising private wires is the location of the renewable energy assets powering the private wire, as generators must be located close to consumers to minimise exorbitant connection costs and local disruptions.
- Longer term agreements (PPAs), can help overcome the initial investment barrier, which is high due to the costs of constructing the generating station and connecting infrastructure. The provision of technical support to complete regulatory hurdles could also help reduce the burden of applications for licence exemptions, as would advice around contracting agreements to ensure confidence in the arrangement.

Public transport and mobility services

Transport is the largest contributor to the UK's greenhouse gas emissions, comprising roughly a third of total emissions. Of this, the largest single category is road transportation.

Public transport and mobility services

Transport is the largest contributor to the UK's greenhouse gas emissions, comprising roughly a third of total emissions. Of this, the largest single category is road transportation.

Public transport and mobility services are vital for not only decarbonising the transport sector, but also reducing the social costs associated with individual vehicle use: traffic congestion; air pollution; accidents and inefficient use of urban space.

Schemes may incorporate electric buses, trams and trains, as well as promoting shared mobility services such as e-bikes, e-scooters and car sharing programs.

Asset type	Description
Electric buses	Bus with propulsion and accessory systems that are powered by electricity, in many cases from exclusively zero-emissions sources.
Micro-mobility	Micro-mobility encompasses a wide range of small lightweight vehicles including bikes/e-bikes, e-scooters and cargo bikes, all of which can be privately owned or part of a shared micro-mobility scheme.
Shared mobility	Shared mobility encompasses all forms of micro-mobility and private transportation that allow multiple users or shared journeys, including car-sharing and car-pooling.
New Cycling Infrastructure	New cycling paths that can be either a part of the road or segregated from it. They can be short individual paths or part of a wider cycle superhighway scheme.
New Walking Links	New walking routes either alongside roads or that are standalone paths that act as pedestrian shortcuts.
Improving Existing Facilities	Improving and upgrading walking and cycling routes by fixing potholes, installing bollards or improving path surfaces.

Market overview

Public transport and mobility services offer a double value proposition of tackling both environmental issues and improving urban mobility.

Beyond ticket sales and usage fees, some mobility assets can leverage technology to stack revenue streams: Electrified fleets can participate in demand response programs by charging during off-peak hours and discharging during high demand. However, the upfront costs for electric fleets can be high and the payback period might be longer than traditional transportation investments. Revenue stacking through demand response is also reliant on the appropriate infrastructure being in place. The long-term success of such services depends heavily on user adoption and enhanced grid flexibility.

Active mobility infrastructure does not generate any direct revenue streams, which makes it difficult to attract private investment. These types of projects are largely funded by central and local governments.

Case Studies

Energy Superhub Oxford is the largest EV hub project in the UK. The project will install an EV network that aims to electrify all buses.

Peterborough Integrated Renewables Infrastructure will incorporate a private network to connect customers and EV infrastructure, which will electrify buses and other council vehicles.

Cycling in London: Data from Transport for London showed that cycling increased by an average of 40% in Autumn from 2019 to 2022. This was largely attributed to the fact that 22% of people now live within 400m of a high quality cycle route, up from 12% in 2019. This was due to the creation of a network of cycle superhighways around the city centre. Additionally, London's cycle hire scheme continues to see record numbers of hires year after year, and are now at rates 11% higher than pre-pandemic levels. E-bikes have recently been added to the cycle hire scheme, which is likely to increase ridership even more over the coming years.

Electric buses

TRL 8

Buses are at the centre of public transport in the UK, with twice as many journeys made on buses than by rail. Consequently, electric buses represent a crucial component of the drive to net zero road emissions and have been a focus of government policy in recent years.

Policy risks: There might be inconsistencies in local and national policy support for electric bus initiatives, with risks related to the future of subsidies, grants, and tax incentives. The current Zero Emission Bus Regional Areas grant scheme (ZEBRA 2) is funded only upto FY 2025.

Additionally, policies mandating the expansion of electric vehicle charging infrastructure may not keep pace with the deployment of electric buses, leading to potential project delays.

Operational risks: Establishing a sufficient and reliable charging infrastructure poses significant operational challenges, with risks around power supply stability and charger availability. Transitioning from diesel to electric buses requires upskilling of maintenance personnel and potentially higher costs for specialist maintenance and repair services.

Market risks: Market risk includes the pace of technological advancements in electric buses, which can render current models obsolete more quickly than anticipated. The upfront costs for electric buses and their charging infrastructure are considerably higher than for traditional buses, which can be a significant barrier for local governments to investment.

Legal and regulatory risks: A lack of clear legal and regulatory structures tailored to electric buses can impede their adoption. This includes the need for reforms in procurement and financing schemes that are not well-suited to the new technology.

ESG risks: There may be social risks associated with ensuring equitable access to new electric bus technologies across different regions and communities.

Technical risks: The technical limitations of current electric buses and charging infrastructure could affect reliability and efficiency. There is a need for ongoing innovation to improve the operational capabilities of electric buses.

Typical investment size range

First Bus placed an £81m order for 193 electric buses, suggesting the average price is ~£420,000. ZEBRA grants can cover upto 75% of additional costs.

Available revenue streams

- Ticket sales
- Advertisement

Case studies

Coventry ambition to be UK's first all-electric bus city.

Common Barriers

- Despite recent decreases in production costs, electrical buses still require ~50% more initial investment than diesel equivalents - although future running costs are much lower, resulting in similar per km lifetime costs. Incentives and subsidies for the technology would help to overcome this financial barrier. Working to stimulate demand on underutilised bus routes can also support long-term revenue and make purchasing the vehicles more cost effective.
- Coordinating funding from public finance on projects from concept to scale can help first-mover projects in regions not yet adapting the technology, as can providing further investment into trailblazing LNZP demonstrators. Careful planning and support in infrastructure upgrades can also facilitate the expansion of electric buses.

Micro-mobility

TRL 9

There are different types of micro-vehicles, both for shared and private use, from human-powered bicycles to electric vehicles such as e-scooters. The main potential of micro-mobility lies in solving first- and last-mile access to and from public transport, and as such it should be considered as a part of an integrated transport system alongside public transport to be most effective.

Policy risks: There is opposition to micromobility schemes in many cities meaning that approval to operate is subject to local consent. In London, private e-scooters are banned but three operators are taking part in a pilot until 2024. This is operating in most boroughs and has strict safety requirements. The government is planning to introduce a Transport Bill to provide regulatory clarity for new forms of micro-mobility vehicles, including e-scooters. The Bill is expected to create a new, low-speed, zero-emission vehicle (LZEV) category, which would differ from the current cycle and motor vehicle categories, giving local transport authorities new powers to manage rental operations.

Operational risks: Key risks include the implementation of various parking models - station-based, hub-based, geofenced, free-floating - each with its benefits and challenges. Station-based models can be expensive due to the need for additional infrastructure, whereas free-floating systems can lead to footpath obstructions and are susceptible to vandalism.

Market risks: Globally, the micro-mobility market has reached scale and continues to grow, with $3bn invested in 2021, almost entirely by institutional investors. Private companies like Beryl, Serco, Lime, TIER and others are already operating in the UK. Market risks include competition amongst operators, including public-sector subsidised options such as London's Santander Bikes, as well as consumer preferences - for example the usage of different apps and pricing structures.

Legal and Regulatory risks: The UK government's upcoming regulations in the Transport Bill will affect how micro-mobility vehicles are used and managed. Currently, e-scooters fall under 'powered transporters' and face strict requirements, while e-bikes have specific EAPC rules to follow. Non-compliance with theses could lead to legal repercussions including loss of drivers' licenses and fines.

ESG risks: There could be social governance risks related to accessibility for all users, including those without smartphones, and potential issues with vehicle theft or vandalism.

Technical risks: Vehicles must be designed to withstand high volumes of urban usage, with the reliability and safety of the vehicles paramount to the success of the initiative. This requires distributed teams of engineers to carry out fleet maintenance as well as recharging. Quick, user-friendly apps and the proper functioning of geofencing technology are also significant technical challenges.

Typical investment size range

Costs vary greatly depending on the form of mobility and the extent of the scheme. Lime is investing £26m in London to bolster its 2,000-strong fleet; TfL and its partners spent ~£200m of net public subsidy over 7 years on a fleet of >11,000 bikes.

Available revenue streams

- Pay per use
- Subscription
- Advertisement

Case studies

Amazon's micro-mobility hub in Hackney

Common Barriers

- For users, barriers include weather conditions, price, conflict with road and pedestrian traffic, repairs, the proximity and/or availability of vehicles at the point of need and total operating radius.
- Implementation of shared micro-mobility schemes have thus far been sporadic. Coordination during implementation and investment into supporting infrastructure is could help with overcoming this barrier.

Shared mobility

TRL 9

Shared mobility includes ride-sharing, car-pooling, corporate shuttles and applications that link passengers to shared vehicles. These solutions improve on-demand transit options, alleviate urban congestion, and support the shift towards low-emission travel.

Policy risks: Policies like Clean Air Zones (CAZ) and Low Emission Zones (LEZ) incentivise shared mobility solutions. Incentives differ by place and there is a need for clearer national guidelines and standards for shared mobility providers, especially in terms of safety and interoperability. Other policies like carpooling exist in other countries to incentivise multi-occupancy vehicles use through pricing or dedicated lanes but in the UK this is limited to guidance.

Operational risks: Shared mobility relies heavily on user experience. Issues such as vehicle availability, charging infrastructure (for electric vehicles), maintenance, and customer support can impact operations. Moreover, the integration with other public transport methods is key to achieving a smooth transitions for users.

Market risks: While there is a growing trend towards shared mobility, there are challenges related to public acceptance, especially among regular drivers. Competition is fierce, and a unique value proposition is essential to gain market share. Most propositions are only successful once they reach scale (options available at all times for users opting not to drive) which usually requires a period of loss-making operations.

Legal and Regulatory risks: Licensing and operating requirements can differ across cities and regions in the UK. Shared mobility providers must navigate this fragmented regulatory landscape. Data protection and user privacy are also significant concerns given the digital nature of these services.

ESG risks: The pressure to rapidly scale can lead to unsustainable sourcing of materials, especially for batteries, with potential negative impacts on vulnerable communities and ecosystems. The social component highlights safety concerns, both in terms of vehicle operation and integration into busy urban environments, which can increase the risk of accidents or conflicts with other road users.

Technical risks: Reliability of platforms, app interfaces, and real-time data processing are vital. Any technical glitches can result in user dissatisfaction. For electric shared mobility solutions, the availability and efficiency of charging infrastructure can impact the viability of the scheme.

Typical investment size range

The typical investment size for shared mobility schemes in the UK can vary widely based on the specific type of mobility service. As an example, mobility startup Go Sharing recently raised £43.16 million.

Available revenue streams

- Pay per use
- Subscription-based
- Advertisement

Case studies

Zipcar UK

Common Barriers

- Overcoming the mindset of private vehicle ownership and assuring people of the convenience and reliability of shared mobility may be a challenge.
- Infrastructure limitations, especially charging infrastructure for electric shared vehicles may inhibit the viability of such schemes as some areas lack the necessary infrastructure to support a large fleet.

New cycling infrastructure

TRL 9

A cycle superhighway is a fast, often segregated cycle lane designed for long distance traffic that aims to rival cars for commutes of 5-20 km distances and make cycling safer and easier for its potential users.

Policy risks: There is a possibility that cycle lanes could face significant backlash from vehicle users if they result in reduced road space and resulting increased congestion. Policies such as Low-Traffic Neighbourhoods (LTNs) and 'mini-Hollands' often include cycling infrastructure along with measures to reduce car usage and speed, and are opposed by local motorists. If the backlash is big enough, it can cause local governments to stop or change cycle routes to avoid angering vehicle drivers any further.

Operational risks: Ensuring the cycle superhighway traffic light system works properly and is in sync with pedestrian and vehicle traffic lights is essential; malfunctions could cause collisions.

Market Risks: Cycle lanes have no direct revenue streams. As a result, they are not an attractive prospect for private investors and have been funded largely by local governments in the UK, with some central government support through, for example through the Department for Transport's Active Travel Fund.

This limits the funding that can be obtained for their expansion. Unexpected spikes in the price of tarmac, asphalt, construction labourers and other essential materials needed to complete the work may significantly increase the cost of projects for Local Authorities and may lead to their cancellation due to the budget constraints.

Legal and regulatory risks: These relate to ensuring cycle lanes are built in a way that maximises safety. If safety levels end up being lower than before the cycle lane was installed, there may be legal implications regarding the chosen cycle lane design.

ESG Risks: The environmental risks associated with building cycle lanes are primarily to do with the carbon footprint of the materials used to build them. Using recycled tarmac or asphalt would significantly reduce the environmental impact compared to using the virgin versions of these materials. Additionally, whether the energy source that powers the construction tools is renewable or not will impact the carbon footprint significantly. However, the reduced car journeys and increased physical activity benefits that come with increased cycling mean that these schemes are a net positive for ESG goals.

Technical risks: It is important to ensure minimal disruption to traffic during construction. This requires sophisticated planning as mismanagement can lead to congestion, increased accidents, and public dissatisfaction.

Typical investment size range	Available revenue streams
£10-12m per mile.	Not applicable.

Case studies

London Cycle Superhighways-Summary

London Cycle Superhighways- Financing

Common Barriers

- Vehicle drivers may oppose the creation of cycling lanes, or the addition of bollards, or other traffic calming measures which am to improve the road-using experience of the cyclist at the expense of the motorist.
- One solution is public consultations which aim to understand objections and, where possible, to strike a balance between competing road-users.

New walking links

TRL 9

Creating new walking paths in places where there is a no direct, safe walking route linking nearby communities is essential to encourage more people to walk when travelling shorter distances.

Policy Risks: Walking routes may compete with space required to fulfill other policy commitments, such as building new housing. Walking links may have to be adapted to accommodate these.

Operational Risks: Due to the low maintenance nature of walking paths, there are no significant operational risks associated with their use. Lighting may be required to improve safety on some paths, but modern LED bulbs require low levels of maintenance.

Market Risks: Walking paths do not directly generate any revenue streams, which makes private investment hard to obtain. Consequently, public funding is used for most walking path construction projects. If prices for materials and labour required for construction were to increase substantially, walking paths may have to be shortened or even cancelled due to the tight budget constraints of local councils.

Legal and Regulatory Risks: Walking paths are not a contentious topic and do not have strict regulations to abide to. Public safety can be a concern for pedestrians, particularly in urban areas, and lighting may be required to allay these concerns. However, as long as the paths avoid private land and communities are consulted, there are rarely significant legal or regulatory risks associated with their creation.

ESG Risks: The environmental risks associated with walking paths are primarily to do with the carbon footprint of the materials used to build it. Using recycled tarmac or asphalt would significantly reduce the environmental impact compared to using the virgin versions of these materials. Gravel, a low carbon material, can be used on paths in rural areas where appropriate. Additionally, whether or not the energy source that powers the construction tools is renewable or not will affect the carbon footprint significantly. However, the reduced car journeys and increased physical activity benefits that come with increased walking mean that these schemes are a net positive for ESG goals.

Technical Risks: As the creation and maintenance of walking paths is a low tech exercise, there are no significant technical risks associated with creating them.

Typical investment size range	Available revenue streams
£360 per metre using bituminous materials.	Not applicable.

Case studies

Cornwall County Circular Walking Route

Birmingham Walking and Cycling Infrastructure Plan

Common Barriers

- Local councils prioritising other projects over creating new paths due to lack of funds, leading to project delays or cancellations.
- Solution: Minimise costs by making paths using natural, readily available materials such as gravel for the pathway and wood for the kerbing.

Improving existing facilities

TRL 9

Improving current infrastructure can allow active mobility to become safer, faster and more enjoyable for its users. Improvements and upgrades will also decrease future maintenance costs.

Policy risks: Creating new infrastructure may be prioritised over improving existing infrastructure, leading to a potential lack of funding for projects of this nature. However, in February 2023 the UK government announced a £200 million scheme to improve walking and cycling routes across the country. The Active travel Fun can be used both to create new active travel infrastructure and to fund improvements.

Operational Risks: Improvements should reduce the cost of future maintenance, if done according to industry standards. Improper upgrades can, instead, decrease the life of existing assets. Projects should consult with engineers on best practice.

Market Risks: Improving existing facilities does not create any direct revenue streams. Consequently, funding for these initiatives is often limited to funding from Local Authorities.

Legal and regulatory risks: Improving infrastructure is not a contentious topic and is not constrained by stringent regulations, therefore there are no significant legal or regulatory risks. However, upgrades that also increase the size of existing schemes are subject to the same challenges by other road users and planning authorities discussed on the previous two pages

ESG Risks: To minimise the negative environmental impact of projects of this nature, renewable energy should be used to power equipment where it is commercially viable. Materials used should be recycled or made of natural materials where possible. For example, using recycled asphalt to fill in potholes on cycle paths.

Technical risks: It is important to ensure minimal disruption to traffic during construction. This requires sophisticated planning as mismanagement can lead to congestion, increased accidents, and public dissatisfaction.

Typical investment size range

- £46 per pothole (if planned), £72 (if reactive).
- £150 per cycling lane bollard.

Available revenue streams

Not applicable.

Case studies

Birmingham Walking and Cycling Infrastructure Plan

County Durham Walking and Cycling Infrastructure Improvements

Common Barriers

- Vehicle drivers may oppose increasing the size of cycling lanes, or the addition of bollards, or other traffic calming measures which am to improve the road-using experience of the cyclist or pedestrian at the expense of the motorist.
- One solution is public consultations which aim to understand objections and, where possible, to strike a balance between competing road-users.

EV infrastructure

Installing charging stations to encourage the adoption and use of electric vehicles within the local community.

EV infrastructure

Installing charging stations to encourage the adoption and use of electric vehicles within the local community.

Electric Vehicle (EV) infrastructure is fundamental for the broader adoption of electric vehicles, which is an important step towards reducing carbon emissions from the transportation sector. This infrastructure includes car charging stations available to the public, home and workplace chargers, as well as charging infrastructure for more specific fleet such as electric buses, HGVs and heavy equipment vehicles.

Advanced EV infrastructure can support bi-directional charging, enabling vehicles to feed energy back into the grid during peak demand times. This Vehicle-to-Grid (V2G) technology can play a part in demand response schemes, helping to balance energy supply and demand.

Asset type	Description
EV charging point	Charging infrastructure for electric vehicles situated in homes, offices or publicly accessible areas.

Case Study

Energy Superhub Oxford is the largest EV hub project in the UK. The project has an integrated approach to battery storage, rapid EV charging, low carbon heating (heat pumps) and smart energy management technologies to cut out carbon and improve air quality across the city. The project will install an EV charging network that will enable fast charging of electric cars, trucks, buses and taxis.

Market overview

EV infrastructure offers a significant and multi-faceted investment opportunity. As the adoption rate of electric vehicles increases, the demand for easily accessible, reliable and efficient charging infrastructure will grow substantially. Forecasts of EV uptake in the UK have been outpaced by actual data for several years (see image below)

Advanced EV infrastructure could also provide additional revenue streams through Vehicle-to-Grid (V2G) technology, where EVs return energy to the grid for a set or variable price.

However, investing in EV infrastructure is not without its challenges. The successful long-term operation and financial viability of EV infrastructure will rely on clear regulatory frameworks and policies to support EV adoption and grid integration.

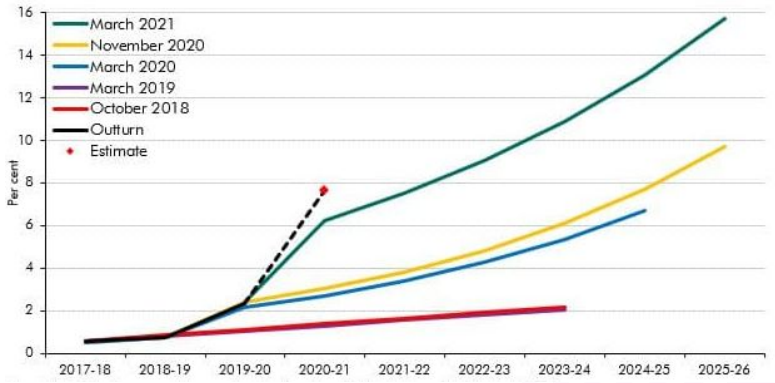


Fig 44: Successive assumptions for electric vehicles as a share of new car sales.
Source: Office for Budget Responsibility, Department for Transport (2021)

EV charging points

TRL 7

EV charging points are a critical component in the UK's transition towards a net-zero carbon economy. The UK recently delayed its 2030 target to phase out new petrol and diesel cars to 2035. Despite this, it is expected that the demand for EVs and EV charging infrastructure will surge in the coming years.

Policy risks: The absence of a long-term strategy for EV infrastructure development may contribute towards market uncertainty. Changes in subsidy levels or the introduction of new regulations can also impact the deployment and operation of EV charging points. Planning permission is required for construction and many Local Authorities have preferences for where EV chargers should be located, and in some cases plans to develop them themselves; this can lead to planning being denied to private operators.

Operational risks: Operational risk arises from unexpected outcomes in the day-to-day running of the EV charging points. Poor installation or maintenance can lead to reduced performance or even downtime. Additionally, there may be risks associated with the supply chain, particularly if the charging points or their components are manufactured by a small number of specialised companies outside the UK.

Market risks: The market for EV charging points is still developing, and there is a risk that the market may not grow as expected. This could be due to a variety of factors, including slower than expected adoption of electric vehicles, changes in technology or changes in government policy.

ESG risks: Environmental risks for EV charging points primarily relate to the source of the electricity used. If the electricity is not from renewable sources, then the environmental benefits of electric vehicles are reduced. Social risks could include issues related to access and equality. For example, ensuring that all residents have access to charging points, not just wealthier areas.

Legal and regulatory risks: Legal risks could relate to the installation and operation of charging points. This could include ensuring compliance with electrical safety standards or permission issues with using public spaces for charging. Competition law is developing in this area but it is possible that in the future, regulators will require all charging points and associated apps to be universally compatible.

Technical risks: Technical risks include issues related to the proper installation, operation and maintenance of the charging points. There may also be capacity issues with the demand on the local grid if large number of charging points are used simultaneously. Additionally, issues with charging time may deter some customers for example, a delivery fleet will require quicker charging times.

Typical investment size range	Available revenue streams
£1000-£1500 per unit.	EV charging fee.

Case studies

Energy Superhub Oxford

Common Barriers

- The cost of installing and maintaining EV charging points can be high, which may be prohibitive for Local Authority In-house delivery models
- Connecting to the grid can cause major project delays

Building energy efficiency and retrofit

Modifying existing buildings to reduce energy usage and carbon emissions through energy efficiency measures such as improving insulation, installing heat pumps and implementing smart energy management systems.

Building energy efficiency and retrofit

Retrofitting is a host of actions aimed at increasing the energy efficiency of buildings, typically through introducing new heating systems, insulation, electricity generation and storage systems, amongst others. To maximise efficiency savings and reduce carbon emissions by the highest possible amount, smart technology can be deployed to manage the technology that is used.

Retrofitting refers to the improvement work on an existing building by introducing new materials, products and electricity generation and/or storage.

Homes are a key focus in the retrofitting challenge as they represent >80% of buildings in the UK and many have low levels of energy efficiency. Retrofitting homes helps make them energy efficient, reducing carbon emissions and bills, as well as local air pollution.

Asset type	Description
Fabric retrofit	Fabric retrofit, or the “fabric first” approach, refers to improving the building fabric to minimise heat losses and maximise air tightness.
Installing heat pumps	Heat pumps extract heat from a source, such as the surrounding air, geothermal energy stored in the ground, or nearby sources of water or waste heat.

Market overview

The overall market for retrofit is huge, with investment of over £300bn likely to be required, and significant government funding committed.

The cost of retrofitting homes varies significantly depending on the size and existing building fabric as well as the depth of retrofit being carried out: Retrofit that creates meaningful changes to energy efficiency can cost less than £2,000, with the most ambitious ‘passivhaus’ net zero home retrofits costing upwards of £100,000 and most homes facing bills of between £7-20,000. Local authorities should carry out building stock analyses and home surveys to generate accurate costs per home and per place.

Despite this investment opportunity, the market for retrofit is still much smaller in the UK than in other countries, with fewer low-carbon heat installers and low numbers of retrofits of all types compared to comparator countries.

As well as costs, returns from energy savings vary greatly by property: Payback periods for individual measures vary from 5 years for a solar array to >75 years for some forms of insulation and deeper retrofit measures. This makes securing private finance difficult. Various schemes over the years, such as the Green Deal, Net Zero Neighbourhoods, and Green Mortgages have attempted to solve this complex problem without success at any scale.

Case Study

The main focus of the Deep Retrofit Energy Model and Energiesprong project is full-house retrofitting with solar PV roof, insulated wall panels, new windows, thermally efficient facades and an in-house ‘energy hub’. The goal is to upgrade over 100 houses across Nottingham and the revenue generated from the tariffs in the upgraded houses is used to fund more retrofit.

Fabric insulation

TRL 9

Fabric insulation refers to the process of improving the thermal efficiency of a building by insulating its external envelope — walls, roofs, and floors. This not only reduces energy bills but also contributes to a more sustainable and resilient building stock.

Policy risks: A shift in Government policy could result in reduced grants or subsidies for retrofit. Energy efficiency standards for existing homes has recently been watered down, but may be reinstated. The Future Homes Standard (due in 2025), is likely to require much higher levels of energy efficiency. Although this will not directly impact retrofit requirements, it may mean that in the short-run already scarce retrofit engineers are less available, though in the medium term this should lead to more entering the market.

Operational risks: These involve challenges faced during the installation of fabric insulation. This could be the unavailability of skilled workers, unexpected structural issues in older buildings, or damage to the property during retrofitting. Badly installed insulation can impede ventilation, creating mould that can damage health. In addition, insulation materials must be stored and handled correctly to retain their efficacy.

Market risks: The demand and supply dynamics for insulation materials can fluctuate based on global market conditions. Shortages or price hikes in materials like mineral wool, foam boards, or cellulose can impact project costs. If sustainable materials become more popular, traditional insulation materials might face reduced demand.

Legal and regulatory risks: For retrofitting projects, especially in listed or historic buildings, several permissions might be necessary to perform retrofit work. Furthermore, non-compliance with the insulation standards set by the authorities can lead to legal repercussions and financial liabilities.

ESG risks: Incorrect or substandard insulation can lead to issues like dampness, mould, and poor indoor air quality. While the intent is to make the building environmentally efficient, poor execution can result in adverse environmental and health impacts.

Technical risks: The integration of fabric insulation requires a sound understanding of the building's structure. In older buildings, retrofitting can be technically challenging due to their unique architectural elements. There's also the risk of choosing incorrect insulation types that might not be compatible with the property.

Typical investment size range

Investment size depends on the type of material and fabric insulation implemented. **Indicative costs**:

Cavity wall insulation – £22 – £26/m2
Internal wall insulation – £55 – £140/m2
External wall insulation – £55 – £180/m2

Available revenue streams

- "Comfort as a service" and similar models charge homeowners comfort fees over an agreed period of time, in return for installation of fabric improvements
- The Government's ECO scheme pays utility companies to install fabric measures in low-income homes, with a levy that is recouped from energy bills from all consumers

Case studies

Royal Borough of Kensington and Chelsea Council's first low-energy council home

Mansfield District Council

Common Barriers

- Upfront cost for quality insulation and professional installation can be significant and may deter investment by property owners. Government grants are available to support high capital costs required for these schemes.
- Lack of awareness as many building owners might be unaware of the benefits of fabric insulation or the availability of government incentives.
- Shortage of skilled labour may result in long lead times.

Installing heat pumps

TRL 9

Heat pumps extract heat from a source, such as the surrounding air, geothermal energy stored in the ground, or nearby sources of water or waste heat, to heat a property. They have high levels of efficiency (approximately 3-5 times greater than conventional boilers), and are electrically powered.

Policy risks: The policy environment around heat pumps is evolving, with recent government strategies aimed at reducing costs and incentivising adoption through grants. However, this landscape remains somewhat uncertain; existing schemes have not yet resulted in widespread adoption, and the effectiveness of incentives like the £7,500 Boiler Upgrade Scheme grants in achieving the government's target of 600,000 heat pump installations per year by 2028 is yet to be fully realised. As with fabric, the Future Homes Standard is likely to require low carbon heat in new buildings which will create competition for scarce labour (see below).

Operational risks: A significant operational challenge is the shortage of trained heat pump engineers. Current numbers are insufficient to meet government installation targets, and there is a risk of engineers spending more on training than they can earn back. To tackle this, there may be a need for cash incentives to boost training and recruitment in the sector.

Market risks: The market for heat pumps, while growing, remains underdeveloped in the UK compared with most other European countries. Transaction activity has been limited, although there are signs that this is changing as regulatory clarity improves. It also faces challenges such as a general lack of awareness among consumers and the need for tailored financial packages to support adoption due to the relatively higher upfront costs.

Legal and regulatory risks: Key risks largely revolve around compliance with Building Regulations. Both ground source and air source heat pumps must adhere to these regulations, which outline the performance expected of materials and building work. Planning rules can also impede installations as heat pumps extrude outside of buildings and create low levels of noise.

ESG risks: The social dimension includes potential disruption during installation, a major barrier to investment, reported by nearly half of the participants in a trial. Consumer buy-in will be essential and requires minimising disruption and upfront costs where possible.

Technical risks: Issues such as lack of space for an outdoor unit or internal space for a thermal store, as well as the need for additional measures like insulation, make some installations too costly or complex. Innovation in the sector is required to make heat pump installation less disruptive and more financially viable.

Typical investment size range

The cost of heat pumps depend on their size, but single-property domestic heat pumps usually range between £5,000-£15,000.

Available revenue streams

"Heat as a service" and similar models charge homeowners comfort fees over an agreed period of time, in return for installation of low carbon heating

Case studies

Cosy Homes Oxfordshire

Common Barriers

- The major barriers to investment in heat pump initiatives are the upfront costs and disruption caused during installation. Government grants are available to help overcome this barrier and innovative financing models for LNZP retrofits, such as *Net Zero Neighbourhoods*, are being trialled by various Local Authorities.
- Inconsistent policy is another key barrier, causing uncertainty in the market, leading to a reluctance of suppliers and installers to invest in upskilling and developing the market. Long-term and consistent policy and funding, such as schemes on 5-10 year funding cycles, would help reassure suppliers.
- Shortage of skilled labour may result in long lead times.

Energy storage and flexibility services

Using battery storage or innovative technologies, such as vehicle-to-grid to support the delivery of flexibility services and demand side response schemes.

Energy Storage and Flexibility services

Flexibility services are a range of existing and developing solutions that electricity system users access to help balance demand and supply in the electricity network and support its efficient use. These markets are often marginal, highly variable and as a result accessed through dedicated aggregators.

Flexibility services involve a Distribution Network Operator (DNO) paying a third party to operate assets in a way that helps the DNO to balance supply and demand in real time. Those third parties may be owners of generation assets or large scale battery storage or may be energy users, and may be asked to "turn up" or "turn down" depending on the needs of the network. Such services are increasingly necessary given the intermittent nature of renewable energy which forms an increasing part of a DNO's energy mix.

On the demand side, apart from large industrial sites, most energy users are homes and businesses that use small amounts of energy individually, but constitute significant demand when aggregated. Coordinating this aggregation is difficult, and dedicated aggregators exist to solve this market problem, through contracts or incentives.

On the supply side, the main form of aggregation is via virtual power plants, which allow many small scale renewable generators to create the scale needed to help balance the grid, either by turning on or off.

Vehicle to grid and battery storage technologies provide the ability to "turn up" *or* "turn down", via aggregation (V2G) or individual contracts (large scale battery storage).

Flexibility services help to avoid both power outages and the use of carbon-intensive backup generators or energy-peaking power plants.

Asset type	Description
Virtual power plants	These are networks of decentralised power generating units, storage systems and flexible demand, which optimise the aggregation of distributed generation resources across large areas by using advanced data analytics such as machine learning.
Demand response aggregation	This involves coordinating a group of energy consumers to adjust their power usage in response to grid needs, often in exchange for financial incentives.
Vehicle to grid technologies	Vehicle-to-grid is a technology that enables energy to be pushed back to the power grid from the battery of an electric vehicle (EV).
Battery storage	Battery storage systems are devices that enable energy from renewables, like solar and wind, to be stored and then released when the power is needed most. Battery storage systems are modular and provide increased flexibility and higher overall utilisation.

Case Study

The PowerShaper Flex is a service by Carbon Co-op that enables homes and small businesses to contribute to grid operations by responding to requests to turn on/off appliances at specific times and locations.

Project LEO is an effort by Local Energy Oxfordshire to create a decentralised and equitable local energy solution to accelerate decarbonisation. The project utilises flexibility services from battery and electricity generation storage to create more efficient use of the energy network.

Demand response aggregation

TRL 9

Demand response schemes involve energy consumption adjustments through corporate aggregators, who contract with businesses for controlled load management, and consumer incentives like variable tariffs or cash rewards to individual users. Both strategies aim to align diverse consumption patterns with grid demands to enhance the overall flexibility and reliability of the grid.

Policy risks: Policies specific to demand response aggregation are still in developmental stages, which creates uncertainty. Moreover, Government initiatives like the Capacity Market and other balancing services are still evolving, in the context of the future of local energy institutions and governance arrangements. Future policy is therefore unclear.

Operational risks: Demand response requires seamless communication, quick response times, and real-time data analytics. Operational lapses, technology failures, or communication breakdowns can undermine effectiveness. Operational adjustments for businesses to align with demand response initiatives may also affect the profitability of such schemes.

Market risks: The value of demand response can fluctuate with changes in energy prices, availability of renewables, and grid demand. Market access for demand response aggregators is still not on par with traditional energy producers, limiting potential revenue streams.

Legal and regulatory risks: The regulatory landscape for demand response aggregation is still maturing. Changes or ambiguities in the regulatory framework can pose challenges or diminish the profitability of the program. Data handling and privacy concerns, given the vast amounts of real-time data involved, can lead to legal challenges.

ESG risks: Aggregators need to consider the social implications of their operations. For example, some users may perceive the monitoring and modification of their device energy usage rates as an invasion of privacy. Therefore, it is the responsibility of the aggregator to implement appropriate security measures to alleviate this societal concern. Most consumer schemes are only available to users with smart meters; this excludes roughly half of the country from being able to access potentially cheaper energy.

Technical risks: Technical risks include the need for qualified technical personnel, which can come at a considerable cost. Additionally, the starting and ongoing costs of marketplace participation and fees are considerable. Technical risks can also arise throughout implementation, such as problems with smart metering or communication technologies.

Typical investment size range

Auction clearing price range from **£19.4 - £8.4 per kW per year** between 2015 and 2018 respectively.

Available revenue streams

Ancillary Services.

Case studies

Octopus ‘Saving session’

New England Demand Response Programme

Common Barriers

- Implementing the necessary technologies and systems for demand response can have high upfront costs, making it a barrier for potential participants.
- End users, such as businesses or homeowners, might perceive participating in demand response programmes as risky, fearing that it could disrupt their regular operations.
- Crafting suitable contracts that safeguard the interests of all parties—aggregators, end users, and grid operators—can be complex.

Virtual Power Plants (VPPs)

TRL 6

VPPs represent an aggregation of generation assets. They can provide a significant contribution to the UK's net zero target by effectively integrating a variety of renewable energy sources into the grid. They can also respond to energy market prices in real time, making them highly flexible and capable of supporting local grid voltage.

Policy risks: The policy landscape for VPPs is still evolving, and changes in regulations or incentives can significantly impact their viability. For example, the absence of clear rules to manage conflicts in service demand can limit the effectiveness of VPPs. There is the need for a regulatory framework that allows for the flexible operation of VPPs, including the ability to respond to real-time energy market prices, potentially with regional variations.
Operating risks: There are risks associated with the performance of the individual resources within the VPP, such as solar PV systems and batteries, and their ability to respond effectively to commands from the VPP operator. The operational risk is also related to the ability of the VPP to manage the complex task of optimising the operation of a diverse range of resources.
Market risks: The market for VPPs is still developing, and there is a risk that the market may not grow as expected. This could be due to a variety of factors, including slower than expected adoption of the technologies that make up VPPs, such as distributed PV systems and batteries, or changes in energy market prices.
Legal and regulatory risks: Legal and regulatory risks relate to ensuring compliance with standards and regulations related to operating distributed energy resources. Risks may also include changes in the rules governing the operation of VPPs, such as the rules for participation in energy markets or for the provision of grid services.
ESG risks: Environmental risks for VPPs primarily relate to the source of the electricity used by the pooled resources. If the electricity is not from renewable sources, then the environmental benefits of VPPs are reduced. Social risks could include issues related to access and equality, such as ensuring that all residents have the opportunity to participate in VPPs.

Technical risks: Technical risks include issues related to the proper operation and control of the aggregated resources within the VPP. This could include issues with the software used to control the VPP, or with the hardware of the individual resources. There may also be risks associated with the integration of VPPs into the grid, such as managing the bidirectional power flows created by distributed energy generators.

Typical investment size range

$100 million for a 500MW VPP.

Available revenue streams

- Sale to wholesale market.
- Ancillary Services.
- Demand response schemes.

Case studies

Flexitricity 500MW VPP and PureDrive VPP

Common Barriers

- The frequent misalignment of distributed energy resource owners' and system operators' interests due to the inappropriate consumer incentives may restrict the potential benefit of distributed energy resources (DERs) to the grid.
- The UK's regulatory environment is still adapting to new energy solutions like VPPs. Without clear policies or guidelines, investors face uncertainties about the future regulatory landscape.

Battery storage

TRL 8

Battery energy storage systems (BESS) store electricity when demand is low and release it during peak demand periods. With the UK's increasing shift towards renewables and the goal of achieving net-zero carbon emissions, battery storage systems play an indispensable role in ensuring a stable and sustainable energy supply.

Policy risks: Policy risk is a significant factor for BESS. For instance, the absence of a long-term strategy for BESS development can create market uncertainty. Changes in subsidy levels or the introduction of new regulations can also impact the deployment and operation of battery storage.

Operational risks: Operational risk arises from unexpected outcomes in the day-to-day running of BESS. Poor installation or maintenance can lead to reduced performance or even downtime. Additionally, there may be risks associated with the supply chain, particularly if the systems or their components are manufactured by a small number of specialised companies outside the UK.

Market risks: The batteries that power BESS are composed of lithium-ion and lead-acid, leaving battery pack prices susceptible to volatility in supply and demand of raw materials such as metal. Battery technology has been around for over 100 years but is currently subject to significant change both in technology (for example sodium batteries) and processes (large scale recycling and battery interchangeability). Asset owners should be aware of future changes that may make accelerate the obsolescence of current investments.

Legal and regulatory risks: The UK has taken a flexible regulatory approach to BESS, with limited legal drawbacks. The UK does have safety requirements for BESS which all projects would have to adhere to. These are divided into electrical installation requirements, grid connectivity requirements, product safety requirements and dangerous goods regulation requirements.

ESG risks: A potential environmental risk for BESS is the use of the rare earth element, lithium in batteries. Being mindful of where lithium is sourced from and the battery life cycle are key to reducing this risk.

Technical risks: Technical failures with BESS have been reported at multiple sites over the past few years; cooling and fire suppression system failures are common risks to be considered, as well as damaged batteries and thermal runway.

Typical investment size range

£680/kWh.

Available revenue streams

- Energy Storage.
- Flexibility services.

Case studies

Local Energy Oxfordshire

Energise Barnsley

Common Barriers

- Gaining permissions and the physical integration of battery storage systems to the grid can be complex and costly, especially with the current infrastructure.
- The rapid pace of technological advancement in battery storage can render current technologies obsolete in a short span, making investors wary of early commitment.

Vehicle-to-grid technologies

TRL 6

V2G is a technology that enables energy to be pushed back to the power grid from the battery of an EV. With V2G technology, an EV battery can be discharged based on different signals — such as energy production or consumption nearby.

Policy risks: The UK's energy regulations are yet to fully incorporate the specifics of V2G integration, creating uncertainties for investors and operators. Additionally, uncertain governmental incentives for electric vehicles (EVs) and V2G technology can influence adoption rates and commercial viability.

Operational risks: A lack of standardised V2G charging systems can complicate the roll-out and integration processes. Furthermore, The current grid and charging infrastructures might need substantial upgrades to handle widespread V2G operations.

Market risks: There is a risk that the EV market may not grow as expected due to a variety of factors, including slower than expected adoption of electric vehicles, changes in technolog or changes in government policy. Skepticism or reluctance by EV owners to participate in V2G schemes may also hamper market development, as might difficulties for grid operators in coordinating bidirectional flows of energy at scale.

Legal and regulatory risks: Gaining permissions to connect V2G systems to the grid, especially at scale, can be legally complex. V2G operations may also generate vast amounts of user data, subjecting operators to data protection and privacy regulations. The digital nature of the systems means cybersecurity threats are also a risk.

ESG risks: There may be concerns about the life cycle environmental impact of EV batteries. Public perceptions of and reaction to novel large-scale V2G projects may deter progress, especially if they impact the grid's reliability.

Technical risks: Integrating V2G systems with varied EVs, grids, and energy management systems can be technically challenging. There is also not substantial information on the impact of V2G operations on EV battery health and longevity which may deter participation in the scheme. The digital nature of V2G systems mean that there are also technical challenges with the apps and systems used to access the service; if users are not able to easily discharge their EV batteries by an amount they specify they may disengage.

Typical investment size range

£4,000 (inc. cost of charger, ancillary hardware and installation).

Available revenue streams

V2G Charging Fee.

Case studies

Local Energy Oxfordshire

Kaluz

'Intelligent Octopus'

Common Barriers

- The return on investment for V2G is still uncertain, given the evolving technologies and regulations.
- The lack of clear regulatory frameworks can deter potential investors wary of future policy shifts.

A6

Cash flows for each delivery structure

In-house Delivery

The Project Sponsor, typically a Local Authority, will be both the asset owner and the operator without establishing a stand-alone delivery vehicle. In the diagram below, the arrows represent cash flows.

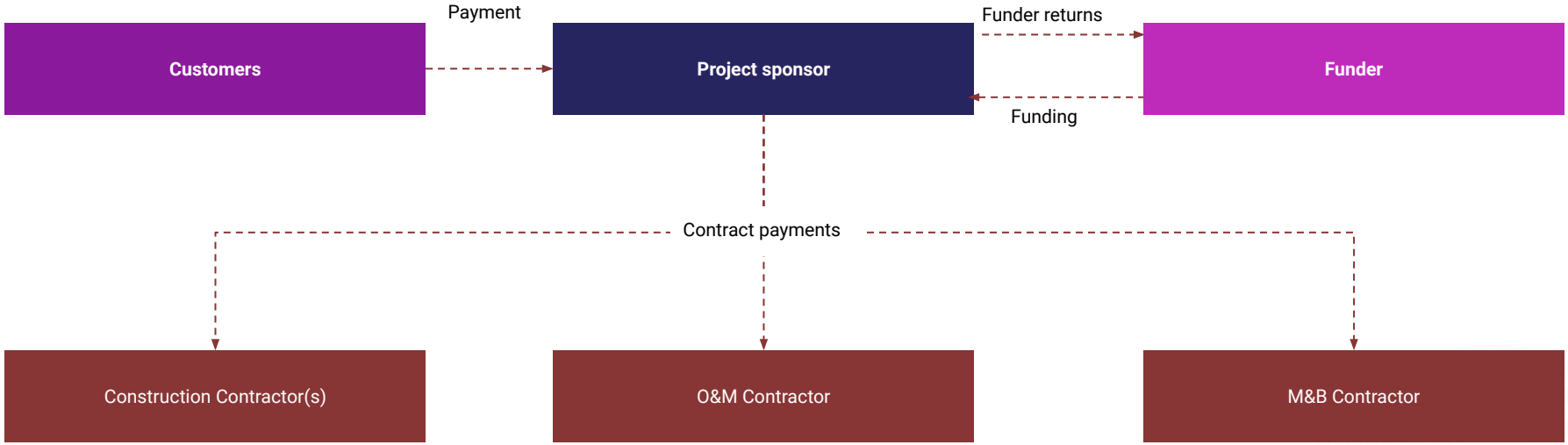


Fig.45 In-house Delivery cash flow structure

Public-owned SPV

The Project Sponsor establishes a stand-alone vehicle to own and operate the assets. In the diagram below, the arrows represent cash flows.

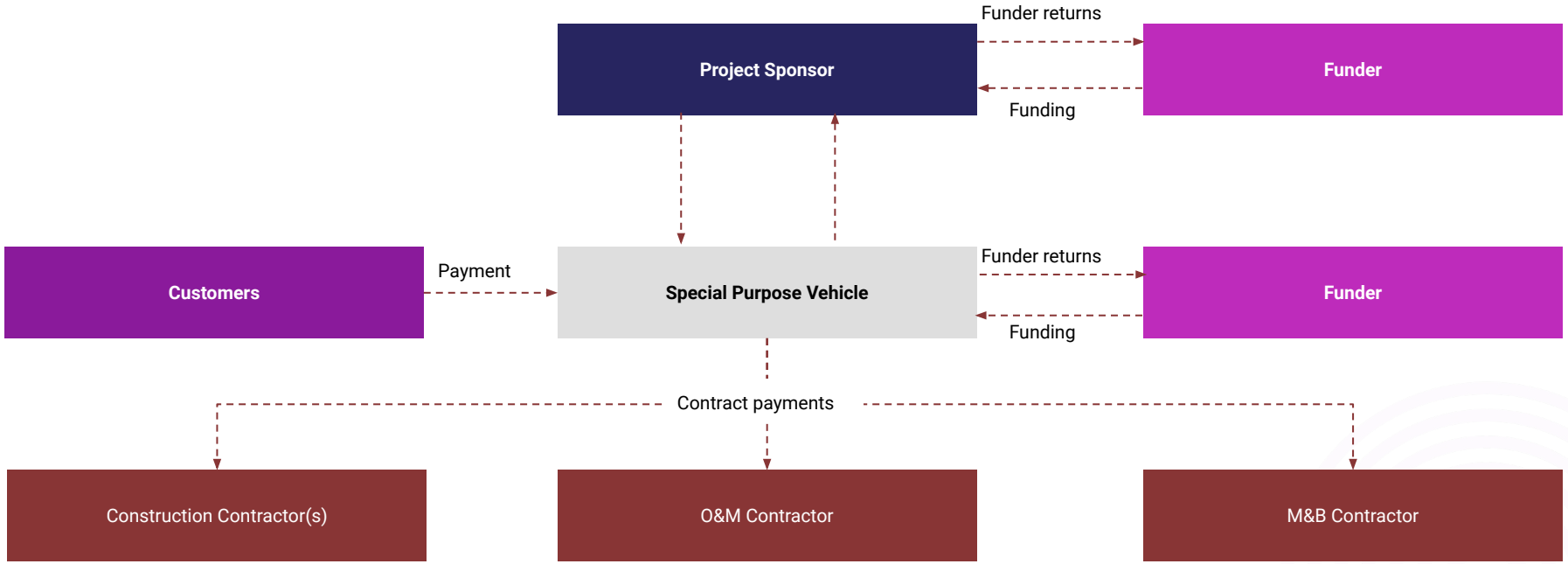


Fig.46 Public-owned SPV cash flow structure

Joint Venture SPV

The Project Sponsor establishes an SPV with a partner. They will share control over delivery and operation. A shareholders' agreement will determine decision-making. In the diagram below, the arrows represent cash flows.

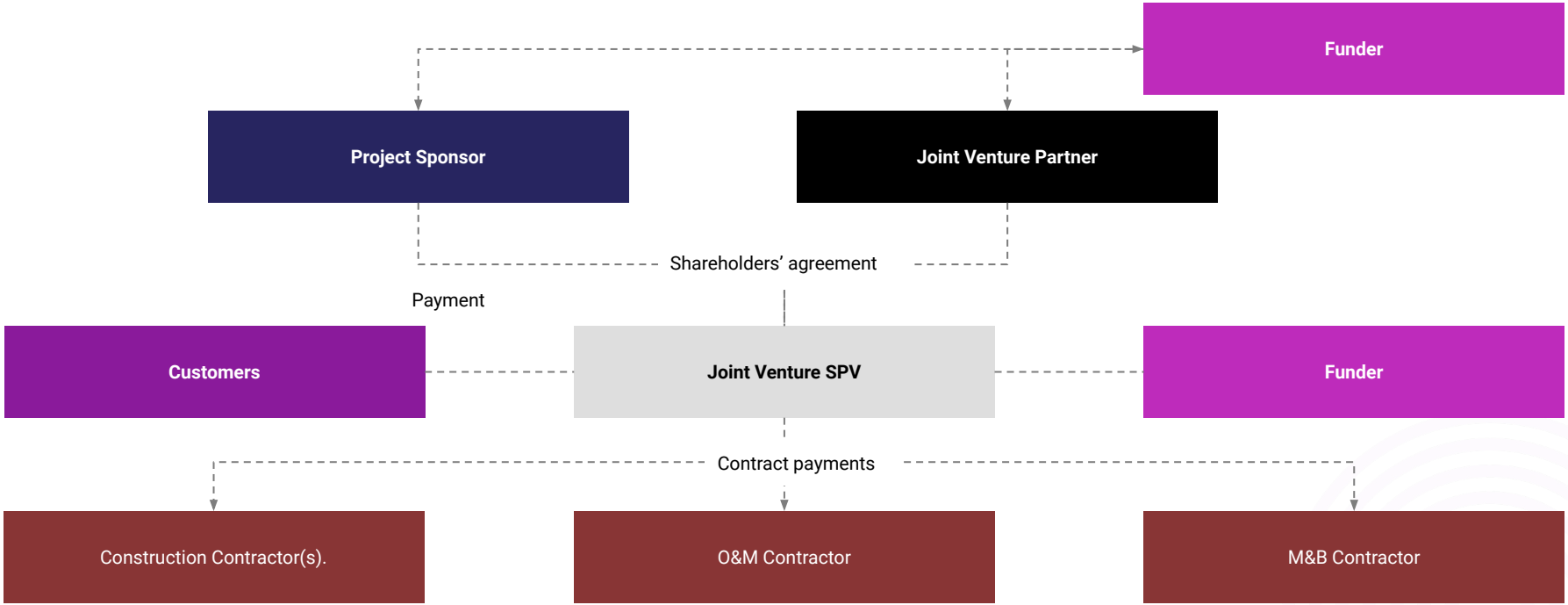


Fig.47 Joint Venture cash flow structure

Third-party Delivery

The Project Sponsor enters into an energy services or concession agreement with a third party. The party is both the asset owner and operator, retaining liability for the asset. The third party may outsource operations and maintenance. In the diagrams below, the arrows represent cash flows.

a. Concession with assets funded by third party

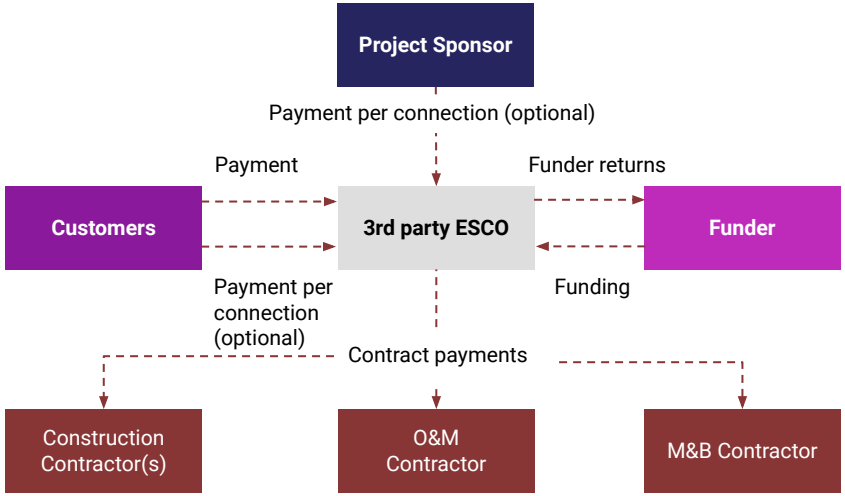


Fig.48a Third-party Delivery cash flow structure. Concession agreement where assets are funded by the third party.

b. Concession where third party adopts assets

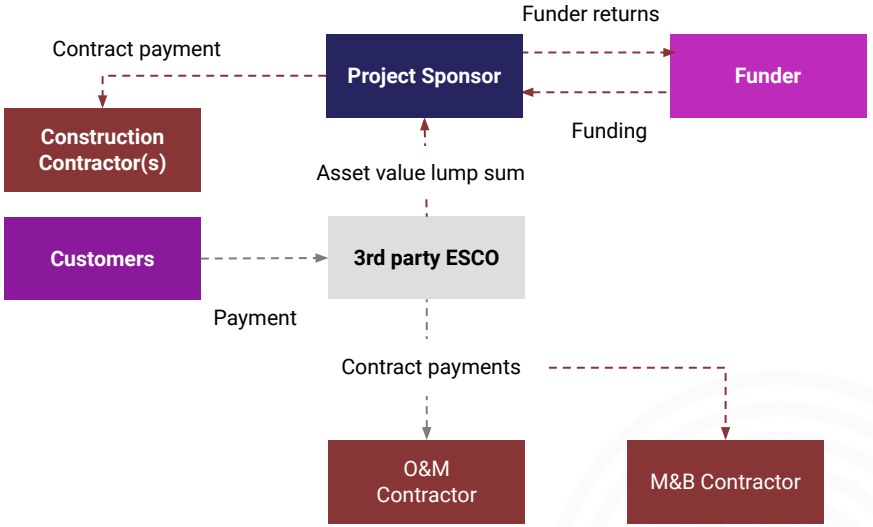


Fig.48b Third-party Delivery cash flow structure. Concession agreement where the third party adopts the assets from the project sponsor

Third-party Delivery (continued)

The Project Sponsor enters into an energy services or concession agreement with a third party. The party is both the asset owner and operator, retaining liability for the asset. The third party may outsource operations and maintenance. In the diagram below, the arrows represent cash flows.

c. Energy services agreement / no contractual relationship

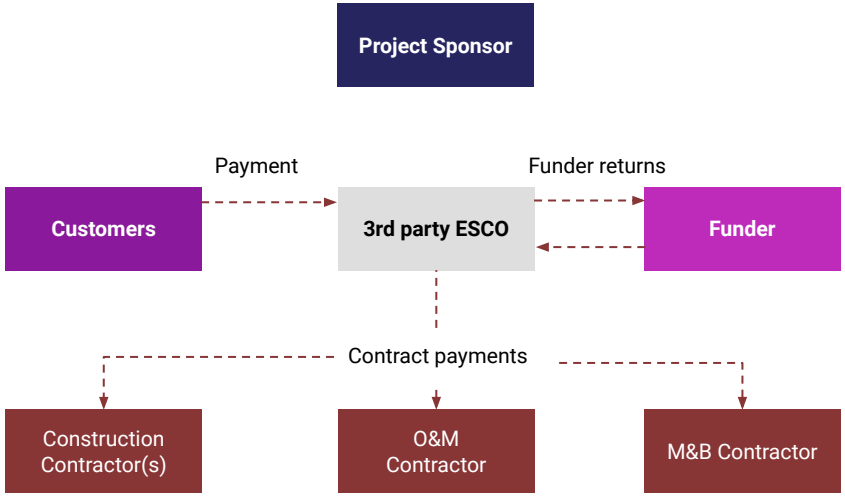


Fig.48c Third-party Delivery (energy services agreement or no contractual relationship) cash flow structure

A7

Typical contracts

Typical contracts

Local Authorities and the private sector can collaborate in a variety of ways to help the UK achieve net zero emissions.

Introduction

There are number of ways that Local Authorities can collaborate with private investors and private contractors to help drive the net zero transition. This ranges from Shareholders' Agreements to Design & Build Contracts to Supply Agreements. The following slides provide a description of the typical contracts that can be used as well as general considerations and prompts to discussions of some of the key issues that are likely to arise in the context of the subject matter of this document.

It is worth noting that more commercial and legal consideration will be needed for a given local not zero project to develop the arrangements discussed and ensure that the net zero transition can be achieved most effectively.

This annex summarises the following typical arrangements:

1. Shareholders' agreement between a Local Authority and a Joint Venture partner.
2. Energy Centre Lease and Network Easements between a Land Owner and a network operator.
3. O&M Contract between a Local Authority and a contractor.
4. Use of System Agreement between a Local Authority and a system user/operator.
5. Concession Agreement between a Local Authority and a Concessionaire.
6. Collateral Warranty between a Local Authority and a Subcontractor/ design consultant.
7. D&B Contract between a Local Authority and a contractor.
8. DBOM Contract between a Local Authority/SPV/Joint Venture and a contractor.
9. Supply Agreement between a supplier and commercial customer.
10. Supply Agreement between a supplier and a bulk customer.
11. Supply Agreement between a supplier and a domestic customer.
12. Supply Agreement between a supplier and a Residential Social Landlord.
13. Construction contracts between the Local Authority and a private entity.
14. Service Level Agreements (SLA) between the Local Authority and a private entity.

Typical contracts (continued)

1. **Shareholders' Agreement** between Local Authority and Joint Venture Partner

The Shareholders' Agreement will set out the terms on which the Local Authority and the delivery partners, as shareholders, will govern the Joint Venture contract, with either party substantially funding the procurement and delivery of the Joint Venture. Terms will include agreement on:

- **Standard representations and warranties** from both parties. These include incorporation, powers, enforceability of obligations and conflicts with other laws/obligations.
- What **board meetings** are necessary to, for example, give directors authority to allot shares, appoint relevant directors and carry out relevant administrative necessities.
- A **list of Reserved Matters** which the Joint Venture contract cannot carry out without the consent of the shareholders.
- The **conditions of the Joint Venture contract** and the processes for the **transfer of shares or termination** where one party ceases to hold shares.
- All relevant **legal agreements;** Anti-corruption, Dividend Policy, Accounting policies, Tax Matters, Deadlock resolution processes, etc.
- The following **boilerplate** terms: Status of the agreement, No partnership or agency, rights and remedies, third-party rights, force majeure, change in law, notices, variation and waiver, invalidity and severability, entire agreement, Governing law.

2. **Energy Centre Lease** and **Network Easements**

An easement agreement provides the legal right for another party to maintain facilities on someone else's land. In these contracts, easements over Primary Network running from The Energy Centre will be granted in accordance with the Energy Centre Lease.

- There are a number of **lease particulars:** title numbers, parties, any prohibitions or restrictions on disposal, restrictive covenants, easements, permitted use.
- The **energy centre is the Demise** (transferred by lease) and the rent is £1.00 plus the usual additional costs incurred by the Landlord as a result of any breaches of the Tenant's covenants.
- The **Tenant's Covenants** should include: payment of outgoings; VAT; Utilities; Repair; Conduits; prohibited uses; permitted uses; alterations; preservation of easements; alienation; statutory requirements and regulations; planning, notices; entry by the Landlord; Landlord's costs; indemnity in relation to Tenant breaches; yielding up and encumbrances.
- The **Landlord's Covenants** should include quiet enjoyment, landlord to maintain, restrictions in relation to adjoining properties, grant of easements and assignment of reversion. The landlord will normally insure the building in which the Energy Centre is located.

Typical contracts (continued)

3. Operation & Maintenance Contract between a Local Authority and a contractor

An Operation & Maintenance (O&M) contract occurs where the LA is directly involved in the delivery and management of a project and is outsourcing its O&M. The LA has some degree of control, such as giving property rights, and is willing to have a hands on role in governing the delivery of the contract by the contractor.

- There should be a number of **Contractor obligations in regards to provision of services**, for example being in compliance with all applicable law and all authorisations.
- There will also be a **performance regime** where detailed performance requirements (and KPIs) will be needed for governing O&M contractor performance.
- The LA's obligations may include **granting exclusivity to the contractor in respect of the delivery of the service** (for example, running a day to day bus service, delivery of heat, installing and maintaining heat pumps) and allowing the contractor to operate without material disruption.
- **Standard legal requirements** will be required such as liability, insurance, termination, subcontracting, confidentiality, security, dispute resolution procedures and boilerplate terms.

4. Use of System Agreement between a Local Authority and a system user/operator

A Use of Systems agreement takes place when the LA wishes to support and obtain value from an energy system (for example, district heating scheme) by owning and taking risk in pipework. The LA is likely to own the land in which the energy system is situated and it grants rights of use to the operator of the energy system in return for a fee.

- The **System User is likely to be either a generator or a supplier** or someone with a combination of those roles.
- The **right to use the Energy System will be given by the LA** to the System User and will not interfere provided that the System User complies with its obligations. Maintenance responsibility will also have to be allocated between the System User and the LA.
- LA obligations and **details around security will be dependent on the terms of the contract**. There will also be grounds for termination and consequences of termination.
- For insurance, the **System User is likely to be required to provide evidence** of Contractor's All Risk, property damage, 3rd Party.

Typical contracts (continued)

5. **Concession Agreement** between a Local Authority and a Concessionaire

A concession agreement takes place where the Local Authority does not wish to be involved in the delivery of the project and is outsourcing the full concession for design, build, operation and service provision. The Local Authority has some some degree of control and may partly fund the project.

- There are standard **representations and warranties** including incorporation, powers, enforceability of obligations and conflicts with law.
- There are many **concession obligations across works** (building and operation of the project) and **service provision**. These obligations all ensure that the agreement is compliant with the law and delivers a good outcome to customers and to the Local Authority.
- The Local Authority may require a **performance regime** to ensure that the Concessionaire is delivering to an appropriate level. The LA will also have a number of obligations depending on its involvement in the project.
- **Payments for works**. Funding options typically include: capital costs split between LA and Concessionaire. The Concessionaire may pay adoption payments, there may be an LA loan to the Concessionaire or a revenue sharing arrangement.
- Appropriate **property rights and licences** will need to be granted to the Concessionaire. There will also be the usual legal requirements put in place: liability, insurance, confidentiality and security.

6. **Collateral Warranty** between a Local Authority and a Subcontractor/ design consultant

A collateral warranty is a contract that sits alongside an underlying contract, such as a building contract, and grants rights to a third party. In local net zero projects, the LA may wish to obtain security that subcontractors (for example, Design & Build Contractors) involved in the delivery have performed their obligations:

- The **contractor has a warrant** that in carrying out the relevant professional services in line with their appointment, it has exercised and continues to exercise all reasonable skill, care and diligence expected. The contractor also cannot use any “prohibited materials”.
- There will have to be a **copyright licence**, where the contractor grants the Beneficiary with full title guarantee a royalty free, irrevocable, perpetual non-exclusive licence to use, adapt and copy the “documents”.
- The Beneficiary (LA) will have the **right to assign the collateral warranty** on a given number of occasions without the consent of the contractor.
- There will also be **limitations built into the contract**, such as no actions under the collateral warranty to be commenced against the contractor in connection with the services after 12 years from the date of completion of services.
- Include the following **boilerplate** terms: Notices, waiver, entire agreement, governing law.

Typical contracts (continued)

7. **Design & Build (D&B) Contract** between a Local Authority and a contractor

A D&B contract in this case involves an LA that is directly involved with the delivery of the project and is outsourcing D&B. In this contract, the LA will have some degree of control over the project/development and can therefore give assurance to the contractor with regards to access to carry out the work.

- There are standard **representations and warranties** as well as **contract obligations** to ensure that the contractor fulfils its contract and does so in accordance with all the relevant specifications outlined by the LA.
- The Local Authority will have a **number of obligations** that are dependent upon its role in the development. One obligation will be to grant **appropriate access rights** to the contractors.
- The payment will happen using the **Construction Act 2011 compliant payment for works,** with a retention of sums from final works payments as security for warranties, if appropriate.
- **Liability will be based on the Works sum** and for insurance, contractors are required to provide evidence of Contractor's All Risk, Property Damage, Third-party and Professional Indemnity.
- There will generally be **no subcontracting** without notification and consent.

8. **Design, Build, Operation and Maintenance (DBOM) Contract** between a Local Authority/SPV/Joint Venture and a contractor

In this case, the LA wishes to directly procure most aspects of the delivery of the project and so looks to procure a Design, Build, Operation and Maintenance (DBOM) Contractor. The LA has some degree of control over the development and will substantially fund or procure funding, for example, through external debt funding or through an LA loan. The LA is generally willing to have a hands on role in governing the delivery of the project.

- There are standard **representations and warranties** and the DBOM contractor has obligations for both Works and Services that ensure the contractor is fulfilling its contract in accordance with with the Local Authority's guidance.
- The Local Authority will have a **number of obligations** that are dependent on its role in the development. One obligation will be to grant **appropriate access rights** to the contractors.
- The payment will happen using the **Construction Act 2011 compliant payment for works**,with a retention of sums from final works payments as security for warranties, if appropriate.
- **Liability will be based on the works sum** and for insurance, contractors are required to provide evidence of Contractor's All Risk, Property Damage, Third-party and Professional Indemnity.
- There will generally be **no subcontracting** without notification and consent.

Typical contracts (continued)

9. **Supply Agreement** between a supplier and commercial customer

Energy and heat can be supplied to a commercial customer through a supply agreement with a supplier. The supplier is normally the LA and will control the content of the agreement, but if the supplier is not the LA, a detailed form of RSL agreement will still need to be approved by LA.

- There will be **terms relating to heat supply and ancillary services,** such as the provision of heat to be made available 24 hours per day for the duration of the supply agreement.
- **Billing and pricing terms will be important**. Invoices will need to be provided showing energy use based on meter readings and pricing protection provided.
- There will also be a **fault rectification/performance regime** that will ensure the supplier meets appropriate standards of performance and compensation for regime breach.
- **Customer responsibilities should be considered** and should include payment, preventing damage/not tampering with the energy system and not obtaining heat or energy from another supplier during the term of Agreement.
- There will be **non-payment terms that include a clear procedure of disconnection** after a certain number of non-payment days. There will also be a termination clause laying out the rights for bulk of customers to terminate the contract.

10. **Supply Agreement** between a supplier and a bulk customer

A supply agreement takes place here where the LA wishes to control the content of the Bulk Supply Agreement and has procured a contractor to deliver energy.

- There will be **terms relating to heat supply and ancillary services,** such as the provision of heat to be made available within agreed operating parameters.
- **Customer protection clause will include the ability to challenge meter readings** and request testing of meters, data protection and confidentiality, as well as appropriate dispute resolution procedures.
- There will also be a **fault rectification/performance regime** that will ensure the supplier meets appropriate standards of performance and compensation for regime breach.
- There will be **non-payment terms that include a clear procedure of disconnection** after a certain number of non-payment days. There will also be a termination clause laying out the rights for the bulk of customers to terminate the contract.

Typical contracts (continued)

11. **Supply Agreement** between a supplier and a domestic customer

This agreement takes place where the LA is either the heat supplier or has procured a SPV to deliver heat supplies, and wishes to control the content of the residential supply agreement. If the energy/heat supplier is not the LA, a detailed form of the supply agreement will be approved by the LA.

- There will be terms relating to **heat supply and ancillary services,** such as provision of heat to be made available 24 hours per day for the duration of the supply agreement.
- **Billing and pricing terms will be important,** providing invoices for energy use based on meter readings and providing pricing protection.
- There will also be a **fault rectification/performance regime** that will ensure the supplier meets appropriate standards of performance and compensation for regime breach.
- There will be **a clause for domestic customer responsibilities,** which will include payment, not damaging the energy system and responsibility for payment if the property is let.
- There will be **non-payment terms that include a clear procedure of disconnection** after a certain number of non-payment days. There will also be a termination clause laying out the rights for a domestic customer to terminate the contract.

12. **Supply Agreement** between a supplier and a Residential Social Landlord

Energy can be supplied to a Residential Social Landlord (RSL) and its tenants through a supply agreement with a supplier. The supplier is normally the LA and will control the content of the agreement but if the supplier is not the LA, a detailed form of an RSL agreement will still need to be approved by LA.

- There will be terms relating to **heat supply and ancillary services,** such as provision of heat to be made available 24 hours per day for the duration of the supply agreement.
- **Billing and pricing terms will be important,** providing invoices for energy use based on meter readings and providing pricing protection.
- There should be a **customer protection clause** that includes provision of appropriate customer communication, provision of additional services to vulnerable RSL tenants and compliance with energy regulations.
- There will also be a **fault rectification/performance regime** that will ensure the supplier meets appropriate standards of performance and compensation for regime breach.
- **RSL specifics** include (but are not limited to): RSL payment for standing charge/consumption during void periods, RSL payment of proportion of standing charge/maintenance charge and RSL obligation to notify heat/energy supplier of incoming tenants.

Typical contracts (continued)

13. **Construction contracts** between the Local Authority and a private entity

A construction contract is used whenever the LA requires something to be built (for example, cycle paths, bus stops, walking routes) by a third-party supplier. The heads of terms include the following:

- Terms providing an **overview of the work** to be performed, such as design, construction and any other specific tasks.
- Estimated start date, finish date and major milestones.
- **Quality standards** required for materials, workmanship and the final outcome.
- **Insurance coverage** required, including liability and worker's compensation.
- Commitment to adhering to **industry safety regulations** and who is responsible for each aspect of this.
- Defining the procedure for **requesting and approving changes** to the scope of work or specifications and outlining how changes will be priced and how changes to timeline and costs will be handled.
- Creating the **payment schedule**, including the amount due at different project milestones, retention details and handling of costs associated with additional work.

14. **Service Level Agreements (SLA)** between the Local Authority and a private entity

In this context, SLAs are most common between LAs and energy providers to ensure a consistent supply of renewable energy. However, they can also be used to provide a city wide bike rental scheme or to outsource running a bus service. The heads of terms for SLAs include the following:

- A detailed description of the **services to be provided**, including any specific tasks or deliverables.
- Clear, **quantifiable performance goals** that the service provider is expected to achieve (for example, 80% of buses running on time).
- **Roles and responsibilities** of both the service provider and the client. Any expectations on collaboration and supplier input will be included in this.
- How **communication** between parties will be facilitated and the frequency of updates.
- Procedure for **escalating complaints** to higher management levels.
- How often the SLA will be reviewed and updated if the agreement runs over a long period of time.
- Conditions under which the **SLA can be terminated** by either party and the notice period required for termination.

A8

Financial modelling

Financial model development process

The financial model is essential to determine the commercial viability of a project. It should be iterated during the project life cycle.

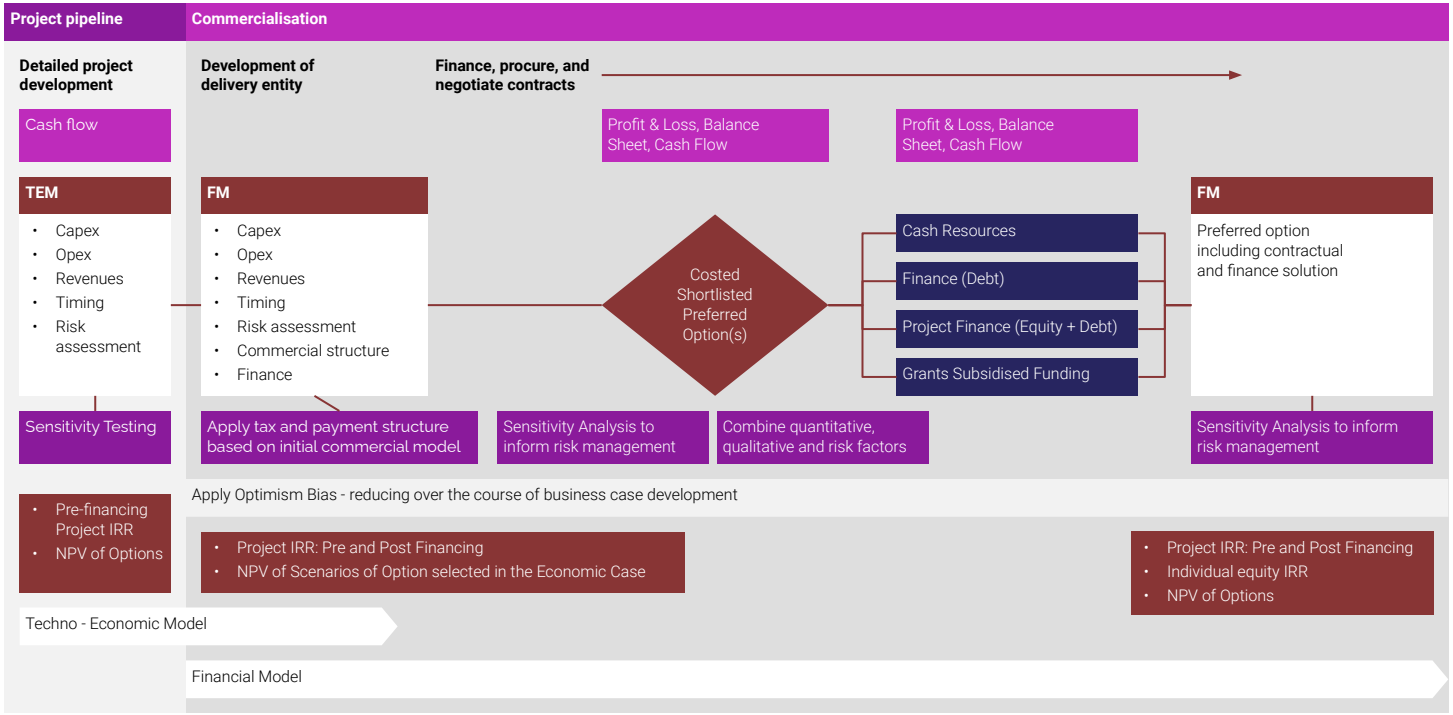


Fig.49 Financial model development process

Modelling best practice

The best practice of Financial Models is often dictated by the FAST (Flexible, Adaptable, Structured and Transparent) standard.

The key principles of financial model development should be as follows:

01 Clear separation between inputs, workings and outputs. All assumptions are clearly defined.

02 Formulae are consistent across each row and timelines are treated consistently.

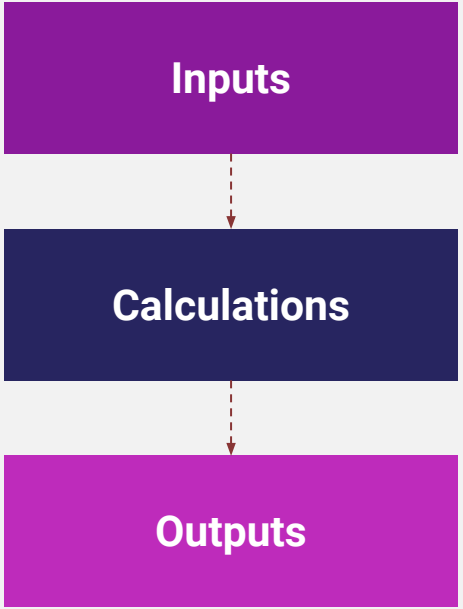
03 Clear data flows from inputs through working to outputs. Linearity with no circularity.

04 Appropriate model integrity and commercial check are included. No hidden rows, columns or worksheets.

05 Sign convention is consistent

06 Transparency and simplicity of macros within the Financial Model. Their use should be minimised.

It is important to keep inputs, calculations and outputs separate:



Model inputs and calculations

The financial model should be clearly structured with inputs and calculations separated.

Inputs

Model input data can be subdivided into four areas of a project structure:

1. **Overarching:** Costs relating to the overall product or service.
2. **Generation:** All costs associated with the production of a product or service.
3. **Distribution:** All costs associated with the distribution of a product or service to the first point of connection downstream of direct operations.
4. **Consumption:** All costs associated with delivering a product or service from the first point of connection to the final customer (captures third-party sales).

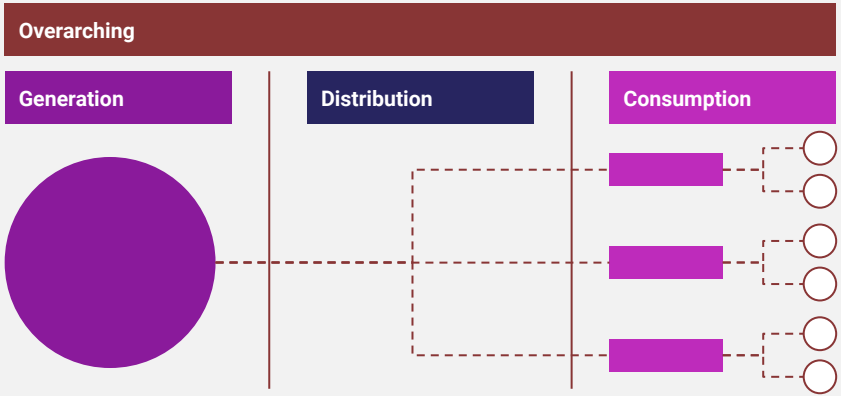


Fig.50 Model input data project structure

Calculations

From this input data, a series of calculations can be performed to contribute to the final model outputs. Examples of which include the following:

- **Time:** Model timeline, project flags and phasing.
- **Index:** Indexation and discount factor calculations.
- **Income:** Revenue sources for the project.
- **Operating costs:** Ongoing costs of running the project.
- **Capex:** Capital expenditure cost calculations over the chosen appraisal period.
- **Financial costs:** Financing and investor return calculations.
- **Cash Flow considerations and bad debt provision:** Including appropriate provisions for delayed payment of bills and an assumption around bad debts.

IRR, NPV, BCR and CE

IRRs help investors to understand the rate of return of the investment, while NPVs help investors assess the absolute size of the return. NPSV, BCR and CE help government analysts to incorporate both social and financial value into appraisal calculations.

Internal Rate of Return

IRR is used to measure the return that can be made from alternative investments. The higher a project IRR confers, the greater return or profit that project may offer. A project can be considered an acceptable investment if its IRR is greater than a defined minimum acceptable rate set by the institution making it.

The three commonly used IRR measures in assessing projects are as follows:

Project IRR: The weighted average cost of capital for a project, usually calculated from all non-financing project cash flows, such as capital costs, operating and maintenance costs, revenues and working capital adjustments.

Modified IRR: Similar to Project IRR, but with the assumption that positive cash flows are reinvested at the investing organisation's cost of capital and the initial outlays are financed at the organisation's financing cost.

Individual Investor IRR: The return on the individual investor's investment based on the cash inflows and outflows over the time the investment is held in the project

Net Present Value, Benefit Cost Ratio and Cost-effectiveness

NPV is commonly used for long term projects to calculate the prospective value of a project over its life, allowing for the time when the investment is made and cash flows are received. The NPV calculation discounts the projected cash flows to allow for the time delay in their receipt, at the required rate of return on the investment. This is normally used in the investment appraisal decision.

In financial models, NPV is used to understand the impact of a financing approach on the total cost of the project.

NPV = *Present value of future financial benefits - Present value of future costs*

A variant of NPV, Net Present Social Value (**NPSV**), is also a frequently considered model output. It looks at the total value of a project to society as a whole, taking into account the full range of costs and benefits, including private and social, resulting from a project.

NPSV = *Present value of future [social + financial] benefits - Present value of future costs*

A **Benefit Cost Ratio** is another way of expressing the NPSV. Instead of a £ value for residual benefits, the BCR is a ratio showing how man £s of benefits were generated for each £ spent.

BCR = *Present value of future [social + financial] benefits / Present value of future costs*

Cost effectiveness is a ratio which is often used when benefits are difficult to quantify. In these cases, analysts will demonstrate how much was spent to achieve a particular qualitative goal. For example, £s per tonne of CO_2 abated.

CE = *Qualitative measure / Costs*

A9

Detailed revenue streams

Heat

Heat Sales: Revenue generated by selling heat to consumers or businesses within the area of the project.

Pricing structures: The most common pricing structure is to combine a Fixed Charge (minimum running costs) and a Variable Charge (to cover marginal costs, usually dependent on consumption). There might also be an added Connection Charge in the case of Heat Networks.

Pricing levels: An option would be to ensure that pricing is equivalent to (or cheaper than) the alternative, for example, gas boiler. Some suppliers implement a price promise which caps heat prices at the cost of the alternative while others set their prices to be equivalent to, or at a percentage discount against the cost of the alternative. In long-term contracts, determining a lasting counterfactual against which a discount or cap can be calculated poses challenges. As the market evolves and energy landscapes shift, these counterfactuals can undergo significant changes. To address this, it's imperative that any such benchmarks are regularly reviewed and adjusted as needed.

Customer types: Landlords, residents, commercial units.

Revenue capturing mechanisms: Pay per Use, Power Purchase Agreement, Virtual Power Purchase Agreement; Subscription services.

Relevant Projects: Heat networks, Combined gas and power.

Risks:

- May require debt collection services where customers fall behind on payments.
- Lower fixed charges mean more linkage to actual consumption, while higher fixed charges generate more comfort to the funder.
- Price levels when considering fuel poverty and profitability of the scheme.
- Scheme being financially viable while also retaining customers.

Heat Storage: Revenue generated by storing excess heat generated during peak hours and selling it during periods of high demand. This can include the use of thermal storage tanks or underground thermal energy storage to store excess heat from renewable sources or waste heat from industrial processes.

Pricing structures: Two primary applications for thermal storage are intra-day and interseasonal storage. For intra-day technology, time-of-use tariffs and price signals for time shifting can be utilised for the pricing structure.

Pricing levels: Dynamic time-of-use tariffs are necessary to establish pricing levels for heat storage. This means that customers that contribute to shifting demand away from peak periods are rewarded.

Customer types: Community centres, universities, hospitals, industry.

Revenue capturing mechanism: Flexibility services, Export payments, Subscription services.

Relevant projects: District heat networks, Combined heat and power.

Risks:

- Economics and upfront costs of different thermal storage technologies
- Several technologies are far from the commercialisation stage in the UK, such as PTES (pit thermal energy storage) and THS (thermochemical heat storage). These technologies also lack clear performance standards.
- Immaturity in dynamic pricing and other sources for time-shifting pricing structures. Price signals such as dynamic electricity pricing are only present for large-scale generation, but mostly absent at the residential scale.

Heat (continued)

Cooling Sales: Revenue generated by selling cooling to consumers or businesses within the area of the project.

Pricing structures: The most common pricing structure for cooling sales is to combine a Fixed Charge (minimum running costs) and a Variable Charge (covers marginal costs, usually dependent on consumption).

Pricing levels: The pricing levels vary according to the electricity market in the country. The price level will also vary depending on what is included in the service. In some cases, there is the addition of manufacturing and installation of the cooling equipment, and in others the price is just for the cooling as a service.

Customer types: Businesses, community centres, industry.

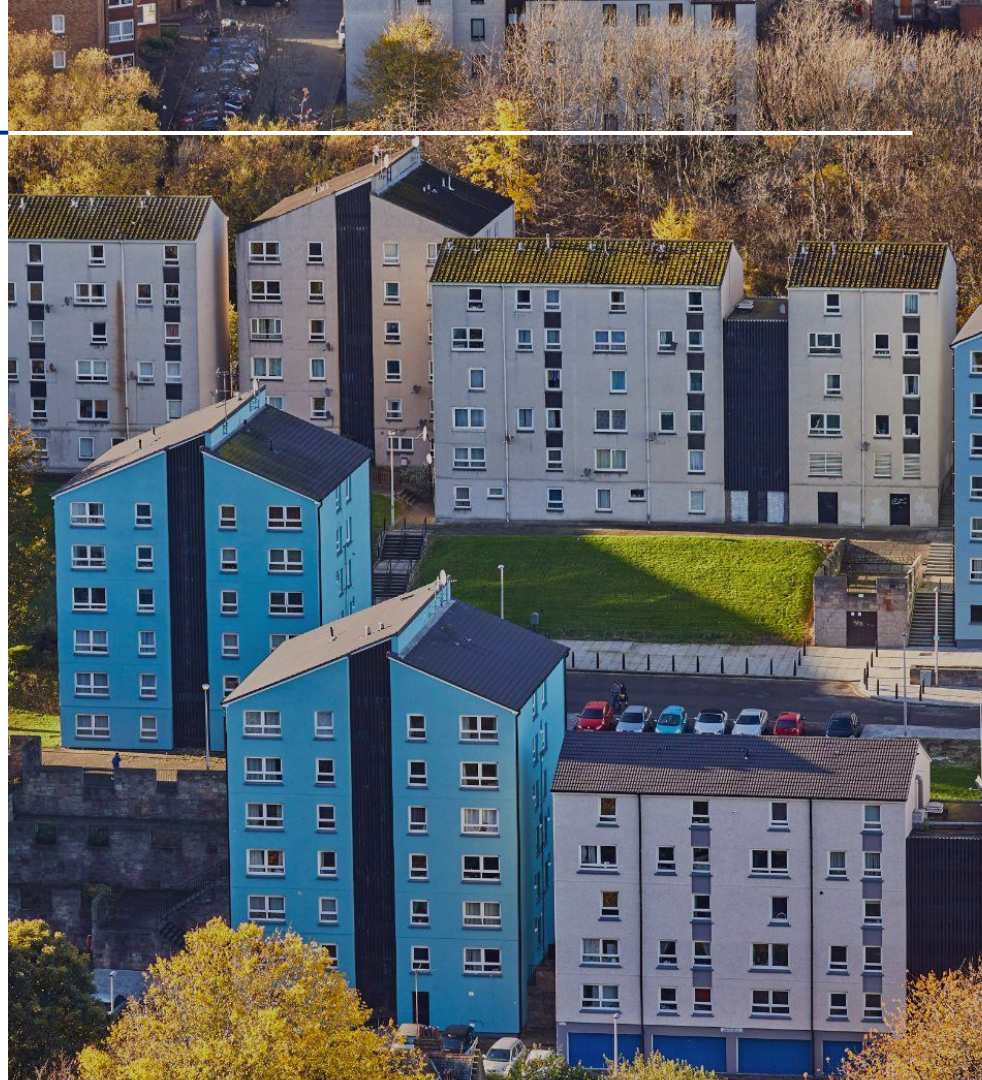
Revenue capturing mechanism: Pay-per-use, Subscription services.

Relevant projects: Heat networks, Renewable electricity generation.

Risks:

- Customers falling into debt and need for resources in debt collection.
- Lower fixed charges mean more linkage to actual consumption, while higher fixed charges generate more comfort to the funder.
- Scheme being financially viable while also meeting the cost of the alternative to keep customers.

Power



Power Sales: Revenue generated by selling electricity to consumers or businesses within an area or exporting to nearby regions.

Pricing structures: The most common pricing structure for power sales is to combine a Fixed Charge (minimum running costs) and a Variable Charge (covers marginal costs, usually dependent on consumption). In the traditional utility business model, this is the main revenue stream of the electricity sector.

Pricing levels: The price levels vary according to the electricity market in the country. Generators supply the electricity the customers demand, and the price levels are dictated by the wholesale electricity prices. The wholesale price can be across the whole country (as it is in Great Britain), or regional. For PPAs, the pricing level is locked at the agreed price between the generator and the customer.

Customer types: Landlords, residents, commercial units, other regions.

Revenue capturing mechanism: Pay per Use, Power Purchase Agreement, Virtual Power Purchase Agreement, Subscription services.

Relevant projects: Renewable electricity generation; Heat networks.

Risks:

- Customers falling into debt and need for resources in debt collection.
- Prioritisation of electricity security and focus on sustainable energy use mean the economic performance of utilities sales impacts investment decisions.
- Increased role of consumer in bilateral power exchange can decrease the quantity of revenues coming from power sales.
- Scheme being financially viable while also meeting the cost of the alternative to keep customers.

Flexibility services

Market: Electricity System Operator (ESO)

Ancillary Services: Revenue generated from services that support the transmission of electricity from producers to consumers to maintain reliable operations of the power system. Examples include frequency regulation, voltage control and black start capabilities (the ability of generation to restart parts of the power system to recover from a blackout).

Pricing structures: The settlements team at National Grid ESO calculates and makes payments to ancillary service providers. Pricing depends on the exact nature of the service provided and can include Capacity Payments (payments for being available) and Utilisation Payments (payments for actual service provided) which are based on the value they provide to the grid's stability and reliability. The exact structure can vary; there is often a premium due to the essential nature of these services.

Pricing levels: The pricing levels are typically set by the system or grid operator and can be based on real-time market dynamics, predetermined tariffs or auction mechanisms. In some regions, there might be competitive markets for these services where prices are determined by supply and demand. All tariffs are based on the geographical zone the supplier is connected to.

Customer types: Grid operators, large-scale energy producers.

Revenue capturing mechanism: Availability and utilisation payments.

Relevant projects: Renewable electricity generation, Energy storage and Flexibility services

Risks:

- Regulatory changes can impact the demand for or compensation rates of ancillary services.
- Price uncertainty given the dynamic market could impact stable revenue generation.
- Failure to deliver the promised service can result in penalties or loss of contracts.

Market: Electricity System Operator (ESO)

Aggregator services: Revenue generated by aggregating and optimising distributed energy resources (DERs) such as solar PVs, battery storage and EV infrastructure to provide demand flexibility services to the grid.

Pricing structures: Aggregators operate within the Demand Flexibility Service (DFS) framework which was introduced in winter (22/23) to access additional flexibility by allowing consumers to be incentivised for voluntarily flexing their electricity usage.

Pricing levels: National Grid can pay up to £5 per kWh Or £5,000 per MWh as a demand reduction incentive, with no cap on the earnings if the demand is not met by the supply available.

Customer types: Households, businesses, energy suppliers, EV charging service providers, energy storage system operators.

Revenue capturing mechanism: Pay-per-use, Subscription services.

Relevant projects: Private wires & Heat Networks, flexibility services.

Risks:

- The success of DFS is contingent on a significant number of users opting into the service, making widespread adoption crucial.
- The evolving nature of DFS and its rules can introduce uncertainties for participants.
- The need for continuous engagement and collaboration with industry stakeholders to ensure accurate mapping and visibility of aggregated assets.

Flexibility services (continued)

Demand response: Revenue generated by reducing or shifting energy usage during peak hours to help balance the grid. This can be done by reducing demand during peak time (load reduction), shifting demand from peak time (load shifting), increasing demand in periods of excess supply (turn-up demand response) or using batteries to reduce electricity consumption during peak times (battery-led demand response).

Pricing structures: The structure will depend on the type of demand response scheme. In a central system approach, the customer will be exposed to the imbalance price for demand response volumes. In a Supplier-Customer system, the central retail prices are not as relevant. The price will be structured on a volume basis.

Pricing levels: The most efficient price level for demand response is the market clearing price less the retail price for generation, which is the price that determines the consumer's marginal consumption - this is excluding supplier's retail charges.

Customer types: Community centres, universities, hospitals, industry.

Revenue capturing mechanism: Availability and utilisation payments.

Relevant projects: Flexibility Services.

Risks:

- Suppliers may be vertically integrated and so not incentivised to develop demand response schemes because this could mean added competition (when aggregators are responsible for the demand response).
- Lack of customer interest in demand response and so not enough uptake.
- Instability of retail prices of electricity.
- Potential lack of transparency on the framework used to set prices.

Microgrid services: Revenue generated by selling energy from a local energy market (microgrid) to the wholesale market.

Pricing structures: This depends on the category of the microgrid, which depends on their connection mode to the grid (off-grid or grid-connected) and the type of ownership (facility or community). Off-grid microgrids will have to pay a connection charge to be connected to the grid. Community schemes usually guarantee a lower cost of energy and hence an overall lower price for customers.

Pricing levels: The optimal price level for microgrid services is determined by the cost of local generation and storage and the prevailing wholesale market rates. It is essential to consider the balance between incentivising local generation and ensuring affordability for microgrid consumers.

Customer types: Grid operators, residents, commercial units.

Revenue capturing mechanism: Power Sales, availability and utilisation payments..

Relevant projects: Private wires & Heat Networks, Flexibility Services.

Risks:

- Economic challenges, especially if the cost of local generation exceeds wholesale market prices.
- Shortage of skills and expertise in some more remote locations where microgrids would be essential.
- Exposure to variation in wholesale prices of electricity which may impact revenue generated.
- Potential resistance from traditional utilities that may regard microgrids as competition.

Flexibility services (continued)

Balancing Mechanisms (BM): Revenue generated by participating in a real-time market used by the National Grid to balance electricity supply and demand.

Pricing structures: BM operate in an ad-hoc market with no forward commitments and feature highly dynamic prices. Participants can post prices and capabilities for varying their consumption or generation after "gate closure", which is 60 to 90 minutes before real-time. Prices are categorised as either bids (to consume more or generate less) or offers (to consume less or generate more).

Pricing levels: Prices are determined by the real-time need to balance the grid. They tend to fluctuate significantly based on the immediate requirements of the National Grid. Typical daily price range in 2020 was £3-£70/MWh with price spikes exceeding £230/MWh for individual or a number of adjacent settlement periods.

Customer types: Virtual Lead Parties (VLPs)*, Licenced in generators, energy customers.

Revenue capturing mechanism: Availability and utilisation payments.

Relevant projects: Energy Storage and Flexibility Services, Renewable electricity generation.

Risks:

- The dynamic and short term nature of BM means that prices can be highly volatile and may not present predictable revenue streams.
- Increased competition from more participants could potentially drive down the prices offered.
- Technical or operational failures can prevent delivery during a balancing event, leading to penalties.

***A Virtual Lead Party (VLP) is an independent aggregator that manages power generation and/or electricity demand from various assets with the objective of offering Balancing Services to the National Grid ESO.**

Capacity Market (CM): Revenue generated by ensuring there is sufficient capacity to manage peaks using either generation increase or demand reduction.

Pricing structures: Capacity Market prices are determined during annual auctions for one year ahead (T-1) and four years ahead (T-4). The pricing structure is based on the need for capacity during peak demand periods and is designed to incentivise the availability of this capacity.

Pricing levels: Auction results vary depending on the year and have ranged from £1/kW/year - £45/kW/year for T-1 between 2020 and 2022. Historic T-4 prices have been in the range of £8.4/kW/year and £22.5/kW/year between 2019 and 2024.

Customer types: Energy Storage System operators, renewable energy generators, demand-side response programs.

Revenue capturing mechanism: Availability and utilisation payments.

Relevant projects: Energy Storage and Flexibility Services, Renewable electricity generation.

Risks:

- Fluctuating market dynamics leading to lower auction prices which reduce the revenue potential.
- Technical or operational failures preventing delivery during a capacity event, leading to penalties.
- Changes in demand patterns could potentially reduce the need for capacity services.

Flexibility services (continued)

Market: Electricity System Operator (ESO)

Optional Downward Flexibility Management (ODFM): Revenue generated by reducing or increasing renewable generation output to manage the electricity system during particularly low demand times of high generation.

Pricing structures: ODFM operates with a week-ahead availability submission, where providers bid for their availability to deliver the required service. Bidding is subject to a range of conditions which a participant in the programme would need to adhere to in order to qualify for this service. The longer auction period, relative to other models, makes it ideal for renewable electricity generation assets such as solar and wind.

Pricing levels: Service fees in 2020 were £60-200/MW/h but the value may not be representative of 2023 figures, as it varies based on the technology, distributed energy resources (DERs) capacity and competition among providers.

Customer types: Renewable energy generators, Energy Storage system operators.

Revenue capturing mechanism: Availability and utilisation payments.

Relevant projects: Flexibility Services, Renewable electricity generation

Risks:

- Service requirement is typically seasonal, during the summer, and may not have significant demand in the winter months.
- Bid values may not necessarily be the highest value for power provided by renewable energy generating assets.
- Changes in demand patterns and greater cooling requirements in the summer months could potentially reduce the need for ODFM services.

Flexibility services (continued)

Market: Electricity System Operator (ESO)

Dynamic Containment (DC): Revenue generated from providing fast-acting frequency response when frequency breaches operational limits (+/- 0.2Hz).

Pricing structures: DC operates with day-ahead bidding, where flexibility providers, especially those with battery storage assets, bid for availability to deliver the service for the subsequent 24 hours. If their bid is accepted, they are paid the agreed price for the entire 24-hour period unless they declare unavailability.

Pricing levels: The exact pricing levels for DC are determined based on the need for fast-acting frequency response. The recent average value for DC was £17/MWh. Prices can be influenced by the demand for DC services and the competition among providers.

Customer types: Energy Storage system operators.

Revenue capturing mechanism: Availability and utilisation payments.

Relevant projects: Energy Storage and Flexibility Services.

Risks:

- The relatively new nature of DC means that there might be uncertainties in its operation and pricing.
- DC are not suitable for a range of LNZP energy assets such as renewable electricity generation and combined heat and power due to the need for fast response times.
- Increased competition from more energy storage system participants could potentially drive down the prices offered.

Market: Electricity System Operator (ESO)

Short-Term Operating Reserve (STOR): Revenue generated by providing reserve energy to the National Grid to address unexpected mismatches in supply and demand.

Pricing structures: STOR operates with a dual payment structure. This includes compensation for energy delivered (utilisation) and, depending on the contract type, may also involve payment for being ready to respond to a STOR event (availability) within the specified service windows.

Pricing levels: Pricing is determined by the immediate need for reserve energy and the competition among providers.

Utilisation in 2013/14 was: Average £123/MWh; Minimum £15/MWh; Maximum 263/MWh.

Availability in 2013/14 was: Average £4/MWh; Minimum: £0.25/MWh; Maximum £14/MWh.

Customer types: Renewable energy generators, Energy Storage system operators.

Revenue capturing mechanism: Availability and utilisation payments.

Relevant projects: Energy Storage and Flexibility services, Renewable electricity generation.

Risks:

- The dynamic and short term nature of STOR means that prices can be highly volatile and may not present predictable revenue streams.
- Utilisation values may not necessarily be the highest value for power provided by renewable energy generating assets.
- Technical or operational failures can prevent delivery during a balancing event, leading to penalties.

Flexibility services (continued)

Market: Distribution System Operator (DSO)

Sustain Peak Management (SPM): Revenue generated by providing capacity or energy to address a forecasted need to prevent a critical asset (such as a transformer) from becoming overloaded due to excess demand.

Pricing structures: The auction period ranges from months to years, with a delivery notice from a month ahead to a day ahead. The delivery duration is approximately two hours and the minimum capacity required is 1kW.

Pricing levels: Recent average values for SPM availability and utilisation were £150/MWh and £380/MWh respectively.

Customer types: Energy Storage system operators.

Revenue capturing mechanism: Availability and utilisation payments.

Relevant projects: Energy storage and Flexibility Services.

Risks:

- Potential revenue fluctuations, as the mean and median values for SPM differ significantly, indicating volatility in the market.
- There is the need for accurate scheduling to ensure that power management aligns with grid requirements and avoids penalties.
- Potential challenges in integrating with other systems or services due to its dynamic nature.

Market: Distribution System Operator (DSO)

Sustain Export Peak Management (SEPM): Revenue generated by providing capacity or energy to address a forecasted need to prevent a critical asset (such as a transformer) from becoming overloaded due to excess generation.

Pricing structures: The auction period ranges from months to years, with a delivery notice from a month ahead to a day ahead. The delivery duration is approximately two hours and the minimum capacity required is 1kW.

Pricing levels: There is limited information on the pricing of this service. However, similar to other DSO services, the pricing would be influenced by the urgency of the requirement and the capabilities of the participating assets.

Customer types: Aggregators, Energy Storage system operators.

Revenue capturing mechanism: Availability and utilisation payments.

Relevant projects: Energy storage and Flexibility services

Risks:

- Given the novel nature of the service, there might be uncertainties in its operation and market acceptance.
- Increased competition from more participants could potentially drive down the prices offered.
- Technical or operational failures can prevent delivery during a balancing event, leading to penalties.

Flexibility services (continued)

Market: Distribution System Operator (DSO)

Secure - DSO Constraint Management (SDCM): Revenue generated by providing capacity or energy to help address an emerging issue that could result in an unplanned outage if not addressed.

Pricing structures: The auction period for this service is determined by the DNO, with a delivery notice of a week ahead. The delivery duration is approximately two hours and the minimum capacity required is 1kW.

Pricing levels: Recent average values for SDCM availability and utilisation were £125/MWh and £175/MWh respectively.

Customer types: Energy storage operators, renewable energy generators, combined heat and power units.

Revenue capturing mechanism: Availability and utilisation payments.

Relevant projects: Energy Storage and Flexibility Services.

Risks:

- Maintaining a specific demand capacity may require expensive and sophisticated monitoring and control systems.
- The dynamic and short term nature of SDCM means that prices can be highly volatile and may not present predictable revenue streams.
- Technical or operational failures can prevent delivery during a balancing event, leading to potential power outages and associated penalties.

Market: Distribution System Operator (DSO)

Dynamic – DSO Constraint Management (DDCM): Revenue generated by offering capacity or energy after an unplanned outage or fault has occurred.

Pricing structures: The auction period for this service is determined by the DNO, with a delivery notice ranging from 120 to 15 minutes. The delivery duration can be up to 8 hours and the minimum capacity required across all DERs is 50kW.

Pricing levels: Recent Average values for availability and utilisation were £15/MWh and £270/MWh respectively.

Customer types: Renewable energy generators, Energy Storage system operators.

Revenue capturing mechanism: Availability and utilisation payments.

Relevant projects: Energy Storage and Flexibility Services.

Risks:

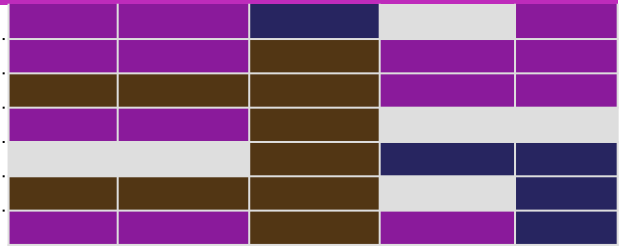
- DDCM delivery duration can last up to eight hours, this might be beyond the capability of some DERs.
- The need for real-time adjustments to meet dynamic demand requires robust systems and quick response times.
- The evolving nature of DDCM and its rules can introduce uncertainties for participants.

Flexibility services (continued)

The following tables provides a summary of which technologies are suitable for the particular services that distributed energy resource (DERs) within a LNZP can provide within either an ESO or DSO market. ESO flexibility services are generally shorter term contracts, with higher minimum capacity thresholds than DSO services due to the rapid and dynamic response required to manage grid frequency. As such, renewable energy assets are less suitable for ESO services than DSO services.

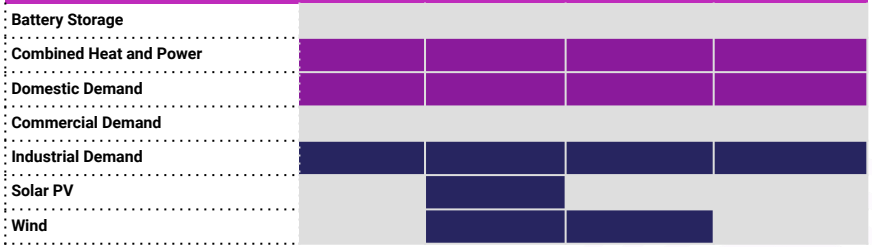
ESO Services	BM	CM	DC	STOR	ODFM
Auction Period	Live	4- and 1- year ahead	Day ahead	Seasonally	Week ahead
Delivery Notice	3 mins upwards	4 hours	0.5 to 1.0 sec	20 to 240 min	6 to 18 hours
Delivery Duration	As required	Duration of Notice	Continuous	2 hrs	3 to 6 hours
Minimum Capacity	1 MW	1 MW	1 MW	1 MW	3 MW

Suitability of Technology



DSO Services	SPM	SEPM	SDCM	DDCM
Auction Period	Months to years	Months to years	DNO- dependent	DNO- dependent
Delivery Notice	Month to day ahead	Month to day ahead	Week ahead	120 to 15 min
Delivery Duration	2 hours	2 hours	2 hours	Up to 8 hours
Minimum Capacity	1 kW	1 kW	1 kW	50 kW (across all DERs)

Suitability of Technology



DER is unable to deliver the service

DER can generally deliver service for the duration indicated but may have limited availability

DER requires a number of pre-conditions to deliver the service

DER can deliver the service for the entire duration and has good availability

Mobility

Charging infrastructure: Revenue generated by providing electric vehicle charging services to the public, such as charging infrastructure.

Pricing structures: The price structure for commercial EV charging depends on the business model. The project can set a usage fee that covers the costs of the charge points or the fee can be set to generate a profit. In some cases, projects may offer free charging to attract new customers.

Pricing levels: The pricing levels will depend on the business model chosen, and it can vary from higher prices to the end-consumer for profit making, or free of charge when the goal is to attract more new users. The location of the infrastructure may also have an impact on the prices.

Customer types: Electric vehicle owners or renters

Revenue capturing mechanism: Pay per use; Flexibility services; Subscription services

Relevant projects: Private wires & Heat Networks; EV infrastructure

Risks:

- Depending on the price levels and location of the charging point, it may not be attractive to enough customers to cover the costs of the project.
- Installation of an inappropriate charging point - for example, a single rapid charger is not suitable for businesses where multiple customers need to be served at once.
- Pricing levels are a risk, since there is low brand loyalty to charging points, and so customers are mostly driven by lower prices and fees.
- Long charging times which may not be suitable for certain customers, such as large delivery fleet that operate on a margin.

Public Transportation: Revenue generated from providing public transportation to customers, usually with a focus on electric buses and other electric vehicles.

Pricing structures: The pricing structure of public transport will be determined mainly by the costs of providing this service. The price will be based on the location, length and time of journey, as well as the transportation method used. Users of public transport will usually pay per journey or buy a seasonal ticket, which can be a subscription or periodically.

Pricing levels: Taking into account this is a service needed for people to travel, the price levels need to be adjusted to what is feasible to the local population. There is usually a daily maximum price cap to ensure prices are affordable for customers.

Customer types: Public transport users.

Revenue capturing mechanism: Pay per use; Subscription services.

Relevant projects: Public transport and mobility services.

Risks:

- Prices need to take into account the buying power of the local population, because public transport is essential to ensure equal access to employment and education. Therefore, the project might not be profitable due to high costs and low revenues.
- Public transportation use is falling globally in recent decades, which could mean declining revenues (IEA).
- Shortage of staff resources and expertise for newer technologies.
- Substitution of current vehicles for lower carbon alternatives might be costly, especially if the buses are not at the end of their useful life.

Other revenues

Customer connection charges: Revenue generated by charging customers for connecting to the local energy grid or specific renewable energy projects. This can include residential, commercial and industrial connections.

Pricing structures: Connection charges are calculated based on the 'Gross Asset Value' (GAV) of the connection assets. The GAV represents the costs incurred to build and install the assets, split into three areas: Engineering and Construction Costs, Interest During Construction, Liquidated Damages Premium (LDP).

Pricing levels: The connection charge has two components:
Capital component - recovers the costs incurred to provide the connection, including depreciation and the Transmission Owner's permitted Rate of Return.

Non-capital component - a contribution to the annual running costs and maintenance of the connection, including Site Specific Maintenance (SSM) and Transmission Running Cost Factor (TRC).

Customer types: Utilities companies, energy service providers, industry, grid operators, aggregators.

Revenue capturing mechanism: Pay-per-use.

Relevant projects: Private network and energy distribution.

Risks:

- Additional charges for late payments may apply.
- Variations in the cost of procuring and installation of connection lines.
- There are charges incurred if an asset is terminated before the end of its useful life.
- Cybersecurity risks are a potential threat to consumers and network operations.

Sales of components: Revenue generated from the direct sales and/or installation of physical components, such as heat pumps, insulation and retrofit parts.

Pricing structures: The price structure will pass on the production and installation costs of these components to the customer.

Pricing levels: The price levels are based on comparing with other suppliers and matching the price. Since this process usually requires customers to pay high upfront costs, the price level is a key determinant for uptake of these technologies.

Customer types: Landlords, residents, commercial units.

Revenue capturing mechanism: Pay-per-use; On-bill financing.

Relevant projects: Building retrofit.

Risks:

- High upfront costs for purchase and installation of components. These can be incurred by the customers or project proponent and can delay uptake.
- Customers may not have accessible avenues to compare different alternatives in the market, which might lead to them not purchasing the products. A platform where customers can compare all alternatives and suppliers could be, for example, a way to simplify decision making.
- Misinformation or lack of interest from customers to retrofit their homes and businesses, especially if it is not the most financially viable option.
- There are manufacturing constraints and supply chain vulnerabilities that can act as barriers to products, such as heat pumps becoming more commercially viable.
- Shortage of skilled installers and maintenance workers in this space.

Other revenues (continued)

Carbon offsets: Carbon offsetting is when companies pay other entities to reduce carbon emissions that they cannot reduce themselves. Revenue is generated by selling a carbon credit which represents a certain volume of emissions reductions.

Pricing structures: The price structure will vary depending on the type of carbon credit. Removal credits will cost more than reductions and this will be reflected in the price levels. Integrity is vital for pricing and credibility and various accreditation organsiations exist, for example GoldStandard, Verra and HACT.

Pricing levels: The pricing levels will vary according to the type of credit: Transportation credits can be as cheap as $1/credit, while forestry & land use can be £200+/credit. Higher quality projects often mean a higher price premium.

Customer types: Businesses.

Revenue capturing mechanism: Payment for credits.

Relevant projects: Atmospheric Greenhouse Capture (for example, Afforestation, Direct air capture).

Risks:

- There is risk of a lack of additionality of carbon credits; it can be difficult to prove that the credits represent GHG removals that would have not taken place anyway.
- Reputational risks can arise if the credits are low quality.
- Uncertainty around credit volumes and demand present potential business risks to carbon credit procurement strategies.
- There are constant updates to regulations around carbon credits, and this poses a risk to long-term strategies of suppliers of carbon offsets.
- Pricing is volatile and prices are forecast to rise significantly in the coming years

A10

Examples of legal forms

Partnerships

A Partnership is a simple and flexible way for two or more legal entities to set up and run a business together with a view to profit.

Overview

This structure can arise without any formal agreement, but typically partners will create a legally binding partnership agreement. Partnerships lack a separate legal personality, meaning partners share the risks, costs and responsibilities of the business. Capital is typically raised from the partners' own assets and/or loans, although being unincorporated limits borrowing in practice.

Each partner is self-employed and pays tax on their share of the profits. Legal entities other than individuals, such as Limited Companies or Limited Liability Partnerships, can also be partners.

Applicable delivery structures

- In-house Delivery
- Public-owned SPV
- Joint Venture SPV

Applicable funding options

- Public loans and bonds
- Corporate loans and bonds
- Direct (equity) investing
- Balance sheet funding (internal reserves)
- Innovative financing mechanisms

Regulatory requirements

- Annual self-assessment tax returns to HMRC from both the partnership and individual partners.
- Maintenance of records showing business income and expenses.
- If a partner is a legal entity, they have additional tax and reporting obligations.

Risk management

- Clear terms and conditions in the partnership agreement to prevent future disputes.
- Diversified investment strategies to reduce financial risks.
- Regular internal audits to ensure financial health and compliance with tax laws.
- The use of liability insurance where applicable to cover potential business liabilities.

Further considerations

- The terms of the partnership agreement, including capital contributions, profit/loss distribution and dispute resolution.
- The potential implications of having a partner that is a Limited Company or Limited Liability Partnership.
- There are limitations in borrowing and Partnerships cannot raise equity finance by issuing shares.

Limited Partnerships (LP)

A Limited Partnership (LP) is a partnership made up of two or more partners. The general partner oversees and runs the business while limited partners do not partake in managing the business.

Overview

A Limited Partnership, distinct from a Limited Liability Partnership, includes two types of partner: general partners and limited partners. Similar in form to a Partnership, the key differences are that limited partners are not involved in managing the business, and their liability is restricted to the amount they have invested. Limited Partnerships must be registered at Companies House to exist, and any changes to the partnership must also be registered. Limited partners are different from 'sleeping' partners in a Partnership or Limited Partnership, who do not take part in running the business but remain fully liable for its debts.

Applicable delivery structures

- Public-owned SPV
- Joint Venture SPV

Applicable funding options

- Public loans and bonds
- Corporate loans and bonds
- Direct (equity) investing
- Balance sheet funding (internal reserves)
- Innovative financing mechanisms

Regulatory requirements

- Registration of the partnership at Companies House.
- Companies House needs to be updated with any changes to the partnership.
- Limited partners may not participate in the management of the business.

Risk management

- Clearly defined roles and responsibilities of general and limited partners in the partnership agreement.
- Ensuring limited partners do not overstep their boundaries and get involved in management, which could jeopardise their limited liability status.
- Regular internal audits to ensure financial health and compliance with business and tax laws.

Further considerations

- Determine the balance of general and limited partners to manage the control, involvement and liability spread in the partnership.
- Ensure that limited partners understand their role and the extent of their liability.
- Awareness that the partnership's existence and any modifications to its structure are dependent on Companies House registration.
- Assess the implications of limited partners not being allowed to manage the business, which can impact the operational capacity of the partnership.

Trusts

Trusts are a legal entity that hold assets on behalf of an individual or another organisation, are managed by trustees, and are typically used for asset protection or estate planning purposes.

Overview

Trusts are unincorporated and do not possess their own legal identity. They are legal instruments for holding assets that separate legal ownership from economic interest. Trusts hold assets on behalf of an individual or another organisation and govern how these assets are used. They are managed by trustees, a small group of individuals legally responsible for the administration of the trust. Trustees are personally liable for any debts or claims against the trust that cannot be satisfied out of the trust's own resources. Trusts establish their own set of rules via a trust deed, ensuring that assets and profits are utilised for a particular purpose.

Applicable delivery structures

- In-house Delivery

Applicable funding options

- Grants
- Public loans and bonds
- De-risking instruments
- Balance sheet funding (internal reserves)
- Community Schemes

Regulatory requirements

- Adherence to the rules enshrined in the trust deed.
- Administration by trustees, who carry legal responsibilities and liabilities.

Risk management

- Trustees should fully understand their responsibilities and liabilities to minimise risk of mismanagement.
- Regular audits to monitor the proper use of assets and adherence to the trust deed.
- Use of legal and professional advice to ensure adherence to all relevant laws and regulations.

Further considerations

- Define clear objectives and purposes within the trust deed.
- The role and selection of competent trustees is paramount due to their significant legal responsibilities.
- Trusts typically don't raise finance or distribute profits, but instead manage assets.
- Trusts often work in conjunction with unincorporated associations, which cannot own property.

Limited Company

A structure that has its own legal identity separate from its owners (shareholders), offering them limited liability and the ability to enter into contracts in its name.

Overview

A Limited Company is the most common legal form used for running a business. Upon incorporation, it forms an entity with a separate legal personality, meaning the organisation can do business and enter into contracts in its own name. Two constitutional documents are required at incorporation: a Memorandum, which records the agreement of the initial members to form a company, and Articles of Association, setting the legally binding rules for the company. A Limited Company is owned by its members and typically finances itself through member investments, loans and retained profits.

Applicable delivery structures

- In-house Delivery
- Public-owned SPV
- Joint Venture SPV
- Third-party Delivery

Applicable funding options

- Public loans and bonds
- Corporate loans and bonds
- Direct (equity) investing
- Balance sheet funding (internal reserves)
- Innovative financing mechanisms

Regulatory requirements

- Registration at Companies House and maintenance of company's public records.
- Notification to Companies House about structural and managerial changes.
- Reporting taxable income or profits to HMRC, annual returns to HMRC.

Risk management

- Directors should act in the interest of the company and its members.
- Regular audits to ensure transparency about the extent of a company's secured credit.
- Use of legal and professional advice to ensure adherence to the Companies Act 2006 and other regulations.

Further considerations

- Decision on the type of Limited Company: Private Limited Company (Ltd) or a Public Limited Company (Plc), with a potential to become a Listed Company.
- Private Limited Companies are common for businesses from a single shareholder director to large private equity capital businesses.
- Public Limited Companies are usually more strictly regulated to ensure transparency and protection for public investors.
- Listed Companies are subjected to stringent regulatory requirements to maintain market integrity.

Limited Liability Partnerships (LLP)

A type of partnership in which each partner's liability is limited to the amount they have invested into the business, providing the benefits of a partnership with the legal protection of a corporation.

Overview

A Limited Liability Partnership (LLP), is a form of partnership in which, unlike a traditional partnership, the individual partners have limited liability. This means that their liability is limited to the amount they have invested in the business and any personal guarantees they have given to raise finance. As a result, an LLP is closer to a limited company than to a traditional partnership. Each member takes an equal share of the profits unless the members' agreement specifies otherwise, and LLPs are governed by the Limited Liability Partnerships Act 2000.

Applicable delivery structures

- In-house Delivery
- Public-owned SPV
- Joint Venture SPV
- Third-party Delivery

Applicable funding options

- Public loans and bonds
- Corporate loans and bonds
- Direct (equity) investing
- Balance sheet funding (internal reserves)
- Innovative financing mechanisms

Regulatory requirements

- Registration and filing of accounts and annual returns at Companies House.
- Two members must be "designated members" who hold responsibilities, including appointing auditors and signing off and filing the accounts at Companies House.
- Each non-corporate member of an LLP needs to register as self-employed with HMRC, and both the LLP itself and each individual member must make annual self-assessment returns to HMRC.

Risk management

- Clarity in the members' agreement, specifying different responsibilities and distribution of profits.
- Regular audits to ensure financial transparency and accountability.
- Use of legal and professional advice to ensure adherence to regulations and requirements related to LLPs.

Further considerations

- LLPs have greater freedom than companies over arranging their internal affairs, including decision-making processes and profit distribution.
- LLPs offer the advantage of limited liability but retain the flexibility of a partnership in terms of internal management.
- LLPs are especially suitable for professional services firms such as law firms, accountancy practices and consultancy firms.

Community Interest Company (CIC)

A company designed for social enterprises, where profits and assets are primarily used for community benefit, with special features including a community interest statement and an asset lock.

Overview

A Community Interest Company (CIC) is a form of company (limited either by shares or by guarantee) created for 'social enterprises' that wish to use their profits and assets for community benefit. CICs are designed to ensure they serve a community interest with several special features, including a community interest statement, an "asset lock" and caps on dividends and interest payable.

Applicable delivery structures

- Public-owned SPV
- Joint Venture
- Third-party Delivery

Applicable funding options

- Public loans and bonds
- Corporate Loans and bonds
- Direct (equity) investing
- Balance sheet funding (internal reserves)
- Innovative funding (crowdfunding, peer-to-peer etc)
- Community Schemes

Regulatory requirements

- CICs must submit a community interest statement to the CIC Regulator with evidence that they satisfy a community interest test defined in law, and continue to satisfy the test for as long as they remain a CIC.
- CICs must have an "asset lock", restricting the transfer of the company's assets to ensure they are used for community benefit.
- CICs are subject to caps on dividends and interest payable.

Risk management

- Ongoing compliance with the community interest test and adherence to the asset lock.
- Monitoring of dividend and interest payments to ensure they remain within the caps imposed.
- Regular audits to ensure financial transparency and accountability.

Further considerations

- CICs are an excellent option for businesses that want to assure stakeholders of their commitment to social impact, as the restrictions and reporting requirements provide an in-built level of transparency and accountability.
- CICs can be more complex to manage than traditional companies due to the additional regulatory requirements, and may not be suitable for all kinds of businesses.

Community Benefit Society (BenCom)

A BenCom operates for the benefit of the community rather than just its members, and profits are returned to the community rather than distributed among members.

Overview

A Community Benefit Society (BenCom) conducts business for the benefit of the community, rather than the members of the society. It must be run primarily for the benefit of non-members and in the interests of the broader community. Profits are not distributed among members or external shareholders, but returned to the community. BenComs often apply an asset lock, which protects their assets for the community's future benefit.

Applicable delivery structures

- Joint Venture SPV
- Third-party Delivery

Applicable funding options

- Public loans and bonds
- Corporate loans and bonds
- Direct (equity) investing
- Balance sheet funding (internal reserves)
- Innovative funding (crowdfunding, peer-to-peer etc)
- Community Schemes

Regulatory requirements

- BenComs are incorporated and must register and submit annual accounts to the Financial Services Authority (FSA).
- They must operate primarily for the benefit of non-members and in the interests of the community.
- If they operate as a charity, they are considered "exempt charities" and are only required to report to the FSA, not the Charity Commission.

Risk management

- Compliance with the focus on community benefit.
- Ensuring financial transparency and accountability with regular audits.
- Managing financial resources in line with caps on dividends and interest.

Further considerations

- BenComs allow for a community-oriented model that focuses on social and community benefit.
- If established as a charity, they can have access to grants and charitable trusts.
- They require careful management and strong leadership to balance the focus on community benefit with financial sustainability.

Co-operative Society (Co-op)

A membership organisation run for the mutual benefit of its members, where profits are typically reinvested into the organisation or distributed among members.

Overview

A Co-operative Society (Co-op) is a membership organisation run for the mutual benefit of its members. Its primary purpose is to trade with members or provide them with goods, services and facilities, with any surplus usually reinvested back into the organisation. A Co-op can distribute profits to its members and may or may not qualify as a social enterprise, depending on its activities and profit distribution.

Applicable delivery structures

- Joint Venture SPV
- Third-party Delivery

Applicable funding options

- Public loans and bonds
- Corporate loans and bonds
- Direct (equity) investing
- Balance sheet funding (internal reserves)
- Innovative funding (crowdfunding, peer-to-peer etc)
- Community Schemes

Regulatory requirements

- Co-ops are incorporated and must register and submit annual accounts to the Financial Services Authority (FSA) rather than Companies House.
- Co-ops must adhere to the co-operative values and principles as defined by the International Co-operative Alliance.
- They have a principle of open membership and can therefore raise funds by issuing shares to the public.

Risk management

- Compliance with the co-operative values and principles.
- Ensuring financial transparency and accountability with regular audits.
- Balancing the interests of a potentially large and diverse group of member-owners.

Further considerations

- Co-ops allow for democratic control with a “one member, one vote” basis, regardless of the size of individual shareholdings, giving each member an equal say in the operation of the business.
- They offer a model that combines the benefits of business ownership with a focus on social and community benefit.
- They require careful management and strong leadership to balance the interests of a potentially large and diverse group of member-owners.

A11

Glossary

Glossary

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

BESS | Battery Energy Storage Systems: Devices that enable electrical energy to be stored during periods of energy surplus and later released when needed.

BEPS | Base Erosion and Profit Shifting: A corporate tax strategy by which multinational companies "shift" profits from higher-tax jurisdictions to lower-tax jurisdictions where there is little or no economic activity.

BM | Balancing Mechanism: A real-time market used by the National Grid to balance electricity supply and demand.

CA | Combined Authority: 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, for example the Greater London Authority (GLA) and West Midlands Combined Authority (WMCA), the devolved regional governance bodies of Greater London and West Midlands, respectively.

CAZ | Clean Air Zone: An area within a city where a Local Authority has put measures in place to improve the air quality, usually involving restrictions on petrol and diesel cars.

CCHP | Combined Cooling Heat and Power: The process by which the heat produced from a combined heat and power unit is used to power an absorption chiller, in order to generate chilled water from applications such as air conditioning or refrigeration, in addition to electricity and heat production.

CfD | Contracts for Difference: A mechanism for de-risking low-carbon electricity generation by offering price stability for renewable energy producers.

CIC | Community Interest Company: A CIC is a type of company limited by shares or guarantee, created for social enterprises that want to use their profits and assets for community benefit.

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

CIO | Charitable Incorporated Organisations: A CIO is an incorporated structure designed specifically for charitable groups, allowing them to register just once with the Charity Commission as an incorporated form of a charity which is not a company.

CIPFA | Chartered Institute of Public Finance and Accountancy: The leading professional body for public finance in the UK and globally. It provides guidance and sets standards for accounting and financial management in Local Authorities.

CIS | Construction Industry Scheme: A scheme designed to prevent tax evasion by subcontractors working in the construction industry, whereby a contractor may withhold tax from payments made to subcontractors for construction operations.

CHP | Combined Heat and Power: The use of a heat engine or power station to generate electricity and useful heat at the same time.

Concession Agreement: Grants certain rights to the third party to operate and manage the project. This could include: Defining the standards and quality of the service the private entity must deliver; The revenue sharing mechanisms or fixed fees the private entity pays to the Local Authority; Provisions to ensure that the Local Authority retains regulatory authority over the private entities operations; And defining the terms under which the agreement can be renewed, extended or terminated.

CM | Capacity Market: The Capacity Market was introduced to ensure there is sufficient reliable capacity to meet peak energy demands. CM participants are paid to ensure they are available to respond either by increasing generation or reducing consumption when there is a high risk a system stress event could occur.

CTSA | Corporation Tax Self-Assessment: Under CTSA, the burden of correctly assessing a company's tax liability rests with the taxpayer. A tax return will constitute a clear statement that the amount shown on a self-assessment is the correct amount of tax payable, rather than an opening position in negotiations.

DBOM Contract | Design-Build-Operate-Maintain Contract: In DBOM contracts, the contractor is responsible for designing, building, operating and maintaining the completed facility.

Glossary (continued)

DC | Dynamic Containment: A fast-acting, post-fault service designed to contain the frequency of the National Grid within the statutory range of +/-0.5Hz in the event of a sudden demand or generation loss.

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.

DER | Distributed Energy Resources: Smaller electricity generation units that are located on the consumer's side of the meter, for example rooftop solar photovoltaic units.

DFS | Demand Flexibility Service: A demand response system in the United Kingdom which allows electricity system operators in England, Scotland and Wales to access additional flexibility in the providing of power when demand is high.

DHN | 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.

DNO | Distribution Network Operator: DSOs are responsible for managing the distribution networks that deliver electricity to end users.

DRA | Demand Response Aggregation: A DRA involves coordinating a group of often smaller energy consumers into an aggregated group who can adjust their power usage in response to grid needs, often in exchange for financial incentives.

DSO | Distribution Service Operator: DSOs are responsible for managing the distribution networks that deliver electricity to end users.

Due Diligence: Due diligence is the investigation that a reasonable business is normally expected to take before entering into an agreement or contract with another party.

D&B | Design and Build: In D&B projects a singular contractor is responsible for designing and building the facility.

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

EBITDA | Earnings before Interest, Taxes, Depreciation, and Amortisation: An alternative measure of profitability to net income. By stripping away any effects of indebtedness, taxes and costs to maintain assets, it gives an indication of the profitability of operating the business only..

ECO | Energy Company Obligation: A UK Government scheme designed to tackle fuel poverty and help reduce carbon emissions by installing energy efficiency measures in fuel-poor homes.

EfW | Energy from Waste: The process of generating energy in the form of electricity and/or heat from the primary treatment of waste, or the processing of waste into a fuel source.

Energy service agreements: Outline the specific energy-related services to be provided including details of the pricing structure, payment schedules and any penalties for performance shortfalls; define data sharing and privacy rules in the context of smart energy solutions.

EPC | Energy Performance Certificate: EPCs disclose the energy efficiency of a building. The EPC contains information on potential energy costs and carbon dioxide emissions.

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

ESG | Environmental, Social and Governance: ESG refers to a collection of corporate performance evaluation criteria that assess the robustness of a company's governance mechanisms and its ability to effectively manage its environmental and social impacts.

EV | Electric Vehicle: A mode of transport which is powered by electricity.

FinCo | Financial Company: A Financial company is a publicly traded financial services, banking or investment company.

FRS | Financial Reporting Standard: Financial Reporting Standard provides principles for preparing financial reports. It is applicable in the UK and Republic of Ireland.

Glossary (continued)

GHG | Greenhouse Gas: A gas that, when emitted into the Earth's atmosphere, contributes to the greenhouse effect by absorbing infrared radiation.

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.

GLA | Greater London Authority: The devolved regional governance body of Greater London, England.

HMT | HM Treasury: A department of His Majesty's Government responsible for developing and executing the government's public finance policy and economic policy.

HMRC | HM Revenue and Customs: A non-ministerial department of the UK Government responsible for: the collection of taxes; the payment of some forms of state support; the administration of other regulatory regimes, including the national minimum wage; and the issuance of national insurance numbers.

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.

HHCRO | Home Heating Cost Reduction Obligation: A UK Government scheme designed to reduce the cost of heating and insulation improvements for residents that are struggling with fuel bills.

HHSRS | The Housing Health and Safety Rating System: A risk-based evaluation tool to help Local Authorities identify and protect against potential risks and hazards to health and safety from any deficiencies identified in dwellings.

HNIP | Heat Networks Investment Project: The project provides grants funding and guidance to Local Authorities for heat network projects.

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

IDNO | Independent Distribution Network Operator: Independent Distribution Network Operators are companies that develop, own, operate and maintain smaller, local electricity distribution systems within the Distribution Network Operator's network.

IETF | Industrial Energy Transformation Fund: The fund supports development and deployment of technologies that enable businesses with high energy use to transition to low-carbon alternatives.

IFRS | International Financial Reporting Standard: A set of international accounting standards that determine how certain types of transactions and other events should be reported in financial statements.

In-house Delivery: The Project Sponsor, typically a Local Authority, will be both the asset owner and the operator without establishing a stand-alone delivery vehicle.

IRR | Internal Rate of Return: IRR is used to measure the returns that can be made from alternative investments. A higher project IRR implies a greater return for investors.

Joint Venture: The Project Sponsor establishes an SPV with a partner. They will share control over delivery and operation. A shareholder agreement will determine decision-making.

Joint Venture Partner: A member of a Joint Venture. Joint Venture partners share in the risk and reward of the Joint Venture.

LAD Scheme | Green Homes Grant Local Authority Delivery Scheme: Provides £500m in funding to Local Authorities through Local Net Zero Hubs to improve the energy efficiency of low income and low energy performance homes, with a focus on those with EPC ratings of E, F or G.

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.

Glossary (continued)

LASAAC | The Local Authority (Scotland) Accounts Advisory Committee: Responsible for preparing the Code of Practice on Local Authority Accounting for Local Authorities in Scotland. The Code is based on International Financial Reporting Standards (IFRS), as adapted for the public sector context.

LCB | Local Climate Bonds: Regulated investment products launched by Councils to access cost-effective funding for specific decarbonisation projects, offering local people an opportunity to invest in their area in a way similar to crowdfunding and to make a return from doing so.

LCCC | Low Carbon Contract Company: Enters into and manages Contracts for Difference (CfD) with low carbon electricity generators. The LCCC is responsible for issuing the contracts, managing them during the construction and delivery phase, and making CfD payments.

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

LEP | Local Enterprise Partnership: Non-statutory bodies responsible for local economic development in England.

LHEES | Local Heat Energy Efficiency Strategy: LHEES aim to establish Local Authority plans for systematically improving the energy efficiency of buildings and decarbonising heat.

LLP | Limited Liability Partnership: An LLP is a separate legal entity but, unlike a normal partnership, the members of an LLP enjoy limited liability. Each member takes an equal share of the profits, unless the members' agreement specifies otherwise.

LNZP | Local Net Zero Projects: Local net zero projects involve investments in six main asset types across local energy, buildings and transport.

LNZH | Local Net Zero Hubs: Entities, funded by UK Government, that promote best practice and support Local Authorities to develop net zero projects that can attract commercial investment.

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

LUDC | Locally-led Urban Development Corporation: This allows non-mayoral areas to pursue a locally-led development corporation for the purposes of transformational regeneration and growth specific to the needs of their areas.

kWh | Kilowatt hour: A measure of electrical energy equivalent to a power consumption of one thousand watts for one hour.

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.

MEEF | Mayor of London's Energy Efficiency Fund: A £500m investment fund to deliver the low carbon, sustainable projects and infrastructure London needs to tackle the climate emergency. MEEF supports projects that deliver new low carbon technology or upgrade existing infrastructure to help make London net zero by 2030.

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).

MW | Megawatt: A unit of power equal to one million watts

M&B | Metering and Billing: The totality of all equipment, data, procedures and activities used to determine the charges to be sought for provision and usage of electricity, and to present these charges on end users' bills.

NNDR | National Non-Domestic Rate: Non-Domestic Rates, or business rates, collected by Local Authorities are the way that those who occupy non-domestic property contribute towards the cost of local services.

Glossary (continued)

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

NPV | Net Present Value: NPV is commonly used for long term projects to calculate the prospective value of a project over its life, allowing for the time when the investment is made and cash flows are received.

NPSV | Net Present Social Value: Social NPV looks at the total value of a project to society as a whole, taking into account the full range of costs and benefits, including private and social benefits, resulting from a project.

NZPP | Net Zero Pathway Plan: Net zero pathway planning sets out the change required to transition an area's energy system to net zero. This will typically include a detailed techno-economic analysis of a range of technologies and scenarios.

NZN | Net Zero Neighbourhood: A local area 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.

OECD | Organisation for Economic Cooperation and Development: An intergovernmental organisation with 38 Member countries, founded in 1961 to stimulate economic progress and world trade.

ODFM | Optional Downward Flexibility Management: An opt-in service for small scale renewable generators to receive payments from the National Grid if they are asked to turn down or turn off their generation of electricity during periods of particularly low demand and high generation.

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.

OpCo | Operation Company: An Operation Company handles operational aspects of project delivery, including project development, customer relations and partnerships.

O&M | Operation and Maintenance: A contractual agreement between a project company and a professional operator to provide operation and maintenance services for the project.

PCC | Peterborough City Council: The Local Authority for Peterborough in the East of England.

PCR | Public Contracts Regulations: Above a certain financial threshold, central government, non-ministerial departments, executive agencies and non-departmental public bodies buying supplies, services or works must follow the procedures laid down in the Public Contracts Regulations 2015 before awarding a contract to suppliers.

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

PIRI | Peterborough Integrated Renewables Infrastructure: Peterborough Integrated Renewables Infrastructure is a project aiming to utilise electricity and heat produced by the existing 7 MW Peterborough Energy Recovery Facility.

PMA | Plant and Machinery Allowances: UK tax relief for 'capital' expenditure on plant and machinery assets.

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

PPP | Public-Private Partnerships: A collaboration between a government and private enterprise, often on large infrastructure projects that the private partner may finance, plan or execute.

PSDC | Public Sector Decarbonisation Scheme: The scheme provides grants for public sector bodies to fund heat decarbonisation and energy efficiency measures.

Public-owned SPV: The Project Sponsor establishes a stand-alone vehicle to own and operate the assets.

Glossary (continued)

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.

Project Sponsor: A party with the motivation to establish a successful LNZP, that takes responsibility for driving delivery and managing the network.

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, until 2022, promoted the use of renewable heat to help reduce carbon emissions and meet the UK's renewable energy targets.

RSL | Residential Social Landlord: A residential social landlord is a provider of lower-cost social housing which is registered with the Regulator of Social Housing. Social landlords can be a local council or a housing association.

SCA | Service Concession Arrangement: An arrangement where the Project Sponsor (the grantor) contracts with a private sector entity (the operator) to construct (or upgrade), operate and maintain infrastructure assets for a specified period of time (concession period).

SDLT | Stamp Duty Land Tax: A tax imposed by the UK Government on the purchase of land and properties with values over a certain threshold.

SEG | Smart Export Guarantee: The Smart Export Guarantee (SEG) is a government obligation for larger suppliers to offer an export tariff that pays customers for excess electricity that they send back to the grid from renewable technologies.

SEPM | Sustain Export Peak Management: A service whereby energy exporters and consumers can reduce electricity export or increase energy consumption during periods of low demand to prevent parts of the electricity infrastructure (such as a transformer) being overloaded by an excess of electricity generation.

SHDF | Social Housing Decarbonisation Scheme: A fund which provides £800m for social housing landlords to be used to improve energy performance of social housing.

SLA | Service Level Agreement: An SLA is a contract between a service provider and its customers that documents what services the provider will furnish and defines the service standards the provider is obligated to meet.

SLES | Smart Local Energy System: A SLES uses grid flexibility to manage network constraints and provides routes to market and investment models for local electricity generation.

SME | Small-Medium Enterprise: An SME is any organisation that has fewer than 250 employees and a turnover of less than €50 million or a balance sheet total less than €43 million.

Solar PV | Solar Photovoltaic: Photovoltaics is the conversion of light energy into electrical energy using semiconducting materials that exhibit the photovoltaic effect.

SPM | Sustain Peak Management: A service whereby energy exporters and consumers can increase electricity export or reduce energy consumption during periods of high demand to prevent parts of the electricity infrastructure (such as a transformer) being overloaded by an excess of electricity generation.

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

Subsidiarity: The principle that a central authority should have a subsidiary function, performing only those tasks that cannot be performed at a more local level.

STOR | Short-Term Operating Reserve: The STOR provides the National Grid with additional power when actual demand on the National Electricity Transmission Network is greater than forecast and / or there is unforeseen generation unavailability.

TCA | EU-UK Trade and Cooperation Agreement: The EU–UK TCA is a free trade agreement signed on 30 December 2020, between the European Union, the European Atomic Energy Community and the United Kingdom.

TfGM | Transport for Greater Manchester: TfGM is a local government body responsible for coordinating transport services throughout Greater Manchester in North West England.

Glossary (continued)

Third-party Delivery: The Project Sponsor enters into an energy services or concession agreement with a third party. The party is both the asset owner and operator, retaining liability for the asset. The third party may outsource operations and maintenance.

Third-party Investor: A investor in a project who is not the Project Sponsor, the Local Authority or Joint Venture Partner. Examples may include a bank, a private equity house or a lease provider.

TRO | Traffic Regulation Orders: A traffic regulation order is a legal document that helps manage traffic in defined areas by introducing speed limits, on-street parking restrictions, weight limits, one-way streets and banned turns and prohibition of driving. Often used to encourage walking and cycling, and manage parking.

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.

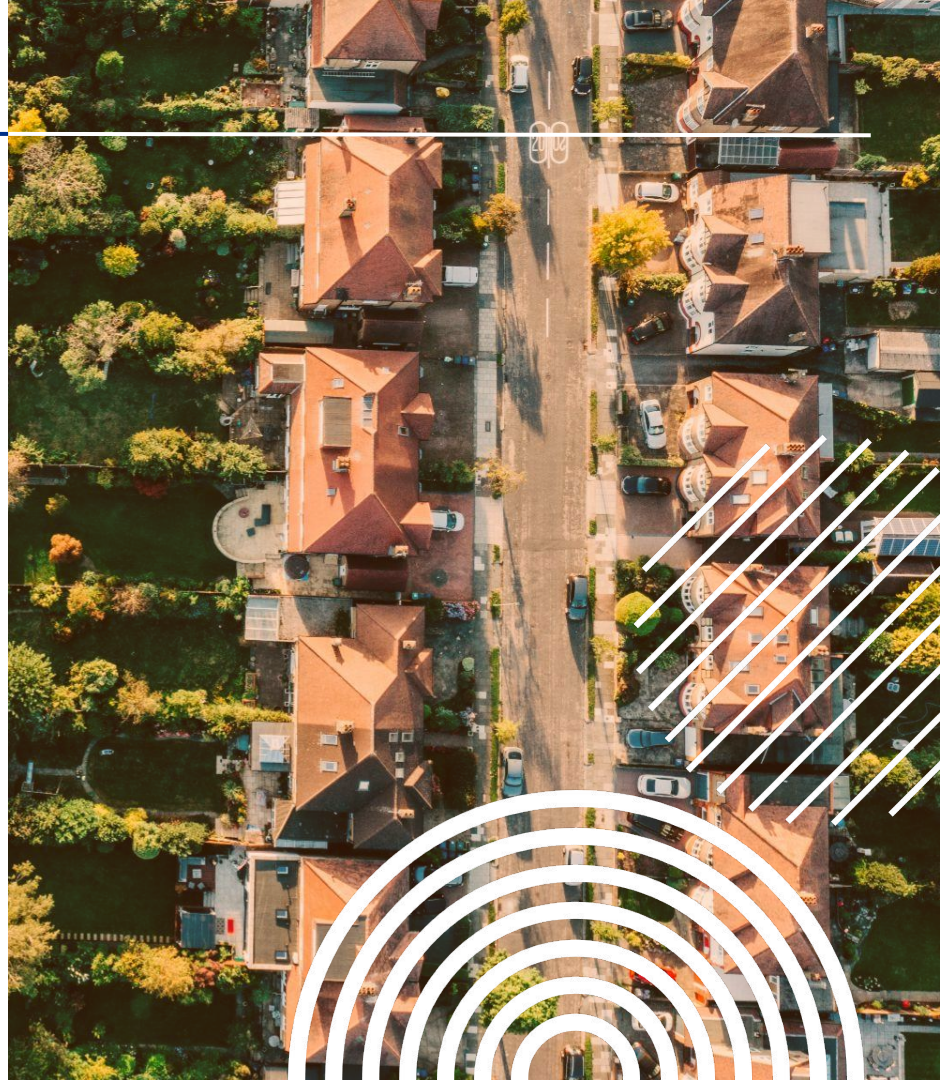
UKRI | UK Research and Innovation: UKRI is a non-departmental public body of the Government of the United Kingdom that directs research and innovation funding, funded through the science budget of the Department for Science, Innovation and Technology.

VAT | Value-Added Tax: VAT at 20% is a tax payable by UK and non-resident investors on the cost of many goods and services purchased in the UK. VAT is also chargeable by UK and non-resident investors carrying on a business in the UK, who make taxable supplies of at least £85,000 a year for a UK investor or at any level for a non-resident investor (fixed to April 2026).

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

V2G | Vehicle to Grid: V2G is a technology that enables energy to be pushed back to the power grid from the battery of an electric vehicle (EV).

YNY | York and North Yorkshire: A proposed combined authority covering York and the North Yorkshire region.



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