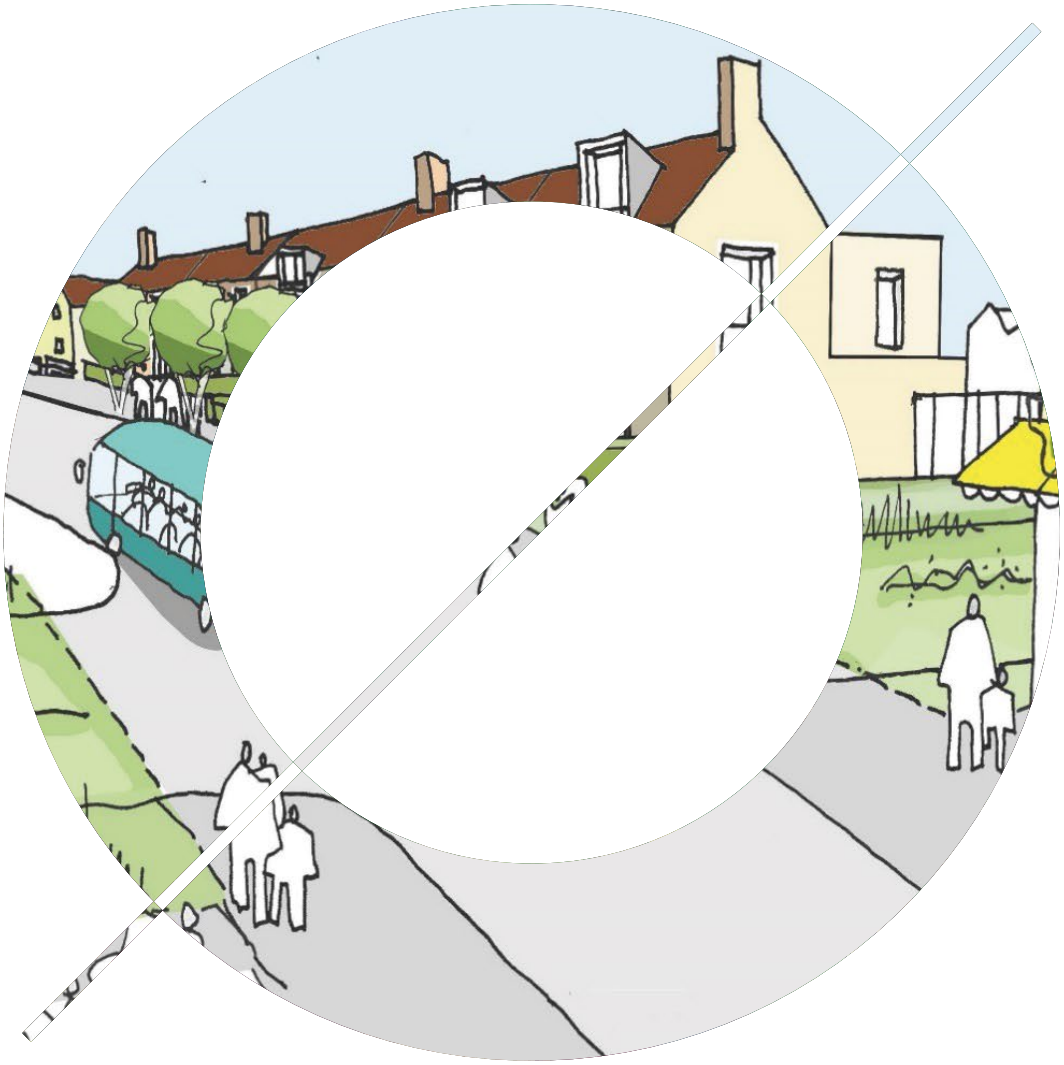
Cities Commission For Climate Investment

The Case for a National Net Zero Neighbourhoods Programme

June 2023



A Connected Places Catapult Initiative

CATAPULT Connected Places

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Glossary of Key Terms

Term	Definition
Blended finance	Funding that involves a mix of private and public capital.
Building envelope	The elements of the outer shell of a building that maintain the indoor environment and facilitate its climate controls. Includes various forms of wall insulation, floor insulation, window glazing, as well as mechanical ventilation of the building.
CapEx	Capital expenditure: Expenses to build and deliver major long-term assets, in this case the building retrofit measures and community level interventions.
Demand reduction	Refers to reduction in energy demand that results from some of the building retrofit measures, specifically building envelope, lighting & appliance upgrades.
Demonstrator	A project that is part of the first phase of projects to be designed and implemented in order to test and prove the concept.
FinCo	The financial organisation that deals with contractual and financial matters for the Net Zero Neighbourhood programme.
Non-repayable capital	Funding that does not require a return. This could be from both public or private sources.
NZN programme	The Net Zero Neighbourhood (NZN) programme is the whole programme delivering roll-out of NZNs across the UK.
NZN project	A Net Zero Neighbourhood project is a single project to design, implement and operate an NZN in a specific location.
OpCo	The organisation that provides the operational functions of the Net Zero Neighbourhood programme, primarily to support to local authorities, and oversight of NZN projects as an agent for the FinCo.
OpEx	Operational expenditure: expenses for the day-to-day running of the project, in this case including design and procurement costs in the initial phase, followed by maintenance costs during the lifetime of the assets.
Outcome buyers	Investors that seek a non-financial return, in this case related to a co-benefit of the Net Zero Neighbourhood (e.g. better healthcare outcomes, job opportunities, educational outcomes).
Refinance	Raising funding to pay back prior borrowings.
Repayable, private capital	Commercial funding, most likely from private sector financial institutions, that is lent with the expectation of a set monetary return.
Revenue funding	Funding to cover OpEx costs.

Executive Summary

Introduction

This Outline Business Case (OBC) has been produced for Connected Places Catapult (CPC) on behalf of the Cities Commission for Climate Investment (3Ci). 3Ci was founded by Connected Places Catapult, London Councils and Core Cities UK with a vision to support local authorities to secure the necessary long-term finance for achieving net zero. 3Ci is creating a wider partnership, including UK government, Innovate UK, Metro Mayors, combined authorities, Scottish and Key Cities, Counties and Districts and a growing league of private investors, financiers, advisors, developers and built environment technology professionals.

The Strategic Outline Business Case (SOBC), produced earlier in 2022, highlighted that a preferred way forward for achieving the spending objective of *"accelerating the UK's pace of eliminating greenhouse gas (GHG) emissions by 2050"* is the design of a new programme that delivers a **place-based, multi-intervention Net Zero Neighbourhood (NZN), supported by a blended finance model**.

This OBC showcases that the 3Ci NZN programme could provide value and affordability to both the Exchequer and society. Recognising the complexity of the programme, the OBC demonstrates that delivery mechanisms, governance and management structures, and the procurement framework, among others, have been considered and can be viable.

The "ask"

The purpose of this OBC is to make the case for approval and further funding to progress the 3Ci NZN programme to the next "Phase" (Phase 3). **Phase 3 is where the programme principles can be demonstrated in practice, within a set of demonstrator projects**, and the major questions, including the blended finance model and the operational supporting structures Financial Company (FinCo) and Operating Company (OpCo), can be tested further to provide proof and refinement of concept.

Considering the above, this OBC is explicitly seeking approval for:

- **Further funding for 3Ci to prepare for, design, and select a set of demonstrators** (Phase 3a) in a series of locations where the programme principles and blended finance model could be effectively tested.
- Further interrogation of the 3Ci NZN programme through a **Full Business Case (FBC)**.

Further details of 'the ask' are expanded on later in this OBC.

Brief overview

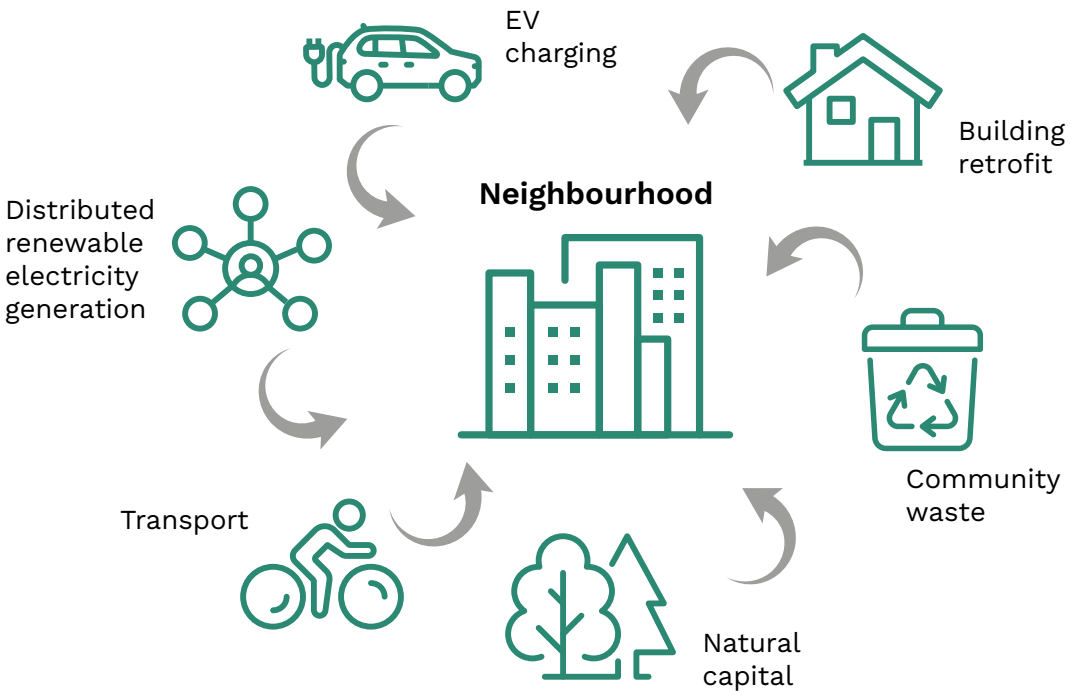
The 3Ci NZN programme

The proposed 3Ci NZN programme *(a placed-based, multi-intervention, Net Zero Neighbourhood supported by a blended finance model)* is derived (within this OBC) from considering the UK's Net Zero Strategy and policy, identifying potential barriers (in achieving net zero by 2050) and therefore designing a programme that unlocks those barriers and provides opportunities and benefits. Considering this, the 3Ci NZN programme presents a viable and credible intervention for contributing to achieving net zero by 2050, at pace and scale, as a result of its unique characteristics:

- Firstly, **it promotes a place-based approach to (nationwide) decarbonisation** (greenhouse gas reductions) that promotes community and local authority buy-in and participation.
- Secondly, it **facilitates the delivery of multiple interventions** in one place in order to scale up delivery, generate efficiencies and derive wider socio-economic benefits.
- Thirdly, it **provides a blended funding model**, which combines government and outcome-seeking funding, with profit-seeking private investment. It also provides a cost saving to the government, possibly reducing what could be around a 70-80% subsidy, to around 35%, by appealing to institutional investors who can offer longer payback periods than those typically seen with retail finance.

Lastly, it **generates revenues** that make it an investable programme that can be used to fund the programme (repayable finance) and **removes the need for individual residents and asset owners to personally fund the significant upfront costs of decarbonisation**, whilst providing an incentive to participate (reduced energy bills).

Figure 1: 3Ci NZN programme intervention schematic



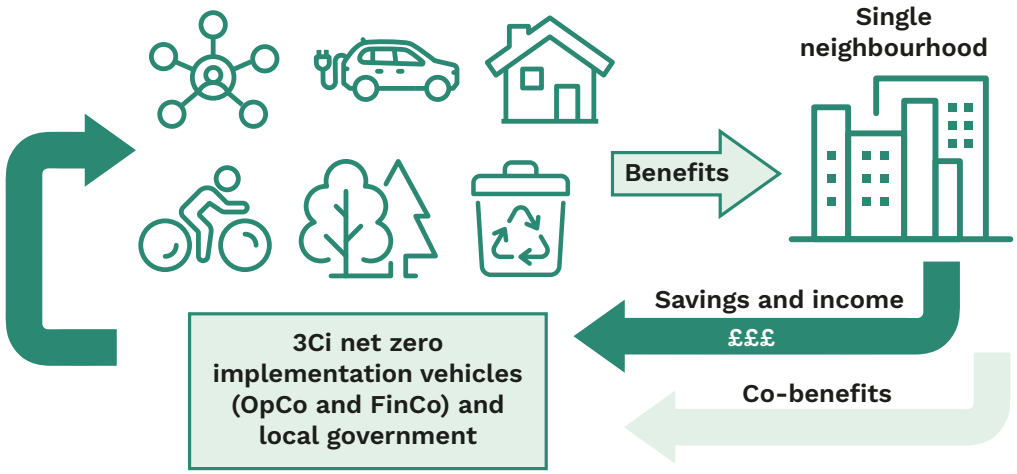
In addition to these key characteristics, the programme has broader co-objectives that would be achieved including; providing the implementation vehicle for a 'National Energy Efficiency Roll Out Programme', supporting a just transition and the levelling-up agenda, generating improved health and quality of life outcomes, and contributing to alleviating the cost-of-living crisis through mitigating fuel poverty and increasing disposable income.

How it works

The 3Ci NZN programme approach combines a blended finance mechanism, designed to leverage private sector capital on top of public finance, with practical place-based implementation. This delivers a range of technical interventions together, that are collectively needed to decarbonise population centres in line with the UK's net zero ambitions. This will overcome the many challenges associated with large scale decarbonisation, to enable rapid orchestrated roll out, creating a strong, localised demand signal for the supply chain. Nationally this would create a multi-billion pound investment opportunity for long-term patient capital to invest into net zero delivery and will deliver significant broader public benefit (referred to above).

- Funding and supporting vehicles (FinCo and OpCo) are set up alongside local authority implementation and capitalised from a mix of funding sources.
- The funding vehicle then pays the upfront costs of deep decarbonisation and other broader interventions for a neighbourhood at no cost to the residents and/or property owners.
- The resident retains part of the energy and maintenance saving, leaving them in a better economic position with a more comfortable house and enhanced neighbourhood.
- The remainder of the savings are captured through on-utility-billed, property-linked, long-term service contracts, creating an annuity income stream for the funding vehicle to support the capital structure.

Figure 2: Schematic of the 3Ci model mechanics



Source: BwB, modified by Arup

In the current, depressed global economic environment, the need to generate inclusive, sustainable, and long-term economic growth is imperative for the overall well-being of citizens and businesses in the UK. A UK-wide roll out of the 3Ci NZN programme would bolster sustainable (long run) economic growth through additional investments in cleaner infrastructure (gross fixed capital formation) which creates capital deepening (infrastructure build-out). Furthermore, the linkages between generating additional capital deepening with new technology, innovation, and the involvement in, or access to, global value chains could provide a confidence boost to infrastructure-led growth through improvements in total factor productivity. In addition, the programme would require a significant boost in the number of skilled and semi-skilled workers required to roll out the programme at scale across the UK. This could drive up-skilling and result in an increase in labour productivity and output, bolstering economic growth.

In accordance with the Green Book guidance, as issued by HM Treasury, and the "Five Cases" recommended structure, this OBC will set out the strategic context, the case for change, and the preferred option (Strategic Case). It will demonstrate the findings from the economic analysis (Economic Case) and it will outline the findings associated with affordability, commercial viability, and deliverability in the Financial, Commercial, and Management Cases respectively.

Strategic Case summary

The UK government has a net zero policy and strategy to achieve net zero by 2050, highlighting its commitment to addressing climate change impact. Whilst the policy and strategy are in place, gaps remain in relation to actual delivery, instruments, and interventions available that will foster further progress in achieving the target. This is as a result of barriers that exist and continue to persist, such as capacity, coordination, and affordability constraints.

This Strategic Case identifies critical success factors that are designed to overcome these barriers. As a result, the 3Ci NZN programme, a place-based, multi-intervention net zero programme, supported by a blended finance model and its supporting governance and management structures, provides unlocking features (such as scalability, replicability, and investability) which encapsulate these critical success factors and enable the barriers to be overcome.

The 3Ci NZN programme, with the strategic (spending) objective of "accelerating the UK's pace and scale of eliminating greenhouse gas (GHG) emissions by 2050", is the preferred option for contributing to achieving net zero by 2050 from a strategic and policy point of view.

1 *https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-governent*

Economic Case summary

The Economic Case evaluates the economic benefits and costs associated with the 3Ci NZN programme in comparison with the counterfactual, using a proxy place neighbourhood, to determine the extent to which the programme delivers value for money for the public sector and wider society. The appraisal methodology is based on principles and guidance set out in the Green Book, issued by HM Treasury.

The benefits include direct carbon emissions reductions and financial benefits (energy bill savings) from building retrofit, as well as indirect benefits from active travel, waste, and green interventions. All of which contribute to better physical and mental health outcomes, as well as significant savings to the public purse in terms of reduced subsidies. Combining all quantifiable costs and benefits, the project delivers an overall positive net present value (NPV). Given the nature of the assumptions, some caution is required when interpreting the results and therefore a range of NPVs (of between £2.5m and £32.1m) and benefit-cost ratios (BCRs') (between 1.1 and 1.9) have been showcased in the Economic Case to demonstrate sensitivity of the results to certain inputs and assumptions, as well as the stress testing applied to the results.

The analysis helps to give an idea of the scale of impact that might be observed and signals that the 3Ci NZN programme does generate additional added value to society and the Exchequer.

Management Case summary

The Management Case for this OBC focuses on the management of the activities that align with the ask being made and provides a brief discussion of: the management concept for the overall programme; details of the management of Phase 3a (demonstrator design); and details of the management of Phase 3b (demonstrator implementation).

The overall 3Ci NZN programme will deliver numerous Net Zero Neighbourhood (NZN) projects. Both the programme and each project will need effective management and coordination to succeed. The core approach to management of each of these is provided in this OBC with the detailed descriptions available in the full Management Case. The core structure recommended includes two entities–one to raise and distribute investment (the FinCo) and one to help develop designs and ensure delivery (the OpCo). This structure reduces risks for investors, as operational complexities will not impact the FinCo vehicle, which should enable greater capital to be raised at reduced rates of return. The OpCo is designed to enable close regional collaboration with Local authorities. Between them, the OpCo and LA will engage with each neighbourhood to develop an implementable design with local support. The FinCo is the final arbiter of whether a design is ready for implementation.

The Management Case describes the details of Phase 3a:

- **Wave 1**: There should be c. 10 Wave 1 demonstrators where LAs create designs to a detailed state that can be assessed for viability. This would lead to investment-ready designs.
- **Wave 2**: There should be c. 25 Wave 2 demonstrators where LAs are supported to develop their capacities ready to start design work.
- **Central components**: Central components need to be established (FinCo, OpCo) and developed (acceptance criteria; property contract; project assessment framework; payment obligation mechanism; fund risk register).

Of particular focus is the mechanism to obligate current and future residents to pay the NZN service charge. A number of existing legal options are discussed including the Green New Deal legislation, local land charges, and deeds of covenant, and a conclusion reached that there are a number of viable, legal approaches.

The Management Case describes the details of Phase 3b:

- **Wave 1**: Those Wave 1 designs that are identified as of sufficient quality are funded for on the ground implementation. This would lead to implemented NZN designs (number dependent on investment) with resident payments being collected, generating revenue.
- **Wave 2**: Those Wave 2 demonstrators ready to commence design work can develop their designs, providing a further set of NZN designs ready for funding.
- **Central components**: Expansion of capabilities and scale of the FinCo and OpCo to support the implementation of NZNs.

Financial Case summary

The Financial Case provides a narrative around some of the key constraints in implementing a scaled retrofit programme. This is primarily related to the economic return profile of implementing deep building retrofit (including demand reduction– insulation and other energy efficiency measures– heat degasification– typically heat networks or heat pumps–, and distributed renewable energy generation and storage (solar battery)). It highlights that the costs to implement are high, relative to the financial saving on the annual energy bill of the resident, meaning a public subsidy component is inevitable in the funding mix.

If the non-public subsidy component of the funding for this transition is focused on retail finance products for individual citizens (such as green mortgages), the contribution of those citizens to the cost is likely to be low. This is because of a relatively short requirement investment payback period for individual citizens (c. 5-10 years), which should

be considered in the context of the average UK homeowner being 56 years old. That would suggest a required public subsidy level in the region of 70-80% of the cost. In addition, this analysis also ignores the fact that retail finance is not an option, given the added split incentive complications in the private rental and social housing sectors which collectively make up one third of UK housing as well as the fact that many owner-occupiers don't have access to credit.

The Financial Case highlights that there are two key ways to reduce this required public subsidy level through; reducing the upfront costs, and increasing the value of the energy savings and therefore support for private finance. The Financial Case suggests that the 3Ci NZN programme's financial model is designed to achieve both by:

- Reducing the upfront implementation costs through procurement economies, implementation economies, and system design economies via a place-based approach, and
- By aggregating the non-subsidy funding component across multiple dwellings: allowing energy savings to be valued over the investment time horizon of institutional investors (30-50 years), instead of individual homeowners (5-10 years).

As a result, the place-based, blended financial model provides cost savings to the government by reducing the required subsidy from around 70-80% to around 35%; it removes the need for homeowners to fund the upfront cost of retrofit, and delivers a return to institutional investors. The Financial Case also considers the factors behind the likely required sign-up level within a neighbourhood to make the model effective, which is focused on bundling sufficient numbers and clusters of properties within reasonable proximity, rather than an overall percentage within a fixed area.

Finally, consideration is also given to the financial position of the resident, including the risk to the resident of being locked into a largely fixed annual service fee in future scenarios of significantly reduced energy pricing. It concludes that given building retrofit is a necessary step in meeting the UK's legally binding 2050 net zero target, residents not participating in this scheme will need to fund retrofit by other means, giving them an equally, if not greater, lack of exposure to reduced energy prices.

Commercial Case summary

The Commercial Case considers the goods, services, and/or works required to deliver the 3Ci NZN programme. It assesses the procurement routes and resources required to achieve the programme in the most efficient, socially beneficial, and value driven manner. The Commercial Case also considers the overall procurement strategy and risk allocation associated with the requirements and identifies the most viable route to ensure sufficient capacity and capability exists for programme delivery.

As a result, the Commercial Case considers:

- the functional model that will provide value for money, efficiency, and support local social initiatives and economies, including provision of sufficient capacity, capability, expertise, resource, and value for money to ensure successful programme delivery (procurement delivery strategy).
- the capacity, capability, readiness and willingness of the market to support the 3Ci NZN programme (supply market capacity).
- routes to engaging with Contractors and households to ensure the most appropriate deals for programme delivery are achieved (contracting strategy).
- risks associated with procurement processes and tendering activity (General risks and personnel issues); and routes to establishing formal contracts with residents/households (household contracting).

Introduction

Overview

This Outline Business Case (OBC) is part of a wider body of work commissioned and delivered by 3Ci. In 2021, 3Ci commissioned a report (Phase 1, concluded in October 2021) which examined the combined factors that local authorities need to address to comprehensively and quickly respond to the urgent climate challenge and the government's ambitious targets to reach net zero by 2050. Following the publication of the Phase 1 report, Department for Business Energy and Industrial Strategy (BEIS) provided funding to support this piece of work (Phase 2).

It is important to note that this report does not cover the wider programme of work being delivered by 3Ci. This wider programme includes the following:

- National net zero project pipeline – the development of a national register of local and regionally-led, bankable projects to deliver net zero outcomes.
- Regional investor events – a series of events aimed at convening cities and local governments with investors to showcase opportunities, building mutual understanding and confidence.
- Local integrated investment pilots – delivery of a programme of geographically diverse pilot projects, which test and demonstrate a financing framework that allows different sectors to invest in the infrastructure our cities need in a profitable way with confidence.
- Dissemination of local and regional innovations – the development of a national platform to share innovations rapidly in an easily accessible and standardised format.
- National technical assistance programme – the creation of a development fund that invests in the necessary capacity and skills to bring projects forward for investment.

Purpose of this report

As part of Phase 2 a Strategic Outline Business Case (SOBC) was produced that started to test the assumptions and models described in the Phase 1 report. The SOBC found that the most positive approach is to design a programme of interventions that are place-based, are multi-asset, and use a blended finance approach using public funds and private finance. The Phase 1 report and SOBC can be found appended to this OBC.

This report is the next stage of Phase Two, the Outline Business Case (OBC). It builds on the preferred option identified in the SOBC and presents a case for investment for a UK-wide programme and a shorter-term demonstrator pilot, which will test the concept across a small number of UK places.

The rate of change required to meet the government's 2050 targets is pronounced, and research – including this body of work – suggests that the only approach to tackling climate change is for the public and private sector to work together. This also means looking at new financial instruments that combine public funds and private investment, lessening the burden on the consumer and the Exchequer.

The complexity of this proposed programme is such that it is using an untried or tested model to try to innovate and accelerate the pace of change relating to major retrofit and decarbonisation programmes across the UK in individual homes and across local authority assets.

Therefore, the case for investment and the ask running through this OBC is twofold:

- **It is seeking approval/support to further interrogate, through a *Full Business Case* (FBC)**, the fiscal, societal, and environmental benefits of a long-term UK wide programme to deliver decarbonisation at scale to meet the government's ambitious net zero targets. Throughout the OBC, this is called 'the 3Ci NZN programme'.
- **It is asking for a further £26.9 million of funding for 3Ci to prepare for, support, and design a group of (c.10) fully specified and investable demonstrators** (Phase 3a). (Discussed further below and in the Management and Financial Case).
    - **The later funding ask, post-OBC, will be an additional request for the public sector component of funding for** actual implementation of ready demonstrators, selection and design of new/additional demonstrators, and an expansion of the central entity operations – Phase 3a (continued) and 3b. This will be based on outcomes, evidence, and readiness generated from Phase 3a, but is likely to be in the region of £300 to £500 million.

Background

The Phase 1 report:

The Phase 1 report identified an investment opportunity of £206 billion to achieve net zero in the 12 considered cities, through six categories of interventions:

- renewable electricity generation;
- domestic and commercial building decarbonisation;
- transport decarbonisation;
- waste management decarbonisation; and
- green infrastructure projects;

The Phase 1 report defined a framework to achieve decarbonisation involving coordinated investments across different asset types, based on a place-based approach. This involves a blended finance model designed to leverage private sector capital on top of public finance. Aggregation of revenues through this model can facilitate investments in a broader range of interventions combining more profitable asset types, such as renewables, with other measures, such as buildings retrofit, as well as civic infrastructure such as green assets.

Figure 3: Phase 1 report cover

The key recommendations and insights from the Phase 1 report are as below:

- The report identified **£206 billion worth of investment measures** across the UK's Core Cities and London Councils, in order for them to meet their net zero targets. This was based on a review of city climate plans and an extensive data analysis, with net zero investment measures required across multiple sectors.
- Implementation requires **delivering interventions across multiple sectors/asset types**. Single asset-based approaches lack the potential in terms of aggregating revenue streams and/or delivering economies of scale. A multi-intervention, place-based approach would deliver financial returns in the form of direct savings and additional revenue streams, as well as other social and environmental benefits.
- The report found that renewable electricity generation offers the **greatest opportunity for private finance** at present, while large scale solar and battery storage schemes can also provide good financial returns.
- Interventions such as waste management decarbonisation, green infrastructure, or building decarbonisation are not as attractive for private investment, due to providing limited returns. These would need to be implemented alongside projects that have direct revenue sources **via the proposed multi-asset model**.
- There is a **gap in resources and capabilities** within local authorities as well as across specialist areas. Capacity and capability building is required for delivery of the council's climate action plans.
- There is a need to develop **structures and services to enable collaboration** between public bodies, private sector investors, local businesses, and residents.
- The report recommended that multi-intervention, **place-based, net zero delivery models should be tested via demonstrator projects**. This will determine whether it is possible to wrap interventions together to obtain an overall package which can attract private investment by capturing cash returns and other benefits in a blended finance structure.
- **Policy changes** and acceleration of policies will be necessary to maximise the role of private finance.

The 3Ci NZN programme

The 3Ci NZN programme, with the **main objective** of "*accelerating the UK's pace of eliminating greenhouse gas (GHG) emissions by 2050*" and addressing the funding challenge (as identified in the Phase 1 report and SOBC), is a programme that:

- Provides a **place-based approach** to decarbonisation (greenhouse gas reductions): It is a neighbourhood-level approach that promotes community buy-in and is led by the local authority (with support).

- **Facilitates multiple interventions** in one place: It will be a one-stop-shop that delivers (primarily) **building retrofit solutions** (including solar PV, heat degasification, and central heating and insulation upgrades) at a building-level, while also providing secondary interventions based on community requests and needs (promoting a differentiated approach more likely to drive engagement and community consent, but also delivering additional public benefit). These additional interventions include:
    - **Natural capital** (ecological and environmental enhancements such as tree planting, etc.).
    - **Transport interventions** that promote active travel (cycle lanes, bike storage, etc.) and shifts to electric vehicles.
    - **Waste solutions** (such as community composting, repair café etc.), and
    - Other **community infrastructure** (such as a co-working space or youth centre, etc.) to facilitate citizen sign up in order to scale up delivery, generate efficiencies and drive wider socio-economic benefits.
- **Provides a blended funding model**: this combines public funding (government) and outcome-seeking funding, with profit-seeking private investment, and
- **Generates revenues**: that can be used to **fund the programme** (repayable finance) **and removes the need for individual residents and asset owners to personally fund the significant costs of decarbonisation**, and providing household incentive to participate (energy cost savings).

From project to programme

A core concept in this OBC worth mentioning up front is that the modelling (both economic and financial) of the 3Ci NZN programme is based on a proxy-place (neighbourhood).

The proxy-place (which is detailed in the Economic Case) has been chosen as a broadly representative urban neighbourhood with multi-deprivation levels and building types. The economic modelling is based on a full 3Ci NZN programme intervention in this neighbourhood to showcase the benefits and costs at a neighbourhood level.

We acknowledge that each neighbourhood will have very different demographics, building typologies, deprivation structure, economic and social activity, rural/urban patterns, and may require greater or fewer interventions, as well as differing local authority and community desires based on e.g. culture. There is also an appreciation that, as a result of these differences, a simple linear extrapolation of net benefits from proxy-place to nationwide is not suitable. However, the logic is such that if there is a positive outcome for the proxy-place, we can broadly agree that there would be a net benefit at a nationwide (programme) level, despite localised differences and constraints. The programme is designed to be flexible and accommodate the localised differences.

The 3Ci NZN programme, if approved, will set in play a large and systematic process for rolling-out decarbonisation (see Management Case for details) at a project and neighbourhood level. This includes setting up the organisational, management, procurement, stakeholder engagement and investor-related structures and platforms that will support the programme at pace and scale. **This comprises several phases, indicated in Figure 1 below, over 5-year period**:

Figure 4: NZN programme phases

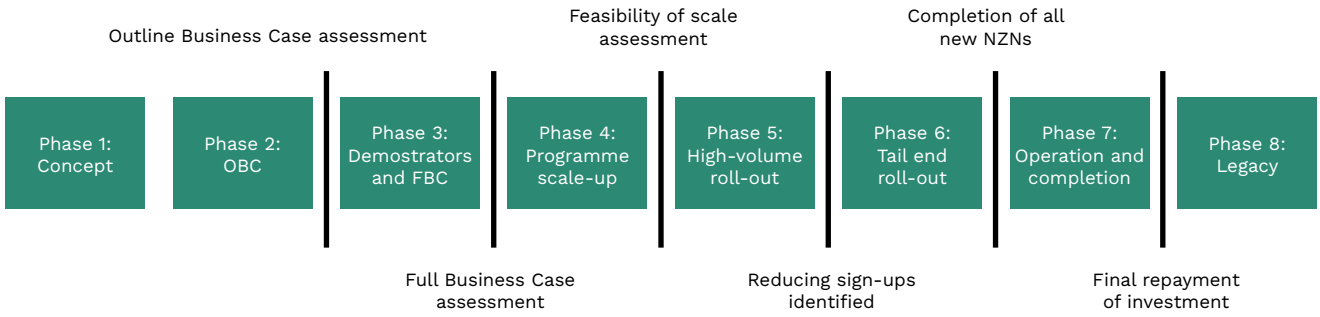


Table 1 below provides a breakdown of the anticipated full programme roll out. Of significance for this OBC are Phases 2 and 3. The results and outcomes from the Phase 2 work will be shared with a wide audience and will provide the basis for subsequent progression of the programme to Phase 3; including testing of the 3Ci NZN programme in demonstrator neighbourhoods (Phase 3a and 3b), forming the foundation for eventual roll out in locations across the UK, should they be successful.

Figure 5: NZN programme phase descriptions

Phase 1: Concept	Designing concept and testing as a Strategic Outline Business Case (SOBC) – Complete.
Phase 2: Outline Business Case (OBC)	Making the Case for the programme as a whole. Designing Phase 3a and 3b.
Phase 3: Full Business Case (FBC) and demonstrators	3a) Shift to FBC for the 3Ci NZN programme and selection and preparation for demonstrators. 3b) Testing key questions and designs in practice (demonstrator implementation).
Phase 4: Programme scale-up	Beginning the roll out of the full programme. Steadily increasing volume of NZNs that can be delivered at one time. Proving capacity to deliver at peak volumes needed to meet net zero goals.
Phase 5: High-volume roll out	Steady-state roll out of new NZNs at maximum capacity aligned with net zero goals.
Phase 6: Tail end roll out	Reducing volumes of new NZNs until no new NZNs implemented.
Phase 7: Operation and completion	Ongoing support to NZNs. Management of NZN completions.
Phase 8: Legacy	Legacy operations (if required) to support NZNs.

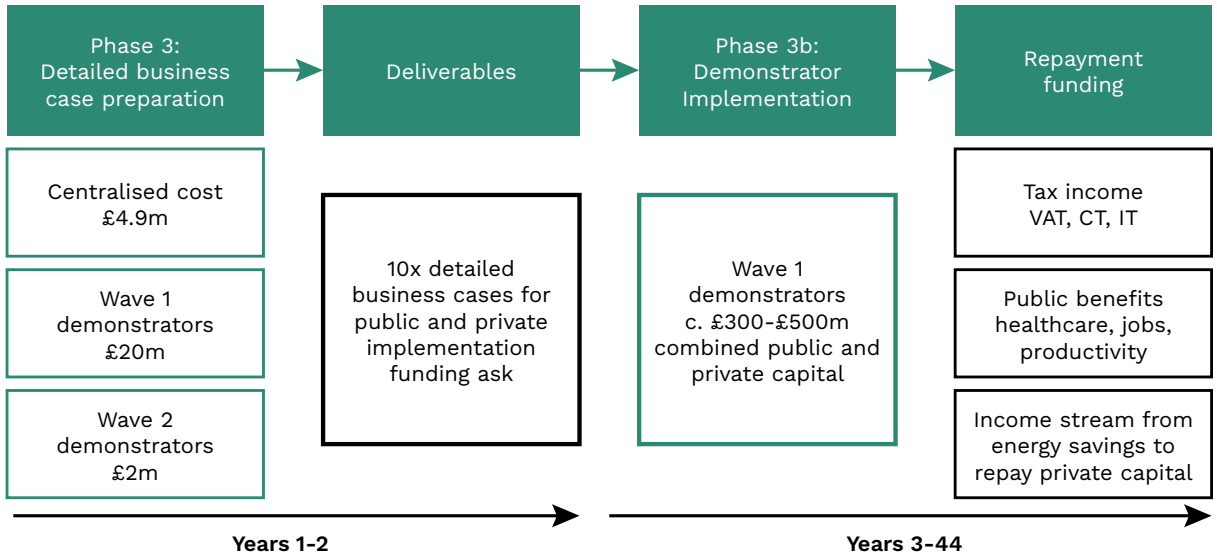
Source: Eunomia

The demonstrator projects

As mentioned above, in order for the 3Ci NZN programme principles to be demonstrated and tested in practice, including testing of the blended finance model and the operational supporting structures, a process of selecting, designing and implementing a set of demonstrator projects is required. This will provide proof and refinement of concept. To this end, there are three core requirements to shift towards demonstrator readiness and implementation (Phase 3a), including:

- **Setting up central entities and resources** ready to support demonstrator design and implementation.
- **Wave 1 demonstrators: selection and design**. This wave of demonstrators will take a group of LAs that **are acquainted with the concept** and have capacity to build a design to a detailed project design for their NZN with associated business case. This will test the design process and demonstrate where authorities are ready to move to implementation. Once they have reached this point then, if funding is available, they can move to implementation.
- **Wave 2 demonstrators: selection and preparation**. This wave of demonstrators will take a group of LAs that have **no background** in this model or concept to a position of readiness to commence a design (effectively the position that Wave 1 demonstrators are at for the beginning of the phase). This will test the preparation process for LAs.

Figure 6: Project phases and estimated funding requirements



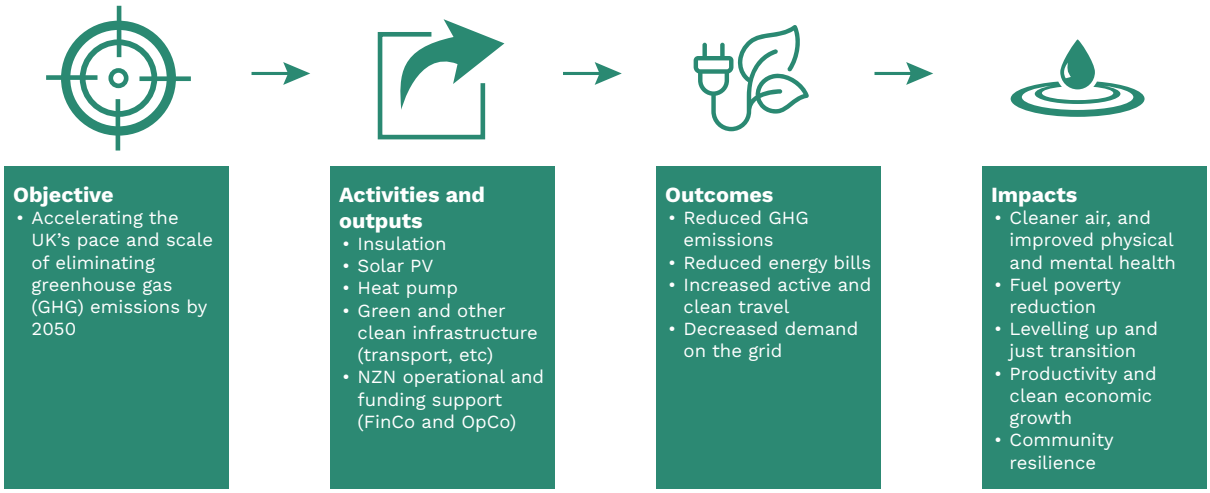
Source: BwB

The theory of change – an introduction

An in-depth and complex logical model has been developed for the 3Ci NZN programme and reflected on in the Management Case and the Strategic Case. However, the main 'takeaway' relates to the theory of change (inputs, activities, outputs, outcomes, and impacts) for the 3Ci NZN programme and the interlinkages of the logical model across all five cases in the OBC.

Figure 7 below provides a summary reflection of the logical model. Of importance are the outcomes and impacts that are expected to be achieved through this programme, in alignment with government net zero policy directives, but also the impact that it will have in relation to contributing to reducing fuel poverty, bolstering the levelling up agenda and supporting economic growth through productivity gains and fixed capital formation.

Figure 7: Summarised theory of change



Report structure

This report is structured based on the 'five case model' as set out in 'the Green Book guidance, issued by HM Treasury.'. This comprises the following:

- **Strategic Case**: presents the strategic and policy context, articulates the need for change, and defines the strategic objectives for the project.
- **Economic Case**: provides a qualitative and quantitative evaluation of economic benefits and costs for the project options and analyses the extent to which the project delivers value for money.
- **Management Case**: reviews programme planning, structuring, governance and stakeholder engagement arrangements, and the extent to which the project is deliverable.
- **Financial Case**: considers funding and financing arrangements and assesses the project's affordability.
- **Commercial Case**: evaluates procurement and commercial arrangements, and the extent to which the project is commercially viable.

Strategic Case

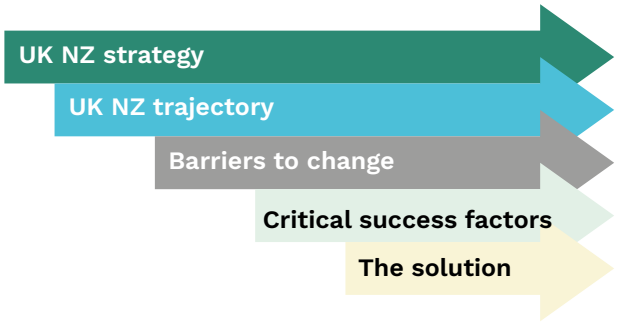
Introduction

In this OBC, the Strategic Case continues from the work in the SOBC and provides a logical narrative reflecting on the global context, UK policy, the case for change, barriers, success factors, the proposed solution, and the spending objectives to determine whether they are still valid as a basis for moving the 3Ci NZN programme onto the next phase.

The case for change and the 3Ci NZN programme - the evolution:

This section should be read with the following logical flow, as depicted in figure 7 below. Firstly, reflecting on the global climate crisis and what the UK's response is (the UK's Net Zero Strategy). Then reflecting on any gaps that there may be in achieving net zero by 2050 and identifying the possible barriers to change. Finally, the critical success factors required to overcome those barriers, which help to derive the solution.

Figure 8: Strategic Case logical flow



Climate change and the UK's net zero commitment

The climate emergency is one of the greatest global challenges facing humanity. The Paris Agreement was adopted by 196 parties at the UN Climate Change Conference (COP21) in Paris on 12th December 2015 and entered into force in November 2016. Its goal is to limit global warming to below 2.0 degrees Celsius, while supporting efforts to limit the increase even further to 1.5 degrees. To achieve this goal, countries aim to reach a global peak of greenhouse gas emissions as soon as possible to achieve a climate neutral world by mid-century. The Paris Agreement is the first binding agreement that commits nation states to undertake common efforts to combat climate change and adapt to its effects.

Since the Paris Agreement, further legislation has been passed around the world to tackle the impact of climate change, with the UK committing to achieve "net zero" by 2050. This target means that by 2050 greenhouse gases that are still emitted in the UK must be equal to or less than what is removed from the atmosphere by either the natural environment or carbon capture technologies.

UK government's net zero policy

In response to the growing call for countries to take decisive action against climate change, the UK government has taken steps to ratify the COP agreements through its broad policy vision and strategy to deliver a net zero economy by 2050. It is recognised that several policies across multiple sectors and spheres already exist, summarised.

The government's 2021 Net Zero Strategy, "Build Back Greener" is the overarching strategy that "*sets out policies and proposals for decarbonising all sectors of the UK economy to meet our net zero target by 2050*"[2].

Further, according to the UK's Local government association, around 300 councils have declared a climate emergency (and have taken some form of action to reduce their own carbon emissions) while a report to Parliament5 in June 2022 by the Climate Change Committee stated that as of 2021, 335 councils have a Climate Action Plan (CAP) – 74 do not. 28 of the 32 London boroughs and the City of London have adopted climate emergency declarations, with 27 boroughs and the City of London having published CAPs6.

2 *Net Zero Strategy: Build Back Greener - GOV.UK (www.gov.uk)*

Current net zero trajectory

A recent report to parliament on the UK's progress in reducing emissions by the Climate Change Commission (CCC), highlighted several key messages:

- **The UK government now has a solid Net Zero Strategy in place**, but important policy gaps remain.
- **Tangible progress is lagging the policy ambition**. With an emissions path set for the UK and the Net Zero Strategy published, **greater emphasis and focus must be placed on delivery**.
- **Successful delivery of changes on the ground requires active management of delivery risks**. Not all policies will deliver as planned. Some may be more successful than expected, while others will fall behind.
- **Action to address the rising cost of living should be aligned with net zero**. There remains an urgent need for equivalent action to reduce demand for fossil fuels to reduce emissions and limit energy bills.
- **Slow progress on wider enablers**. The Net Zero Strategy contained warm words on many of the cross-cutting enablers of the transition, but there has been little concrete progress.

The report recognises the victories of some low-hanging fruit to- date, but also provides a warning that actual progress outside of these is not being sufficiently made: "*[The] recent uptake of electric cars is very positive – as with renewable electricity, the combination of cost reductions over the last decade and the policy framework now in place provide confidence that the necessary progress will be made in deployment.* ***However, outside these bright spots, we are not seeing the necessary progress across a wide range of areas***."

In summary, the report recognises that government has a credible strategy in place but emphasises the need to focus on actual delivery to ensure progress is not stalled, active management, utilising net zero to contribute to alleviating fuel poverty, and further linkages to other government objectives.

Barriers to change

Globally, decades of abundant investments in fossil-fuel related infrastructure (petrol stations, refineries, etc.), vehicles and machinery, as well as the abundance of these natural resources and their historically low (relative) cost against renewables, has meant that alternative and cleaner energy solutions have been priced out of the market for the average household and business.

This is an example of market failure in which the negative externality associated with fossil-fuels is not priced into the market, and which justifies government intervention.

In addition, despite all the policies, strategies and funding on the table in the UK at present, there appears to be misalignment across all spheres of government, and lack of capacity and know-how to develop and implement plans at a local level. Furthermore, there is even less ability or appetite at local level to engage with the financial sector on bespoke, and somewhat foreign, financing instruments, within a regulated budget process, to make a net zero project viable. Around 70%[3] of UK councils have found funding constraints to be the largest inhibitor of implementing their net zero plans, highlighting the need for a unique funding and financing model to support achieving the 2050 net zero target.

These 'barriers to change' need to be identified and a delivery model developed which is designed to mitigate these barriers. This will unlock the private and public investment necessary, and net zero initiatives required to deliver net zero by 2050. Several barriers to change are listed in table 3, but a few barriers are expanded on here:

- **Financial and commercial**: The returns on net zero investments are generally low compared to the required investment and as such there are currently few opportunities for investible projects. Only renewable energy generation has shown the kinds of returns needed to secure private sector investment independent of public sector intervention. The transition to net zero and meeting the policy objectives requires significant upfront capital, which is beyond the reach of public finances alone[4]. In addition, the current funding arrangements are not of a sufficient scale to support wide scale roll out of net zero by local authorities. Reasons for this include the following:
- **Fragmented schemes** that are designed for specific purposes without effective coordination make it more complex for local authorities to find funding and limits their ability to deliver across multiple objectives.
    - Piecemeal funding with inappropriate delivery timescales limits the ability of local authorities to plan for the long-term. A key challenge is that a lot of projects do not have sources of revenue; this makes certain projects challenging to fund.
    - Current funding arrangements appear to favour local authorities with projects that are ready to go and do not provide sufficient

3 3 2022 Progress Report to Parliament - Climate Change Committee (theccc.org.uk)

4 4 See Phase One report findings

support to early-stage preparation. Whilst it facilitates roll-out of decarbonisation technologies, the distribution of funding may not go to the local authorities that require it the most.

- A cap on local authority borrowing is anticipated as part of the new Levelling Up and Regeneration Bill. The proposed powers will provide the government with options to, among other things, "...undertake commissioned reviews of local authority finances, place borrowing caps in relation to a range of risky activities or take specific actions to reduce its level of risk"[5].
  If this funding gap is met only by citizens and businesses there will be damaging impacts on the poorest sections of society, counter to the Levelling Up and Growth Plan agenda[6]. Furthermore, existing financing and delivery systems have not been designed to deal with the complexity of coordinating action locally in multiple sectors – the built environment, energy, transport, waste, and green infrastructure.

- **Economic Case-making**: To secure public sector funding, a strong Economic Case must be made that demonstrates value for money over and above the direct carbon savings and financial returns. There are a broad range of direct and indirect benefits associated with decarbonisation which may not have been captured sufficiently in the past, hindering the ability of projects to secure the required funding and approvals to go ahead.
- **Public support**: The support of the public is vital to achieving a pathway to net zero. Significant action is required either in the form of proactive action or consent. The heating of homes, business premises, office space, factories, and other commercial building will need to be decarbonised, which will rely on significant retrofitting and the installation of alternative forms of heating such as heat pumps and heat networks. Residents and business owners will either need to procure this work directly or will need to give consent were the public sector to subsidise or pay for these actions. Similarly, the decarbonisation of transport will require residents and businesses to purchase new vehicles or seek alternate forms of transport. Public support of local actions will also be required for local authorities and other legislators to drive forward the projects that are necessary. Current approaches and projects do not feature a clear strategy for capturing public support.
- **Governance and powers**: Achieving net zero means decarbonising all neighbourhoods throughout the country. The transport network, homes, commercial properties, public buildings, industry, the energy supply, and waste will all need to be transformed, requiring a coordinated and significant level of local, regional and nationally delegated authority to implement this change, as well as an integrated and flexible governance and management structure.
- **Local authority involvement and capacity**: The UK Climate Change Committee (CCC) has reported that around one-third of the UK's emissions are dependent on sectors that are directly shaped or influenced by local authorities. A large proportion of UK GHG emissions arise in segments of economic activity that are directly controlled or influenced by local authorities who are often left out of decarbonisation projects. These local authorities also often lack capacity (and sometimes specific capability) to deliver the types of locally-based, multi-asset investment programmes that are needed to achieve the required carbon savings[7].

5 *Local government capital investment and borrowing: proposed measures to address risk - GOV.UK (www.gov.uk)*
6 *See: https://www.gov.uk/government/publications/levelling-up-the-united-kingdom*
7 *https://www.theccc.org.uk/publication/sixth-carbon-budget/#downloads*

Table 1: Barriers to change

Barrier	Description
Financial-commercial	Lack of workable models for the recovery of private investment.
Behavioural	Landlords, and citizens more broadly, view decarbonisation as a non-priority.
Socio-economic	The cost of intervention falls disproportionately on the poor and discourages public sector support.
Economic	The lack of emphasising and quantifying benefits have made for a weak Economic Case and a lack of Government support.
Governance	Lacking the coordination and delivery vehicle for intervention.
Public opinion	Lack of awareness, poor information, resistance to changes to homes and net zero actions.
Powers	Councils lack the powers to drive action beyond their own assets.
Behaviour	Building owners generally have other priorities, lack knowledge, don't have to act.
Technical	Mature technology, but technically challenging to implement in combination.
Data	Lack of detailed and reliable data.
Electricity system capacity	High uncertainty about reinforcement requirements.
Human resource capacity, skills and accreditation	Few resources are currently devoted to a huge systemic challenge while upskilling and professional certifications are currently limited.
Supply chain	Industry standards and knowledge don't meet the needs, constrains scaling even if we had the money and projects.
Regulatory	Limits local innovation in energy contracting and delivery.

Overcoming the barriers to change: Critical success factors

A successful net zero delivery model will be one that mitigates or removes the barrier to change listed in table 3 above. In order to derive a credible net zero delivery programme, these barriers must be addressed by identifying critical success factors. The SOBC developed the following critical success factors on the basis of the barriers to change and external research. As a result, the critical success factors, include factors that:

- Enable local government to shape and lead individual projects.
- Create community buy-in and get the support of the public.
- Create financially viable business opportunities for private investors.
- Reduce transaction and investment costs for citizens.
- Have a transparent governance and management structure that improves co-ordination at both national and local level.
- Provide the capacity and expertise needed to land and deliver net zero projects.
- Justify significant public sector investment.

These critical success factors provide the unlocking features that overcome the barriers to entry and help to derive the solution to support the UK's net zero policy directive.

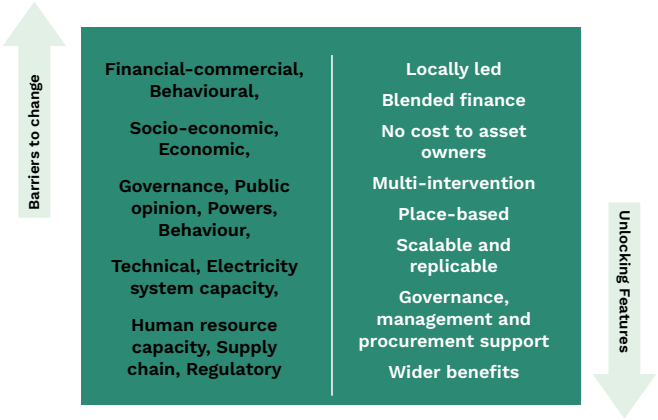
The solution:

Utilising the above critical success factors, acknowledging the government Net Zero Strategy, but being cognisant of the (current) unavailability of instruments available to ensure progress is made; it is clear that achieving net zero by 2050 requires an intervention plan at the neighbourhood level to ensure incremental and steady delivery and progress towards this target. This means taking a **'pPlace-based approach', instead of a more traditional (and siloed) asset-based one, that can be replicated and scaled across the UK**, accounting for demographic and geographic differences and capabilities at local government level, as well as funding, financing and affordability considerations.

The 3Ci net zero programme (*a place-based, multi-intervention Net Zero Neighbourhood, supported by a blended finance model*), established in the SOBC as the preferred option, provides "unlocking features" that address the barriers to change and encapsulate the critical success factors outlined above. The "unlocking features" of a successful net zero programme will:

- Be locally led and designed.
- Be p lace-based and focused on neighbourhoods and communities.
- Blend public and private funding and finance, and generate revenues that remove personal costs of decarbonisation.
- Integrate national, regional, and local authorities in a multi-stakeholder governance structure.
- Provide multi-sector interventions.
- Be scalable, replicable, and innovative.
- Provide governance, management, procurement and technical support and structures, and
- Generate wider benefits to society, such as clean air, better health and quality of life outcomes.

Figure 9: Unlocking features that address barriers



The 3Ci NZN programme, is a programme that:

- **Provides a place-based approach** to mass, nationwide decarbonisation (greenhouse gas reductions): It is a neighbourhood-level approach that promotes community buy-in and is led by the local authority (with support).
- **Facilitates multiple interventions** in one place: It will be a one-stop-shop that delivers (primarily) **building retrofit solutions** (including solar PV, degasification, and central heating and insulation upgrades) at a building-level, while also providing secondary interventions based on community requests and needs (promoting a differentiated approach). These additional interventions may include:
  - **Natural capital** (green infrastructure - ecological and environmental enhancements such as tree planting, etc.),
  - **Transport interventions** that promote active travel (cycle lanes, bike storage, etc.),
  - **Waste solutions** (such as community composting, repair café etc.), and
  - other **community infrastructure** (such as a town hall or youth centre, etc.) facilitate the delivery of in order to scale up delivery, generate efficiencies and derive wider socio-economic benefits.
- **Provides a blended funding model**: this combines public funding (government) and outcome-seeking funding, with profit-seeking private investment, and
- **Generates revenues**: that can be used to **fund the programme** (repayable finance) **and removes the need for individual residents and asset owners to personally fund the significant costs of decarbonisation**, and providing household incentive to participate (energy cost savings).

As a result, the 3Ci NZN programme provides a pathway to supporting the UK's Net Zero Strategy, overcoming existing barriers to change, and achieving the target of net zero by 2050.

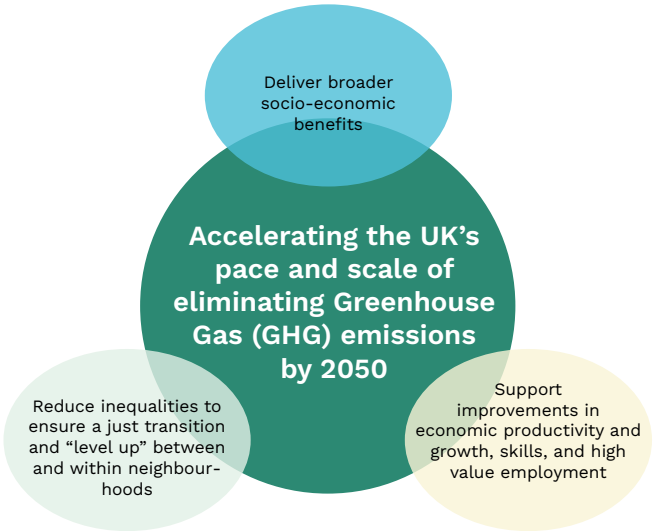
The spending objective

The strategic (spending) objective of the 3Ci net zero place-based, multi-intervention programme is: "*accelerating the UK's pace and scale of eliminating greenhouse gas (GHG) emissions by 2050*".

The spending objective (and other SMART objectives) was developed in the SOBC in response to the overarching policy directive in the UK of achieving net zero by 2050, but was refined in response to the current trajectory of net zero interventions in the UK (as reflected on in section 3.4 of the SOBC).

The strategic context, policy environment and net zero trajectory has not changed since the SOBC and, as a result, has determined that the spending objective remains as per the SOBC and **is therefore still valid for the OBC**.

Figure 10: Strategic objectives and co-objectives



Summary and next steps

The UK government has a net zero policy and strategy to achieve net zero by 2050, highlighting its commitment to addressing climate change impacts. Whilst the policy and strategy are in place, gaps remain in relation to actual delivery, instruments and interventions available that will foster further progress in achieving the target. This is as a result of barriers that exist and continue to persist, such as capacity, coordination, and affordability constraints.

This Strategic Case identified critical success factors that are designed to overcome these barriers. As a result, the 3Ci NZN programme, *a place-based, multi-intervention net zero programme, supported by a blended finance model* and its supporting governance and management structures, provide unlocking features (such as scalability, replicability, and invest-ability, which encapsulate these critical success factors and enable the barriers to be overcome.

The 3Ci NZN programme, with the strategic (spending) objective of "*accelerating the UK's pace and scale of eliminating greenhouse gas (GHG) emissions by 2050*", is the preferred option for significantly contributing to achieving net zero by 2050 from a strategic and policy point of view.

As a result, this OBC will showcase that the 3Ci NZN programme provides the greatest value and affordability to the Exchequer and society as a whole (in the Economic and Financial Cases); and that the delivery mechanisms, the governance and management structures and the procurement framework, among others, have been clearly considered (in the Management and Commercial Cases). Considering the above, this OBC is seeking approval for:

- Further interrogation of the 3Ci NZN programme through a Full Business Case (FBC),
- Asking for £26.9m funding for 3Ci to prepare a selection of fully specified, place-based business cases for investable demonstrators (Phase 3a), and
- Signalling a further ask of between £300 and £500m for the continuation of Phase 3a, including expansion of the support structures and actual implementation of demonstrators, and further design, selection, and implementation of additional demonstrators (Phase 3b).

Economic Case

Introduction

This Economic Case aims to provide objective appraisal of the 3Ci place-based, multi-intervention, blended finance delivery model using the proposed benefit-resulting interventions described in the Strategic Case. To this end a proxy neighbourhood has been chosen so that quantitative and qualitative analysis and a value for money assessment can be carried out at a project level. It is important to note that it is not possible to model all the benefits and interventions described in the Strategic Case and that the costs and benefits at a project level are not necessarily synonymous with those at a programme level, but rather, provides an indicative value of net benefits possible at a programme (nationwide/ societal) level. We explore this at the end of this section. Further to this, the Economic Case does not justify the ask of this OBC, which is funding for the group of demonstrators and the full business cases, but instead provides evidence to support the benefits claims made in the Strategic Case for the programme as a whole. The justification for the demonstrator funding is made in the Strategic and Financial Cases.

This Economic Case provides evidence that public sector investment in 3Ci NZN projects (place-based (neighbourhood level), multi-intervention initiative, supported by a blended-finance model) is value for money and could secure significant private sector investment thereby reducing the burden on the public purse. As such it supports the claim that the overall 3Ci NZN programme could support the UK Net Zero Strategy in accelerating the pace and scale of decarbonisation and meeting its net zero targets, whilst ensuring government spending captures a wide range of socio-economic benefits, is value for money, and delivers a transition to net zero that is equitable. It also highlights the scale of private sector investment that can be secured with the 3Ci approach and the significant savings to the public purse that this implies.

Identification of the preferred option

The Green Book, issued by HM Treasury, requires an Economic Case to identify the proposal that meets the strategic objectives of the programme whilst delivering the best public value to society. This preferred option is usually identified by appraising a short list of options. However, the preferred option (the 3Ci NZN programme) has already been identified in the SOBC and ratified in this OBC Strategic Case.

This was done through the structured design process that sought to mitigate the wide range of barriers to change that are currently hindering large scale rollout of net zero initiatives and the decarbonisation of the economy. The identification of these barriers fed into the development of critical success factors that a successful delivery model would need to satisfy. A corresponding set of ‘unlocking features’ were developed and incorporated into the detailed design of the 3Ci delivery programme.

As a result, the Strategic Case has argued that the 3Ci NZN programme is the preferred option and could provide actionable and tangible progress in support of the governments Net Zero Strategy by providing an instrument (the 3Ci NZN programme) that will accelerate the delivery of decarbonisation interventions and reach the 2050 net zero target.

What the Economic Case will show

This Economic Case focuses on appraising the preferred option, both quantitatively and qualitatively, and demonstrating that the investment required from the government by the 3Ci NZN programme is value for money. Although, as discussed in as discussed in the Economic Case introduction, the appraisal is carried out at project rather than a programme level.

The theoretical framework on which the cost benefit analysis is built explores how the public and private sectors are treated within the economic modelling; the business as usual (BAU) (counterfactual) against which the project has been compared; and the geographical level at which the appraisal takes place (the proxy-place). The proxy place that has been chosen and its justification as a suitable study area is described.

The benefits themselves are then explored. To ensure the widest range of benefits are appraised, a benefits mapping exercise has been carried out for all of the initiatives proposed in the programme. Each benefit is explored individually explaining the theory of change and providing a narrative. Where possible, the benefits are monetized so they can be included in a value for money assessment. The assumptions are then outlined and justified.

Finally, a cost benefit analysis is carried out and values for the net present social value (NPSC) and the benefit cost ratio (BCR) are presented.

The preferred option: The interventions

The OBC appraises the full range of initiatives being proposed by the 3Ci NZN programme, the preferred option. On the basis of these, a benefits mapping exercise was carried out to ensure the widest possible range of benefits were captured. Further detail of the actual interventions, inputs, and assumptions are captured below, but the following provides a brief introduction to the neighbourhood interventions reflected on:

- **Building retrofit**: This includes a mix of interventions in domestic and non-domestic buildings such as solar PV and battery installation, fabric first insulation and replacement of gas boilers with heat pumps. This is the most significant intervention as part of the proposed net zero delivery model, since reduction in energy demand and the associated energy bill savings generates a revenue stream for the private investors, reduces GHG emissions, and provides cost savings and other wider benefits to the residents, such as health and improved air quality.
- **Green infrastructure**: Assumes planting trees or other green interventions linked to the respective ecology and typography of the "place". These are rich in co-benefits such as carbon sequestration, biodiversity enhancements, flood prevention, health benefits, and community well being. In this OBC, planting of trees has been used for the green infrastructure benefit.
- **Transport interventions**: This includes possibilities of "active travel" retrofits and infrastructure such as cycling and walking lanes and bicycle sheds, but also assumes technological changes such as electric vehicle charging infrastructure, electric buses and car sharing schemes. In this OBC, electric vehicle (EV) charge points and bike-hangars are assumed to be installed. This is assumed to stimulate more trips using these modes of transport whilst replacing trips made in vehicles fuelled by internal combustion engines (ICE). This leads to a reduction in GHG emissions, a reduction in pollutants and improvements in health.
- **Waste interventions**: This includes the provision of household waste management, such as waste collection and sorting infrastructure, facilities for the pre-treatment of waste prior management, facilities for processing food wastes and textiles, among others. In this OBC, since these types of interventions may be very community-specific and driven, we have not captured any monetisable benefits, but only estimated costs. However, the main benefits associated with these measures will be a reduction in emissions associated with the production of goods and other benefits associated with the circular economy.
- **Blended finance model**: This includes the assumption and inputs (provided from the Financial Case) that significant private sector finance is raised, reducing the public sector subsidy from c. 80% to c. 35%, all things being equal.
- **Place-based, neighbourhood level**: the use of a proxy-place, described in more detail below, highlights the intervention is undertaken at a localised, urban neighbourhood level, with relatively representative characteristics of the UK.

Methodology and approach

Introduction

In this OBC, to determine whether the 3Ci NZN programme provides value for money, a quantitative appraisal is carried out where possible in which a monetary value for the costs and the benefits associated with initiatives at a project level are estimated. Where this is not possible qualitative analysis is carried out. The costs and benefits of the preferred option (PO) against a BAU counterfactual is objectively appraised using the principles of welfare economics at a local, neighbourhood level (using a proxy place).

The benefit cost ratio

Ultimately, to judge value for money to the taxpayer, the benefits will be compared to the financial costs to the public sector through the calculation of a benefit cost ratio (BCR). The cost to the public sector is the subsidy required to make the Financial Case viable and unlock the requisite private sector investment. Financial benefits and costs are aligned to the blended finance model described in the Financial Case. The economic modelling uses, where appropriate, both a top down and bottom-up approach. For example:

- **A bottom-up approach**: the current costs and energy demand have been derived from current market prices for each intervention item (e.g.: capital cost for solar PV or heat pumps), while energy demand has been calculated based on existing data on kw/h per sqm, per annum.
- **A top-down approach**: the energy demand trajectory over the life of the project for the BAU scenario is determined using the Department for Business, Energy Industrial Strategy (BEIS) and Emissions Projections (EEP) Net Zero Strategy (NZS) baseline scenario.

A further issue to be considered is the treatment of tax revenue to the Treasury. The roll out of the 3Ci NZN programme will provide additional channels of revenue through the taxation of profits accruing to the private sector and additional income tax revenue associated with additional goods and

services associated with the 3Ci NZN programme as well as additional employment. However, there may be a reduction in tax revenue from energy companies due to the reduction in energy demand and therefore taxable profits. Further to this, there may be a reduction in taxes associated with internal combustion engine (ICE) vehicles (although the principle of such taxes are behavioural rather than income generating). Given this complexity, we avoid quantitative analysis of tax revenue but describe it qualitatively.

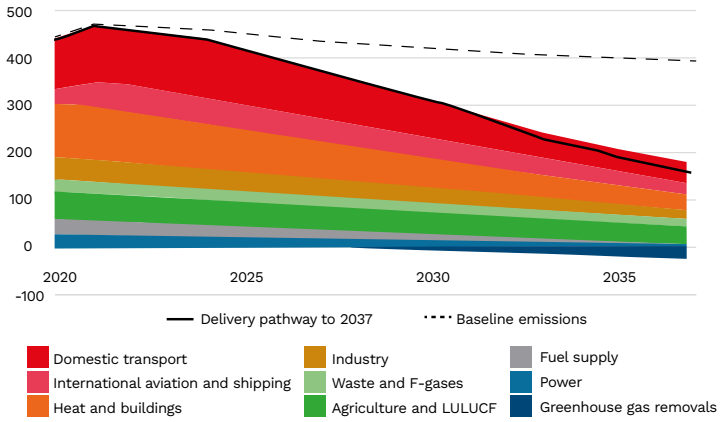
The counterfactual

The Green Book issued by HM Treasury, requires that, when carrying out value for money (VfM) assessment, the preferred option being considered in the Economic Case be appraised against the BAU.

Although we recognise the government's Net Zero Strategy and the net zero targets that have been committed to, there are many policy decisions, government actions, and decarbonisation instruments and initiatives that still need to be implemented to reach the 2050 target[8]. The counterfactual applied to the economic model reflects this, while the 3Ci NZN programme aims to fill this gap and support and deliver the government's Net Zero Strategy.

A core component of the counterfactual used for our modelling are the gas and electricity demand that the buildings within our proxy place will use. **For this we have made use of the BEIS Energy and Emissions Projections (EEP) Net Zero Strategy (NZS) baseline scenario[9] , updated in October 2021**. Effectively, this EEP NZS baseline projections scenario includes " *...only government policies which have been implemented, adopted, or planned*[10] *as of August 2019*". This scenario aligns with the Strategic Case logic and research and is the basis for the BAU. Figure 11 compares the baseline emissions pathway based on the EEP energy demand forecasts with a net zero delivery pathway that the Net Zero Strategy aims to achieve[11].

Figure 11: Indicative delivery pathway to 2037 by sector



Source: BEIS EEP NZS

The proxy-place

In an attempt to make the modelling of the 3Ci NZN programme as real as possible, a proxy-place has been drawn from Leeds City Council using geographic information system (GIS) technology. The proxy place methodology attempted to generate a level of diversification in terms of:

- A mix of residential, retail and other commercial, but skewed towards residential.
- Should have around approximately 1000 properties.
- Should have a level of mixed deprivation scores (to be largely representative – i.e. some affluence and some relative poverty.

However, it should be noted that the proxy-place is not an accurate representation of all the cities (urban/rural) in the UK and therefore the economic model results would vary based on the area chosen, but provides a valuable way to test expected impacts.

The table below reflects on land use statistics of the proxy place. The selected neighbourhood is around 6.6 hectares and includes 733 buildings and 1,377 unique properties, of which residential accounts for the largest number of unique buildings and the largest footprint (sqm) in the neighbourhood. The proxy place includes statistics on multiple deprivation levels (which contain weighted items such

8 *https://www.theccc.org.uk/publication/2022-progress-report-to-parliament/*

9 *Net Zero Strategy baseline: covering note - GOV.UK (www.gov.uk)*

10 *This equates to expired, implemented, adopted, and planned policies as defined by the United Nations Framework Convention on Climate Change (UNFCCC), see Part II, Section V(A) paragraph 13, page 83. This is a UNFCCC 'with additional measures' (WAM) scenario. Annex D gives details of the policies we include.*

11 *A combination of sector modelling and the BEIS Energy and Emissions Projections (EEP)18 are used to project the baseline future emissions*

as crime, employment, income, and health deprivation). As can be seen, the proxy place covers three of the five quintiles, with the top quintile (least deprived) and the fourth quintile (second most deprived) not included. The percentage of unique properties under all three 3 reflected quintiles are almost equally distributed. (The economic modelling uses 1,323 buildings as its base, made up of commercial, retail and residential properties, as per the table below).

Table 2: Land use of proxy place

Land use	Number of unique properties	Building area (m^2)	Number of buildings	% Of total unique properties	% Of total area
Commercial	84	3,933	9	6.1%	6.0%
Retail	222	8,637	25	16.1%	13.1%
Residential	1,017	46,627	692	73.9%	70.7%
Other (e.g. vegetation)	54	6,730		3.9%	10.2%
Total	**1,377**	**65,927**	**733**	**100%**	**100%**

Key inputs and assumptions

The economic modelling is based on principles, guidance and values set out in the Green Book supplementary guidance on valuation of energy use and greenhouse gas emissions (GHG or CO2e) as well as some high-level assumptions. It is to be noted that the economic modelling is based on the proxy place and so the monetary values of benefits and costs refer to this proxy place (of 1,323 properties). The following interventions have been modelled to assess the economic impact on the society as a whole:

- **Building retrofit**: This includes insulating properties through fabric retrofit, installation of heat pumps, solar PV and more energy efficient lighting.
- **Green infrastructure**: This includes planting trees in communal green areas.
- **Transport interventions**: This includes the provision of bike storage facilities in the neighbourhood and technological changes like provision of electric charging infrastructure.
- **Waste intervention**: This includes the provision of household waste management, such as waste collection and sorting infrastructure, facilities for the pre-treatment of waste prior management, facilities for processing food wastes and textiles, among others.

The appraisal period is 40 years from 2024, the year after implementation. Future benefits are discounted to account for social time preference, the value that society places on the present over the future, as per Green Book guidance[12]. It is to be noted that the Green Book supplementary guidance recommends using the long-run variable cost (LRVC) to value change in energy use instead of retail prices, which are inclusive of carbon cost. However, it is not clear if the retail prices consider the full cost of carbon. As the key feature of the programme is the reduction of energy bills which makes the model lucrative to investors, it makes sense to use the retail prices to measure the financial benefits even though this might lead to a risk of double counting, as the model also measures the impact on GHG emission using carbon values separately. Some of the key inputs and assumptions used in the economic modelling are set out in Tables 5-9 below.

Table 3: Basic parameters used for modelling

Assumptions	Description
Scheme opening year	2024
Appraisal year	2022
Appraisal period	40 years post scheme opening (2024-2063)
Price and discounting base year	2022
Discount rate	3.5% for the first 30 years and 3% for the rest of the 10 years in accordance with TAG Unit A1.1 and the Green Book guidance

12 *https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1024054/1.Valuation_of_energy_use_and_greenhouse_gas_emissions_for_appraisal_CLEAN.pdf*

Assumptions	Description
Retail gas and electricity prices for all properties	The model uses BEIS energy prices (central, 2020 values) as the base case. This is sourced from the Green Book supplementary appraisal guidance on valuing energy use and greenhouse gas (GHG) emissions.
Carbon conversion factors for electricity and gas	Factors sourced from the Green Book supplementary guidance data table provide by BEIS.
Carbon values for appraisal	2020 values sourced from the Green Book supplementary guidance data table provide by BEIS.
Air quality damage costs from primary fuel use	2020 values sourced from the Green Book supplementary guidance data table provide by BEIS.
Distributional uplift factor of 0.16	Based on the DLUCH methodology, and applied for the proxy-place.

Table 4: Building retrofit assumptions

Assumptions	Description
Average property size	90 square metres.
Number of unique properties	The selected proxy neighbourhood houses 1,323 properties - mix of residential and light commercial/retail.
Annual thermal energy required pre-retrofit	124 kWh per meter square.
Gas boiler efficiency	82%
Annual thermal energy required post fabric-first retrofit	62 kWh per meter square.
Heat pump seasonal coefficient of performance (SCOP)	3.0
Number of panels in a solar PV	10
Power of each panel	320 W
Efficiency of the solar panel	80%
Annual PV generation per kW in the UK	900 kWh/kW
Annual electricity demand	40 kWh per metre square.
Annual electricity demand after replacing light bulbs with lower energy alternatives	35 kWh per meter square.
Energy bill savings	The savings on the energy bill gets divided between the residents, investors and maintenance fund/OpEx in the proportion 45%, 34%, and 21% respectively.
Energy demand of counterfactual	Use the EEP gas and electricity demand forecasts from BEIS (last published in October 2021).
Take up rates for counterfactual	Use the FES “Falling Short” scenario to model intervention take up rates[13]. Similar to the EEP energy demand projections, this scenario falls some way short of net zero targets.

13 *https://www.nationalgrideso.com/future-energy/future-energy-scenarios*

Table 5: Green infrastructure assumptions

Assumptions	Description
Size of the existing communal green space	6,730 square metres. This includes vegetation and parks in the proxy neighbourhood.
Proportion of the green space available for planting trees	This is assumed to be 20% as that is the minimum canopy cover council wards should aim for as per the Woodland Trust UK.
Annual carbon dioxide equivalent sequestration	Assuming 5.75 tonnes of carbon sequestration per hectare for an average woodland based on the Enabling a Natural Capital Approach (ENCA) Services Databook.
Green infrastructure amenity benefit	Values sourced from the Department for Communities and Local Government (DCLG) appraisal guidance.

Table 6: Active travel (bike storage) assumptions

Assumptions	Description
Number of existing cycling trips	32 trips per day. This has been estimated using the propensity to cycle tool.
Proposed number of bike storage	125 bike storage. Each unit accommodates 3 bikes.
Number of trips with the proposed intervention	Using assumption of only 20% of the space being used by new cyclist. 80% of the space would be unused as some people would not use it or might park elsewhere.
Current cycling infrastructure for this route	On-road segregated cycle lane. High-level assumption.

Table 7: EV charging assumptions

Assumptions	Description
Existing EV vehicle uptake rate	In line with the National Grid Future Energy Scenarios[14] (FES) Falling Short scenario. Like the EEP energy forecasts, this scenario falls short of national targets. Evidence suggests addressing a lack of EV charging infrastructure can help increase EV uptake[15].
Do something EV uptake rate	In line with the midpoint between the FES falling short scenario and the FES consumer transformation scenario, which achieves net zero scenario.
Average distance travelled by each ICE vehicle	7,400 miles per vehicle per year[16]
Amount of fuel burnt by ICE vehicles	38.8 miles per gallon of petrol[17]

14 *About FES - FES 2022 | National Grid ESO*

15 *https://researchbriefings.files.parliament.uk/documents/CBP-7480/CBP-7480.pdf*

16 *https://www.nimblefins.co.uk/cheap-car-insurance/average-car-mileage-uk*

17 *https://www.nimblefins.co.uk/cheap-car-insurance/average-mpg#:~:text=The%20average%20MPG%20for%20cars%20in%20the%20UK,UK%20all-electric%20car%20gets%20a%20whopping%20132%20MPGe.*

Economic benefits

Overview

The purpose of this appraisal is to gauge the potential economic benefits and costs, as an indicative basis for considering how the scheme might contribute to an overall value for money assessment. The implementation of multi-intervention measures in a neighbourhood will deliver both direct financial benefits as well as other benefits to the residents, environment, and the wider society as outlined in the table below:

Table 8: Economic impacts

Benefit type	Intervention	Description	Quantitative/Qualitative
Direct financial benefits	Building retrofit	Energy cost savings for occupants.	Quantitative
	Building retrofit	Energy cost savings recouped by private investors.	Quantitative
	Building retrofit	Revenue for asset replacement and maintenance fund	Quantitative
	Building retrofit	Gas boiler maintenance savings for occupants.	Quantitative
Other benefits	Building retrofit	Sequestered GHG emissions.	Quantitative
	Building retrofit	Improved air quality and health impacts.	Quantitative and qualitative
	Building retrofit	Employment benefits.	Quantitative
	Building retrofit	Fuel poverty alleviation.	Qualitative
	Green infrastructure	Reduced GHG emissions.	Quantitative
	Green infrastructure	Amenity benefit	Quantitative
	Active travel (bike storage facilities)	Health, environment, ambience, accidents, and congestion benefits associated with improving cycle parking facilities.	Quantitative
	Electric vehicle charging infrastructure	GHG emissions avoidance	Quantitative
	Waste intervention	Avoidance of consumption emissions	Qualitative

A significant majority of the benefits come from two sources, the reduction in energy bills from households and commercial properties and the value of avoided GHG emissions. The reduction in bills make up approximately 45% of the positive benefits estimated in the modelling (excluding the private sector CapEx negative benefits) and avoided emissions comprise 35%. Another significant source is employment benefits, which make up 10%.

Direct financial benefits

The direct financial benefits comprise the impact on energy bills and maintenance costs for the building occupants, as well as the share of cost savings recouped by the private sector as revenue. The delivery of retrofit measures will result in energy bill savings of £32.8m overall, of which, £14.6m will accrue to the resident of the property, £11.2m to the private investor and £7m will go towards the asset maintenance fund and operating cost. This includes £2,590 of gas boiler maintenance savings associated with the replacement of gas boilers with heat pumps.

Although not quantified in the model at this stage, it is to be noted that a reduction in the energy bills would also have implications for the private energy providers as well as the UK government. Reduced energy use by the residents would result in less revenues earned by the energy providers, which might further reduce the taxes (on profit) paid by the energy providers to the government. However, the savings on energy bills for the residents will also result in a higher disposable income which could be used to consume additional energy and purchase other goods and services, thereby generating tax revenue for the government.

Benefits: Distributional uplift

The value of an additional pound of income/ consumption is higher for low-income individuals due to the marginal utility of consumption. Because the proxy place we have selected has a lower average income that the UK, we apply an income-based distributional uplift factor of 0.16 to the household energy cost savings, which results in additional benefits of £2.4m. **This is a benefit specific for the chosen location, it would not apply to a programme level analysis**.

Benefits: GHG emission avoidance and air quality impact

The overall reduction in energy consumption associated with retrofit measures also provides various benefits to the environment and society. Carbon conversion factors and carbon appraisal values provided by Department for Business, Energy & Industrial Strategy (BEIS) as part of the Green Book supplementary guidance were used to derive the value of GHG emissions avoided. These are estimated to be around £25.6m and make up for the largest share of non-financial benefits.

The lower energy consumption also impacts the air quality which has been estimated using the air quality "damage cost" approach in accordance with the Green Book guidance. This cost primarily values health impacts (including mortality and morbidity), but also includes non-health impacts. These costs are applied to the reduction in energy consumption to derive the air quality damage cost savings of £0.7m. Although not fully quantified, it is recognised that insulating a building and providing good ventilation can result in improved physical and mental health of the occupants. Studies have shown that retrofit measures can positively change the mood and quality of life of the occupants, thereby improving their mental health. Cold housing has an adverse impact on the occupants in terms of cardiovascular and respiratory morbidity and on the elderly in terms of winter mortality, which energy efficiency intervention such as retrofit measures can improve[18].

The provision of green infrastructure consists of planting trees on a 0.13 hectare of green communal space and results in carbon sequestration valued at £5,250. This also provides certain amenity benefits to the residents of the neighbourhood which is valued at £0.3m, using amenity benefit values from the Department for Communities and Local government (DCLG) appraisal guidance.

Benefits: Fuel poverty alleviation

The government uses a low income low energy efficiency (LILEE) indicator to measure fuel poverty in England. Under this indicator, a household is considered to be fuel poor if:

- they are living in a property with a fuel poverty energy efficiency rating of band D or below, and
- when they spend the required amount to heat their home, they are left with a residual income below the official poverty line.

The following three elements determine the fuel poverty status of a household:

- household income
- household energy requirements and
- fuel prices

Rising energy cost and energy-inefficient homes tend to adversely impact the economic status of low-income households who struggle to sufficiently heat their homes. Delivering retrofit measures to domestic properties provides a strong opportunity to help alleviate fuel poverty for the households as energy efficiency has been the key driver in reducing the share of homes in fuel poverty every year since 2010[19].

Benefits: Job creation

The impact of implementing retrofit measures on job creation has been analysed to provide estimates on additional jobs created in the neighbourhood and the value of those additional jobs.

The methodology is based on the Green Book issued by HM Treasury. It uses regional construction gross value added (GVA) and employment figures to derive an (sterling value) output per worker. The proposed capital spend is divided by the output per worker to generate a gross employment figure. This gross figure is then adjusted to full employment equivalents (FTE) and filtered for additionality using the following the Green Book guidance:

- **Deadweight**: the proportion of benefits (jobs) which would have occurred anyway in the absence of the project.
- **Displacement**: the proportion of benefits (jobs) that reduce jobs elsewhere in the target market/area.
- **Leakage**: the proportion of benefits (jobs) accruing to those outside the area of impact.
- **Substitution**: where a firm substitutes an existing employee with a jobless person to account for public sector assistance.
- **Multiplier**: further economic activity due to income and suppliers associated with the project and longer-term dynamic effects.

The factors applied for the above variables have been taken from research and guidance from the DLUCH as well as ONS input-output employment multipliers. Some of the inputs, including the factors used were further adjusted as a **conservative approach to ensure only additional jobs are accounted for**. This includes adjusting the employment output bias factor (derived from regional construction GVA and employment) by 1.5x in order to ensure fewer, but more skilled jobs are accounted for in the model, and changing the multiplier to reflect 0% instead of the original 250%.

18 *https://pure.ulster.ac.uk/ws/portalfiles/portal/11261680/KIRKLEES_PROJECT_and_COST_BENEFIT_REPORT.pdf*

19 *Annual Fuel Poverty Statistics LILEE Report 2022 (2020 data) (publishing.service.gov.uk)*

Table 11: Job additionality factors

Sub regional (Borough/neighbourhood level)	Guideline/Initial	Adjusted factors
Deadweight (the counterfactual)	40%	40%
Displacement	22%	22%
Leakage	16%	16%
Substitution	3%	3%
Multiplier (ONS)	250%	0%
Output bias factor	*1*	*1.5*

The formula used to derive net additional employment is as follows:

Total gross creation*(1-deadweight)*(1-displacement)*(1-leakage)*(1-subsitution)*(1+multiplier)

This approach provides 1) a net additional employment (full time equivalent, or FTE) figure of 136 additional jobs, of which 131 are immediate (year 1) CapEx related, and five are expected to be ongoing, annual maintenance related, as a benefit of using a place-based approach. In addition, using the Green Book suggested weekly income earnings and adjusting for weighted income earnings based on the proxy-place statistics; the Economic Case provides 2) a value of additional annual earnings of £7.2m over the appraisal period. The benefits associated with job creation are place-based benefits and so are included in the adjusted benefit cost ratio (BCR) but not the core BCR. Although the local area benefits from the additional jobs, the wages received and the indirect effects through supply chains and additional spending in the local economy, it is assumed there is no additionality at the UK wide level. This is because the appraisal should be agnostic to the macro effects of government spending as per the Green Book guidance.

Benefits: Active travel infrastructure

The impact of active travel interventions is assessed using DfT's active mode appraisal toolkit (AMAT) which calculates the value of benefits based on a set of inputs around the existing and proposed active travel trips and infrastructure. The provision of 125 bike storage units (three bikes per unit) in the neighbourhood would encourage more cycling trips in the area. It is assumed that each additional bike space can result in an additional cycling trip. However, to keep the estimates very conservative, it is assumed that only 20% of the 375 additional bike parking spaces will translate into new cycling trips. This will result in benefits of £2.2m ranging from health (reduced absenteeism and risk of premature death) to improved local air quality and journey ambience, less noise, and reduced congestion.

Benefits: Electric vehicle charging infrastructure

It is assumed that the comprehensive rollout of high-quality electric vehicle (EV) charge points in a neighbourhood alongside the promotion that will accompany the neighbourhood scheme will stimulate the uptake of EV vehicles[20]. These additional EVs are assumed to replace vehicles powered by internal combustion engines and the trips that they make, thus reducing GHG emissions. For the counterfactual we used the uptake rate used to model the 'falling short' scenario. This is a scenario, similar to the EEP energy forecasts, in which the UK falls short of net zero targets. For the intervention, the up-take is rate is modelled using the FES EV uptake rates that are publicly available[21], and is the mid-point between the 'falling short' scenario and consumer transformation. The estimated NPV of this benefit is £1.2 million.

Benefits: Waste-related interventions

Waste benefits have not been quantified and monetised in this OBC as a result of the variety of potential interventions that could be implemented at a household and community level. Table 11 provides a list of possible interventions:

Table 12: List of possible waste related interventions

Intervention	Description
Recycling banks	"Bring banks" are large bins placed in accessible locations around local communities to collect materials which are not collected via kerbside e.g. clothes
Drinking water fountains	Installation of drinking fountains/bottle filling fountains around the community
Community composting facilities	Can be in the form of "bring sites" or composting/community groups running kerbside collection[22] for example. Local residents can use the compost created.
Repair café	A community initiative event where volunteer craftspeople help fix broken household items for free, or host swap events.

Source: Eunomia

20 *https://researchbriefings.files.parliament.uk/documents/CBP-7480/CBP-7480.pdf*
21 *https://www.nationalgrideso.com/future-energy/future-energy-scenarios/archive*
22 *Community Composting - www.carryoncomposting.com*

However, costs have been modelled, based on an estimated average cost per neighbourhood, referenced from the Financial Case.

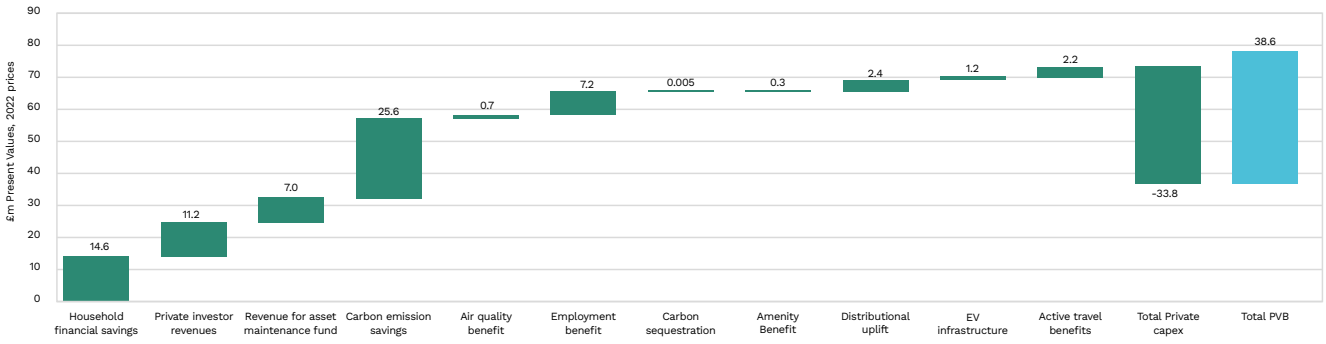
Qualitatively, there are several benefits from waste interventions at the neighbourhood level, which are reflected on below (as cited from a government review of waste policy)[23]:

- Reduces demand on finite natural resources and the associated environmental impacts of the extraction, harvesting, and processing of those resources.
- Minimises GHG emissions associated with the production of goods by reducing demand for goods.
- Minimises GHG emissions associated with the processing of waste through waste collection, transportation and treatment.
- Reduces local authority waste management budget due to decreased quantities of waste.
- Encourages social inclusion and economic development through creating jobs, volunteer schemes, and training opportunities, as well as improving access to reduced price goods for lower income families; and
- Frees up consumers' financial resources for potentially more economically productive endeavours - consuming less will use fewer financial resources to purchase products that become waste.

Total present value of benefits

The overall present value of benefits (PVB) of the project is £38.6m (2022 prices, discounted). These represent the additional benefits associated with the proposed 3Ci NZN programme in comparison with the counterfactual. The components of PVB are shown in Figure 8. All figures presented here are discounted, in 2022 prices and summed over the 40-year appraisal period. The private sector capital expenditure has been included here as a negative benefit in line with the Green Book guidance.

Figure 12: Present value of benefits



Economic costs

The delivery of this project will require capital investment as well as some operating cost. Capital expenditure (CapEx) includes the large, but one-off expenditure required to fund the interventions themselves which can then generate financial and other benefit returns. It is anticipated that this expenditure would be incurred in the year 2024.

The operating expenditure consists of costs for asset maintenance & replacement, and the cost to run the fund structure itself. These costs are all funded by the revenues generated within the financial model. In the economic modelling, these costs are equivalent to the proportion of savings on energy bills that is allocated to the asset maintenance & replacement fund and therefore the amount is shown in the cost side, as well as the benefits side.

Given that the capital expenditure (OpEx) for this project would involve both private sector investment and public subsidy, it is to be noted that in this appraisal the present value of costs (PVC) represents the impact on the public budget and therefore excludes costs that are borne by private sector firms, as these costs do not affect the (HMT) budget. Costs to the private sector are included as dis-benefits. The model assumes that 40% of the capital expenditure would be incurred by the public sector and 60% by the private sector. This split has been derived from the financial model.

23 *Government review of waste policy in England 2011 - GOV.UK (www.gov.uk)*

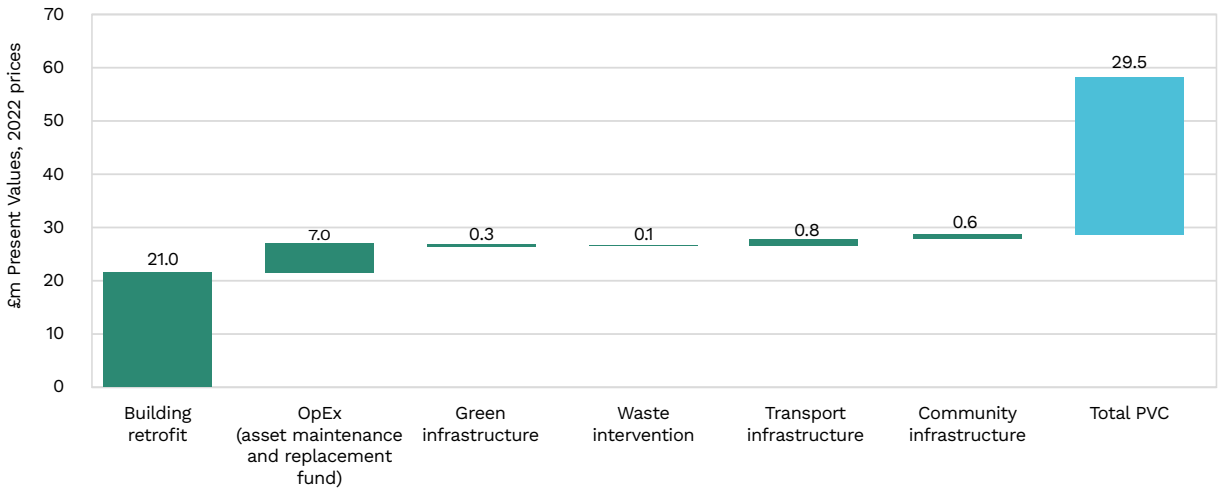
The details around the nominal cost estimates are outlined in the Financial Case. The cost used for the economic appraisal are further adjusted to consider the following in compliance with the transport analysis guidance (TAG) guidance:

- Real cost of inflation per annum on capital costs only (+2.1%)
- Optimism bias on capital costs only (+25%): Given a range of interventions modelled, the optimism bias has been calculated by applying the rates given in the Green Book supplementary guidance[24] for standard buildings and standard civil engineering to the weighted average capital cost of building and non-building interventions, respectively.

The capital investment cost used in the appraisal after accounting for the above is £21m for building retrofit, £34.5k for green infrastructure, £0.1m for waste related intervention, £0.8m for transport intervention (including EV and active travel infrastructure) and £0.6m for community CapEx.

The operating expenditure for building retrofit is £7.0m. The overall present value of costs of the project is £29.5m (2022 prices, discounted). The components of PVC are shown in Figure 9. All figures presented here are discounted, in 2022 prices and summed over the 30-year appraisal period.

Figure 14: Present values of cost



Results

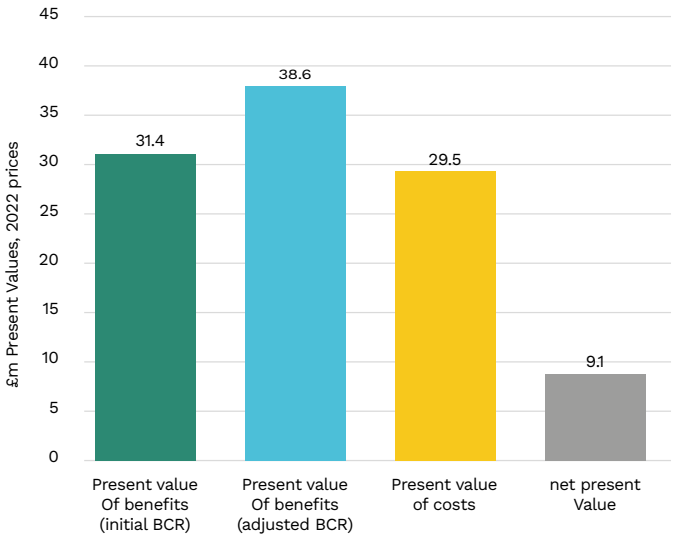
This section provides a summary of the economic modelling results, combining all of the costs and benefits.

The results, as summarised in Figure 12 and table 12 below, indicates:

- An overall positive net present value (NPV) of £9.1m.
- An initial benefits cost ratio (BCR) (which excludes employment benefits) of 1.1.
- And adjusted BCR (including employment benefits) of 1.3.

Given the nature of the assumptions, some caution is required when interpreting the results, but this analysis helps to give an idea of the scale of impact that might be observed. As a result, these outputs are further stress-tested below in the sensitivity analysis section.

Figure 15: Overall economic impact



24 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/191507/Optimism_bias.pdf

Table 13: Overall economic appraisal summary

	£m, 2022 values
COSTS (Public sector CapEx)	
Building retrofit CapEx	21.0
Green infrastructure CapEx	0.0
OpEx (Asset maintenance and replacement fund)	7.2
Waste intervention CapEx	0.1
Transport intervention CapEx	0.8
Community Infrastructure CapEx	0.6
Total PVC	**29.8**
BENEFITS	
Domestic retrofit:	
Household financial savings	14.6
Private investor revenue	11.2
Revenue for asset	
Maintenance fund	7.0
Carbon emission savings	25.6
Air quality benefit	0.7
Distributional uplift	2.4
Employment benefit	7.2
Green infrastructure:	
Carbon sequestration	0.005
Amenity benefit	0.3
Transport:	
EV infrastructure	1.2
Active travel benefits	2.2
Private sector CapEx	-33.8
Initial BCR:	
Total PVB	**31.4 million**
Net present value	**£1.8 million**
BCR	**1.1**
Adjusted BCR (including employment impacts):	
Total PVB	**38.6 million**
Net present value	**£9.1 million**
BCR	**1.3**

Sensitivity analysis

To test the robustness of the appraisal results, sensitivity tests have been undertaken. The definition and results of the four sensitivity tests are summarised in the tables that follow.

Table 14: Summary of sensitivity tests

Sensitivity Test	Definition	Impact
BEIS energy prices (central)	This is the assumed base case in the model which uses BEIS energy prices (central case).	• PVB : 38.6m. • NPV at 9.1m. • Initial BCR at 1.1, and • Adjusted BCR at 1.3.
beis energy prices (high)	This tests the impact of using the high range of BEIS energy price.	As a response to the high energy prices: • NPV increases to 13.1m compared to 9.1m in the base case. • The initial and adjusted BCR increases to 1.2 and 1.4 respectively.
current market prices	This tests the impact of using very high energy prices that are estimated by performing external analysis on the current energy price scenario.	As a response to the impact of (market estimate) high energy prices, • NPV increases to 32.1m compared to 9.1m in the base case. • The initial and adjusted BCR increases to 1.7 and 1.9 respectively.
capex optimism bias (high)	This tests the impact of increasing the optimism bias on capital costs to 40%.	As a response to the increase in the capital cost, • NPV decreases to 2.5. • The initial and adjusted BCR decrease to 0.9 and 1.1 respectively.
capex optimism bias (high)	This tests the impact of decreasing the optimism bias on capital costs to 20%.	As a response to the decrease in the capital cost, • NPV increases to 11.5. • The initial and adjusted BCR decrease to 1.1 and 1.4 respectively.

Table 15: Results of sensitivity tests

	BEIS energy prices (central)	BEIS energy prices (high)	Current market prices	CapEx Optimism bias (high)	CapEx Optimism bias (low)
COSTS (public sector CapEx)					
Building retrofit CapEx	21.0	21.0	21.0	23.4	20.1
Green infrastructure CapEx	0.03	0.0	0.0	0.0	0.0
OpEx (Asset maintenance and replacement fund)	7.0	8.0	12.7	7.0	7.0
Waste intervention CapEx	0.1	0.1	0.1	0.2	0.1
Transport intervention CapEx	0.8	0.8	0.8	0.9	0.7
Community infrastructure CapEx	0.6	0.6	0.6	0.7	0.6
Total PVC	**29.5**	**30.5**	**35.2**	**32.2**	**28.6**
BENEFITS					
Domestic retrofit					
Household financial savings	14.6	16.6	26.5	14.6	14.6
Private investor revenue	11.2	12.8	20.3	11.2	11.2
Revenue for asset					
Maintenance fund	7.0	8.0	12.7	7.0	7.0
Carbon emission savings	25.6	25.6	25.7	25.6	25.6
Air quality benefit	0.7	0.7	0.7	0.7	0.7
Distributional uplift	2.4	2.7	4.3	2.4	2.4
Employment benefit	7.2	7.2	7.2	7.2	7.2
Green infrastructure					
Carbon sequestration	0.01	0.0	0.0	0.0	0.0
Amenity benefit	0.3	0.3	0.3	0.3	0.3
Transport					
EV infrastructure	1.2	1.2	1.2	1.2	1.2
Active travel benefits	2.2	2.2	2.2	2.2	2.2
Private sector CapEx	-33.8	-33.8	-33.8	-37.8	-32.4

	BEIS energy prices (central)	BEIS energy prices (high)	Current market prices	CapEx optimism bias (high)	CapEx optimism bias (low)
Initial BCR					
Total PVB	**31.4**	**36.3**	**60.1**	**27.4**	**32.8**
Net present value	**1.8**	**5.8**	**24.9**	**-4.8**	**4.2**
BCR	**1.1**	**1.2**	**1.7**	**0.9**	**1.1**
Adjusted BCR					
Total PVB	**38.6**	**43.6**	**67.3**	**34.7**	**40.1**
Net present value	**9.1**	**13.1**	**32.1**	**2.5**	**11.5**
BCR	**1.3**	**1.4**	**1.9**	**1.1**	**1.4**

The Economic Case and programme level results

The analysis carried out within this Economic Case has been at a project level focusing on an identified proxy place which includes initiatives that would typically be implemented in a Net Zero Neighbourhood. This local scale allows the analysis to be based on core criteria of the 3Ci NZN programme, including being place-based. Given that there are significant nuances at local level, including demographic, geographic, cultural, rural/urban, social and economic activities, among others, it is understood that a programme level/nationwide economic assessment is not a simple linear extrapolation of the proxy-place model described above. However, the proxy-place modelling does, at least, give an indication of broad and positive net benefits that could materialise on average at a nationwide level, as a result of the 3Ci NZN programme intervention. In addition to this note, the Financial, Management and Commercial cases reflect on possible constraints at a macro-level.

Summary

The Economic Case evaluates the economic benefits and costs associated the 3Ci NZN programme in comparison with the counterfactual, within the selected proxy place, to determine the extent to which the programme delivers value for money for the public sector and wider society. The appraisal methodology is based on principles and guidance and set out in the Green Book, issued by HM Treasury.

The benefits include direct carbon emissions reductions and financial benefits (energy bill savings) from building retrofit as well as indirect benefits from active travel, waste, and green interventions, which contribute to better physical and mental health outcomes, among others.

Combining all quantifiable costs and benefits, the project delivers an overall positive net present value (NPV). Given the nature of the assumptions, some caution is required when interpreting the results and therefore a range of NPVs (of between £2.5m and £32.1m) and BCRs (between 0.9 and 1.9) have been showcased in the Economic Case to demonstrate sensitivity of the results to certain inputs and assumptions, as well as the stress testing applied to the results.

The analysis helps to give an idea of the scale of impact that might be observed and signal that the 3Ci NZN programme does generate additional value added to society and the Exchequer.

Management Case

Introduction

This Management Case is a focused version of a detailed case for the overall programme which is available separately as required. The focus of the case presented here is primarily on the management of the activities that align with the ask being made. As such it contains:

- A brief discussion of the management concept for the overall programme.
- Details of the management of Phase 3a: demonstrator design.
- Details of the management of Phase 3b: demonstrator implementation.

Programme management outline

The overall 3Ci NZN programme will deliver numerous NZN projects. Both the programme and each project will need management to succeed. The core approach to management of each of these is provided here, with the detailed descriptions available in the full Management Case.

The proposed approach to programme management is based on a set of principles:

- To minimise intermediaries between funders and revenue generation.
- To minimise risk of ownership structure.
- Flexibility to work with authorities of different readiness and capacity.
- Primacy of local authorities in local decision making.
- Primacy of place-based approach, and
- Scalability.

At the heart of the proposed structure are Local/ Regional Authorities (referred to together as Local authorities (LAs) throughout the document for simplicity) and two new, central organisations:

- **A financial organisation that primarily deals with contractual and financial matters**. This is referred to in this paper as the FinCo. It also determines the scale of the programme based on funding availability at any given time and intelligence about the capacity of the market to deliver.
- **An organisation that provides the operational functions of the programme, primarily to support local authorities**, and oversight of NZN projects as an agent for the FinCo. This is referred to in this paper as the OpCo.

The reason for proposing two new organisations is to facilitate the principle of minimising intermediaries between funders and revenue generation. By keeping contracts and flows of finance coordinated by one organisation, the FinCo, the proposition to funders is simple and easy to understand. There is a single entity that can aggregate money from loans and grants, distribute this to the projects, and then collects fees and repay investors.

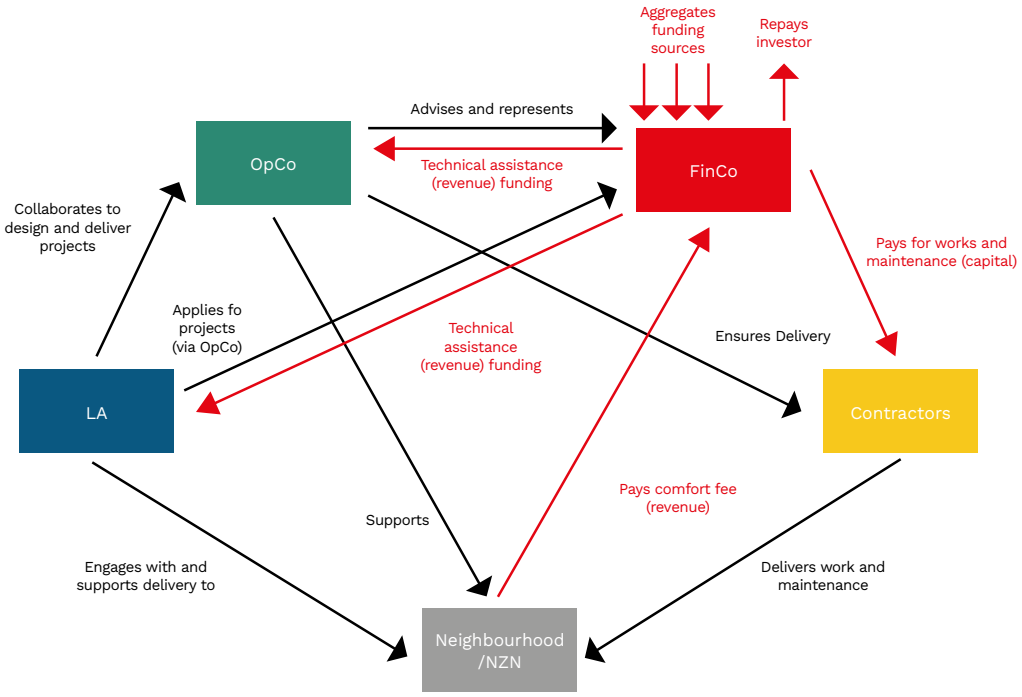
Separating this function from the large and complex operational activities that the OpCo will deliver protects the FinCo from the risks that arise from this. The OpCo could go bankrupt, but the FinCo could still collect fees and repay investors.

This split also enables the FinCo to act as a client to each project, scrutinising it for adherence to criteria. There is the potential for there to be a conflict of interest if the FinCo was also delivering these projects, jeopardising good decision-making and, through this, the reputation of the programme with investors.

This structure also allows there to be multiple models of project collaboration between the OpCo and Local authorities without this impacting the FinCo – the contractual and financial arrangements will be near identical across all design and delivery variants. Again, this simplifies the proposition to investors. It also enables project governance to be flexible.

With this core concept in mind, the diagram in Figure 5 shows the primary actors engaged in the NZN programme and the primary ways in which they relate.

Figure 5: Major entities and interactions (red arrows are flows of money)



Source: Eunomia

The FinCo and the OpCo would evolve through the programme's lifetime. It is anticipated that they would commence being in public ownership to de-risk the programme during the early innovative stages, with the potential for changing ownership once the concept was proven and de-risked.

Phase 3: Proving concept

This OBC (Phase 2) is making the case for two further phases before full programme roll out: Phase 3a demonstrator design and Phase 3b demonstrator implementation. these will then, if successful, be followed by phase 4 programme initiation. the core components of the ask are:

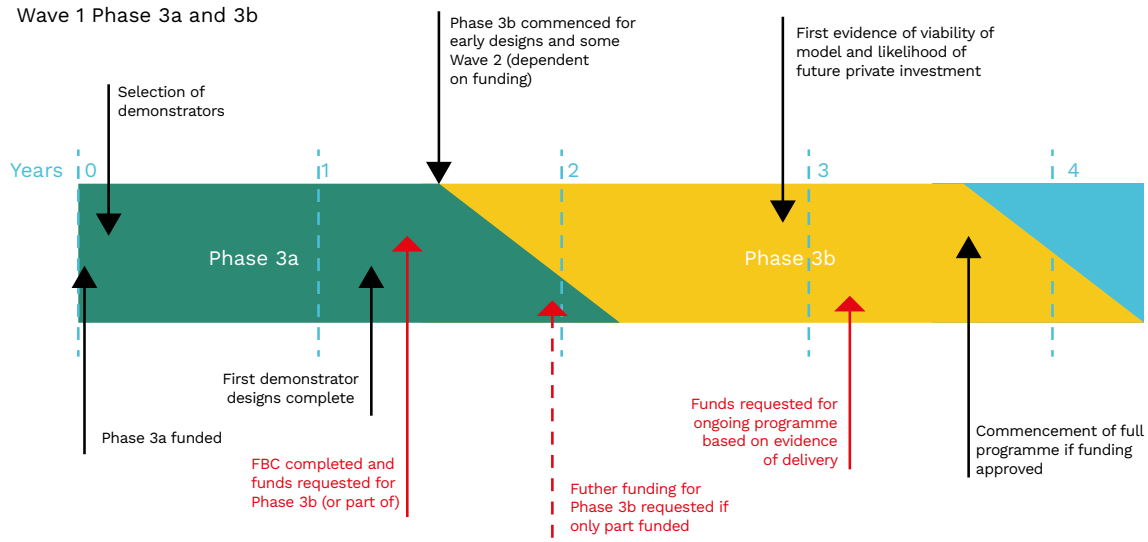
- **Phase 3a**:
  - **Set up central entities and resources** ready to support demonstrator design and implementation.
  - **Wave 1 demonstrators: Selection and design**. This wave of demonstrators will take a group of LAs that are acquainted with the concept and have capacity build to a detailed project design for their NZN with associated business case. This will test the design process and demonstrate where authorities are ready to move to implementation. Once they have reached this point then, if funding is available, they can move to implementation (Phase 3b).
  - **Wave 2 demonstrators: Selection and preparation**. This wave of demonstrators will take a group of LAs that have no background in this model or concept to a position of readiness to commence a design (effectively the position that Wave 1 demonstrators are at for the beginning of phase). This will test the preparation process for LAs.
- **Phase 3b**:
  - **Expansion and operation of central entities**. In particular to be able to deliver full support for implementation of Wave 1 and to solicit private investment following proof of concept.
  - **Wave 1 demonstrators: Implementation**. For those demonstrators that have adequate designs, funding will be provided to implement these. This will test the implementation concept, the support structure proposed, and ideally prove the concept which will generate an investment opportunity and therefore drive the model.
  - **Wave 2 demonstrators: Selection and design**. Wave 2 demonstrators will be selected and funded for support to design their NZNs as in the previous phase for Wave 1.

Both phase 3a and phase 3b have been scheduled to last two years from a budgeting perspective. In reality, some NZN designs will be ready earlier and could progress to phase 3b should funding be available. Implementation times will also vary; however, two years was selected as this time appears appropriate for most (if not all) projects to move to the end of the phase. This then provides a timeframe for funding ongoing expenditure, such as the running of the OpCo and FinCo.

This timing is shown in Figure 6. This shows potential funding asks in red. The timeline gives an indication of timings, but the exact timings will depend on a number of factors including the speed of demonstrator selection and the speed of demonstrator design, the second of which is an unknown quantity.

It is important to recognise that not all designs from Wave 1 have to progress to implementation in Phase 3b, and not all Wave 2 authorities have to progress to design in Phase 3b. What is vital is that enough Wave 1 demonstrators are implemented to prove the model and determine whether full roll-out is appropriate.

Figure 6: Anticipated timeline of activity



Source: Eunomia

Phase 3a: Demonstrator design and implementation preparation

The objective of this Phase is to deliver investment ready NZN designs that are ready for implementation. Separating out the design phase enables Department for Business, Energy & Industrial Strategy (BEIS) to determine whether the designs are fit for purpose and therefore whether the implementation funding should be assigned.

Management of Phase 3a

Phase 3a needs to be centrally coordinated by a single entity to ensure that the demonstrator design is fit for purpose and coordination is achieved. This aligns with elements of the OpCo functions that will need to be established. It is recommended that provision of OpCo functions and coordination of the overall Phase 3a is achieved through the coordinating entity being 3Ci. 3Ci is an entity that is representative of and trusted by Local authorities, maximising the possibility of collaboration. 3Ci would lead some of this work itself and procure support to deliver the other elements.

Table 9 describes the major components of Phase 3a. These comprise multiple activities and will require coordination as they will need to be delivered by multiple parties.

The order of magnitude cost to deliver each of these is provided to justify the ask. These values reflect fixed costs of coordinating the programme, and variable costs that relate to the number of demonstrator designs delivered. It is anticipated that there would be minimal variation in the fixed central costs with the number of demonstrators, unless the demonstrator numbers are vastly increased.

This gives the following:

Fixed centralised costs:	£4.9m
Wave 1 variable costs:	£2m per demonstrator
Wave 2 variable costs:	£0.08m per demonstrator

This gives the following variation if the number of Wave 1 demonstrators is varied:

5 Wave 1 demonstrators:	£16.9m
10 Wave 1 demonstrators:	£26.9m
20 Wave 1 demonstrators:	£46.9m[25]

25 *Though likely to require some additional funding to OpCo functions of c.£1m*

Table 9: Phase 3a core ask components

Component	What is included?	Delivered by	Outcome	Order of Magnitude Cost
Set up and skeleton running of FinCo	Set up of an entity ready to receive funds from multiple sources and develOpContracts with residences; Engagement with potential investors for funding of implementation	3Ci/SPV expert Contractors FinCo once established	FinCo Entity	£0.7m
Set up and initial running of OpCo functions	Set up of technical assistance capacities to support LAs in design and future implementation; Delivery of: Wave 1 and 2 selections; Convening activities; Communications activities	3Ci/technical expert Contractors	Coordinated	£2.5m
Centralised resources	Acceptance criteria; Property contract; Project assessment framework; Payment obligation mechanism; Fund risk register	OpCo function, outsourcing where necessary	Key, reusable resources	£1.7m
Wave 1 detailed design	Design of specific place-based net zero Neighbourhood across 10 authorities. Work packages: Baseline area; Heating; Energy; transport; Green infrastructure; Design coordination; Community engagement; Financial design; Local authority coordination; Design refinement	Local authorities and OpCo in collaboration, outsourcing where necessary	Detailed designs for NZNs	£20.0m (£2.0m per demonstrator)
Wave 2 preparation	Capacity development for 25 authorities	LAs	25 LAs ready to progress a design	£2.0m
Total				£26.9m

Source: Eunomia

The most important of these activities are discussed below in greater detail.

Demonstrator selection (activity of the OpCo function)

Selection of Wave 1 Demonstrators is one of the major activities that will drive the timings of Phase 3a. It is also vital to the potential success of the demonstrators.

The following process is proposed to maximise speed of allocation and to maximise collaboration.

An open call is made to 3Ci members and additional authorities known to be advanced in their thinking and planning on this topic. This open call will highlight the criteria that demonstrators need to meet in order to be ready for funding. These will be:

- Strong understanding of place-based NZN model.
- Existing internal capacity to lead a design (before funding of further full-term equivalents (FTEs) by Phase 3a).
- Provisional place(s) identified with detailed knowledge of area characteristics.
- Member/cabinet support for the NZN project.
- Mapping of existing policy and work and how it interacts with an NZN.
- Some funding in place.

Those authorities that believe that they can meet these broad criteria can then put themselves forward to be a demonstrator. If the number of authorities exceeds the specified number by a small amount, then all will be progressed. If there are fourteen or more applicants, then LAs will be requested to pair up where possible to reduce the total number. Alternatively additional funding may be sought to facilitate some additional Wave 1 demonstrators.

If there is a choice between applicants, the criteria the group should consider around the overall make-up of the cohort should be:

- Demonstration of NZN applied to a majority of building construction types.
- Demonstration of NZN applied to all major property ownership arrangements.
- Coverage of the greatest range of socio-economic groupings.
- Regional distribution across a minimum of five of the 12 regions of the UK, including a minimum of one region outside of England.

Alongside this, the potential to maximise success should be considered. Success is likely to be primarily determined by maximising sign-up. The group of LAs are asked to come to a consensus decision (if there is an excess of applicants). Any authorities missing out should be paired with another authority, whilst additional funding is sought to facilitate the additional designs.

Selection of Wave 2 demonstrators will depend on the numbers that are interested in becoming part of the wave. It is suggested that given the nature of Wave 2, if more than 25 authorities apply, then a lottery is held rather than any competitive assessment.

Wave 1 detailed design

Detailed design will be a collaborative process between Local authorities, the OpCo function, and any additional Contractors either party chooses to engage. £2.0m is identified as required to provide this detailed design. The components of this design are set out in Table 10.

The estimated costings are likely to be higher than would be the case once the programme is established, as design costs can be streamlined, and centralised efficiencies realised. In addition, these have been planned with the intention of ensuring a very high-quality design to maximise the initial chances of success. Once designs have been conducted, there would likely be substantial savings from reducing this headroom.

Each design will require a different balance between OpCo and LA capacities, reflecting each LA's unique situation. This means that it is not yet possible to provide an exact delineation of which design components (and therefore skills) need to be attributed to each organisation. Instead, the balance between the OpCo and the LA will need to be worked out at the commencement of design, with the OpCo confirming the approach and releasing funds accordingly.

However, there will be a core payment to the LA which will provide coverage for core activities. Similarly, there are certain tasks that are highly likely to be led by the LA (such as stakeholder engagement) which have been highlighted in the table.

Table 10: Detailed design components

Design work package	Included elements	Key areas for central assistance	Order of magnitude cost
La coordination	Internal LA capacity; Aligning internal departments as needed; Overall PM of design		£200k
Footprinting and monitoring area	Emissions baseline; Socio-economic profiling; Natural capital baseline	All	£200k
Community engagement	Mapping stakeholders; Resident engagement; Business engagement	Tools for stakeholder mapping	£300k
Procurement plan	Assessment of local capacity to deliver; plan for procurement process of design		£50k
Heating (space and water)	Surveys of buildings; Design of building retrofit and heating systems (heat pump vs heat network); Heat network mapping	Heat network mapping	£300k
Energy generation and distribution	Solar PV location design; Battery and distribution system design; Local grid assessment and design	Battery and distribution system design; Local grid assessment and design	£200k
Transport	EV charge point type and location; Survey of community travel needs; Local active travel infrastructure design	Survey of community travel needs; Local active travel and infrastructure design	£100k
Green infrastructure	Green infrastructure planning and design		£50k
Behaviour change strategy design	Review of engagements with neighbourhood; Plan for engagement during implementation (including methods); Assessment of design factors that will maximise sign-up	All	£100k

Design work package	Included elements	Key areas for central assistance	Order of magnitude cost
Community infrastructure design	Review community assets and gap analysis; Confirmation of proposed infrastructure and testing with neighbourhood; Community infrastructure design		£50k
Financial design	Design of financial offer to residents based on cost of implementation; Design of billing mechanism		£100k
Design coordination	Coordinating above design elements; Designing community infrastructure components; Designing any optional elements such as waste/recycling infrastructure		£150k
Refinement	Design post review		£100k
Contingency			£100k
Total			£2.0m

Source: Eunomia

Legal mechanism to aggregate resident energy savings (payment obligation mechanism)

One of the centralised resources, in particular, is central to this model. This is the implementation of a legal structure which has the outcome of creating a periodic payment obligation on the resident of the property (referred to as the payment obligation mechanism for shorthand). This periodic payment obligation needs to be maintained over a multi-decade period and sustained when owners and/or tenants of the property change. It must be achieved without creating a financial charge on the property in order to avoid a significant deterrent to participation.

While determining the exact mechanism is a core component of phase 3a of this project, initial legal advice suggests this is viable. The conclusions based on the advice received is summarised below, but this summary should not be taken as legal advice.

In addition to considerations regarding suitability in the long term, it has also been taken into account whether changes in law would be needed in order to make the option viable. There are options that could be implemented with no new secondary legislation, making them useable in early pathfinder demonstrators. Others that are perhaps more efficient might require secondary legislation to become usable. The ultimate legal structure may therefore evolve over time.

The three key mechanisms that were considered that do not create a financial charge on the property were:

- Using the pre-existing Green New Deal legislation and financing mechanism to collect the cost of energy efficiency measures through the utility bill. Complexities arise because this legislation was designed to stimulate a private sector market focused on individual house retrofit (with an associated raft of consumer protection) and here it would be applied to a more centralised model. Further investigation is needed to determine whether this gives rise to any difficulties that would necessitate change via secondary legislation.
- Using a local land charge to create a payment obligation to the Local Authority, collected through the Council Tax billing mechanism. Complexities come from potentially placing the borrowing onto local government balance sheet rather than into the funding vehicle.
- Using a deed of covenant to create a direct payment obligation to the funding vehicle subject to a stipulation that requires the original recipient to procure a matching obligation as a condition of transferring ownership of the property. Complexities come from this being unusual in conveyancing and with cost and administration on each change of ownership.

A fourth mechanism was discussed briefly but not included in the written advice, which was whether the legal mechanism by which energy suppliers can recoup the cost of capital equipment, e.g. smart meters, through the standing charge of the utility bill could be adapted at greater scale to recoup the wider energy efficiency costs. This merits further exploration but would likely require secondary legislation.

Table 11: Payment obligation mechanisms

Option	Pros	Cons
1. Green New Deal mechanism	Existing legislation	Complexity of consumer protection components of legislation (required when underpinning private sector solution; not required in NZN model but still subject to these obligations)
	Designed to bind property and successive owners	Would be difficult to avoid using Green New Deal terminology, so means remarketing what was seen as a failed model
	Energy-related cost recovered through energy bill	
2. Local land charge	Designed to bind property and successive owners	Can only create obligation to Local Authority, making off balance sheet funding difficult if not impossible, impacting scale up
	No registration fees	Legislation required to create new category of local land charge
	No admin burden on individual on transfer of title	
	Local land charges common in conveyancing	
3. Deed of covenant	Private arrangement not requiring legislation	Unusual in conveyancing market
	Simple structure	Existing lender will need to consent when first issued
	Will bind property successors	Cost and administration to set up new deed of covenant on each property transaction

Source: BwB and Eunomia

In summary, a deed of covenant may be the most easily implementable structure in the short-term for a demonstrator as it is a private contractual arrangement that requires no secondary legislation, but would require buy in from the major mortgage providers (many of whom are already engaged around this model).

Local land charges may also be a short-term approach, provided that a new land charge category can be created. However, unless a way can be found to back-to-back the income payment to the funding vehicle without creating a consolidated debt on local government balance sheet, that will limit ability to scale the model in the long-term.

Adapting (simplifying) the Green New Deal legislation for a local government-driven centralised model may be the best long-term solution, but would be likely to require more complex secondary legislation.

Viability of delivering Phase 3a

Engagement with multiple authorities has proven that many (primarily core cities and London Boroughs) are engaged in the concept and have an appetite to develop the concept further, with some already committing to developing their own designs. This indicates that it is viable to develop a set of designs with a number of LAs. A list of LAs that are known to be engaged with the concept or active in this space is included in the Extended Management Case.

Alongside LA engagement, there will need to be design expertise to deliver these designs. This will be available as all of the technical solutions are known quantities and there are design experts available across the UK. They can be obtained through Contractors and consultants, or could be brought in-house by LAs and 3Ci with appropriate recruitment. It is therefore assessed that there are no major obstacles to delivery of Phase 3a.

Phase 3a outcomes

The core outcomes of Phase 3a will be:

- Up to 10 investible NZN designs with buy-in from local communities demonstrating viability of an NZN design approach
- A FinCo ready to receive and distribute investment to deliver implementation, and funded for first two years
- A set of key common components for the programme (including standard contract and payment obligation mechanism)
- A set of up to 25 additional authorities ready to design future NZNs

Together these should provide the final evidence for the FBC which can be used for decision-making over funding Phase 3b and, eventually the programme as a whole.

Phase 3b: Wave 1 implementation, Wave 2 Design

The objective of this Phase is to deliver implemented NZNs, proving the concept and driving the future financial model by demonstrating returns for potential investors. To achieve this, the core functions will need to be expanded. Alongside this, further NZN designs should be developed to create a pipeline of NZN projects for future investment.

Management of Phase 3b

Phase 3b once again needs to be centrally coordinated by a single entity to ensure that the demonstrator implementation is fit for purpose and coordination is achieved. Unlike Phase 3a, this phase sees the introduction of investment funds into the programme. The concept is that these should be managed by the FinCo. This phase therefore needs to be the responsibility of the FinCo; however, the OpCo is envisaged as the FinCo's representative, and so will effectively be the coordinator of Phase 3b on behalf of the FinCo.

In Phase 3a it was recommended that 3Ci provide the OpCo functions. At this stage it might be appropriate to move these to a separate entity owned by 3Ci due to the much greater scale of work being undertaken as it would provide a simple, clear structure.

The core ask for this phase is shown in Table 12. The order of magnitude cost to deliver each of these is provided to justify the ask. These values reflect costs of coordinating the programme, and variable costs that relate to the number of designs implemented, and new demonstrators brought on board. It is anticipated that there would be some variation in the central costs with the number of implemented demonstrators, which is reflected below.

This gives the following:

Centralised costs	£8.9m of which £1.5m varying with Wave 1
Wave 1 variable costs:	£39.0m per demonstrator
Wave 2 variable costs:	£1.7m per demonstrator

This gives the following variation if the number of Wave 1 demonstrators is varied:

5 Wave 1 demonstrators:	£220.2m
10 Wave 1 demonstrators:	£415.9m
20 Wave 1 demonstrators:	£807.4m

Wave 2 variation is not explored as it does not dramatically impact the much greater costs of Wave 1 variation.

Table 12: Phase 3b core ask components

Component	What is included?	Delivered by	Outcome	Order of Magnitude Cost
Expansion and operation of FinCo	Expansion of FinCo to be able to contract with Contractors and residences, to manage invested monies, and to solicit for additional private investment to replace government money and for future programme investment.	FinCo once established	Investment into projects.	£3.3m
Establishment and operation of OpCo functions in dedicated 3Ci-owned entity	Establishment of dedicated OpCo organisation, support for Wave 1 Implementation, support for Wave 2 design, procurement of additional expertise as needed, reporting on progress, representation of FinCo.	3Ci/technical expert Contractors		
OpCo once established as separate entity	Coordinated programme	£5.6m		
Wave 1 Implementation	Implementation of design developed in Phase 3a (capital expenditure), operational budget for LA oversight and ongoing stakeholder engagement.	Contractors funded by FinCo and overseen by OpCo and LA	Implemented NZNs and associated funding flows	£390.0m (£38.0m capital and £1.0m operational per demonstrator)
Wave 2 Design	Design of specific place-based Net Zero Neighbourhood across 10 authorities. Work packages: Baseline area; Heating; Energy; Transport; Green infrastructure; Design coordination; Community engagement; Financial design; Local authority Coordination; Design refinement.	Local authorities and OpCo in collaboration, outsourcing where necessary	Detailed designs for NZNs	£17.0m, assuming 10 (£1.7m per demonstrator – reduced from £2.0m to reflect efficiencies)
Total				£415.9m

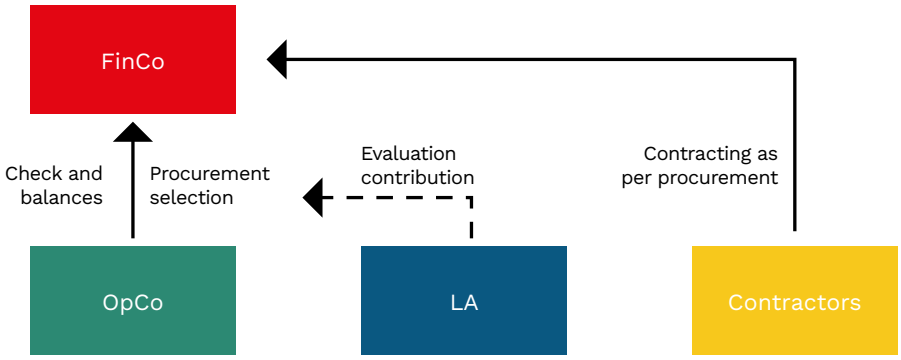
Source: Eunomia

Wave 1 implementation

The major additional component compared to Phase 3a is the implementation component which will be the implementation of designs developed in the previous phase. The detail of these designs will only be identified once they have been developed in Phase 3a.

Implementation will be managed in two stages: procurement and implementation. Both of these stages are structured in a similar way. Management of procurement is shown in Figure 7. This demonstrates that the FinCo is the contracting entity, but that the OpCo conducts the procurement with LA support for evaluation. The procurement is conducted according to the specifications set out in the design delivered in Phase 3a.

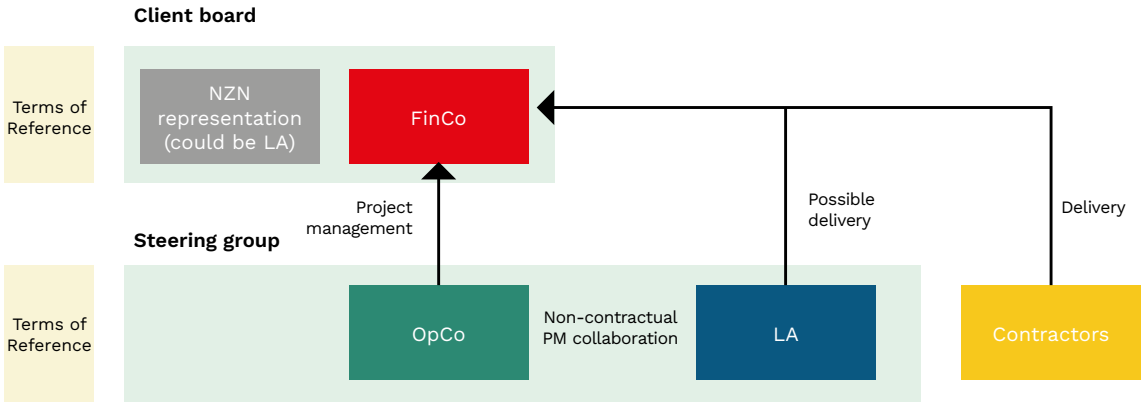
Figure 7: Management procurement



Source: Eunomia

Following procurement, implementation will be managed as shown in Figure 8. This shows that implementation will be managed by the OpCo on behalf of the FinCo, and the LA can contribute to project management as part of the steering group. The client is effectively the FinCo, but a board is created that includes NZN representation.

Figure 8: Management of implementation



Source: Eunomia

Viability of delivering Phase 3b

Phase 3b differs from Phase 3a in terms of implementing the designs. This requires equipment and skills that are explored in the Commercial Case. At present it is likely that there are limits to the availability of these skills and equipment, and therefore early signalling to the market of the potential needs of Phase 3b will be vital to ensure that sufficient responses can be provided to the procurement processes.

The viability of this phase also depends on the buy-in from residents into the programme. This will have been tested in Phase 3a, but only acted on in Phase 3b. There is a threat that numbers actually signing up to the programme are dramatically down on those that indicated interest in Phase 3a. If this is the case then the viability of Phase 3b will be severely challenged, potentially preventing delivery. In this instance, there would need to be a process of research to identify what is leading to low sign-up and designs altered to reflect these findings, with another attempt to raise the sign-up rate. It is therefore assessed that there are two potential obstacles to successful delivery of Phase 3b:

- Lack of capacity in the market to deliver on implementation; and
- Poor sign-up among communities.

Management of these risks will be fundamental to successful delivery of Phase 3b. However, if these cannot be overcome, Phase 3b can be aborted before capital expenditure has been delivered.

Phase 3b outcomes

The core outcomes of Phase 3b will be:

- Up to 10 implemented NZNs starting to generate income, proving model concept in practice and de-risking model for investors. Following the two year period, these will tangibly deliver:
    - Infrastructure in the local area and residences signed up to the programme (which will reduce bills and reduce emissions).
    - Contracts between the FinCo and residents for a comfort service.
    - Contracts between the FinCo and maintenance Contractors for maintenance of infrastructure.
- A FinCo successfully soliciting private investment for future programme rounds and funded for two years.
- An OpCo capable of supporting LA designs and implementations, funded for two years.
- A set of 10 additional designs from Wave 2 demonstrators ready for investment.
- An assessment of the success of the implementation process and likelihood of returns from the model.

Together, these should provide the foundations for programme roll out (Phase 4) should the model demonstrate in practice the benefits identified in this business case.

Financial Case

Introduction

This Financial Case considers the costs and benefits to the resident of carrying out deep retrofit and how the Financial Case could be funded.

These numbers have been run on both the latest published Department for Business, Energy & Industrial Strategy (BEIS) unit energy costs[26] and on currently available market estimates of forward unit energy costs[27]. It is noted that the former were updated in June 2021 and the latter in September 2022. Unit electricity prices are 2.5x higher in the latter than the former, given rapid changes to the dual tariff price cap. Those changes have been driven principally by the cost of gas and with the forward gas price curve remaining elevated are likely to be a much more realistic predictor of financial outcomes (2024 price per therm at around 270p, compared to 127p in April 2022 when the price cap had already increased by over 50% from 2021). These higher (and more realistic) energy prices do significantly improve the investment case. Outcomes are presented based on the BEIS energy price scenario in square brackets throughout.

One of the key barriers to implementing a scaled retrofit programme is that the economic return profile of implementing deep retrofit, i.e. a combination of the below, is poor:

- Demand reduction (insulation and other energy efficiency measures).
- Heat degasification (heat networks or heat pumps typically), and
- Distributed renewable energy generation and storage (solar battery).

The costs to implement are high relative to the financial saving on the annual energy bill of the resident, meaning a public subsidy component is likely to be inevitable in the funding mix.

If the non-public subsidy component of the funding for this transition is focused on retail finance products for individual citizens (such as green mortgages), the contribution of those citizens to the cost is likely to be low.

This is because of a relatively short required investment payback period for individual citizens (c. 5-10 years), which should be considered in the context of the average UK homeowner being 56 years old. Modelling out the likely annual saving and discounting that back to a net present value, would suggest a required public subsidy level in the region of 70-80% of the cost, in order to avoid the citizen destroying economic value. Forcing action through a range of policies with a lower subsidy level is likely to be politically difficult.

In addition, this analysis also ignores the fact that retail finance is not an option for many owner-occupiers who do not have access to finance, either due to low-income levels or high existing debt levels relative to their house value. In addition, there are the added split incentive complications in the private rental and social housing sectors which collectively make up one third of UK housing.

There are two key ways to improve the effective economic profile and reduce the level of public subsidy support:

- reduce the upfront costs, and
- increase the value of the energy savings to the borrower

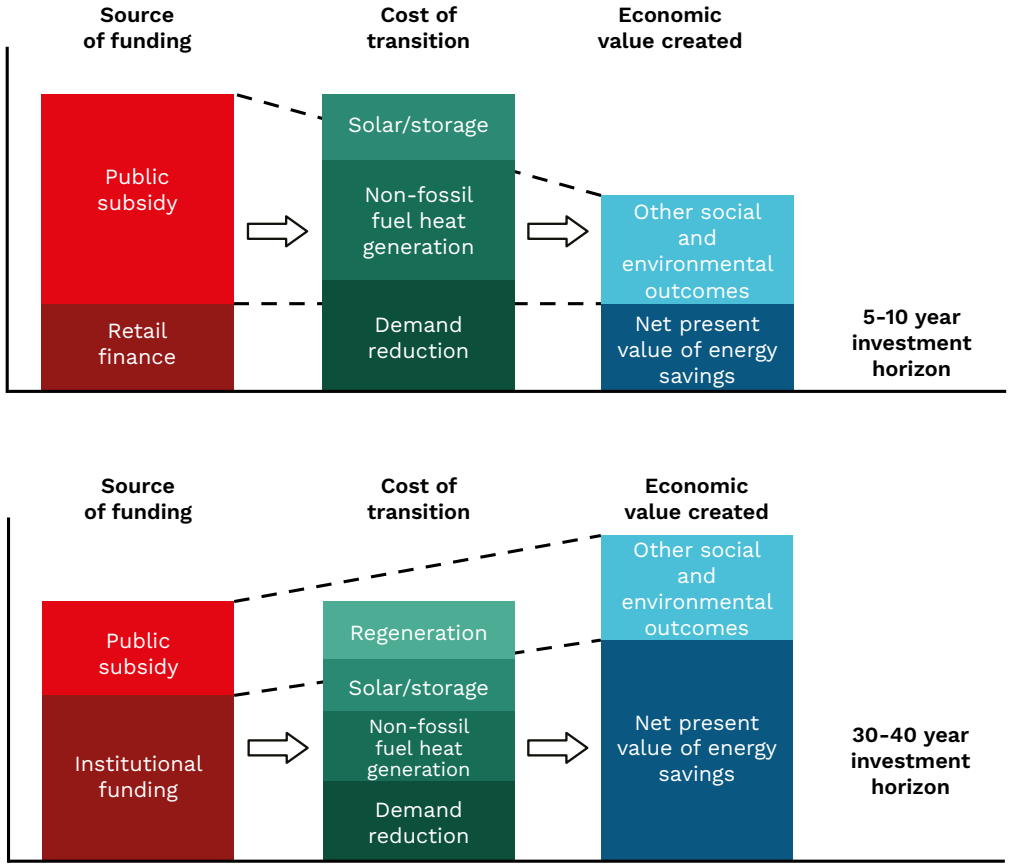
The 3Ci NZN programmes financial model is designed to achieve both. It is conservatively estimated that a place-based approach reduces the upfront implementation costs by 19% through a range of procurement economies, implementation economies and system design economies.

The technology will still deliver the same annual reduction in energy bill in a place-based approach vs an individual approach, but by capturing the energy savings across multiple dwellings and aggregating for the non-subsidy funding component, energy savings can be valued over the investment time horizon of institutional investors (30-50 years) instead of individual homes owners (c. 5 years).
This significantly reduces the required subsidy from c. 70-80% needed to preserve homeowners capital in an individual model to around 35% in our place-based model. Collectively these will significantly reduce government funding required to decarbonise UK buildings.

26 *Table 4 mid case https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fassets.publishing.service.gov.uk%2Fgovernment%2Fuploads%2Fsystem%2Fuploads%2Fattachment_data%2Ffile%2F1024043%2Fdata-tables-1-19.xlsx&wdOrigin=BROWSELINK*

27 *Investec research, Martin Young, 15th September 2022*

Figure 9: Illustration of higher public subsidy requirement with retail finance vs institutional finance



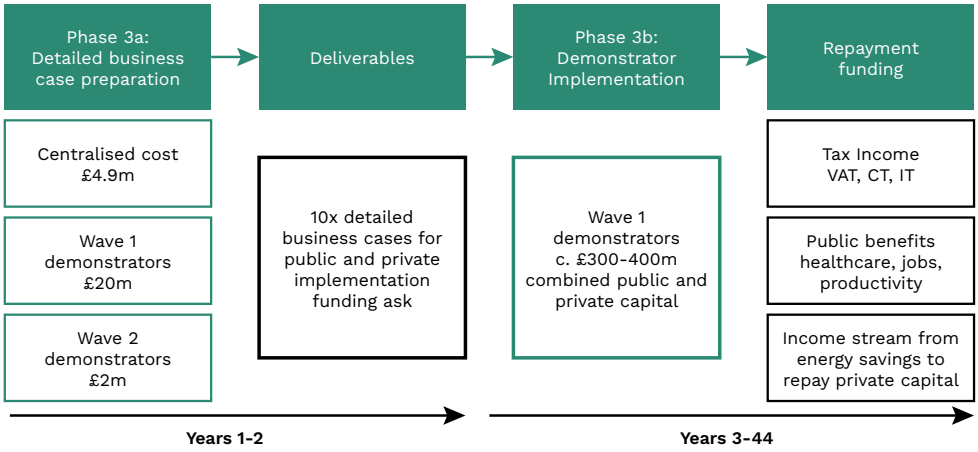
Source: BwB

In addition, the 3Ci NZN programme will also facilitate additional investment in the broader neighbourhood (which could collectively be called “Regeneration”) delivering a tangible additional benefit for residents as well as greater economic value from a range of social and environmental outcomes. This will promote uptake from the community, reducing the risks to successful acceleration. Aggregation of design and implementation expertise on a local level rather than house by house will likely also yield more systemic outcomes.

Two phase funding approach

The Financial Case has been modelled for the overall programme based on a set of assumption of a proxy average UK place. However, to create specific, place-based business cases that can actually be used to raise the capital funding required to implement proof of concept demonstrators (from a blend of public and private sources), further detailed business case development must be carried out in partnership with selected local authorities on actual proposed demonstrator sites.
The next phase of this project is therefore structured into two phases as below.

Figure 10: Funding phases



Source: BwB

Phase 3a

The current ask is for £26.9m to fund Phase 3a. That funding will be split between funding a centralised entity to provide support and co-ordination for business case development, as well as to commission. various shared assets such as property linked contracts, but the bulk of the funding will go to selected Local authorities who will lead that development, as well as a small amount priming a second wave of demonstrator locations. The output of Phase 3a over 12-24 months, will be the completion of 10 detailed, investment-ready business cases for specific locations, ready to support the investment ask for implementation.

Phase 3b

The following phase will be to implement the demonstrators where the bulk of the funding will be deployed in the supply chain to carry out the deep retrofit.

While the work in Phase 3a will inform the specific funding and forecast return characteristics, significant modelling of this phase based on a proxy place has been carried out.

Fundamentally there are two groups of financial flows in this phase:

- implementation
- refinance, maintenance and repayment

Implementation

The bulk of the funding raised in Phase 3b will be spent on engaging the supply chain to implement the planned set of interventions designed in Phase 3a over the course of 12 months or so.

Our modelling suggests that these costs will total c. £34,500 per property if implemented on a neighbourhood scale, taking into account various economies of this approach, and including a set of neighbourhood level investments in addition to the building interventions themselves (as per the right hand column of the table below).

Figure 11: CapEx requirements

	Single property	1,000 distributed properties	1,000place-based properties
CapEx required per property (GBP)			
Demand reduction	13,639	12,411	11,013
Heat source degasification	14,132	12,860	11,411
Solar panel and battery install	7,500	6,825	6,056
Total building specific intervention CapEx	**35,271**	**32,096**	**28,481**
Green infrastructure	4,946	4,501	3,994
Transport infrastructure	1,237	1,126	999
Waste/circularity infrastructure	236	215	191
Community infrastructure	985	897	796
Total broader community intervention CapEx	**7,404**	**6,738**	**5,979**
Total/CapEx	**42,675**	**38,834**	**34,460**
Discount percentage		**-9%**	**-19%**
Equipment procurement economies on 40% of the cost	0%	5%	5%
Sales economies on 20% of the cost	0%	35%	35%
Install economies on 40% of the cost	0%	0%	15%
System design economies on 100% of the cost	0%	0%	5%

Source: BwB

The Extended Financial Case shows the detailed assumptions that go into each of these figures.

Refinance, maintenance, and repayment

The work carried out in the implementation will significantly reduce the energy bill of the resident, as per Figure 12, based on realistic forecast 2024 energy pricing. For comparison, the same analysis based on BEIS energy prices has also been carried out.

Figure 12: Energy bill reduction under realistic price scenario

	2024 pPre-retrofit	**Demand reduction**	**Heat pump and central heating**	**Solar and storage**
Annual heating and hot water gas consumption (kwh) per dwelling	12,000	6,805	0	0
Annual heating and hot water elec consumption (kwh) per dwelling	0	0	1,909	1,909
Annual mechanical ventilation elec consumption (kwh) per dwelling	0	180	180	180
Annual household elec consumption (kwh) per dwelling	3,100	3,150	3,150	3,150
Total household energy consumption (kwh) per dwelling	**15,100**	**10,135**	**5,239**	**5,239**
Of which gas	12,000	6,805	0	0
Of which electricity	3,100	3,330	3,330	3,330
Annual gas standing charge	109	109	0	0
Annual electricity standing charge	109	109	109	109
Annual heating and hot water unit gas costs per dwelling (GBP)	2,212	1,254	0	0
Annual heating and hot water unit electricity costs per dwelling (GBP)	0	0	866	866
Annual mechanical ventilation elec cost per dwelling (GBP)	0	82	82	82
Annual other household consumption electricity costs per dwelling (GBP)	1,406	1,429	1,429	122
Total energy costs per dwelling (GBP)	**3,835**	**2,982**	**2,485**	**1,179**
Of which gas (GBP)	3,835	1,363	0	0
Of which electricity (GBP)	1,515	1,619	2,485	1,179
Maintenance cost for heating & hot water system (gbp/dwelling pa)	125	125	0	0
Total maintenance costs per dwelling (GBP)	**125**	**125**	**0**	**0**
Total costs per dwelling (GBP)	**3,960**	**3,107**	**2,485**	**1,179**
Reduction vs baseline	5%	-18%	-34%	-69%

	2024 pre-retrofit	**Demand reduction**	**Heat pump and central heating**	**Solar and storage**
Annual heating and hot water gas consumption (kwh) per dwelling	13,610	6,805	0	0
Annual heating and hot water elec consumption (kwh) per dwelling	0	0	1,909	1,909
Annual mechanical ventilation elec consumption (kwh) per dwelling	0	180	180	180
Annual household elec consumption (kwh) per dwelling	3,100	3,150	3,150	270
Total household energy consumption (kwh) per dwelling	**16,710**	**10,135**	**5,239**	**2,359**
Of which gas	13,610	6,805	0	0
Of which electricity	3,100	3,330	5,239	2,359
Annual gas standing charge	109	109	0	0
Annual electricity standing charge	109	109	109	109
Annual heating and hot water unit gas costs per dwelling (GBP)	2,508	1,254	0	0
Annual heating and hot water unit electricity costs per dwelling (GBP)	0	0	866	866
Annual mechanical ventilation elec cost per dwelling (GBP)	0	82	82	82

	2024 pre-retrofit	Demand reduction	Heat pump and central heating	Solar and storage
Annual other household consumption electricity costs per dwelling (GBP)	1,406	1,429	1,429	122
Total energy costs per dwelling (GBP)	**4,132**	**2,982**	**2,485**	**1,179**
Of which gas (GBP)	2,618	1,363	0	0
Of which electricity (GBP)	1,515	1,619	2,485	1,179
Maintenance cost for heating & hot water system (gbp/dwelling pa)	125	125	0	0
Total maintenance costs per dwelling (GBP)	**125**	**125**	**0**	**0**
Total costs per dwelling (GBP)	**4,257**	**3,107**	**2,485**	**1,179**
Reduction vs baseline	6%	-23%	-38%	-71%

Source: BwB

Figure 13: Energy Bill reduction under BEIS energy prices (June 2021)

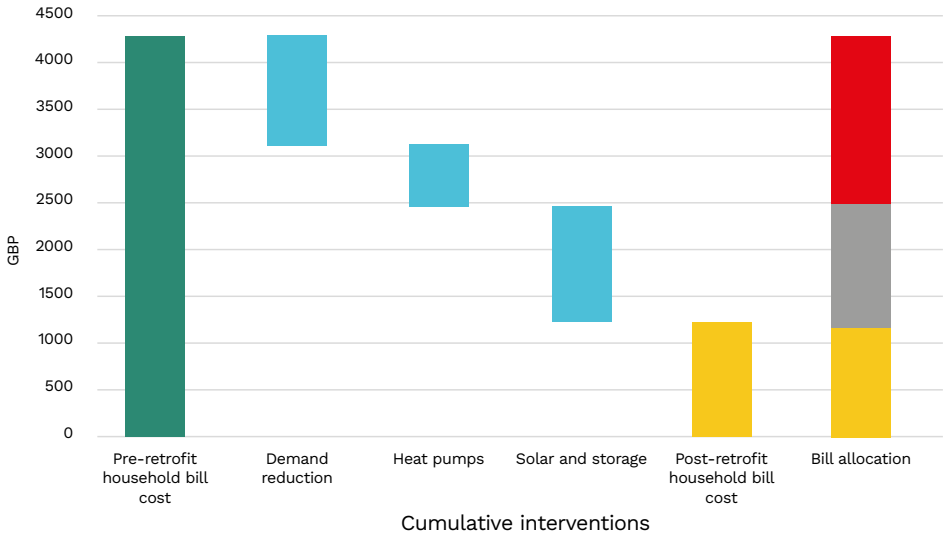
	2024 pre-retrofit	Demand reduction	Heat pump and central heating	Solar and storage
Annual heating and hot water gas consumption (kwh) per dwelling	12,000	6,805	0	0
Annual heating and hot water elec consumption (kwh) per dwelling	0	0	1,909	1,909
Annual mechanical ventilation elec consumption (kwh) per dwelling	0	180	180	180
Annual household elec consumption (kwh) per dwelling	3,100	3,150	3,150	3,150
Total household energy consumption (kwh) per dwelling	**15,100**	**10,135**	**5,239**	**5,239**
Of which gas	12,000	6,805	0	0
Of which electricity	3,100	3,330	5,239	2,359
Annual gas standing charge	109	109	0	0
Annual electricity standing charge	109	109	109	109
Annual heating and hot water unit gas costs per dwelling (GBP)	551	312	0	0
Annual heating and hot water unit electricity costs per dwelling (GBP)	0	0	403	403
Annual mechanical ventilation elec cost per dwelling (GBP)	0	38	38	38
Annual other household consumption electricity costs per dwelling (GBP)	654	665	665	57
Total energy costs per dwelling (GBP)	**1,423**	**1,233**	**1,214**	**607**
Of which gas (GBP)	660	422	0	0
Of which electricity (GBP)	763	811	1,214	607
Maintenance cost for heating and hot water system (gbp/dwelling pa)	125	125	0	0
Total maintenance costs per dwelling (GBP)	**125**	**125**	**0**	**0**
Total costs per dwelling (GBP)	**1,548**	**1,358**	**1,214**	**607**
Reduction vs baseline	-4%	-15%	-24%	-62%

	2024 pre-retrofit	Demand reduction	Heat pump and central heating	Solar and storage
Annual heating and hot water gas consumption (kwh) per dwelling	13,610	6,805	0	0
Annual heating and hot water elec consumption (kwh) per dwelling	0	0	1,909	1,909
Annual mechanical ventilation elec consumption (kwh) per dwelling	0	180	180	180
Annual household elec consumption (kwh) per dwelling	3,100	3,150	3,150	270
Total household energy consumption (kwh) per dwelling	**16,710**	**10,135**	**5,239**	**2,359**
Of which gas	13,610	6,805	0	0
Of which electricity	3,100	3,330	5,239	2,359
Annual gas standing charge	109	109	0	0
Annual electricity standing charge	109	109	109	109
Annual heating and hot water unit gas costs per dwelling (GBP)	625	312	0	0
Annual heating and hot water unit electricity costs per dwelling (GBP)	0	0	403	403
Annual mechanical ventilation elec cost per dwelling (GBP)	0	38	38	38
Annual other household consumption electricity costs per dwelling (GBP)	654	665	665	57
Total energy costs per dwelling (GBP)	**1,497**	**1,233**	**1,214**	**607**
Of which gas (GBP)	734	422	0	0
Of which electricity (GBP)	763	811	1,214	607
Maintenance cost for heating and hot water system (gbp/dwelling p.a.)	125	125	0	0
Total maintenance costs per dwelling (GBP)	**125**	**125**	**0**	**0**
Total costs per dwelling (GBP)	**1,622**	**1,358**	**1,214**	**607**
Reduction vs baseline	-3%	-19%	-28%	-64%

Source: BwB

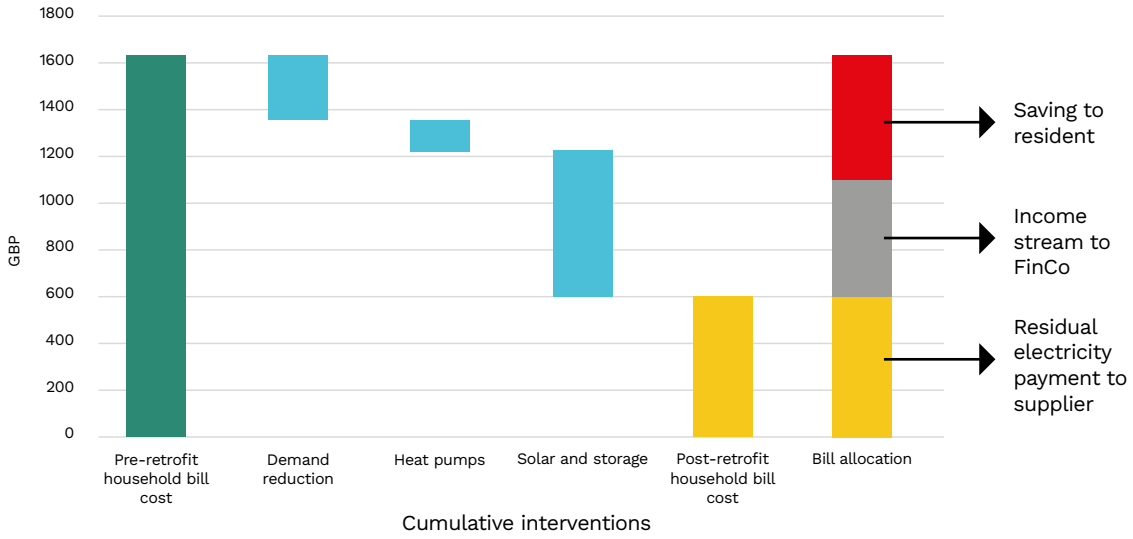
Core to the concept of the Net Zero Neighbourhood is the consideration of a property linked NZN service charge payment, ideally collected via the utility bill, in return for the investment in the property. This service charge fee cannot be greater than the energy saving delivered and in our realistic price scenario modelling, the resident's saving is capped at £2,500. This represents a c. 40% reduction to the initial energy bill. The rest of the savings are captured as an income stream to the funding vehicle. This income stream will commence on completion of the implementation, i.e. in the second year of Phase 3b and will remain in place with an annual consumer price index (CPI) linked inflator for 40 years.

Figure 25: Reduction in costs under realistic energy price scenario



Source: BwB

Figure 14: Reduction in costs under BEIS energy prices (June 2021)



Source: BwB

Our modelling suggests approximately 34% of that income stream will be required to be set aside to fund annual maintenance and periodic replacement of the assets deployed over the 40 year period. 1-2% will need to be set aside to manage the operating costs of the funding vehicle and it is assumed 1.5% delinquency rate on payments. This leaves 60-65% of the income stream which can be used to raise long-term patient capital, effectively selling the 40-year income stream to impact-focused yield investors like pension funds. There has been significant interest in the concept from a range of private sector capital providers and from the UK Infrastructure Bank.

This capital can be used to refinance a part of the upfront capital requirement that was raised to implement Phase 3b in the first place.

Our analysis suggests that approximately 65% of the upfront capital could therefore be raised from private sector repayable sources.

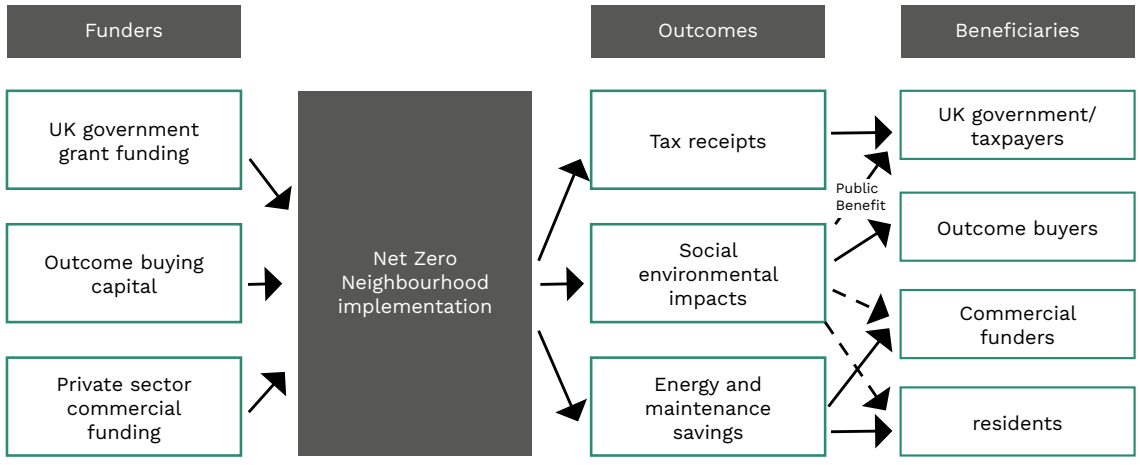
Figure 15: Funding mix calculation (Realistic energy price scenario)

Year post-retrofit	**1**	**2**	**3**	**4**	**5**	**-------> 40**
Original energy bill and maintenance cost for resident (GBP)	4,257					
Year 1 saving (GBP)	3,078					
Post-retrofit energy bill for resident (GBP)	1,179					
Year 1 service charge for resident (GBP)	1,321					
Total cost to resident (energy + service - fee)	2,500					
Original energy bill/maintenance saving for the resident	41%					
Saving given to resident (GBP)	1,757					
Gross income to fund from resident (GBP)	1,321	1,348	1,375	1,402	1,430	
Annual inflation		2.0%	2.0%	2.0%	2.0%	
Contribution to asset maintenance/replacement fund (GBP)	(454)	(463)	(473)	(482)	(492)	
Assumed delinquency rate	1,5%	1.5%	1.5%	1.5%	1.5%	
Delinquency	(20)	(20)	(21)	(21)	(21)	
Operational cost (GBP)	(21)	(21)	(22)	(22)	(23)	
Income available for funding (GBP)	**826**	**843**	**860**	**877**	**895**	
Required return rate for lenders- over inflation	1,25%					
Expected inflation rate	2.0%					
Overall rate of return	3.25%					
Tenure of loan	40					
Re-financing amount based on fund revenue (GBP)	**25,498**					
Required return rate for lenders over inflation	5%					
Expected inflation rate	2.0%					
Overall rate of return	7.0%					
Tenure of loan	2					
Pre-financing amount	**22,271**					
Total capital required	34,460					
Funding gap	12,189					
Private capital as a percentage of total	**65%**					

Source: BwB

However, it should be cautioned that in a first proof of concept demonstrator programme it is likely that private sector funding would come in at a much lower level, perhaps only one third of the upfront funding requirement.

Figure 16: Funders, outcomes, and beneficiaries



Source: BwB

A range of sensitivities to the various input assumptions can be found in the Extended Financial Case.

Additional considerations

Two important considerations are also explored below:

- resident sign up
- energy prices and lock-in risk

Resident sign up

Driving significant engagement from residents is a core concept of the NZN model. The hypothesis is that a combination of factors will drive much greater retrofit sign up than we currently see.

- Significant discounts to prevailing energy bills (30-40% on average).
- No need for any upfront funding.
- No need to individually plan technical scope or co-ordinate the supply chain through implementation.
- No ongoing liability to maintain and replace energy assets.
- Delivery of incremental investment to the neighbourhood in addition to the building upgrade work.
- Potential to unlock local employment and economic growth.

An open question remains as to what level of sign up can be achieved and what is required to support the financial model. This will be a key learning from running demonstrators, but intuitively it feels like a sign up level of 60-70% of households will be required, though this is a somewhat simplistic viewpoint.

There are a number of interrelated goals that sign up levels impact:

- Building sufficient overall demand to unlock procurement economies of scale for installed equipment (buying 500 heat pumps is cheaper per unit than a single unit).
- Building sufficient overall demand to unlock selling economies of scale for the supply chain (by providing mass demand for installation services, the installer avoids its normal selling costs, allowing a discount).
- Building sufficient, broadly proximate demand to unlock installation economies of scale (facilitating an installation team to work on several properties within walking distance will reduce installation costs per property).
- Building sufficient, highly proximate (e.g. contiguous) demand to unlock system design economies of scale (sufficient proximity to allow shared infrastructure between properties – e.g. a ground source heat pump shared between neighbouring properties could be cheaper than two individual air source heat pumps ASHPs.
- Building sufficient overall demand within a neighbourhood to allow a contribution per property to a neighbourhood fund to support implementation of the non-building assets, without creating too large a 'free-rider' issue where non-participating households benefit from the green infrastructure etc.

It is clear from the above that just considering overall percentage of households that sign up is overly simplistic. Creating multiple islands of neighbouring properties within a neighbourhood would be more valuable than a more diffuse selection of properties across a neighbourhood, even if the overall sign up level is identical.

In order to further drive sign ups, a rewards-based system could be considered where incremental neighbourhood funding is unlocked as overall sign up within the neighbourhood exceeds pre-agreed thresholds.

Energy prices and the risk of lock-in

The recent rapid rise in energy costs is both an opportunity and a risk for this funding model.

At a simple level, energy bills have increased relative to the capital costs of implementing energy efficiency work, so any given percentage saving on the bill represents a better return on investment for the upfront capital. This increases the ability for this funding model to support a higher proportion of the capital requirement through repayable private sector debt and reduces the need for public subsidy.

It also increases the ability to share the energy saving with the resident, thereby increasing incentive to sign up.

However, because a portion of the existing energy bill is being converted into a fixed long-term service

charge, it does raise the issue of how to mitigate the risk that the resident is left out of pocket if there is a dramatic future fall in energy prices such that the average UK energy bill falls below the amount an NZN resident would be paying.

This risk can be reduced by:

- The size of the year one discount offered to the resident.
- The fact that the service charge is inflated by consumer price index (CPI) and a reasonable portion of the CPI basket is driven directly or indirectly by energy prices. This means that in a significantly deflationary energy price environment there would also be some downward pressure on the service charge.
- That the resident is still paying a component of their energy costs to energy suppliers which would also fall.

In the base case, the starting energy bill is £4,257 (including a £125 per annum gas boiler maintenance cost).

Following the work, the resident would be left with a residual £1,179 energy supply payment and a £1,321 'NZN Service Charge' which would grow with a CPI-linked inflator each year, but this leaves them £1,757 better off.

If unit energy prices were to halve, the average bill would fall to £2,200 (the standing charges would be unaffected).

For the NZN resident, the energy component of their bill would fall to £644. Even without including any deflation in the NZN Service Charge that would put their total cost at £1,965, still better off than if they signed up in the first place.

We would note that the forward gas price curve (looking out around 5 years) does not currently countenance falls in price of anything like this magnitude but given the very long-term nature of the contract it does remain a tail risk.

All of that said, it is also worth considering whether the correct counterfactual to compare to is this "do nothing" scenario where the resident is still living in a poor energy efficiency, fossil fuel heated home.

In reality, if a resident doesn't sign up to a scheme such as the NZN they will at some point in the future be required to invest their own capital into their property in order for the UK to meet its 2050 net zero commitments, ie an "average household energy bill" will not be based on housing stock in its current energy efficiency state. The capital they will be required to spend and therefore finance is likely to be much higher than the amount financed in this model (which drives the size of the service charge), because they will not benefit from the place-based economies of scale that are delivered by the NZN model.

At current mortgage rate, the annual cost of servicing the debt to self-fund the energy efficiency works would be considerably more than the service charge and this debt repayment of course would not fall in a significantly deflationary energy price environment.

There is, however, a theoretical risk that, perhaps driven by major technological breakthrough, energy prices fall very significantly during the contracted period and the reduction in the cost to an NZN resident leaves them in a position where they are paying more than they would have been. In this context, thought should be given to how this could be mitigated.

Ultimately a decision would have to be taken whether to leave that risk with the resident or to try to transfer that risk to a third party. One option for the latter could be to explore the possibility of insurance products to hedge away the energy price downside tail risk and a second option could be for an effective state guarantee. It should be noted that for the latter option, in a situation where energy prices have fallen dramatically and given that energy prices are an input cost into most economic activity, it is likely that there would be a significant economic boom, providing a hedge to the possible financial liability to make residents whole vs average energy bills.

Commercial Case

Introduction

The question the Commercial Case seeks to answer is “can a deal be done?”. This requires an assessment of the capacity of the market to meet demand with supply at the scale needed.

There are four types of deal that need to be delivered for an NZN project to succeed:

- The deal between residents and the FinCo to commit to the payment obligation.
- The deal between FinCo and investors to obtain financing for the projects.
- The deal between FinCo and suppliers to deliver the NZNs; and
- The deal between FinCo and suppliers to provide maintenance and replacement of NZN components.

The first two deals can only be tested by developing a workable design for a specific place which will allow the specifics to be presented to both residents and investors to test the ability to do a deal. In particular, the decision over payment obligation mechanism will impact the ability to do a deal with residents. The ability of companies to maintain an NZN for the given price will need to be tested once it is designed. However, it is possible to assess the capacity of the market to implement the NZN, and this is the focus of the Commercial Case at this stage.

This Commercial Case therefore considers the goods, services and/or works required to deliver the 3Ci NZN programme and the procurement routes and resources required to achieve the programme in the most efficient, socially beneficial and value driven manner. The Commercial Case also considers the overall procurement strategy and risk allocation associated with the requirements, and identifies the most viable route to ensure sufficient capacity and capability exists for programme delivery. Commercial considerations around the proposition to residents and to investors will be assessed following development of demonstrators where these issues can be tested properly.

The Commercial Case considers:

- **Procurement delivery strategy** – the functional model that will provide value for money, efficiency and support to local social initiatives and economies, including provision of sufficient capacity, capability, expertise, resource, and value for money to ensure successful programme delivery.
- **Supply market capacity** – the capacity, capability, readines, and willingness of the market to support the 3Ci NZN programme.
- **Contracting strategy** – routes to engaging with Contractors and households to ensure the most appropriate deals for programme delivery are achieved.
- **General risks and personnel issues** – risks associated with procurement processes/tendering activity.
- **Household contracting** – routes to establishing formal contracts with residents/households.

Procurement delivery strategy

The procurement activities required to deliver the programme requirements broadly fall into two categories:

- Operational procurement activity – that is, procurement required to set up and operate the 3Ci NZN programmes Net Zero Neighbourhood (NZN) company structure, such as office space, consultancy/legal support, IT systems, staffing.
- Project-specific procurement activity – that is, procurement required to meet the needs of each NZN project, such as goods and services to deliver housing stock retrofit.

Procurement model and structure

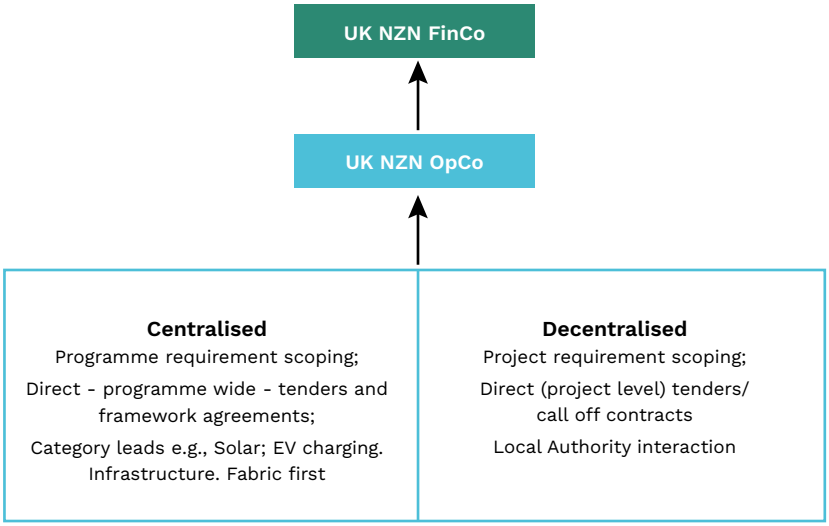
The procurement model and structure that follows ensures capacity and capability availability from the programme start, whilst supporting local authority delivery focus. As defined within the Management Case of this OBC, the organisational structure will be formed as an NZN FinCo, plus NZN OpCo, with all monetary movements and contracting being done through the NZN FinCo. The NZN OpCo shall be a largely operational delivery and support function. It should be noted that it is expected the NZN FinCo and NZN OpCo will have to comply with all aspects of the Public Contracts Regulations 2015 (PCR) (as amended), or applicable public contracting legislation in force at that time[28], as well as the Public Services (Social Value) Act 2012.

A hybrid procurement model as shown in Figure 17 facilitates the achievement of capacity (avoiding duplication of resource, providing project specific resource at required times, enabling subject matter experts to be shared across all projects), capability (delivery experts available across all projects and specific to each project), whilst supporting local

28 *All proposals and references to contracting routes within this OBC reflect the procurement legislation in force at time of writing*

delivery aims (decentralised procurement support to ensure local supply routes can be maximised), and achieving value for money (streamlined delivery structure maximising contract routes including supply security, volume order discounts and favourable market terms).

Figure 17: Procurement delivery structure



Source: Eunomia

Delivery of social benefit through procurement activity

Public procurement spend on goods, services, and works is a significant lever for achieving delivery of increased social benefit for a community. The UK government introduced a requirement in June 2020 (Procurement Policy Note 06/20[29]), for public procurements to mandate inclusion, and consideration, of social value, with a minimum tender award weighting of 10%. As an organisation bound by the PCR, this criterion would apply to contracts established by the NZN OpCo.

The ability to retain contract delivery locally, within the authority's area, supports local economic development, skills development (including focus on target employment groups) and the government's levelling up agenda. The potential for local delivery must be explored at the onset of the NZN project and procurement routes considered (e.g. balancing cost and benefits of using an NZN OpCo framework agreement versus a project specific (localised) procurement exercise).

Alternatively, the NZN OpCo could consider, when implementing framework agreements, the scope to geographically 'lot' the framework agreement – as permitted under the PCR[30] - (e.g. South East England, South West England, Midlands, etc.) and therefore encourage on-boarding of local (geographically defined) suppliers. Geographically lotted framework agreements achieve the cost benefit generally seen through the framework purchasing model, yet provide the ability for supply distance, mileage, delivery cost, and local benefit to be considered.

Supply market capacity

To achieve programme delivery requires contracting with suppliers for delivery of a range of:

- **Goods** – encompassing NZN Fin and OpCo operational/set-up requirements (e.g. furniture and IT equipment), plus the assets required to deliver the NZN projects (e.g. heat pumps, solar panels etc.).
- **Services** – ranging from operational needs of the NZN FinCo and OpCo, such as IT systems and consultancy, to project-specific asset installation and maintenance services.
- **Works** – infrastructure delivery specific to a project.

Key issues to be considered include:

- **Market capacity/readiness** – availability of goods, source location (potential import delays), geographical dispersion, scope for production increase, available knowledge base, opportunity for delivery of social benefit/levelling up through recruitment and training. Is there existing capacity within the market to take on this work?
- **Market capability** – can the market physically deliver the goods, services, and works required, in the locations required and to the volumes and schedules required? Can the market keep up with and maintain deliveries at pace? Can the market recruit or train staff to achieve this? Can the market evolve, or innovate fast enough to continue to help the programme deliver efficiencies?

29 *https://www.gov.uk/government/publications/procurement-policy-note-0620-taking-account-of-social-value-in-the-award-of-central-government-contracts*

30 *https://www.legislation.gov.uk/uksi/2015/102/regulation/46/made*

- **Market willingness** – how engaged is the market already in this field, how committed will suppliers be to help achieve the programme aims?
- **Barriers** – what known barriers exist and how can these be overcome?

With respect to goods and services required to establish the NZN Fin and OpCo, the bulk of requirements can be fulfilled from existing Crown Commercial Services framework agreements (see Extended 'Commercial Case'), sufficient time must be factored in for award, delivery, and implementation of these requirements (in particular software solutions) to enable the organisation to be functional in advance of project requirements commencing.

The assessment of market capacity with respect to the key goods, service, and works anticipated as necessary for NZN project delivery has shown that, by exception, the key considerations are:

- Installation and maintenance of heat pumps and solar PV panels is limited only by availability of skilled resource.
- Production capacity of heat pumps can meet demonstrator phase demand, however order books are generally full (significantly greater orders placed/stock held in the EU than in the UK) and therefore NZN orders would be fulfilled after all existing commitments. Distributor plans for supply increase over next 5 years to c. 5-10,000 per year (lower than post-demonstrator requirements and therefore requires proactive engagement with heat pump distributors to manage forward order books).
- Production capacity of natural fibre housing insulation is limited while manufacturing sites are established. It is likely therefore that demonstrator phase requirements would need to be met via a mix of types of insulation materials.
- Supply of solar PV panels (and EV charging points) is likely to be constrained mainly by management of the overseas manufacture and supply process (and import process). For solar PV panels lead times fluctuate dependent on demand and therefore close supplier engagement and management is required.
- Green infrastructure, e.g. bicycle pods manufacture is generally constrained due to low capacity production at present and may require up front order commitment, or potentially a joint social venture, to support significant increase in capacity.

Delivery of sufficient goods for the demonstrator phase projects is feasible, however is likely to require a collective (NZN FinCo) up front commitment to secure supply of products with production capacity issues. Installation and maintenance resource will require proactive engagement with both the market and UK skills initiatives to determine if resource will increase in the timescale required. Alternatively, some participating local authorities that have sufficient housing maintenance staff may be able to take on some tasks themselves. For both the demonstrator phases and certainly the post-demonstrator phase, the NZN OpCo will require to retain oversight of all projects and project phases, in order to manage and prioritise allocation (or reallocation) of products to ensure NZN project delivery runs smoothly.

The tables under the Extended Commercial Case provide a summary of indicative goods and services required for delivery of an NZN place based project. A summary of key risks identified is provided in table 13.

Table 13: Supply risks

Supply Risk	Applicable to	Mitigation
Skilled resource	Solar PV and heat pump installation, cycle pod manufacture	Engagement with markets, regions and government departments on levelling-up campaigns and support for NZ transition.
Leadtime	Heat pumps	Market dialogue and upfront supply commitments to secure supply.
Raw material availability	Natural fibre housing insulation	Centrally funded processing machine to facilitate increased raw material production.
Volume production	Cycle pods	Investigation of non-recurring costs required to support capacity expansion.

Source: Eunomia

Local authority as a supplier

As outlined in the full Management Case, the level of involvement and knowledge of each individual Local Authority for an NZN project will vary. This is also the case whereby the Authority may choose to retain some elements of delivery in-house, or, to competitively bid for some elements of the requirement as a Contractor (under 'Hamburg Exemption' (clause 12(7) of the PCR). Each decision would need to be reviewed on a case-by-case basis to confirm/determine applicability and would form a part of the initial project scoping with the Authority and Project proposal submission (funding application).

Contracting strategy

Routes to market and considerations

The procurement activity (market engagement, tendering, contracting, and contract/supplier management) will reside within the NZN OpCo. There are several routes to market that the body can consider/utilise:

- Delivery of its own framework agreements for goods, services, or works.
- Delivery of its own direct contracts, for goods, services, or works.
- Contracting with Local authorities for certain service provision (through the Hamburg exemption).
- Use of other existing framework agreements, e.g. Crown Commercial Services.
- Support for award of localised collaborative agreements (e.g. for delivery of a specific service) across a region.

In preparation of the procurement strategy/business case for each requirement (operational or project specific), the procurement function would, in addition - and in support...social benefit - consider whether the procurement could be structured such that it can:

- Help to eliminate barriers to entry for voluntary, charitable, social enterprises (vcse's) or sme's on framework agreements.
- Allow for the requirement to be fulfilled by VCSE's, SME's and/or local suppliers (supporting increased social benefit delivery).
- Use flexible, innovative supply solutions, e.g. A dynamic purchasing system, to enable onboarding of new suppliers on a frequent basis and not preventing market entry for periods of time.
- Use flexible (yet transparent) call off models (for example, using innovative approaches such as desk-based evaluation) to facilitate selection of suppliers most suitable to each NZN project (e.g. most sustainable solution versus lowest cost).

Stock management

A further consideration is that of stock management and whether the OpCo could/should manage a warehouse stocking system to support just-in-time (JIT) delivery of key goods to projects. Such a system provides benefits of high-level stock awareness, key contract management, known delivery times (for projects), and the ability to secure supply and potential volume discounts. However, consideration would need to be given to site location and logistics (versus delivery from the supplier/manufacturer), insurance and staffing, and product liability and warranty.

Risks

Effective and compliant procurement procedures will go a significant way to mitigating any potential risks, however these cannot be entirely eliminated. High-level potential risks have been summarised in the Extended Commercial Case. The allocation of risk between the public entity (NZN company and/or the local authority) and the private sector provider would be considered and determined at the point of tender.

Household contracting

Engagement and contracting activity with (private ownership) households will be managed through a Commercial function within the NZN OpCo, with formal contracts being set up between the household and the NZN FinCo. Contract management will be undertaken by the commercial function of the NZN OpCo. Contracts are expected to be linked to the property, as opposed to the named owner, as ownership may change over the expected period of NZN project. Contracts will be required to commit the property to participate in the relevant level of required retrofit, and to the agreed associated financial model. Financial recovery mechanisms will be explored in detail with demonstrator local authorities and may include an uplift to the property linked council tax, or preferably via property energy bills.

Personnel

No relevant personnel/people management/trade union implications, including Transfer of Undertakings (Protection of Employment) Regulations 1981 (TUPE) have been identified for this project.

It has been assumed local authority staff that are appointed to the project (for their NZN delivery) will remain in the employment of the local authority for the duration. Personnel utilised by the NZN OpCo in a shared service role would remain in the employment of the NZN OpCo, with resource costs recouped either from the local authority or budgeted within the allocated project costs.

Appendix

Detailed Financial Case

A.1.1 Summary

In the Financial Case, we discuss the key financial inputs and outputs of a Net Zero Neighbourhood (NZN). This includes an overview of the mechanics of the model, detailed capital and operational cost forecasts, the income generation model, combined cash flow model, and an overall funding model.

A.1.1.1 What to expect in the Financial Case:

- **Section A.1.2**: we outline the funding ask to government, which comes in two distinct phases: first to move demonstrators to implementation and investment viability and secondly to then fund implementation.
- **Section A.1.3**: we present an overview of how the model works.
- **Section A.1.4**: we run through detailed cost analysis. This is our estimate of the capital and operational expenditure required to construct and then run an NZN over a 40-year period.
- **Section A.1.5**: we discuss how we expect our NZN model to generate income. This is based upon data and assumptions for energy consumption pre & post retrofit, and corresponding gas & electricity prices. This income stream comes from the energy & maintenance savings a household would make given the reduction we forecast in the household energy bill post retrofit.
- **Section A.1.6**: we discuss how this income could be used to harness upfront debt investment from private capital within a blended finance structure. This would significantly reduce the financial burden on government to achieve widespread household retrofit in order to achieve the UK's net zero goals.
- **Section: A.1.7**: we conducted several workshops for a variety of different financing actors. The purpose was to introduce them to the NZN model, and engage with them on the current challenges, discussion points, and appropriate solutions.
- **Section A.1.8**: we have modelled the project's capital requirements and revenue generation as part of this model. This section illustrates the long-term Budget, Cashflow and Funding Statements throughout the lifecycle of the NZN model.

A.1.2 Funding requirements

There are two distinct phases to the funding requirement, which we have called Phase 3a and Phase 3b. The funding ask in this business case covers Phase 3a, but the detailed modelling and analysis we have conducted in the Financial Case allows us to build a picture of the scope of phase 3b.

Overall, the combination of Phase 3a and 3b should allow for a set of 10 Wave 1 demonstrators to progress from developing detailed business cases for Net Zero Neighbourhoods, through to their full implementation.

The core goal of these demonstrators is to prove the funding model's capacity to raise private capital, specifically that these neighbourhood programmes can generate long-term income post-implementation. We forecast, theoretically, that around 65% of the required capital funding could be covered from repayable, private capital sources. This would significantly reducing the burden on the public purse to achieve net zero.

Private capital raising is a two-stage process, with short-term funds raised at the outset alongside public funding to pre-fund the work (i.e. to provide the capital to design and implement the NZNs), and then long-term funds raised once the demonstrators have been completed and the income stream delivered. The long-term funds would be used to repay the initial short-term private funding. For a first proof of concept demonstrator, it would be conservative to assume that there will be no private finance in the initial capital raise given the unproven nature of the funding model. However, long-term funds should still be accessible on successful completion of the implementation, as the income stream will be de-risked and delivered.

However, initial engagement has been carried out already with both short- and long-term private funders, as discussed in Section A.1.7, and we believe there may well be scope to bring private finance into this programme from the outset, albeit at a lower level than the model suggests in theory. Crystalising this theoretical interest will require specific demonstrator sites to be chosen, the business cases advanced, as well as further development of the legal structures to address key investor queries – all of which requires funding.

A.1.2.1 Phasing of funding

Therefore, the funding request is broken into phases.

1. **Phase 3a** (Years 1-2) – detailed project scoping

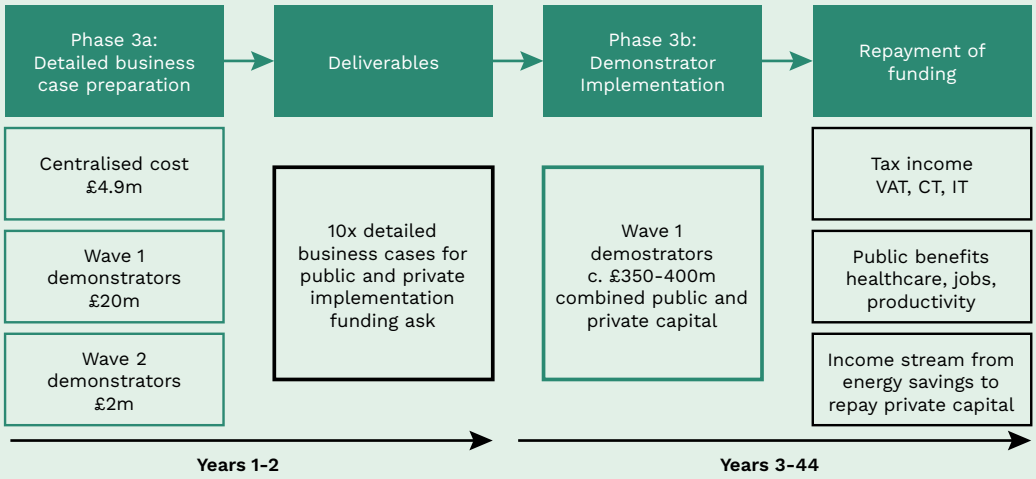
£26.9m of revenue funding to:

- Establish the central supporting organisations (referred to elsewhere as OpCo and FinCo), to run Wave 1 and Wave 2 demonstrator selection processes, and then work with chosen authorities to develop their implementation plans to fundable status.
- Fund budgets in the selected local authorities to create the necessary capacity and capabilities to develop those plans and cover other preparatory costs such as procuring retrofit feasibility assessments.
- Procure work to deliver the key legal and operational structures to implement the model, particularly around property linked service charge contracts, billing methodology and legal entity structures.
- Procure work to establish the key criteria for NZN projects which must be met in order to secure funding and test these against the designs being developed by the Wave 1 demonstrators.
- Fund the readiness acceleration of a cohort of Wave 2 demonstrators, where the local authorities are in a less advanced state of readiness to deploy capital within the required timeline, to advance them to that stage.

2. **Phase 3b** (Years 3+) – implementation of the demonstrators that have been designed in the business cases in Phase 3a

We estimate £350-400m of capital funding will be required to procure the supply chain to deliver the implementation plans, i.e. decarbonise the Wave 1 demonstrator neighbourhoods.

Figure 18: Summary of the two phase funding process



Source: BwB

A.1.2.2 Net funding

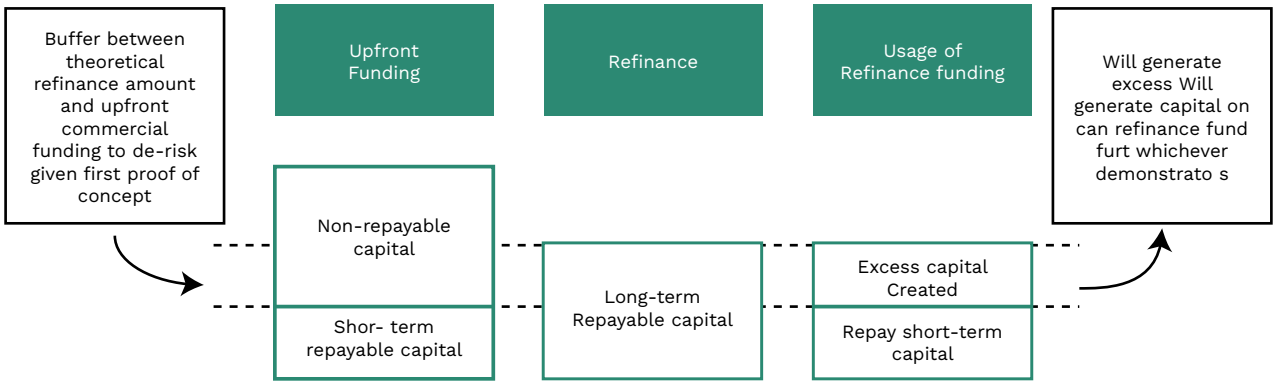
However, this £350-500m figure is the **gross** capital funding requirement. By the close of **Phase 3a** we will be able to determine:

- Existing capital funding that the chosen local authorities bring with them (e.g. Social Housing Decarbonisation Fund, Green Heat Network Funding etc).
- The level of private sector short-term funding that we can secure, based on the finalised implementation plans and the finalised investment structure.

Therefore, the net funding ask of HM Treasury will be quantifiable at that point.

The proportion of this funding that will be requested from HM Treasury will be dependent upon the degree to which private financiers are engaged at this point. Given that the NZN sites in Phase 3b would be some of the first demonstrations of this model nationwide, it is likely that the proportion of private finance would be limited and the net government capital funding ask will be more than what our model suggests is needed in theory. However, this means that on successful delivery of the demonstrators and a refinancing with long-term funders, excess capital will be created.

Figure 19: Refinance likely to further reduce net funding in initial demonstrators



Source: BwB

We would expect these demonstrators to result in significant learnings, allowing us to refine the inputs that form the basis of the underlying financial model. This in turn will allow the expansion of the NZN programme to additional locations and the potential to further reduce the reliance on public sector finance.

Specifically, in the longer term, as well as maximising private sector contribution to upfront repayable capital, there is scope to reduce the UK government contribution to the non-repayable component by offsetting further with other non-repayable funding sources. As with the traditional financial institutions, we have already started engagement with potential stakeholders that fall within this bracket (e.g. philanthropy and outcome buyers), and will continue doing so going forward (further details in section 1.6 & 1.7). The remaining government funding requirement will be justified by significant public benefits delivered. as well as being partly offset by increased tax receipts, principally from VAT on the capital deployment.

The demonstrator programme will allow us to refine the underlying financial model and provides scope to underpin a national roll out to support the UK's net zero targets. This innovative blended finance structure, involving both public and private capital, will allow the scale up of the NZN model well beyond anything that could be achieved purely via public financing.

A.1.3 Summary funding request

The initial ask is for £26.9m revenue funding to move a specific set of projects (10 demonstrators) to implementation & investment readiness over the first 18-24 months.

We will then, based on the designed projects, request additional capital funding. We estimate the total capital required to be £350-400m at this point, and the funding request to HM Treasury will depend on the degree to which private funders are engaged at this point.

The core principle of the proposed funding model is to remove the need for individual residents and asset owners to personally fund the significant costs needed to decarbonise buildings. This is important, as the lack of appetite/ability to take on debt is one of the key barriers to scaled-up retrofit.

Indeed, even if a successful alternative strategy could be created that used policy to compel owners to self-fund, it would have a significant regressive impact as cost per square metre to retrofit is broadly consistent across the country, while income levels and asset prices are not. This creates a much greater negative financial impact of raising personal debt on those with lower incomes and/or in areas where buildings have lower values per square metre.

To remove the need for individual funding, the NZN model aggregates energy and maintenance savings that households benefit from post implementation of building retrofit measures. These aggregated income streams can be used to repay centralised commercial funding for part of the initial capital costs.

Scaled deployment of capital within a neighbourhood to decarbonise housing and augment the broader area will generate a range of outcomes which can be used to drive the funding model.

Broadly these outcomes can be split into three categories:

- **Tax receipts**: Significant tax liabilities are generated for the supply chain who receive the capital deployment, returning to the government principally through VAT. In addition, there is also income tax and corporation tax generated by supply chain employment and profit creation, delivering an income stream for government of around 25% of the total capital deployed.
- **Co-benefits**: These are outcomes that have clear economic value but do not manifest as direct cashflows. Examples include: improved healthcare benefits for the residents from better quality housing leading to lower healthcare costs and greater productivity; reduced water run-off from deployment of green infrastructure reducing costs for water companies; and improved EPC profiles across the area, benefitting mortgage lenders.

- **Cash savings** resulting predominantly from a reduction in energy and maintenance costs to building occupiers, which can be aggregated into a direct financial income stream.

The aforementioned outcomes can be used to harness the different funding sources that make up the blended finance stack in this model,

Firstly, to bring institutional finance into funding this model, the third category is critical to create an income stream for the funding vehicle (referred to elsewhere as the FinCo). This can be used to repay the institutional funding over time, as well as deliver a financial return.

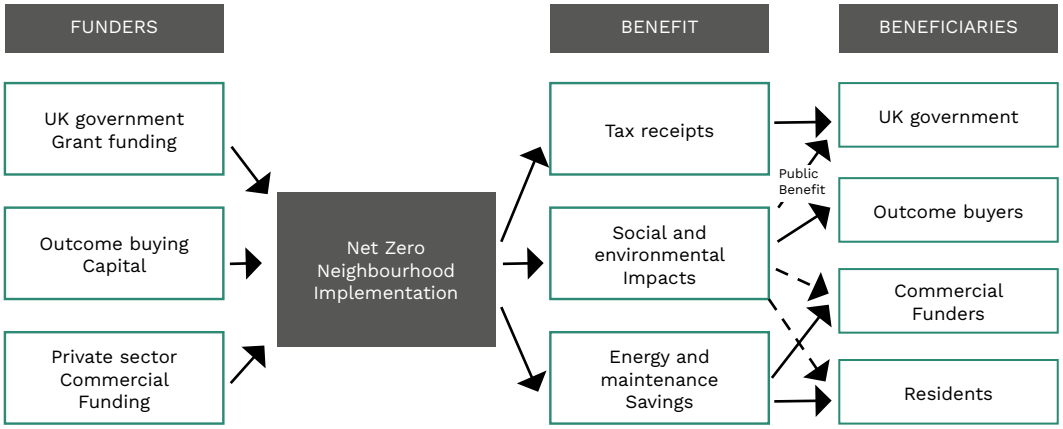
Given the forecast financial returns (discussed in detail later on) would not be sufficient to support the entire capital cost, this private, return-seeking capital must be blended with non-repayable capital. There are two key sources for this: 1) public grant, and 2) outcome payers.

Outcome payers can be harnessed through the co-benefits arising from an NZN, as touched on above. Outcome buyers look for a non-financial return outside of the direct income stream. Depending who the outcome buyer is, the co-benefit they look for is different. For example, a water company that benefits from the reduced water run-off post the implementation of an NZN could pay for some of the upfront capital to establish the NZN in the first place, in return for this outcome. Overall, co-benefits offer room for innovation within the funding stack, and by integrating this category into the model over time, the amount of public subsidy required would decrease.

For government, the tax receipts create an offsetting cash flow for government funding, reducing effective net spend.

The linkages between outcomes and funding sources are summarised below:

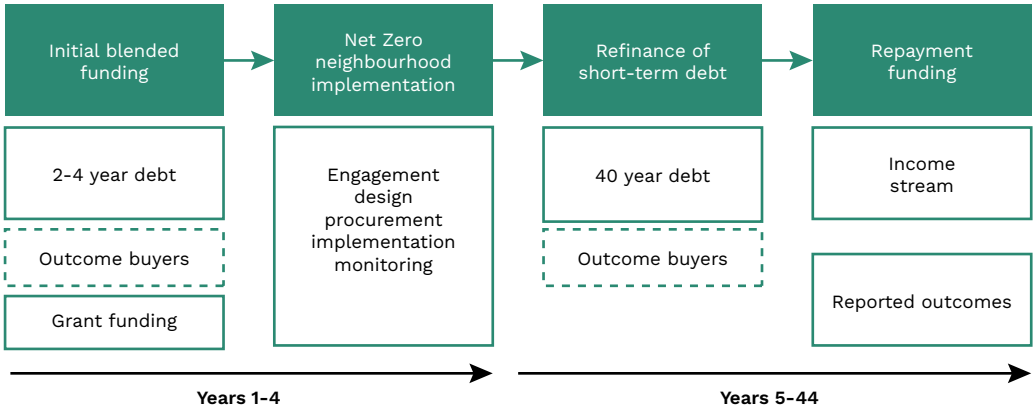
Figure 20: Funders, impacts, and beneficiaries



Source: BwB

The demonstrator timeline structure incorporates a 4-year period at the start to design and then implement an NZN funded by an initial blended finance pool, as well as include sufficient time post-delivery to monitor the outcomes. Once the NZN has been established and the income stream demonstrated and therefore de-risked, there would then be a re-financing with long-term funders for the subsequent 40 years.

Figure 21: Demonstrator timeline



Source: BwB

For initial proof of concept demonstrators, the upfront blended finance mix is likely to be more heavily weighted towards public funding (even potentially 100% public) to prove the validity of the model. Therefore, a successful refinance will lead to excess capital creation, allowing expansion of the initial demonstrators or creation of additional demonstrators.

A.1.4 Capital and operating cost requirements

In this section we describe the costs to deliver a Net Zero Neighbourhood (NZN): both the capital expenditure (CapEx) required to carry out the interventions, and the operating expenditures (OpEx) to manage its implementation.

Note that the costs associated with carrying out the proposed interventions depend on the number of properties within a pre-defined "neighbourhood", and the average property size (m2) of the properties. Given the national scale of the issue to be solved, with around 27.8 million residences[31] nationwide as well as commercial properties, we believe demonstrators should be ambitious in size.

In this business case, we assume:

- Average property size (m2): 90[32]
- Properties per NZN: 1,000

Capital expenditure (CapEx) can be split into two distinct components.

- **Building specific interventions** – these include building envelope insulation, heat pumps, and solar panels applied to both residential and commercial properties. These interventions are critically important if the UK is to decarbonise its built environment to meet its net zero ambitions.
    - While we have labelled these as building specific interventions they, may in fact be shared infrastructure, for example shared battery storage or shared ground source heat arrays. In this case they still specifically apply to the energy systems of the buildings in the neighbourhood
- **Community or neighbourhood wide interventions** These are interventions funded to regenerate the neighbourhood, applied to areas outside the buildings themselves. Interventions could include green infrastructure, EV charging, community centres and waste solutions – as examples.
    - There are several reasons for including these additional interventions. Firstly, these investments will regenerate neighbourhoods in a just and sustainable way and are progressive in their implementation because they come at no extra cost to the resident regardless of wealth. The measures will also generate significant additional public benefit, beyond energy savings. Secondly such interventions will move the scheme beyond a technical decarbonisation programme. This could help residents consent to building interventions being done to their homes as it could be viewed as a means to unlocking broader neighbourhood benefits. Finally, these interventions will also further contribute to the shift to net zero in and of themselves.

In terms of timing, a portion of the total CapEx may need to be committed to the supply chain in the first year of the project to help promote some activation (upskilling of staff, building of inventory) while the detailed planning process is still being completed. However, we assume most of the funding will be deployed in the second year.

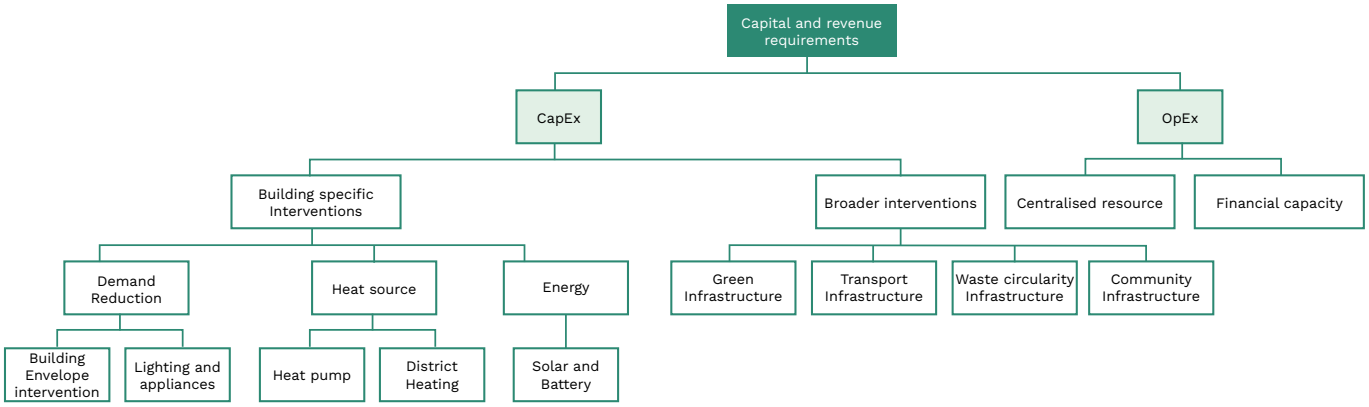
Operational expenditures (OpEx) will cover the cost of designing, procuring, and managing the interventions.

- Part of the OpEx costs will be concentrated in the initial 2–4-year design and implementation phase of the work. These are the costs covered by this funding request. This funding will be deployed both within local government teams implementing at a local level for each demonstrator and within a central resource that can provide specialist expertise and key resources such as contracts and fund structure templates. Collectively this funding will cover various stages of the implementation process from detailed engagement and co-design with communities, technical scope of work, procurement, and project management.
- The rest of the OpEx costs will be incurred through the 40-year funding life of the project, post implementation. These include the maintenance and replacement cycle costs of the installed assets as well as the operational cost of running the fund structure while the long-term debt is being repaid. This second group of costs will be funded by the revenues generated within the model.

31 *ONS. 2022. Families and households in the UK - Office for National Statistics. [online] Available at: <https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/families/bulletins/familiesandhouseholds/2020> [Accessed 8 June 2022].*

32 *David Wilson Holmes. 2018. The Average House Sizes & Average Square Footage in the UK | David Wilson Homes. [online] Available at: <https://www.dwh.co.uk/advice-and-inspiration/average-house-sizes-uk/> [Accessed 7 May 2022].*

Figure 22: Summary of CapEx and OpEx requirements



Source: BwB

A.1.4.1 Capital Expenditure Requirements

Table 14: Summary of CapEx Requirements in an NZN Place-based model

Nzn capital expenditure requirements			
Average property size (m^2)[33]	90		
Property per NZN	1,000		
Interventions	£ Per NZN	£ Per property	£ Per m^2
Demand Reduction[34]	£11,013,000	£11,013	£122
Degasification of heat source[35]	£11,411,000	£11,411	£127
Local energy generation[36]	£6,056,00	£6,056	£67
Sub-total - building specific interventions	£28,481,000	£28,481	£316
Green infrastructure	£3,994,000	£3,994	£44
Transport infrastructure	£999,000	£999	£11
Waste/circularity infrastructure	£191,000	£191	£2
Community infrastructure	£796,000	£796	£9
Sub-total - broader interventions	£5,979,000	£5,979	£66
Total costs	£34,460,000	£34,460	£383

Source: BwB

Building specific capital expenditure

The building focused capital deployment falls into three broad categories:

- **Energy demand reduction** - Interventions which lead to lower demand for energy, reducing the emissions from the building. These include building envelope upgrades (e.g. various types of insulation, mechanical ventilation, double glazing etc.), and lighting and appliance upgrades. In the model, building envelope measures are estimated at c£13k per property, with lighting and appliance upgrades at c£500 per property. Scaling this up to an NZN with 1000 homes results in an estimated cost of £11m per NZN, incorporating economies of scale and place (discussed later in this section).
- **Degasification of heat source** - the transition from gas to electric heating is key to the decarbonisation of neighbourhoods. This funding model is agnostic to the technologies used, however, for illustrative purposes, we have assumed a one-third/two-thirds mixture of ground source and air source heat pump installation alongside some central heating system upgrade to optimise for lower ambient temperature heating (heat pumps typically deliver water at a temperature of around 50 degrees Celsius vs gas boilers which operate

33 *DWH. 2022. The Average House Sizes & Average Square Footage in the UK | David Wilson Homes. [online] Available at: <https://www.dwh.co.uk/advice-and-inspiration/average-house-sizes-uk/> [Accessed 13 April 2022]..*

34 *Included in this intervention, is: insulation, lighting, appliance upgrade, windows, doors, and mechanical ventilation*

35 *Included in this intervention, is: Radiator upsizing, new radiators, and potential underfloor heating install where possible*

36 *Solar - 10 panel system 3.2 KW system + 5.6 KW battery*

at 70-80 degrees, requiring upsizing of radiators etc.[37]). For a place-based model, heat pump installation and central heating upgrades will cost £11.4m[38] per NZN.

- **Local energy generation** – while renewable energy generation, primarily through solar (mostly rooftop) and battery storage, is not always included in the definition of deep retrofit, it is an important intervention for the economic model. The unit cost of electricity is 3-4 times higher than gas[39], and while a switch to electric rather than gas-powered heating saves significant energy consumption it doesn't save money. The strong return profile of solar battery averages up the overall returns of decarbonisation. This is discussed in more detail in section A.1.5. The cost of installing a solar and battery unit for an NZN has been estimated at £6m.

The total estimated capital expenditure required to carry out the above mandatory building interventions for a Net Zero Neighbourhood has been estimated at £28.4m. This comes out to £28,481 per property, and £316 per m2.

Broader community capital expenditure

A key benefit of a place-based approach is the option to invest more broadly in the community, i.e. in the spaces between the houses. Such interventions could include green infrastructure, waste circularity measures, active transport infrastructure, community infrastructure, and more. The rationale of including these interventions is threefold:

- **Incentivisation for community consent**: Carrying out the building decarbonisation interventions described above requires residents and asset owners to consent. The work is disruptive and community engagement with retrofit measures has historically been a barrier to scaled implementation. By offering individual home interventions in order to "unlock" access to broader community benefits, we believe sign-up rates will be higher, potentially being a crucial driver of delivering the whole project. We would advocate a participatory process for the community to co-design these measures to ensure they are as relevant as they can be for a specific neighbourhood to maximise their impact.
- **Direct contribution to net zero**: In addition, these measures themselves are likely to advance the journey to net zero, by encouraging lower carbon transport modes, increased circularity within the community, reduced transport needs (by embedding more services within the community), and direct sequestration of carbon through green infrastructure.
- **Delivery of social impact**: They are also likely to deliver social impact in terms of physical and mental health benefits, biodiversity, productivity, education, and other effects. Many of these will be of relevance to outcome buyers.

While the exact combination of measures that will be implemented in each demonstrator location will be specific to that community, from a modelling perspective we have included a sample set of measures. As will be discussed in section A.1.5, we are not assuming any financial income to flow from these measures. There certainly are models, particularly around transportation, that could yield some income, and this would be an area of exploration within a demonstrator programme which could provide financial upside. However, given the local variation of these interventions, we have assumed no additional revenue streams in our model for now. We factor in a total community capital budget of around £6m per demonstrator which dilutes the financial returns but boosts the social and environmental impact and, as stated, will likely drive resident consent. These broader community interventions include:

- **Green infrastructure**: We assume the planting of trees as part of a neighbourhood regreening programme at a rate of one per household and a cost per planting of just under £5,000[40] per tree. This is the proposed capital cost profile of a 'RootSpace System' (RSS) urban tree over a 50-year lifecycle - the costs include the cost for installation, and excludes the gross economic accumulated benefits. This yields a neighbourhood regreening budget of c. £4m, incorporating economies of place that we discuss later in this section.

37 *Eco-Home-Essentials. 2021. Ground source heat pump - All You Need To Know.. [online] Available at: <https://www.eco-home-essentials.co.uk/ground-source-heat-pump.html#:~:text=An%20efficient%20ground%20source%20heat,which%20require%20around%2065%20deg.> [Accessed 8 June 2022].*

38 *2018. The Cost of Installing Heating Measures in Domestic Properties. [PDF] Delta-ee. Available at: <https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/913508/cost-of-installing-heating-measures-in-domestic-properties.pdf> [Accessed 25 May 2022]*

39 *Energy Systems Catapult. 2020. Comparing the cost of running a Heat Pump and a Gas Boiler. [online] Available at: <https://es.catapult.org.uk/report/comparison-of-heat-pump-and-gas-boiler-running-costs/> [Accessed 8 June 2022].*

40 *2018. STREET TREE COST BENEFIT ANALYSIS. [PDF] Treenomics. Available at: <https://www.treeconomics.co.uk/wp-content/uploads/2018/08/GBU_Street-Tree-Cost-Benefit-Analysis-2018.pdf> [Accessed 6 May 2022].*

- **Mobility**: We include two types of mobility interventions per neighbourhood. The installation of a mix of EV charging stations either on a per property basis or community super-charger stations. In line with the uptake in electric vehicles over time, the need for electric charging infrastructure to keep up with demand is growing, and the presence of incremental stations will likely stimulate more rapid take up. The installation of the charging points has been estimated at £831,000 per NZN. Secondly, as an example of a relatively low-cost intervention that has potential to change behaviours, we include the installation of secure bike storage units for every eight homes at a cost of £3,250 per unit pre economies of scale & delivery.
- **Waste/circularity**: The waste interventions modelled include a mix of community composting, repair cafés, recycling banks, and water fountains. These interventions have been averaged out to take into account of the likelihood that not all such interventions will be implemented, but a combination of them. The estimated cost is c. £191,000 per NZN.
- **Community**: Finally, we include a budget for developing community assets, calculated at £796,000 per NZN. This is a budget to renovate any available space in the community for community assets, such as a co-working space or community centre.

Therefore, the total budget for these broader interventions is c. £6m per 1,000 home Net Zero Neighbourhood, including economies of scale and proximity that we describe below.

Economic benefit of a place-based approach vs asset-based

We have conservatively incorporated some economies of scale and economies of proximity in these capital expenditure numbers that we believe can be derived from a place-based implementation model. From discussion with industry participants, intuitively the economies of scale in combination with the economies of proximity could be greater. One of many valuable outcomes from the proposed demonstrator programme will be quantifying these more accurately.

There are three key drivers of lower unit costs from a place-based approach.

- **Procurement economies**: By simply purchasing equipment in volume, for example 1,000 heat pumps in one negotiated transaction, a better price should be achievable. We have assumed a 5% discount on equipment price in our modelling.
- **Sales and delivery economies**: The largest part of the costs incurred as a result of individual customers engaging with an installation company is rarely the underlying equipment manufacture but is the cost of customer engagement and installation. A heat pump manufacturer, and installer that we spoke to suggested that the manufacture of their product took around 8 people hours, but the sale and installation process took 28 people hours. By the NZN implementation team effectively negotiating the installation with whole communities at a time, instead of the installers having to reach out and successfully sell to individual residents, this results in a significant sales saving. We have assumed a 35% reduction in sales costs, but believe this could be higher. Similarly, on delivery, the installers will be able to deliver on multiple closely located properties concurrently, significantly reducing delivery costs. We have assumed a 15% reduction in delivery costs in our model.
- **Systemic design**: The “art of the possible” when considering systemic transition of heat and energy systems across a whole community is radically different to considering individual properties. For example, rather than an individual solar panel array, battery and heat pump per property, shared asset solutions can be considered, such as shared ground source heat arrays which could require one borehole per two properties, and shared battery storage, community solar assets etc.

Industry experts suggest that the incremental benefits of shared battery storage is non-linear. As batteries increase in size, greater benefits can be unlocked relative to individual battery storage. While we consider that there is considerable potential to reduce averaged capital cost per residence through these measures which improve asset utilisation, we have only included a 5% discount in our model, representing further upside to projections.

We summarise the economies incorporated into our model in the following table. We have compared three situations: 1) An individual property on its own, 2) 1,000 properties – but geographically distributed, and 3) 1,000 properties in one place, representing our NZN model:

Table 15: Economies of a place-based approach

	Single property	1,000 dDistributed properties	1,000 place-based properties
CapEx required per property (GBP)			
Demand reduction	13,639	12,411	11,013
Heat source degasification	14,132	12,860	11,411
Solar panel and battery install	7,500	6,825	6,056
Total building specific intervention CapEx	**35,271**	**32,096**	**28,481**
Green infrastructure	4,946	4,501	3,994
Transport infrastructure	1,237	1,126	999
Waste/circularity infrastructure	236	215	191
Community infrastructure	985	897	796
Total broader community intervention CapEx	**7,404**	**6,738**	**5,979**
Total CapEx	**42,675**	**38,834**	**34,460**
Percentage discount		**-9%**	**-19%**
Equipment procurement economies on 40% of the cost	0%	5%	5%
Sales economies on 20% of the cost	0%	35%	35%
Install economies on 40% of the cost	0%	0%	15%
System design economies on 100% of the cost	0%	0%	5%

Source: BwB

A.1.4.2 Operational expenditure

The OpEx required to deliver an NZN falls broadly into two groups:

- Cost to **design, procure & implement** the NZN in the first c. 4 years of the project.
- **Long term costs** for asset maintenance & replacement, and the cost to run the fund structure itself.

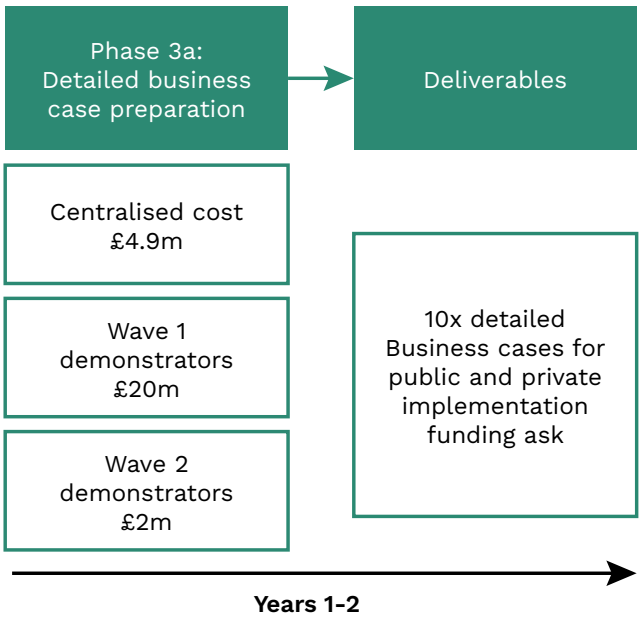
Implementation OpEx

There will need to be significant extra resource deployed at the local government level in order to develop and deliver an NZN. In particular, this will be the case for the first c. 2 years of the project throughout the engagement, design, procurement, implementation, and initial monitoring phases of this process.

These costs would be covered by the funding ask in this request:

- £4.9m of a centralised OpEx resource.
- £20m to fund 10 Wave 1 demonstrators to deliver detailed business cases for a public & private implementation funding ask.
- £2m to fund development of a Wave 2 cohort of demonstrators.

Figure 23: OpEx Funding Ask



Source: BwB

We estimate an annual OpEx cost of c. £1.5m per NZN for the full deployment of this resource. This includes the cost to hire a broad range of personnel:

Table 16: NZN skills requirements

Position	Full-time/Part-time	Cost/FTE	Annual Cost
Finance[41] [42]	3.5	£40,000	£140,000
Transport[43]	3	£35,000	£105,000
Environment[44]	5	£37,000	£185,000
Legal[45] [46]	3.5	£45,000	£157,500
Housing[47] [48]	3	£45,000	£135,000
Technical[49]	4.5	£55,000	£247,500
Policy[50]	2.5	£40,000	£100,000
Procurement[51]	5	£40,000	£200,000
Communications[52] [53]	2.5	£35,000	£87,500
Planning[54]	3.5	£40,000	£140,000
Total		£412,000	£1,497,500

Source: BwB

41 *PFjobs. 2022. Head of Local Government Finance - Southwark, London job with London Council | 27039. [online] Available at: <https://www.pfjobs.co.uk/job/27039/head-of-local-government-finance/?utm_campaign=google_jobs_apply&utm_source=google_jobs_apply&utm_medium=organic> [Accessed 16 April 2022].*

42 *Guardian Jobs. 2022. Senior Finance Business Partner - Climate Change & Commercial - New Shire Hall, Huntingdon, Cambridgeshire OR Home Based job with CAMBRIDGESHIRE COUNTY COUNCIL | 8049631. [online] Available at: <https://jobs.theguardian.com/job/8049631/senior-finance-business-partner-climate-change-and-commercial/?LinkSource=PremiumListing> [Accessed 16 April 2022].*

43 *Lerip. 2022. Sustainable Transport Planner - Hackney Council London | Lerip. [online] Available at: <https://www.lerip.com/uk/jobs/sustainable-transport-planner-hackney-council-london-178729/?utm_campaign=google_jobs_apply&utm_source=google_jobs_apply&utm_medium=organic> [Accessed 16 April 2022].*

44 *Reed. 2022. Net zero Carbon Manager. [online] Available at: <https://www.reed.co.uk/jobs/net-zero-carbon-manager/46509255?source=searchResults&filter=/jobs/jobs-in-fulham?sortby%3DDisplayDate&utm_campaign=google_jobs_apply&utm_source=google_jobs_apply&utm_medium=organic> [Accessed 16 April 2022].*

45 *Reed. 2022. Lawyer. [online] Available at: <https://www.reed.co.uk/jobs/lawyer/46382848?utm_campaign=google_jobs_apply&utm_source=google_jobs_apply&utm_medium=organic> [Accessed 16 April 2022].*

46 *Lerip. 2022. Contracts And Procurement Solicitor - Kensington and Chelsea Council London | Lerip. [online] Available at: <https://www.lerip.com/uk/jobs/contracts-and-procurement-solicitor-kensington-and-chelsea-council-london-179188/?utm_campaign=google_jobs_apply&utm_source=google_jobs_apply&utm_medium=organic> [Accessed 16 April 2022].*

47 *Reed. 2022. Average Housing Officer Salary in London - Reed.co.uk. [online] Available at: <https://www.reed.co.uk/average-salary/average-housing-officer-salary-in-london?utm_campaign=google_jobs_salary&utm_source=google_jobs_salary&utm_medium=organic> [Accessed 16 April 2022].*

48 *Randstad. 2022. Job opening - Housing Officer in London | Randstad. [online] Available at: <https://www.randstad.co.uk/jobs/neighbourhood-housing-officer_london_39010381/?utm_campaign=google_jobs_apply&utm_source=google_jobs_apply&utm_medium=organic> [Accessed 16 April 2022].*

49 *Jobilize. 2022. Jobs hiring now in Woodrow | Jobilize. [online] Available at: <https://www.jobilize.com/job/gb-berkshire-reading-lead-technical-authority-civil-structural-architecture?utm_campaign=google_jobs_apply&utm_source=google_jobs_apply&utm_medium=organic> [Accessed 16 April 2022].*

50 *Reed. 2022. Senior Policy and Scrutiny Officer. [online] Available at: <https://www.reed.co.uk/jobs/senior-policy-and-scrutiny-officer/46377051?utm_campaign=google_jobs_apply&utm_source=google_jobs_apply&utm_medium=organic> [Accessed 16 April 2022].*

51 *Adzuna. 2022. Local Authority Procurement Position. [online] Available at: <https://www.adzuna.co.uk/jobs/details/3011097154?utm_campaign=google_jobs_apply&utm_source=google_jobs_apply&utm_medium=organic> [Accessed 17 April 2022].*

52 *Check a Salary. 2022. Senior Communications Officer in The Borough. [online] Available at: <https://www.checkasalary.co.uk/jobs/job/senior-communications-officer-the-borough-21d7fbd7360606c9d4b0d4dcb2c2adeb?utm_campaign=google_jobs_apply&utm_source=google_jobs_apply&utm_medium=organic> [Accessed 17 April 2022].*

53 *UK, J., 2022. Communications and Media Officer at Nailsea Town Council/JOBSXL - Job Centre Online. [online] Jobsxl. Available at: <https://www.jobsxl.co.uk/jobsuk/365936/communications-and-media-officer-at-london/> [Accessed 17 April 2022].*

54 *Reed. 2022. Senior Communications and Content Officer. [online] Available at: <https://www.reed.co.uk/jobs/senior-communications-and-content-officer/46276099?utm_campaign=google_jobs_apply&utm_source=google_jobs_apply&utm_medium=organic> [Accessed 17 April 2022].*

On a long term view, by centralising components of this resource into an agency which would support local governments, the cost effectiveness vs total capital deployed would improve significantly.

Long term OpEx

The second group of OpEx costs will be incurred regularly through the 40-year refinance funding life of the NZN project. This includes:

- Asset & replacement costs of the installed assets, and,
- The operational cost of running the fund structure while the long-term debt is being repaid.

These costs are all funded by the revenues generated within the model.

Asset maintenance and replacement:

Over time, there is the cost burden of asset maintenance and replacement that the NZN vehicle will fund, as the fixed assets deteriorate over time. Typically, individual asset owners are required to take on the maintenance and replacement cost burden for any equipment installed, whereas in this model, the NZN vehicle will take on this cost. This represents material cost savings for residents, on top of the initial intervention, as well as enabling greater oversight for the OpCo in monitoring and measuring the GHG reductions.

Of the building specific interventions that are proposed, the table below illustrates the lifecycle assumptions of the assets. We factor these varying lifecycles into the model, alongside expected cost deflations for the key components (as per the Climate Change Commission's 6th Carbon Budget[55]), to forecast replacement costs during the 40-year project period.

Table 17: Asset replacement assumptions

Replacement	Average life cycle
Air source heat pump	15 Years[56]
Ground source heat pump	25 Years[57] [58]
Solar PV	Up to 30 years[59]
Battery	10 Years[60]
Inverter	13 Years[61]

Source: BwB

For maintenance costs, we have calculated £200 per property in year one (2024), with this figure growing in line with an annual inflator in subsequent years.

When implementing this in practise, the NZN delivery team would likely outsource the asset replacement & maintenance function to a relevant Contractor and, given the long-life cycle of the project, would most probably sign a long-term contract with a regular, inflating yearly payment. As such, we have used the expected 40-year total lifetime cost of maintenance and replacement to structure the cost as a mirrored regular, inflating annual fee.

Cost to run the funding vehicle:

During the 40-year lifetime of the commercial financing, the funding vehicle will be the legal entity through which income is collected and debt repaid. As such, there will be a cost attached to this. We factor in the cost of a Contractor for five working days per quarter, totalling four weeks per year. The assumption is that this will be an accounting/ finance specialist that will look into the mechanisms of the debt repayment e.g. quarter end accounts and audits.

Table 18: Operational costs to run finance vehicle

Replacement	
Day rate	£1,000[62]
Number of days per quarter	5
Total quarterly rate	£5,000
Total annual rate	£20,000
Annual inflator	2%

Source: BwB

A.1.5 Income generation

A.1.5.1 Repayable finance

The NZN model harnesses the energy and maintenance savings delivered by the range of interventions to provide the income stream needed to repay commercial finance.

The proposal is to do this through multi-decade, property-linked contracts to capture part of the savings created for the resident through an "NZN Service Charge". By only capturing part of the savings the resident would still benefit financially, despite not having contributed to the upfront capital, partly offsetting recently inflated costs of living, and driving

55 *2020. The Sixth Carbon Budget The UK's path to Net zero. [PDF] Committee on Climate Change. Available at: <https://www.theccc.org.uk/publication/sixth-carbon-budget/> [Accessed 11 May 2022].*

56 *Kensa Contracting*

57 *Kensa Contracting*

58 *Source: Kensa Contracting - Gound loops last approximately a century*

59 *Solar Harmonics*

60 *Sunrun*

61 *Solar Harmonics*

62 *2020. Contractor PAY GUIDE 2020. [PDF] Robert Walters. Available at: <https://www.robertwalters.co.uk/content/dam/robert-walters/country/united-kingdom/files/Contractor-pay-guide/Contractor-pay-guide-2020.pdf> [Accessed 3 June 2022].*

uptake of the programme. The Service Charge would increase by an inflation-linked mechanism post year one. This model also effectively avoids a number of the split incentive/principal agent issues that are commonplace in retrofit. Potential legal mechanisms have been discussed in the Financial Case earlier in this report. By capturing the saving over multiple decades, we align the investment opportunity to long-term patient capital providers such as insurance companies and pension fund asset managers, who are a much better fit for this investment profile than individual homeowners (discussed in further detail later in Section A.1.6).

A.1.5.2 Energy and maintenance savings

A.1.5.2.1 Baseline

At the start of 2022, the average UK combined energy bill stood at around £1,300.

Following the Energy Cap change in the Spring this has risen to £2,290.

Our analysis suggests that following the further expected October 2022 changes the average energy bill will rise to £3,891, with the starting energy bill expected to be £4,257 in 2024 when demonstrators are likely to be priced. This includes a £125 saving on the maintenance bill.

A.1.5.2.2 Creating energy and maintenance savings

As described previously, the building focused capital deployment falls into three broad categories:

- demand reduction
- degasification of heat source
- local energy generation

A.1.5.2.3 Demand reduction

Demand reduction is principally-focused on interventions that make the building more thermally efficient - i.e. improving the envelope of the building so that less energy is required to deliver an acceptable level of comfort for the resident - without changing the heating system. It also includes control systems which improve the efficiency of the heating system and potentially also upgrades to more energy-efficient appliances and lighting.

The key assumption in our financial modelling is that the demand reduction interventions will reduce the thermal energy input required to generate an acceptable comfort level from the UK average of 124 kWh/m2 down by 50% to 62 kWh/m2. This compares to the Association of Environment Conscious Building (AECB) standard of 50 kWh/m2[63] and the more ambitious EnerPHit (25 kWh/m2) or PassivHaus (15 kWh/m2) standards.

In addition, we assume a small reduction in demand from non-heating related energy consumption, such as upgrades in lighting and appliances, that are offset by additional electricity consumption to run mechanical ventilation required for the newly more airtight building envelope.

Demand reduction has a more significant impact on total energy consumption (i.e. number of kWhs) than it does on cost reduction, given it is principally reducing gas usage through heating demand reduction, which is at a significantly lower unit cost than electricity.

A.1.5.2.4 Degasification of heat source

This funding model is agnostic to the technologies used, however, for illustrative purposes, we have assumed that – in line with the Climate Change Committee 6th Carbon Budget – one-third of the buildings will have a ground source heat pump (GSHP) installed and two thirds will have an air source heat pump (ASHP)[64]. We would note that in a place-based implementation the relative attractiveness of GSHP may be higher given the potential for shared ground source heat arrays. Given that GSHPs typically run at slightly higher efficiencies than ASHP, a shift towards GSHP slightly improves the private capital potential of the model despite higher upfront capital costs.

While the thermal output of the new heating system is the same 62 KWH/m2, the input energy is very different, due to the differing energy efficiencies of gas boilers vs heat pumps. We assume efficiency ratios, i.e., the number of kWh of thermal energy emitted per kWh of input energy (either gas or electricity), of 0.82 for gas boilers, 2.82 for ASHP and 3.14 for GSHP[65]. This results in a significant reduction in kWhs consumed.

However, given we are replacing gas consumption with (a smaller amount of) electricity consumption, and electricity is at a significantly higher unit cost, the total cost actually rises slightly. This is just about offset by avoiding the gas standing charge. We assume gas prices of 18.4p/kWh and electricity prices of 45.4p/kWh for electricity in 2024.

By no longer having a gas boiler in the property, the resident also avoids annual service charges. Ongoing maintenance and replacement of the installed assets will be covered by the funder.

Not only are heat pumps and district heating more cost effective to maintain over time due to their systemic design and long-lasting equipment (as

63 *Passive House Plus. 2021. AECB launches new retrofit standard - passivehouseplus.co.uk. [online] Available at: <https://passivehouseplus.co.uk/news/general/aecb-launches-new-retrofit-standard> [Accessed 11 June 2022].*

64 *2020. The Sixth Carbon Budget The UK's path to Net zero. [PDF] Committee on Climate Change. Available at: <https://www.theccc.org.uk/wp-content/uploads/2020/12/The-Sixth-Carbon-Budget-The-UKs-path-to-Net-Zero.pdf> [Accessed 2 May 2022].*

65 *https://www.theccc.org.uk/wp-content/uploads/2020/12/Full-Report-Development-of-trajectories-for-residential-heat-decarbonisation-to-inform-the-Sixth-Carbon-Budget-Element-Energy.pdf*

verified by market actors that we have spoken to), but the elimination of gas boilers reduces the compliance burden, also. One particular example associated with gas boilers is the CP12 Gas Safety Certification. This is a legal requirement for landlords to certify a degree of safety with respect to gas boilers. The degasification of their heat source will tangibly reduce their yearly running costs, adding greater value to this proposition.

A.1.5.2.5 Solar generation and storage

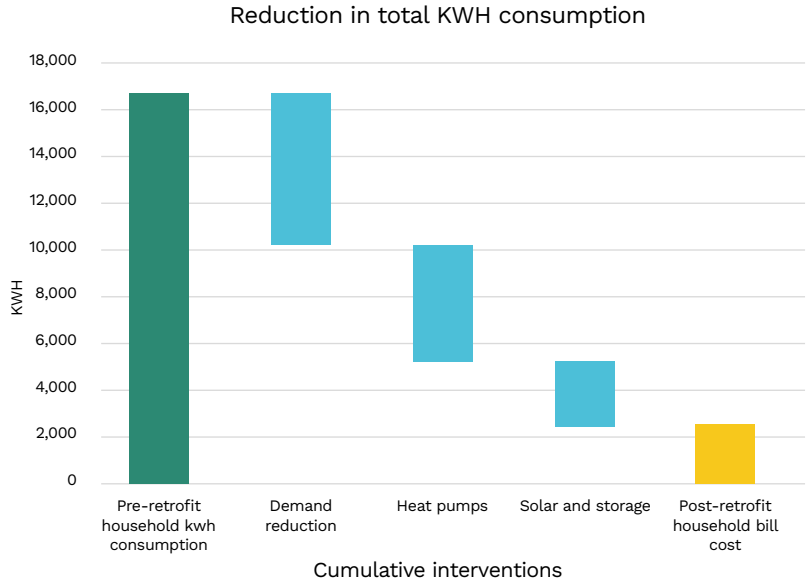
While not strictly a deep retrofit measure, in order to boost the overall economic outcome, we then include the installation of solar panels and a battery to match generation timing with consumption timing, allowing significant self-consumption. This is a direct offset to the remaining energy bill and, given both increases in energy prices and reductions in solar panel and battery costs over time, is financially accretive to the funding model.

Solar electricity generation is not a good match temporally to heat energy consumption, as the former is more effective in the summer and the latter is in greater demand in the winter. But households have a baseline electricity consumption for lighting and appliances which is relatively unseasonal. We have included a solar battery system which will generate a volume of energy that can be offset against this baseline, rather than against heating demand. The fact therefore, that solar generation is more effective in the summer months than the winter months, when most of our heating consumption occurs, is not particularly relevant.

A.1.5.2.6 Net effect

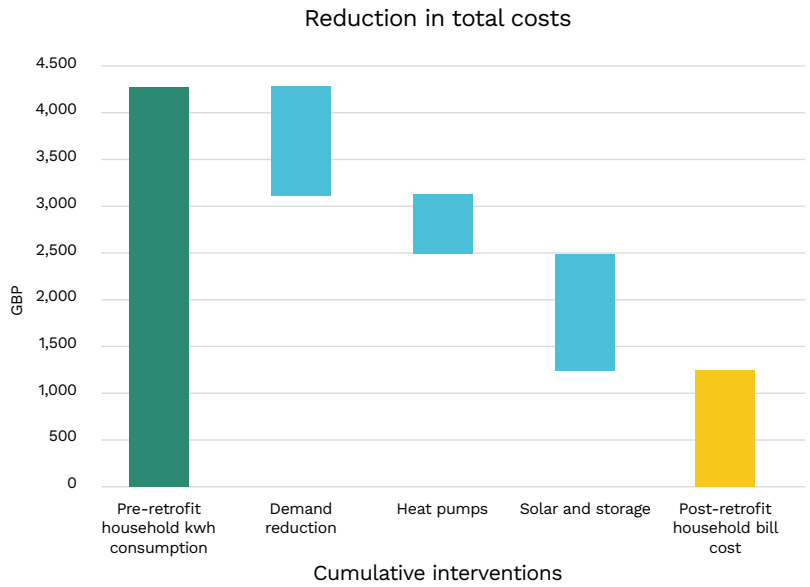
Collectively these interventions reduce energy consumption and associated costs for the resident significantly, as shown in the figures below.

Figure 24: Reduction in household energy consumption



Source: BwB

Figure 25: Rreduction in household energy bills



Source: BwB

The net effect of these measures is to reduce kWh consumption from 16,710 p.a. to 2,359 and costs from £4,257 p.a. to £1,179. This equates to a saving of £3,078 as can be seen in detail below:

Figure 26: Detailed household energy consumption and cost

	2022 Pre-retrofit	**2024 Pre-retrofit**	**Demand reduction**	**Heat pump & central heating**	**Solar and storage**
Annual heating and hot water gas consumption (kWh) per dwelling	13,610	13,610	6,805	0	0
Annual heating and hot water elec consumption (kWh) per dwelling	0	o	0	1,909	1,909
Annual mechanical ventilation elec consumption (kWh) per dwelling	0	0	180	180	180
Annual household elec consumption (kWh) per dwelling	3,100	3,100	3,150	3,150	270
Total household energy consumption (kWh) per dwelling	**16,710**	**16,710**	**10,135**	**5,239**	**2,359**
Of which gas	13,610	13,610	6,805	0	0
Of which electricity	3,100	3,100	3,330	3,330	2,359
Annual gas standing charge	104	109	109	0	0
Annual electricity standing charge	169	109	109	109	109
Annual heating and hot water unit gas costs per dwelling (GBP)	2,009	2,508	1,254	0	0
Annual heating and hot water unit electricity costs per dwelling (GBP)	0	0	0	866	866
Annual mechanical ventilation elec cost per dwelling (GBP)	0	0	82	82	82
Annual other household consumption electricity costs per dwelling (GBP)	1,609	1,406	1,429	1,429	122
Total energy costs per dwelling (GBP**)**	**3,891**	**4,132**	**2,982**	**2,485**	**1,179**
Of which gas (GBP)	2,113	2,618	1,363	0	0
Of which electricity (GBP)	1,778	1,515	1,619	2,485	1,179
Maintenance cost for heating and hot water system (GBP/dwelling p.a.)	125	125	125	0	0
Total maintenance costs per dwelling (GBP**)**	**125**	**125**	**125**	**0**	**0**
Total costs per dwelling (GBP**)**	**4,016**	**4,257**	**3,107**	**2,485**	**1,179**
Reduction vs baseline	0%	6%	-23%	-38%	-71%

Source: BwB

In order to drive up demand for this model, one pre-requisite is that the resident is left in no worse financial position post the work than prior to it. A discussion of the impact of recent rises in energy costs and this potential risk is in the Financial Case, earlier in this document.

Ultimately, a decision would have to be taken whether to leave that risk with the resident or to try to transfer that risk to a third party. One option for the latter could be to explore the possibility of insurance products to hedge away the energy price downside tail risk and a second option could be for an effective state guarantee. It should be noted that for the latter option, in a situation where energy prices have fallen dramatically given that energy prices are an input cost into most economic activity, it is likely that there would be a significant economic boom, providing a hedge to the possible financial liability to make residents whole vs average energy bills.

We believe this will make the proposal significantly attractive to residents in combination with the broader regeneration components.

A.1.6 Overall funding requirement

A key goal is to attract private finance to fund the scale up of the NZN neighbourhood model in the long term, beyond the initial demonstrators. This would have the potential to further the reach of the NZN model compared to what public funding could achieve on its own. To do so, however, private commercial capital would need to be blended with other sources of non-repayable capital (including public funding), to achieve the returns necessary for the private commercial investors.

The income stream from energy and maintenance savings discussed in the prior section is what will be used to harness long term, private commercial capital by providing a multi-decade annuity-like return, suitable for the likes of traditional insurance and pension funds. However, given their relatively low risk appetite, this investor group would only fund the model after the riskiest phase – i.e. delivery of the interventions themselves. As a result, we would also seek higher risk, development capital to pay for the capital interventions during the initial development of each NZN, before refinancing with long term, lower risk, patient capital.

In this section, we discuss these two stages of the NZN funding model:

- pre-NZN implementation, and
- post-NZN implementation

These stages involve contrasting funding requirements and, in most cases, will therefore require different funding sources.

We first discuss the characteristics of these two phases qualitatively, before moving on to illustrate quantitatively with our funding model.

A.1.6.1 Pre-NZN implementation

Before an NZN is completed and generating a revenue stream, there will be a funding requirement to scope and implement the interventions in the first place. Both capital and operating costs, as discussed in Section A.1.4, will need to be provided for the project to get underway. With a rough project delivery timeline laid out below, the funding ask for the pre-implementation stage of the process is 2–4-year development capital, with a higher risk appetite and greater expected rate of return, compared to the longer-term capital we describe in the post-NZN implementation stage.

First 12-24 months: Neighbourhood selection, project scoping & supply chain procurement (aligns with project Stage 1 – see Management Case for details)

Second 12-24 months: Implementation (aligns with project Stage 2)

Monitoring of outcomes across a seasonal cycle to assess de-risked long term income streams (aligns **Final 12 months** with project Stage 3)

Pre-implementation funding will need to be secured at the start of this process to be able to commit capital to supply chain procurement and ensure the relevant supply chain skills and capacity are in place to begin the project.

A.1.6.2 Repayable vs non-repayable upfront capital

We propose that the funding for an NZN project should be a blended model, with a mix of repayable and non-repayable capital making up the upfront development capital stack. This is due to our modelling of the income streams that an NZN will be able to deliver in the long term, as a result of households' energy and maintenance savings as described in Section A.1.5. In short, these cash flows will only be able to support a portion of the required upfront investment. Or, in other words, the direct financial economic returns of delivering decarbonisation aren't strong enough to support a purely commercial model.

Later on in this section, we will discuss:

- The ratio of repayable versus non-repayable capital that we forecast.
- The relevant sensitivities to this, and
- Examples of institutions that could contribute to this mix.

A.1.6.3 Post-NZN implementation

Once the NZN has been completed, we move to the second stage of the funding timeline: the re-financing. At this point, the NZN should be generating proven revenues. This becomes an annuity-like cash flow, which is received by the centralised funding vehicle and can be used to raise long term patient capital which, in turn, is used to refinance the repayable development capital from the pre-NZN implementation phase. This funding requirement comes with very different attributes. As the project has already been implemented and is generating revenues, the risk to the investor is much lower. In addition, given the long-lasting nature of the assets from the renovation programme, investors with much longer time horizons can be targeted. This includes pension funds and insurance funds, who need to match their assets to their long-term liabilities. We discuss potential targets later in this section and within the stakeholder engagement session later in this report.

A.1.6.4 Our funding model

Having discussed the two major stages of the funding process qualitatively above, we discuss our quantitative base case model in this section. The key output for this model is the amount of repayable commercial capital that it will be possible to raise, based on the expected energy and maintenance savings that will materialise post the retrofit programme.

Figure 27: Funding model

Year post retrofit	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Original energy bill and maintenance cost for resident (GBP)	4,257						
Year 1 saving (GBP)	3,078						
Post-retrofit energy bill for resident (GBP)	1,179						
Year 1 service charge for resident (GBP)	1,321						
Total cost to resident (energy+ service fee)	2,500						
Original energy bill/maintenance saving for the resident	41%						
Saving given to resident (GBP)	1,757						
Gross income to fund from resident (GBP)	1,321	1,348	1,375	1,402	1,430	1,459	1,488
Annual inflator		2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Contribution to asset maintenance/replacement fund (GBP)	(454)	(463)	(473)	(482)	(492)	(502)	(512)
Assumed delinquency rate	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%
Delinquency	(20)	(20)	(21)	(21)	(21)	(22)	(22)
Operational cost (GBP)	(21)	(21)	(22)	(22)	(23)	(23)	(24)
Income available for funding (GBP)	**826**	**843**	**860**	**877**	**895**	**912**	**931**
Required return rate for lenders - hyperinflation	1.25%						
Expected inflation rate	2.0%						
Overall rate of return	3.25%						
Tenure of loan	40						
Re-financing amount based on fund revenue (GBP)	25,498						
Required return rate for lenders - over inflation	5.0%						
Expected inflation rate	2.0%						
Overall rate of return	7.0%						
Tenure of loan	2						
Pre-financing amount	**22,271**						
Total capital required	34,460						
Funding gap	12,189						
Private capital as a percentage of total	**65%**						

Year post-retrofit	**21**	**22**	**23**	**24**	**25**	**26**	**27**
Original energy bill and maintenance cost for resident (GBP)							
Year 1 saving (GBP)							
Post-retrofit energy bill for resident (GBP)							
Year 1 service charge for resident (GBP)							
Total cost to resident (energy+ service fee)							
Original energy bill/maintenance saving for the resident							
Saving given to resident (GBP)							
Gross income to fund from resident (GBP)	1,963	2,003	2,043	2,084	2,125	2,168	2,211
Annual inflator	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Contribution to asset maintenance/replacement fund (GBP)	(675)	(689)	(702)	(716)	(731)	(745)	(760)
Assumed delinquency rate	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%
Delinquency	(29)	(30)	(31)	(31)	(32)	(33)	(233)
Operational cost (GBP)	(31)	(32)	(32)	(33)	(33)	(34)	(35)
Income available for funding (GBP)	**1,228**	**1,253**	**1,278**	**1,303**	**1,329**	**1,356**	**1,383**

8	9	10	11	12	13	14	15	16	17	18	19	20
1,518	1,548	1,579	1,611	1,643	1,676	1,709	1,743	1,778	1,814	1,850	1,887	1,925
2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
(522)	(532)	(543)	(554)	(565)	(576)	(588)	(599)	(611)	(624)	(636)	(649)	(662)
1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%
(23)	(23)	(24)	(24)	(25)	(25)	(26)	(26)	(27)	(27)	(28)	(28)	(29)
(24)	(25)	(25)	(26)	(26)	(27)	(27)	(28)	(28)	(29)	(29)	(30)	(30)
949	**968**	**988**	**1,007**	**1,028**	**1,048**	**1,069**	**1,090**	**1,112**	**1,135**	**1,157**	**1,180**	**1,204**

28	29	30	31	32	33	34	35	36	37	38	39	40
2,255	2,300	2,346	2,393	2,441	2,490	2,540	2,591	2,642	2,695	2,749	2,804	2,860
2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
(775)	(791)	(807)	(823)	(839)	(856)	(873)	(891)	(908)	(927)	(945)	(964)	(983)
1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%
(34)	(35)	(35)	(36)	(37)	(37)	(38)	(39)	(40)	(40)	(41)	(42)	(43)
(36)	(36)	(37)	(38)	(38)	(39)	(40)	(41)	(42)	(42)	(43)	(44)	(45)
1,411	**1,439**	**1,468**	**1,497**	**1,527**	**1,557**	**1,589**	**1,620**	**1,653**	**1,686**	**1,720**	**1,754**	**1,789**

The initial input into the funding model is the energy saving in the first-year post-retrofit (£3078in our base case). This compares to the original bill & maintenance cost for the resident pre-retrofit at £4,257.

The first key sensitivity is the % of the savings left with the resident. The 'right' percentage is likely to be a matter of policy varying on political appetite in each individual NZN location – it is important to mention here that whilst returning the savings to the resident may be politically attractive, the greater this percentage is, the lower the amount that can be refinanced. However, the model currently assumes a c. 40% resident discount, which amounts to £1,757 in the first year. As a result, the resident will be left will an overall payment of c. £2,500in the first year, an amount which we believe equates to the floor of where UK energy bills could potentially fall to in the next few years, supported by the guarantee announced by the government. We show sensitivity analysis to this percentage later on.

The result of the above two points is the gross income paid into the centralised funding vehicle by the resident. In the outer years, we expect this to be an inflating income stream.

Once the income is received, there are two key outgoing expenses for the centralised funding vehicle: 1) contribution to the asset maintenance & replacement fund, and 2) operational cost expenditure required to run the funding vehicle. We also factor in an assumed delinquency rate of 1.5%.

Taking the gross income & expenses together, we reach the net income retained by the fund. This is the cash flow stream which will be used to repay the long-term capital providers in an annuity-like manner.

How much capital can be raised commercially?

Using the resulting net income cash flow described above, we can work out the first output of our funding model. This is the amount that can be raised from long-term patient capital providers in the second stage of the funding process: £25,498 per property.

The methodology used to reach this number is as follows:

In our base case, we assume a 40-year loan tenure for post-implementation capital. From our stakeholder engagement, we believe a range of anywhere between 30-70 years would not be unreasonable, thus, we believe our 40-year assumption is not aggressive. We show sensitivity analysis with regard to loan tenure later in this section.

We then assume a 1.25% expected rate of return over inflation given the relatively low risk nature of the annuity stream. We factor in a 2% expected inflation rate, in line with the Bank of England's long term target, resulting in an overall 3.5% return.

Using these two key inputs, we calculate a net present value (NPV) for the cash flow stream (net income from the resident), which gives us the amount of capital we can raise post-retrofit.

From this point, we can work out the expected blend of repayable versus non-repayable capital that can be raised on day one of the project from the first group of investors: those with higher risk appetite who can fund a portion of the project development capital. This is because the amount raised from the longer-term capital providers in Stage Two will be used to refinance the capital raised from the upfront repayable capital providers in Stage One.

To do this, we factor in the interest received by the upfront capital providers (7%, i.e. 5% above the expected rate of inflation) and the tenure of the loan (two years) in order to calculate the amount that can be raised from short-term commercial capital providers on day one: £22,271 per property.

In our base case, therefore, our model shows that 65% of the total upfront capital can be raised privately from commercial provides.

Where does the rest come from?

The remaining 35% of the upfront funding requirement will need to be funded by non-repayable capital.

We believe there are several potential sources for this portion of the capital stack. The most obvious is government funding, which could incorporate the repurposing of current grant funding. However, we believe other avenues are also available to be explored, for example philanthropic money, or other outcome seeking capital providers. This latter category could encompass a broad range of heterogenous stakeholders, which we discuss in further detail later in this section.

A.1.6.5 Key sensitivities in the funding model

We show below the impact on the percentage of capital that can be raised from private, repayable sources.

Required rate of return & loan tenure

Table 19: Sensitivity analysis - impact of a) required rate of return, and b) loan tenure on the percentage of private, repayable capital raised

		Required rate of return (%)											
	65%	**1.50%**	**1.75%**	**2.00%**	**2.25%**	**2.50%**	**2.75%**	**3.00%**	**3.25%**	**3.50%**	**3.75%**	**4.00%**	**4.25%**
	10	21%	21%	21%	20%	20%	20%	19%	**19%**	19%	19%	18%	18%
	15	32%	31%	31%	30%	30%	29%	29%	**28%**	27%	27%	26%	26%
	20	43%	42%	41%	40%	39%	38%	37%	**36%**	35%	35%	34%	33%
	25	55%	53%	51%	50%	48%	47%	45%	**44%**	43%	41%	40%	39%
	30	67%	64%	62%	59%	57%	55%	53%	**51%**	50%	48%	46%	45%
Tenure of loan	**35**	79%	75%	72%	69%	66%	63%	61%	**58%**	56%	54%	52%	50%
	40	91%	86%	82%	78%	74%	71%	68%	**65%**	62%	59%	57%	54%
	45	111%	104%	98%	93%	88%	83%	78%	**74%**	70%	67%	64%	61%
	50	131%	123%	114%	107%	100%	94%	88%	**83%**	78%	74%	70%	66%
	55	152%	141%	131%	121%	113%	105%	98%	**92%**	86%	81%	76%	71%
	60	174%	160%	147%	135%	125%	116%	107%	**100%**	93%	87%	81%	76%
	65	196%	178%	163%	149%	137%	126%	116%	**107%**	99%	92%	86%	80%
	70	218%	198%	179%	163%	148%	136%	124%	**114%**	105%	97%	90%	84%

Table 20: Sensitivity analysis - impact of a) discount of original bill given to the resident, and b) contribution to the asset maintenance fund, on the percentage raised from private, repayable capital

		Discount of original bill given to resident											
	65%	**0%**	**5%**	**10%**	**15%**	**20%**	**25%**	**30%**	**35%**	**40%**	**45%**	**50%**	**55%**
	-100	228%	211%	195%	178%	162%	146%	129%	113%	97%	80%	64%	47%
	-150	224%	207%	191%	175%	158%	142%	125%	109%	93%	76%	60%	43%
	-200	220%	203%	187%	171%	154%	138%	121%	105%	89%	72%	56%	40%
	-250	216%	200%	183%	167%	150%	134%	118%	101%	85%	68%	52%	36%
Contribution to asset maintenance fund (V1) - GBP	**-300**	212%	196%	179%	163%	146%	130%	114%	97%	81%	64%	48%	32%
	-350	208%	192%	175%	159%	143%	126%	110%	93%	77%	61%	44%	28%
	-400	204%	188%	171%	155%	139%	122%	106%	89%	73%	57%	40%	24%
	-450	200%	184%	168%	151%	135%	118%	102%	86%	69%	53%	36%	20%
	-500	196%	180%	164%	147%	131%	114%	98%	82%	65%	49%	32%	16%
	-550	192%	176%	160%	143%	127%	111%	94%	78%	61%	45%	29%	12%
	-600	189%	172%	156%	139%	123%	107%	90%	74%	57%	41%	25%	8%
	-650	185%	168%	152%	135%	119%	103%	86%	70%	53%	37%	21%	4%
	-700	181%	164%	148%	132%	115%	99%	82%	66%	50%	33%	17%	0%

A.1.6.6 Possible funding sources

In this section we provide further detail regarding the types of organisations that could be relevant in each of the respective funding stages. These are not necessarily limited to what we have listed at this stage.

We explore each of the four key buckets below:

- Repayable upfront short-term commercial capital.
- Repayable long-term commercial capital.
- Non-repayable upfront grant funding.
- Other non-repayable upfront funding: Outcome seeking capital providers.

Repayable upfront short-term commercial capital

Table 21: Sources of repayable upfront short-term commercial capital

Funding source	Description
Banks	Traditional commercial lenders
UK Infrastructure Bank (UKIB)	UKIB is a treasury-owned policy bank, intended to help with the UK government's plan to reach net zero by 2050. It has the capacity to provide £22bn of infrastructure finance, and partners with the private sector and local government to finance the green transition. Notably, the UKIB has a public mandate to invest £4bn into local authorities within the next 5 years.
Scottish National Investment Bank (SNIB)	SNIB is owned by the Scottish state and provides long-term investments through debt and equity for businesses, projects, and communities.
Other financial institutions	There is a broad range of financial institutions where mandates could align with the short-term nature of this investment. This includes various corporates, asset managers, investment managers and more. E.g. M&G Catalyst, L&G, Aviva
Development banks	Institutions set up to deploy risk capital for economic development projects on a non-commercial basis.
Real estate/infrastructure investors	These types of institutions could be involved in both the short-term and long-term stages of the NZN funding requirement. E.g. Macquarie
Public sector funding	This is likely to be a minor source of funding, but could be sourced from the likes of the Public Works Loan Board (PWLB), municipal bonds, and more.
Sustainability-linked lending (instrument)	Loans or bonds which incentivise a borrower to improve their sustainability profile over the term of the loan, through a reduced margin for achieving pre-agreed sustainability-related KPIs.

Repayable long-term commercial capital

There are some institutions which overlap between long-term and short-term commercial capital. In particular, these are larger financial institutions that have various sub-segments with differing mandates.

Table 22: Sources of repayable long-term commercial capital

Funding source	Description
Infrastructure and real estate funds	Infrastructure and real estate funds invest in assets and services that people rely on to live, work, and travel. These funds can invest in things like: electricity and other utility services, water and sewage services, and property. They typically seek long-term, low-risk, stable revenue generating investments – making them well suited to the profile of many NZN interventions.
Other financial institutions	Many other financial institutions also look for a long-term annuity stream to suit their investment mandate, and match to the time horizon of their liabilities. These include pension funds, insurance and re-insurance, and endowment funds, to name a few. Pension funds are pooled monetary contributions from pension plans set up by employers, unions, or other organisations to provide for their employees' or members' retirement benefits. They typically seek long-term, low-risk, stable revenue generating investments – making them well suited to the profile of many NZN interventions. Due to the long-term nature of many insurance products (e.g. annuities, life insurance), insurers can invest in long-term assets to match their long-term liabilities.

Non-repayable public grant funding

We envisage that a part of the non-repayable capital portion of the upfront funding requirement will be supported by government via public grants. This could involve both additional grant requests, or alternatively involve the repurposing of existing public initiatives that already exist in the net zero remit.

We have listed some relevant schemes below, although this list is by no means exhaustive:

Table 23: Sources of non-repayable public grant funding

Funding source	Description
Heat pump subsidy scheme	£5,000 grant from the UK government to help replace less efficient gas boilers with heat pumps, from April 2022. The initiative is part of a £3.9 billion project to make all heating systems low carbon by 2035.
Smart meters	The UK government now requires energy suppliers in England, Scotland and Wales to provide smart meters to their customers, free of charge.
Social housing decarbonisation fund	The government has proposed a £3.8bn Social Housing Decarbonisation Fund over a 10-year period, to improve the energy performance of social rented homes. A £62m fund was announced in 2020, followed by £160m for the first wave of the SHDF in financial year 2021/22 delivering to January 2023.
Workplace charging scheme	A voucher-based scheme that provides support towards the upfront costs of the purchase and installation of electric vehicle charge-points, for eligible businesses, charities, and public sector organisations.
Green heat network fund	The Green Heat Network Fund (GHNF) is a 3-year £288 million capital grant fund that will support the commercialisation and construction of new low and zero carbon (LZC) heat networks (including the supply of cooling), and the retrofitting and expansion of existing heat networks. The GHNF is open to organisations in the public, private, and third sectors in England. Individuals, households, and sole traders cannot apply.
Uk shared prosperity fund	The UK Shared Prosperity Fund is a government-allocated fund which is intended to reduce inequalities between communities, as part of the government's wider "levelling up" agenda. In total, the fund will provide £1.5 billion per year by 2024/25. After allocations are announced, local areas will have to create and submit investment plans detailing how they intend to spend the money.

Other non-repayable upfront funding: Outcome seeking capital providers

Within the portion of non-repayable capital required to make the overall blended funding model work, we envisage the ask to government to be dependent upon the extent to which other non-repayable capital sources can be utilised.

Potential sources are wide-ranging and heterogeneous. However, they are linked by the principle that they care about the non-financial outcome of the capital they provide. We show examples of potential interested parties in the following table – though this list is by no means exhaustive.

Table 24: Sources of other non-repayable upfront funding: Outcome-seeking capital providers

Funding source	Description
Foundations and philanthropy	Non-financial returns-based funding towards outcomes aligned with an NZN. This will likely include foundations and philanthropic organisations active in the climate, sustainable, nature and/or community spaces.
Corporates	This is a broad category and could potentially involve corporates from a range of different sectors. As part of increasingly widespread corporate sustainability strategies, funding part of a neighbourhood regeneration model could form part of internal corporate policy. In conjunction, there could be the possibility to structure carbon and/or biodiversity credits (or similar) off the NZN structure, which corporates could buy to meet sustainability or net zero targets. The most likely corporates worth targeting would be those who would see some sort of positive impact on their business as a result of NZN's being rolled out – though not necessarily a directly quantifiable financial benefit. Examples could include: Water companies, who may see less water run-off due to interventions, and thus lower costs. Waste companies, who could benefit from improved circular-economy measures implemented within a community. Bike companies, who would benefit from increased custom post NZN community CapEx implementation measures.
Healthcare sector	Improved quality of living for a community would almost certainly have a second order positive impact on healthcare outcomes, although naturally this would be tricky to quantify. Institutions involved in this sector could therefore be interested in funding part of the NZN development. Examples include local healthcare trusts, procurement companies for the NHS, and even potentially healthcare insurers.
Education sector	Improved quality of living for a community could also be beneficial for the education of residents in that community, although, once again, this would be very difficult to quantify. Having said that, local education institutions could be interested in funding part of the NZN development. This would have to be assessed on a case-by-case basis, but examples could include a prominent private school within a particular locality, or education trusts/charities.
Trade bodies	Trade associations, such as the Federation of Builders, may have an interest to co-finance particular interventions in the short-term in order to facilitate the necessary job creation for their members.
Local smes	Local enterprises that may be willing to re-invest into their communities, whether this is to further a particular business interest, such as local construction firms, or other non-returns forms of financing such as philanthropic donations.
Mortgage providers	A mortgage specifically targeted at green buildings. As an incentive for the borrower to either buy a green building or to renovate an existing one to make it greener, the bank would offer them either a lower interest rate or an increased loan amount. Through a green mortgage, residents could avoid comfort fees. Conversely, the mortgage provider could fund the building envelope interventions as this would improve the EPC profile of their lending books, which will better allow them to align with regulation.

A.1.7 Stakeholder support

A critical element of the model that separates it from the existing place-based models being trialled is the ability to leverage private finance to capitalise the income stream generated as part of a blended finance structure. The intention is to re-finance a significant portion of the upfront development capital required by the deployment of patient private capital which will be supported by the annuity stream of income as described in the model. In order to access these sources of capital there has been broad-based engagement with potential investors as part of the work to prepare this report, to explore the return profile that is expected from them, and the quantum of capital that could be provided.

The engagements were a combination of bilateral conversations, as well as three workshops. The workshops were broken down by type of capital provider:

- upfront development capital
- long-term re-finance
- outcome buyers

The structure and content of these is explored in more detail, below.

A.1.7.1 Stakeholder engagement sessions

Those discussions were formalised and brought together in a number of workshops with a variety of sources of private and public capital, to cover three different aspects of the financing. It is important to note however, that these sources were not mutually exclusive and many funding providers were present across more than one of the workshops. The workshops sought to gain greater engagement from a variety of different private capital providers who would be willing to invest into the structure proposed.

The types of capital providers engaged throughout this process included both repayable and non-repayable funders, including: banks, investment funds, national banks (UKIB and SNIB), philanthropic funds, and public funders.

At the point at which a demonstrator programme is being carried out, it is important to understand that the model is as yet untested. As a result, it makes sense to have a greater percentage of financing from non-repayable sources of finance, such as government funding. A demonstrator constructed in this way affords the model the opportunity to prove out the energy saving income stream captured, with less risk on both the NZN vehicle and the private investor in case savings are lower than projected.

This cohort of investors were also engaged with the view to being the source for some of the initial capital when the NZN model launches commercially. This would occur once the demonstrators have successfully delivered proof of concept.

The below table is a list of investors engaged and public departments throughout this stakeholder engagement process.

Capital providers /enablers engaged					
1.	Green Finance Institute (GFI)	11.	M&G	21.	Laudes Foundation
2.	UK Infrastructure Bank (UKIB)	12.	Aviva	22.	Ancala
3.	Scottish National Investment Bank (SNIB)	13.	Investec	23.	Founders Factory
4.	Barclays	14.	Axa	24.	
5.	HSBC	15.	SwissRe	25.	
6.	Natwest	16.	Bridges Fund Management	26.	
7.	Santander	17.	Amber Infrastructure	27.	
8.	Triodos	18.	Temporis Capital	28.	
9.	Scottish Widows	19.	Just Climate	29.	
10.	Legal & General	20.	Impact Investing Institute	30.	

Public departments engaged	
1.	Department for Business, Energy & Industrial Strategy (BEIS)
2.	Cabinet office
3.	Department for Environment, Food & Rural Affairs (DEFRA)

Upfront capital: The initial interventions will predominantly be financed by commercial entities (such as commercial banks, investment management, asset managers, corporates, and more) that are willing to invest in higher risk projects in return for a greater return. The model assumes that this upfront capital will be repaid after c. 4 years once the income stream from the energy savings has built a track record. The debt can then be re-financed by longer term financial institutions.

Long-term re-finance: A large component of this structure, is the re-financing of the early-stage higher risk capital into a long-term, low-risk, income generating structure that can attract investors. The types of investors include pension funds (both commercial and local authority pension funds) and insurance funds who are seeking long-term (40 years or more), stable income streams to provide assets to match their long-term liabilities. Another cohort that engaged were infrastructure funds, who again seek "hard assets" with long-term income streams.

Outcome buyers: Discussions were also held with a more diverse group of entities who would be interested in the co-benefits of this project. The investment profile of these so called "outcome buyers" is similar to grant financing where they are more concerned with the allocation of capital invested. Their intent is therefore to purchase specific outcomes as opposed to actively seeking a return on their capital. The potential positive outcomes derived from this programme are wide-ranging, and as such the investors were similarly broad-based.

This group included:

- Health providers who would receive the benefit of healthier residents.
- Water companies who would experience less water run-off and improved waste management due to green infrastructure investment.
- Insurance companies who would see lower risk exposure as a positive outcome of more resilient infrastructure through the investments into green infrastructure.
- Mortgage providers who would experience an increase in the EPC profile of their portfolios as a result of the building envelope insulation intervention, which would better align them with increasingly climate-conscious regulation.
- As a placed-based investment vehicle, there could also be interest from SMEs who may be willing to re-invest in their local area, either to generate business activity or as a donation to the community.
- Finally, in this group were specialist impact investors seeking investment opportunities to meet their mandates, and philanthropic foundations who wished to support a project with material but hard to monetise co-benefits.

Within the workshops, in addition to an introductory explanation of the model, the table below outlines the discussion points that framed the majority of each workshop.

Workshop topics of discussion		
Workshop 1: upfront capital	Workshop 2: long-term re-finance	Workshop 3: outcome buyers
1. Finance phasing – 2-4-year development finance 2. Type of investment mechanism – debt or equity 3. The repayment structure 4. Legal entity structure for the investment 5. Credit risk of different consumer payment mechanisms 6. Required returns 7. Inflation linkages 8. Cost of transaction for the investor (to cover running costs of the structure)	9. Finance phasing - 20-40-year re-finance 10. Type of investment mechanism – debt or equity 11. The repayment structure 12. Legal entity structure for the investment 13. Credit risk of different consumer payment mechanisms 14. Required returns 15. Inflation linkages 16. Cost of transaction for the investor (to cover running costs of the structure) 17. Transferability/liquidity of the debt and valuation on transfer	18. Impact metrics required 19. Impact methodologies used 20. Structure of investment

A.1.7.2 Key areas of discussion and feedback

Across the conversations, the below section explores the variety of different topics of discussion:

Payment mechanism

A common topic of discussion across the engagement with financing actors was the type of capture mechanism that would be optimal to collect the revenues generated from resident energy savings.

Whilst mechanisms such as council tax increases were discussed, the option which gained greatest traction was the concept of a property-linked contract where the energy saving is captured on utility bills.

Investors were more receptive to this option due to several reasons:

- An increase in the council tax charge to residents may be seen as politically unpalatable, and would be detrimental to hopes of building community engagement.
- The delinquency rate for utility bills in the UK is lower than that of council tax.
- The service charge captured through the utility bill would be a seamless transition from the current model of how consumers pay their energy bills and would make the before and after financial situation very clear to the resident as all charges would appear on the same bill.

A common question has been whether or not any regulatory change is required in order to both tie the charge to the property, and also capture the service charge through the utility bills. To conclude, it was mentioned that the likes of Ofgem have been engaged in order to validate whether or not the capture mechanism is feasible.

Investment tenure and& return profile

As mentioned above, the focus has been across three different types of investors which make up the private contributors to the capital stack of the blended finance model. Because the workshops were differentiated in this way, it is unsurprising that the discussion focused in large part on the structure of these investments.

A commonly cited analogy by investors was renewable energy investments which also harness initial upfront capital, before re-financing with long-term capital once a track record of data generation has been established.

Of the discussions held on the topic of investment tenure and return profile, there were three key considerations which informed further thinking:

- One investor spoke about how the portfolio average return of their investments was RPI +4%. This became a useful anchor for future discussions around the capital interest for the initial development capital, as well as the return profile of the income stream and its link with inflation over time.
- Relating to the longer term re-financing, another investor raised concerns around liquidity in the market to commit to a multi-decade tenure investment. This perspective was stressed in relation to the return profile and size of the investment. The need to structure the investment effectively for these long-term capital providers is therefore vital.
- Linked to the above point, the question of transferability was an important discussion point for investors. Some investors displayed some concerns around the tenure of the investment, especially if the investment is not transferrable. The ability for an investor to sell their exposure within the tenure of investment was cited as a useful de-risking mechanism. Discussions have continued around how a transfer mechanism could be incorporated so that investors would exit their position if required.

Type of investment

Another important topic of discussion was the type of investment within the NZN. Discussions were held across a number of different topics:

- **Debt vs equity**: Questions were raised around whether it would be preferable to have debt as an investment vehicle, as well as equity. For equity as an investment, some investors questioned whether assets are owned on a singular asset by asset basis, or community area. Furthermore, discussions were held around whether equity stakes could be taken within the income stream of the model.
- **Securitisation**: An important conversation which has been taken beyond the workshop on long-term re-finance where it was raised, was also the consideration of what the debt raised will look like. For one, a question was raised on the securitisation of the debt. In particular if the debt is to be securitised, how, and to what.
- **Credit rating**: Furthermore, part of the model's effectiveness is in gaining the aggregation required in order to attract institutional investors. For certain long-term capital providers however, as soon as a particular investment goes beyond a certain threshold, the investment needs to have a credit rating. This could be either internally rated or publicly rated. Either way, this was an important discussion point raised that has been taken on into future thinking.

- **Index-linked**: A further de-risking mechanism for investors is for the investment to be index-linked. This is where the investment repayment is linked to an inflation index (such as CPI or RPI). The benefit of having an investment index linked from an investor's perspective, is that it protects the investment from the negative impacts of inflation.

Innovative sources of finance

The modelling from which the capital stack is built upon, has projected that approximately two-thirds of capital can be raised from commercial capital providers, whilst the remainder has to be funded from other, non-repayable sources. As mentioned previously, this could be funded from public sources, as well as from other actors such as philanthropic or impact investors.

Feedback from our outcome buyers workshop raised two innovative ideas in particular that could be incorporated into the capital stack:

- **Community–style investments**: This is where a community would combine financial resources to raise debt and have a direct say in the type of interventions they would like to see in their neighbourhoods.
- Issuance of **abated carbon credits** as a consequence of the accelerated decarbonisation of the built environment.

One stakeholder who works in the carbon credits space detailed, however, several challenges with this additional source of revenue. Carbon credits are rarely issued in developed countries as it is more difficult to prove the additionality of the credits – that is, could other sources of finance have been made available to finance the intervention without the need for carbon credits. In developed countries, the abundance of financing sources often makes the argument of additionality challenging.

That being said, in this blended finance model, there is an acknowledged funding gap which needs to be overcome in order to finance the model. In addition to public sources of finance and other outcome buyers, the issuance of carbon credits is being considered as another revenue driver in order to diversify the income stream. Carbon credit certification bodies have been engaged to discuss the possibility, with the understanding that because the model aims to improve several sustainability development goals (SDGs) both directly and through co-benefits (SDG 3: Good Health & Well-Being; SDG 4: Quality Education; SDG 7: Affordable & Clean Energy; SDG 8: Decent Work & Economic Growth; SDG 9: Industry, Innovation & Infrastructure; SDG 10: Reduced Inequalities; SDG 11: Sustainable Cities & Communities; SDG 12: Responsible Consumption & Production; SDG 13: Climate Action; and SDG 15: Life on Land), the credits would gain a significant premium in the voluntary carbon market.

Procurement and supply chain

The challenge with respect to procurement and supply chain is an important consideration, and a topic of discussion throughout many conversations.

The ability for the supply chain to deliver net zero interventions at the scale required is, at present, doubted. Some investors spoke about their reticence with respect to the quality and the quantity of developers with the relevant technical competence to deliver net zero. Operational risk was seen as an important consideration for investors in this transition phase to net zero.

It was proposed that the model effectively mitigates this risk into the long-term as it illustrates a credible long-term demand side signal for technical expertise for net zero technologies to develop. However, it is understood that in the short-term, operational risk is a risk factor. One method of overcoming this barrier may be through performance contracting, and paying upon completion of an install.

There is then the need to consider procurement regulation. If the NZN entity is local authority aligned, investors questioned whether it would be a requirement to abide by public procurement regulation. Crown Commercial Services (CCS), who have already been engaged with on this model, are therefore an important public body to align with. Investors were conscious of wanting to create a central, standardised procurement process which also facilitated local economic growth to align with a levelling up agenda.

It is therefore important for the legal structure to integrate these considerations to allow for the broader aggregation of the procurement framework, whilst engaging local suppliers to carry out the interventions.

Outcome KPIs and methodologies

A further discussion topic not exclusive to the workshop with outcome buyers, was the need to generate accurate data and optimise towards identified key performance indicators (KPIs). It is not only the identification of KPIs to optimise towards, but also the methodologies which formulate them.

Specific KPIs which gained traction across a variety of different investors included:

- GHG reduction – this aligns not only with impact investors looking to accelerate the transition to net zero, but also commercial investors looking to decarbonise their portfolios.
- Regional growth – this aligns with an important levelling up agenda, and could be quantified through employment rate or regional GDP.
- Productivity – this aligns with the political desire to increase the productivity of the UK labour force, and can be measured through metrics such as gross value added (GVA). Certain resources suggest that global labour productivity during peak months has already dropped by 10% as a result of global warming, and that a decline of up to 20% might be expected by 2050 under the highest emissions pathway[66].

In some cases, KPIs that might be desirable for certain investors have traditionally been hard to quantify – for example, educational or health improvements as a result of insulation interventions – and are topics of continued discussion. The UKIBs impact team have also been engaged in order to co-create these indicators and methodologies.

Model sensitivities

Investors were also particularly interested in understanding the sensitivities of the inputs within the model that was described in the workshops.

Key questions included:

Table 25: Key sensitivity questions

Question	Considerations
Could other neighbourhood 'public' buildings (e.g. schools/places of worship) be included alongside residential? Or is this building typology too complex for planning and design purposes?	The model has been created agnostic to building typology, in the understanding that all types of building need to be insulated, including hard to abate buildings. The purpose of the demonstrators is in part to develop the variety of different requirements for different typologies in order to generate learnings and scale impact.
Is there a geographic limit/household density beyond which this becomes less viable (or less efficient)?	In theory, the model created could work for an individual property. The priority requirement is to have an energy saving which could be used to capitalise the NZN vehicle. That being said however, there are certain system benefits which would not be unlocked if a certain level of sign up is achieved. For example, the model assumes a systems discount for shared infrastructure, which would not be an option in a low-density sign-up neighbourhood. This may include shared boreholes for ground source heat pumps, or shared battery storage.
Would there be any replacement costs on account of obsolescence or failure that have been factored in? Would these be covered by supplier warranties?	Across the multi-decade lifecycle which this model proposed, all assets implemented within the interventions (such as solar PV, heat pumps, battery storage etc.) need to be replaced at least once. The cost burden of the asset maintenance and replacement is to be covered by the NZN vehicle, where UK average supplier warranties have been taken in account. This is explored in further detail in section 1.4.

66 *Dunne, J. P., Stouffer, R. J., & John, J. G. (2013). Reductions in labour capacity from heat stress under climate warming. Nature Climate Change, 3(6)*

A.1.8 Key financial statements

A.1.8.1 Budget statement

In this section we share the budget statement which shows the resource costs over the lifespan of the project. Further detail regarding the figures here is discussion in Section A.1.4 Capital & Revenue requirements.

Table 26: Budget statement

Project year	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
All figures refer to cost per property Initial capital expenditure (GBP)	(10,338)	(24,122)	0	0	0	0	0	0
Maintenance and replacement expenditure (gbp)	0		(454)	(463)	(473)	(482)	(492)	(502
Capital requirements per property (GBP)	**(10,338)**	**(24,122)**	**(454)**	**(463)**	**(473)**	**(482)**	**(492)**	**(502**
Revenue requirements per property (GBP)	**(20)**	**(20)**	**(21)**	**(21)**	**(22)**	**(22)**	**(23)**	**(23)**
Total budget requirement per property (GBP)	**(10,358)**	**(24,142)**	**(475)**	**(485)**	**(494)**	**(504)**	**(514)**	**(525**

Project year	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**
All figures refer to cost per property Initial capital expenditure (GBP)	0	0	0	0	0	0	0	0
Maintenance and replacement expenditure (GBP)	(662)	(675)	(689)	(702)	(716)	(731)	(745)	(760
Capital requirements per property (GBP)	(662)	(675)	(689)	(702)	(716)	(731)	(745)	(760
Revenue requirements per property (GBP)	(30)	(31)	(32)	(32)	(33)	(33)	(34)	(35)
Total budget requirement per property (GBP)	(692)	(706)	(720)	(734)	(749)	(764)	(779)	(795

	9	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**
	0	0	0	0	0	0	0	0	0	0	0	0	
)	(512)	(522	(532)	(543)	(554)	(565)	(576)	(588)	(599)	(611)	(624)	(636)	(649)
)	**(512)**	**(522**	**(532)**	**(543)**	**(554)**	**(565)**	**(576)**	**(588)**	**(599)**	**(611)**	**(624)**	**(636)**	**(649)**
	(23)	**(24)**	**(24)**	**(25)**	**(25)**	**(26)**	**(26)**	**(27)**	**(27)**	**(28)**	**(29)**	**(29)**	**(30)**
)	**(535)**	**(546)**	**(557)**	**(568)**	**(579)**	**(591)**	**(602)**	**(615)**	**(627)**	**(639)**	**(652)**	**(665)**	**(679)**

	30	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**
	0	0	0	0	0	0	0	0	0	0	0	0	0
)	(775)	(791)	(807)	(823)	(839)	(856)	(873)	(891)	(908)	(927)	(945)	(964)	(983)
)	(775)	(791)	(807)	(823)	(839)	(856)	(873)	(891)	(908)	(927)	(945)	(964)	(983)
	(36)	(36)	(37)	(38)	38)	(39)	(40)	(41)	(42)	(42)	(43)	(44)	(45)
)	(811)	(827)	(844)	(861)	(878)	(895)	(913)	(931)	(950)	(969)	(988)	(1,008)	(1,028)

A.1.8.2 Cash flow statement

Here, we lay out the cash flow statement, which shows investing, operating, and financing cash flows per property during the lifetime of an NZN demonstrator project.

- **Investing cash flows**: Include all three types of capital expenditure: initial, maintenance, and replacement. The maintenance & replacement costs are combined into a yearly service cost.

Table 27: Cash flow statement

All figures refer to cost per property								
Project year	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Year post retrofit			**1**	**2**	**3**	**4**	**5**	**6**
Initial CapEx outlay (GBP)	(10,338)	(24,122)	0	0	0	0	0	0
Maintenance and replacement CapEx (GBP)			(454)	(463)	(473)	(482)	(492)	(502
Total CapEx (GBP)	(10,338)	(24,122)	(454)	(463)	(473)	(482)	(492)	(502
Operating costs (GBP)	(20)	(20)	(21)	(21)	(22)	(22)	(23)	(23)
Net Income from residents (GBP)			1,321	1,348	1,375	1,402	1,430	1,459
Net operating cash flow (GBP)	**(10,358)**	**(24,142)**	**846**	**863**	**880**	**898**	**916**	**934**
Initial public funding (GBP)	12,189							
Initial private funding (GBP)	22,271							
Repayments of initial private funding (GBP)			(25,498)					
Long-term private funding (GBP)			25,498					
Repayments of long-term private capital (GBP)			(814)	(814)	(814)	(814)	(814)	(814)
Net cash flow	**24,102**	**(24,142)**	**32**	**49**	**67**	**84**	**102**	**120**

All figures refer to cost per property								
Project year	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**
Year post retrofit	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**
Initial CapEx outlay (GBP)								
Maintenance and replacement CapEx (GBP)	(662)	(675)	(689)	(702)	(716)	(731)	(745)	(760
Total CapEx (GBP)	(662)	(675)	(689)	(702)	(716)	(731)	(745)	(760
Operating costs (GBP)	(30)	(31)	(32)	(32)	(33)	(33)	(34)	(35)
Net income from residents (GBP)	1,925	1,963	2,003	2,043	2,084	2,125	2,168	2,211
Net operating cash flow (GBP)	**1,233**	**1,2S7**	**1,283**	**1,308**	**1,334**	**1,361**	**1,388**	**1,416**
Initial public funding (GBP)								
Initial private funding (GBP)								
Repayments of initial private funding (GBP)								
Long-term private funding (GBP)								
Repayments of long-term private capital (GBP)	(814)	(814)	(814)	(814)	(814)	(814)	(814)	(814)
Net cash flow	**419**	**444**	**469**	**494**	**521**	**547**	**574**	**602**

- **Operating cash flows**: Include the cost to run the financing vehicle, as well as the income received by the financing vehicle.
- **Financing cash flows**: Include the capital raised and refinanced during the lifetime of this project.

	9	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**
	7	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**
	0	0	0	0	0	0	0	0	0	0	0	0	
)	(512)	(522	(532)	(543)	(554)	(565)	(576)	(588)	(599)	(611)	(624)	(636)	(649)
)	(512)	(522	(532)	(543)	(554)	(565)	(576)	(588)	(599)	(611)	(624)	(636)	(649)
	(23)	(24)	(24)	(25)	(25)	(26)	(26)	(27)	(27)	(28)	(29)	(29)	(30)
9	1,488	1,518	1,548	1,579	1,611	1,643	1,676	1,709	1,743	1,778	1,814	1,850	1,887
	953	**972**	**992**	**1,011**	**1,032**	**1,052**	**1,073**	**1,095**	**1,117**	**1,139**	**1,162**	**1,185**	**1,209**
)	(814)	(814)	(814)	(814)	(814)	(814)	(814)	(814)	(814)	(814)	(814)	(814)	(814)
	139	**158**	**178**	**197**	**218**	**238**	**259**	**281**	**303**	**325**	**348**	**371**	**395**

	30	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**
	28	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
)	(775)	(791)	(807)	(823)	(839)	(856)	(873)	(891)	(908)	(927)	(945	(964)	(983)
)	(775)	(791)	(807)	(823)	(839)	(856)	(873)	(891)	(908)	(927)	(945	(964)	(983)
	(36)	(36)	(37)	(38)	(38)	(39)	(40)	(41)	(42)	(42)	(43)	(44)	(45)
1	2,255	2,300	2,346	2,393	2,441	2,490	2,540	2,591	2,642	2,695	2,749	2,804	2,860
6	**1,444**	**1,473**	**1,503**	**1,533**	**1,564**	**1,595**	**1,627**	**1,659**	**1,692**	**1,726**	**1,761**	**1,796**	**1,832**
)	(814)	(814)	(814)	(814)	(814)	(814)	(814)	(814)	(814)	(814)	(814)	(814)	(814)
	631	**659**	**689**	**719**	**750**	**781**	**813**	**845**	**878**	**912**	**947**	**982**	**1,018**

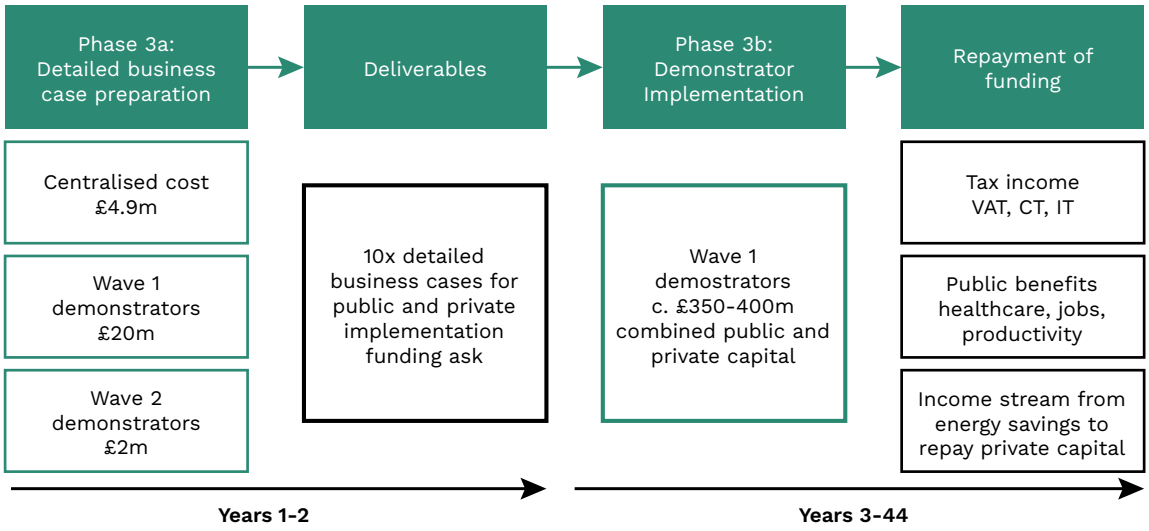
A.1.8.3 Funding statement

We discuss our funding model in detail in Section A.1.6 “Overall funding requirement”. Below, we include a summary of the total capital funding requirement expected per property and per NZN demonstrator programme – once this model begins to be rolled out at scale. Within this, 65% could be funded by private capital, with examples of such institutions discussed in detail in Section A.1.6, while the remainder would need to be funded by non-repayable capital sources.

A.1.8.4 Summary

In this application, we are asking for revenue funding to develop the business cases for 10 demonstrators (Phase 3a). We are not asking for any capital funding at this stage. Going into Phase 3b we would hope to raise the capital funding required to implement these proof of concept demonstrators, from a range of public and private sources.

Figure 28: Funding phases



Detailed Commercial Case

A.2.1 Introduction

The question the Commercial Case seeks to answer is “can a deal be done?”. This requires an assessment of the capacity of the market to meet demand with supply at the scale needed.

There are four types of deal that need to be delivered for an NZN project to succeed:

- The deal between residents and the FinCo to commit to the payment obligation.
- The deal between FinCo and investors to obtain financing for the projects.
- The deal between FinCo and suppliers to deliver the NZNs; and
- The deal between FinCo and suppliers to provide maintenance and replacement of NZN components.

The first two deals can only be tested by developing a workable design for a specific place which will allow the specifics to be presented to both residents and investors to test the ability to do a deal. In particular, the decision over payment obligation mechanism (see section 5.4.1.3) will impact the ability to do a deal with residents. The ability of companies to maintain an NZN for the given price will need to be tested once it is designed. However, it is possible to assess the capacity of the market to implement the NZN, and this is the focus of the Commercial Case at this stage.

This Commercial Case therefore considers the goods, services and/or works required to deliver the 3Ci NZN programme and the procurement routes and resources required to achieve the programme in the most efficient, socially beneficial and value driven manner. The Commercial Case also considers the overall procurement strategy and risk allocation associated with the requirements and identifies the most viable route to ensure sufficient capacity and capability exists for programme delivery. Commercial considerations around the proposition to residents and to investors will be assessed following development of demonstrators where these issues can be tested properly.

A.2.2 Procurement model

Procurement delivery will have to comply with all aspects of the Public Contracts Regulations 2015 (PCR) (as amended), or applicable public contracting legislation in force at that time[67], as well as the Public Services (Social Value) Act 2012. The contracting authority (as defined under the PCR) shall be the UK NZN FinCo, with procurement activity being carried out by the UK NZN OpCo. NZN project funds shall be managed through the NZN FinCo to NZN OpCo, therefore procurement activity (contracting) shall be delivered through the NZN OpCo, ensuring a centrally managed, value-driven procurement function, with oversight to support volume-based ordering and achievement of economies of scale. To ensure project specific local authority needs are met, a devolved procurement service would sit within the NZN OpCo also.

To facilitate an effective, knowledgeable, and efficient procurement delivery, a hybrid procurement structure would be required. A centralised procurement team will sit within the NZN OpCo to ensure proactive, resource-efficient, innovative, value-driven, skilled procurement, following a category management structure (with procurement expertise aligned to delivery of allocated spend area, e.g. solar, or heat pumps, or infrastructure). Alongside this, a decentralised procurement support function (‘shared service’) would provide dedicated procurement support for NZN projects/local authorities to ensure the specific requirements for each project are achieved (provision of a localised procurement interface and support).

The procurement function will need to deliver services including:

- Supplier identification/ solution identification
- Market engagement and onboarding
- Tendering – framework, direct and call-off
- Market research and ongoing innovation mapping
- Contract and supplier management
- Category management

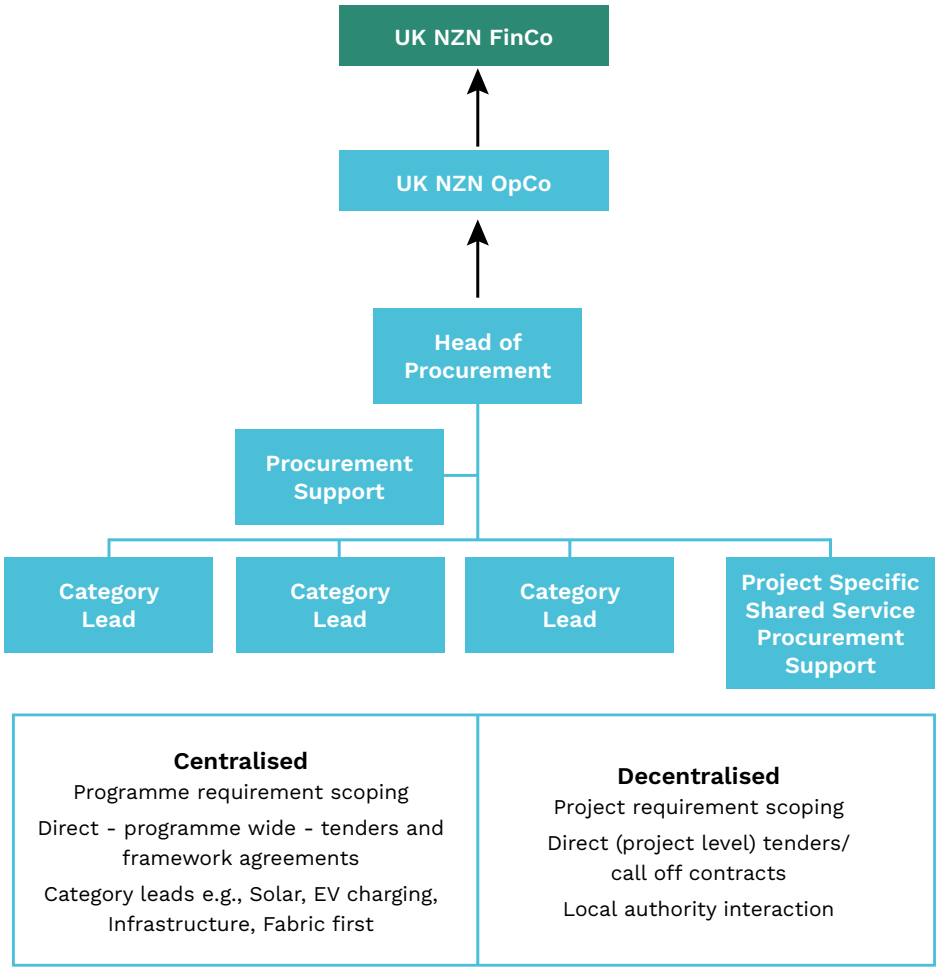
67 *All proposals and references to contracting routes within this OBC reflect the procurement legislation in force at time of writing.*

Figure 29 below defines the resource structure and data flow. The project-specific shared service provision could be managed either through allocation of time from core procurement team members, or delivered specifically by staff recruited for, and allocated 100% to, shared service provision. The model below is flexible, adaptable, and scalable as the programme moves between phases, and outputs increase. The shared service structure ensures resource is proportionately applied to projects (e.g. during design and implementation resource levels are likely to be higher – in this model, such resource can then be moved to subsequent projects, ensuring resource, skills and knowledge flow appropriately across the programme).

This model ensures:

- Knowledgeable, skilled, qualified procurement experts are available across all projects.
- Resource commitments to projects are not over-burdened.
- Resource commitments to projects can be loaded as required (e.g. front loaded for project design and contract set up).
- Oversight and management are retained at a high level across all projects.
- Learnings are shared.
- Maximum efficiency of resource management.

Figure 29: Procurement structure



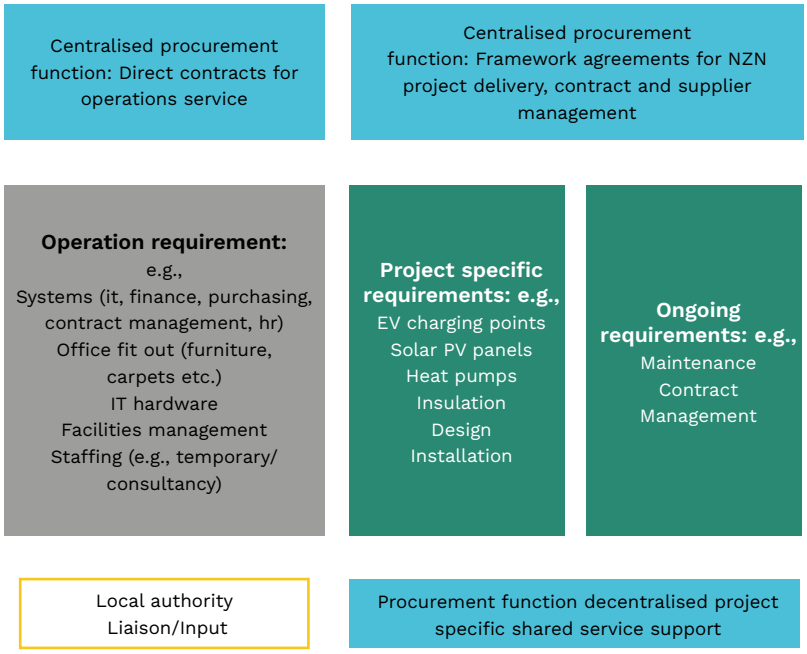
A.2.3 Procurement delivery strategy

The procurement activities required to deliver the project requirements broadly fall into two categories:

- **Operational procurement activity** – that is, procurement required to set up and operate the NZN company structure.
- **Project-specific procurement activity** – that is, procurement required to meet the needs of each NZN project.

These activities are broken down in Figure 30 below, aligning with the management structure detailed in the Management Case, which has defined that the NZN OpCo will provide procurement resource and support on a project-by-project basis.

Figure 30: procurement activity flow



A.2.3.1 Value for money

Delivery of goods, service, and works under the NZN FinCo. and associated projects should strive to achieve value for money (VfM) in all cases. VfM is not solely linked to price paid but can also be demonstrated through other means such as resource efficiency, social value, and carbon or waste reduction.

Economies of scale, including purchasing discounts and streamlining of effort, may be achieved through purchasing activity and realised/managed through the proposed procurement structure outlined above – a centralised procurement function delivering large scale contracts can ensure a greater cost efficiency than multiple smaller, locally run procurement exercises. The Head of Procurement (HoP) would retain responsibility for visibility of planned and upcoming projects to promote potential order benefits (volume order discounting) as applicable for a place-based approach.

By maintaining visibility of current, and planned, NZN project requirements, the HoP can recognise and implement opportunities for volume-based purchase benefit (generally to secure a price discount, but also to ensure delivery lead time and/or market security).

VfM can be achieved also by:

- Use of existing framework agreements where possible for goods or service provision (therefore removing full procurement tender effort).
- Award of new framework agreements for supply of goods or services across all NZN projects (reducing purchasing effort at a project level and gaining some financial benefit for identification of need a volume level).
- Exploration of sustainable supply solutions (e.g. remanufactured IT hardware) (with benefits ranging from financial, to emissions reduction, waste reduction, and social benefit delivery).
- Delivery of social value through supply (seeking successful Contractors to help achieve greater social benefit through their contract delivery).

A.2.3.2 Local authority resources (inhouse vs outsource decision)

As outlined within the Management Case, all funding for implementation flows direct from the NZN FinCo to suppliers/third parties (under direction of the NZN OpCo) and is not passed to local authorities at any point. Therefore, local authorities cannot elect to directly contract their own procurement activities for their NZN project under this programme. The project funds allocated/directed by the FinCo. The local authority would remain closely linked to all procurement activity carried out by the NZN OpCo. for its project delivery.

A local authority may elect to contract for elements of service delivery out with the project funding by utilising their own procurement resource, funding, or existing delivery models.

However, the degree of involvement by each individual local authority will vary for a range of reasons, including the ability of the authority to deliver certain NZN project services itself ('in-house'), versus through a third-party ('outsource') and the importance placed on achievement of social benefit for the authority.

Therefore, at project scoping stage, the level of maturity of the local authority, its resource capacity and capability, and alignment with key corporate delivery objectives, would be assessed against available contracting routes, timescales, and costs, to determine whether any elements of service delivery should be made by the local authority, as opposed to a third party. Contracting would still be required to be put in place via the NZN OpCo (in the name of the NZN FinCo), with the local authority, for that element of service delivery. This contracting route would most likely fall under the 'Hamburg Exemption' (clause 12(7) of the PCR), although each decision would need to be reviewed on a case-by-case basis to confirm/ determine applicability.

A.2.3.3 Delivery of social benefit through procurement activity

Public procurement spend on goods, services, and works is a significant lever for achieving delivery of increased social benefit for a community. The UK government introduced a requirement in June 2020 (Procurement Policy Note 06/20[68]), for public procurements to mandate inclusion, and consideration, of social value, with a minimum tender award weighting of 10%. As an organisation bound by the PCR, this criterion would apply to contracts established by the NZN OpCo. The challenge remains however, to ensure that such social value is delivered locally, i.e. within the boundaries of the local authority.

A.2.3.4 Local social benefit/local delivery

The ability to retain contract delivery locally, within the authority's area, supports local economic development, skills development (including focus on target employment groups) and the Ggovernment's Levelling Up agenda. The potential for local delivery must be explored at the onset of the NZN project and procurement routes considered (e.g. balancing cost and benefits of using an NZN OpCo framework agreement versus a project-specific (localised) procurement exercise). This will be impacted also by the potential availability of the required goods, services or works locally – a market review during project scoping would ensure the potential for localised delivery could be assessed.

A balance will require to be made during pre-procurement activity (requirements definition, market scoping, procurement strategy drafting) to weight the importance of achieving local social value alongside (for example) cost of delivery. This may result in some requirements being tendered at a project level (rather than centrally). Alternatively, the NZN OpCo could consider, when implementing framework agreements, the scope to geographically 'lot' the framework agreement – as permitted under the PCR[69] - (e.g. South East England, South West England, Midlands, etc.) and therefore encourage on-boarding of local (geographically defined) suppliers. Geographically lotted framework agreements achieve the cost benefit generally seen through the framework purchasing model, yet provide the ability for supply distance, mileage, delivery cost and local benefit to be considered.

A.2.3.5 Routes to market and considerations

The procurement activity (market engagement, tendering, contracting, and contract/supplier management) will reside within the NZN OpCo. The NZN OpCo procurement function will determine, at preparation of a procurement strategy/business case (pre-tender), which route is most applicable, and demonstrate why (e.g. if electing to run a new tender in place of using an existing available framework agreement, the reasoning for doing so should be detailed and approved). There are several routes to market that the body can consider/utilise:

- Delivery of its own framework agreements for goods, services or works.
- Delivery of its own direct contracts, for goods, services, or works.
- Contracting with local authorities for certain service provision (through the Hamburg exemption).

68 *https://www.gov.uk/government/publications/procurement-policy-note-0620-taking-account-of-social-value-in-the-award-of-central-government-contracts*

69 *https://www.legislation.gov.uk/uksi/2015/102/regulation/46/made*

- Use of other existing framework agreements, e.g. Crown Commercial Services.
- Support for award of localised collaborative agreements (e.g. for delivery of a specific service) across a region.

In preparation of the procurement strategy/ business case for each requirement (operational or project specific), the procurement function would, in addition – and in support of delivering social benefit – consider whether the procurement could be structured such that it can:

- Help to eliminate barriers to entry for voluntary, charitable, social enterprises (VCSE's) or SME's on framework agreements.
- Allow for the requirement to be fulfilled by VCSE's, SME's and/or local suppliers (supporting increased social benefit delivery).
- Use flexible, innovative supply solutions, e.g. a dynamic purchasing system, to enable onboarding of new suppliers on a frequent basis and not preventing market entry for periods of time.
- Use flexible (yet transparent) call off models (for example, using innovative approaches such as desk-based evaluation) to facilitate selection of suppliers most suitable to each NZN project (e.g. most sustainable solution versus lowest cost).

A.2.3.6 Stock management

A further consideration is that of stock management and whether the OpCo could/should manage a warehouse stocking system to support 'Just In Time' (JIT) delivery of key goods to projects. Such a system provides benefits of high-level stock awareness, key contract management, known delivery times (for projects) and the ability to secure supply and potential volume discounts. However, consideration would need to be given to site location and logistics (versus delivery from the supplier/manufacturer), insurance and staffing, and product liability and warranty.

A.2.4 Supply chain consultation

The requirement for early supply chain consultation is driven by considerations including:

- complexity of the requirement
- volume required
- additional factors such as sustainability or social benefit targets
- knowledge/experience of the market
- potential for innovative solutions
- complex or non-standard payment mechanisms or contract terms

A.2.4.1 Operational procurement requirements

Within delivery of the operational procurement requirements for the NZN structure, the majority of goods and services are readily available, 'off-the-shelf' items that would not require in-depth early supply chain engagement. The supply of IT hardware and items associated with office fit-out can be made with consideration for achievement of circular economy and social value targets. The NZN demonstrator phase may be able to utilise existing software systems from a supporting public body for the purposes of delivering the demonstrator project procurement activity. However, should procurement and implementation of any new systems be required (e.g. a purchase order or finance system), the NZN structure should consider early supply chain engagement for sourcing of suitable software systems, to include scoping, demonstration and trial ahead of required live commencement date.

Some operational requirements could be sourced through existing framework agreements available to the public sector (applicability should be checked). Crown Commercial Services[70] has in place over 100 framework agreements (and dynamic purchasing systems) for provision of goods and services including:

- digital and software solutions
- facilities managemen
- temporary and permanent staff
- office supplies
- furniture, including sustainable solutions
- technology solutions (hardware and software), including sustainable solutions

A.2.4.2 Project specific requirements

All items associated with project specific delivery require early market engagement to determine:

- Sourcing options, including potential existing framework agreements such as CCS vehicle charging infrastructure solutions (VCIS)[71].
- Feasibility of supply in required timescales (i.e. can the market meet the volume required in the timescales required?).
- Typical contractual arrangements (including any upfront or special contract or payment terms).
- Sourcing risks (e.g. material supply risk, obsolescence, import risks).
- Source of supply (local, regional, national, global) and extent to which local social benefit can be achieved.
- Framework structure, e.g. regional lotting, or lotting by product size/output/property size.

70 *www.crowncommercial.gov.uk*

71 *https://www.crowncommercial.gov.uk/agreements/RM6213*

- Opportunity for volume-based order discounting.
- Product warranty.
- Product maintenance programme (frequency, content, cost, skilled labour requirement).
- Supply of installation and maintenance services (whether typically available via the goods supplier).
- Risk apportionment and management (including upfront payments and transfer of ownership of assets).
- Appreciation of market development and innovation for future technology solutions.

In preparation of this OBC, initial supply chain consultation[72] has been carried out and used to inform the following sections. In preparation of the FBC, specific product requirements (output-based specification) requirements would be prepared, and further market consultation carried out to address each of the above points.

A.2.5 Service requirements and market overview

The service requirements for delivery of the NZN demonstrator programmes have been split into 'operational' and 'project specific':

- **Operational procurement activity** – that is, procurement required to set up and operate the NZN company structure (Table 28).
- **Project specific procurement activity** – that is, procurement required to meet the needs of each NZN project (Table 29).

For each, potential sourcing routes have been identified. Further, for the project specific requirements, considerations such as market readiness, supply risks and capacity have also been noted.

Table 28: Summary of operational requirements

Operational requirement	Potential sourcing route	Time to procure/deliver	Delivery body
Digital and software solutions	CCS RM6194 Back Office Software CCS RM3821 Data and Application Solutions	Min 12 months	NZN OpCo
Facilities management	CCS RM3830 Facilities Management Marketplace CCS RM6089 Workplace Services (FM Marketplace Phase 2)	Min 3 months	NZN OpCo
Office supplies	CCS RM6059 Office Supplies	Min 1 month	NZN OpCo
Temporary and permanent staff	CCS RM6229 Permanent Recruitment 2 CCS RM6002 Permanent Recruitment Solutions CCS RM3749 Public Sector Resourcing	Dependent on role type	NZN OpCo
Furniture, including sustainable solutions	CCS RM 6119 Furniture and Associated Services	Min 3 months	NZN OpCo
Technology solutions (hardware and software), including sustainable solutions	CCS RM6068 Technology Products and Associated Services	2–6 months (note, however, that lead-time has an impact on sustainability of the upstream supply chain and short/urgent lead times should be avoided if possible).	NZN OpCo

72 *With thanks to the following for their comments and input: Centrica, Clivet, Cycle Hoop, Cycle Pods, EV Chargers UK, Heat Pump Association, IndiNature, Sevadis.*

Table 29: Summary of project specific requirements

Project specific requirement	Potential sourcing route	Time to procure/ deliver	Market overview	Market readiness notes	Risks
Solar panels	NZN OpCo framework agreement Local supply route/ contract	From call-off = min 6 months	UK distributors, sourcing from overseas (mainly China) manufacturers.	Demand capacity is reliant on manufacturer capacity – Leadtime may fluctuate based on order book volume at any one time. Current lead-time circa 6 months.	Potential for order delay from manufacturer. Potential for import delays. Potential for quality issues.
Solar panel installation	NZN OpCo framework agreement Local supply route/ contract Local authority contract	Dependent on whether call off from a framework agreement, or new direct contract = 3-12 months	Installation is generally included within supply costs, however, scalable volumes of this programme may facilitate additional installation routes to be considered.	Suppliers generally – at present – also install panels. However, the availability and skills set of staff to carry out this work as volumes increase may be a limiting factor.	Availability of skilled staff.
Solar panel maintenance	NZN OpCo framework agreement Local supply route/ contract Local authority contract	Dependent on whether call off from a framework agreement, or new direct contract = 3-12 months	Low level maintenance programme is required, panel life expectancy c. 25 years.	Small percentage of replacements needed over panel life expectancy/ warranty (typically 20 years).	Low level of regular maintenance required, may mean more ad hoc procurement approach.
Heat pumps	NZN OpCo framework agreement Local supply route/ contract	From call-off = min 3 months	UK distribution, global manufacture. Market is well developed in Europe. Warranty 7-10 years, life expectancy 10-20 years.	Leadtime of around 3 months from order. Whilst 1000's per week are manufactured, UK current supply (held stock) is 100's. Distributor plans for supply increase over next 5 years to circa 5-10,000 per year.	Guaranteeing order capacity (UK volumes typically lower than European order volumes). Leadtime notably increasing. Availability of component parts (e.g. microchips) driving lead-times.
Heat pump installation	NZN OpCo framework agreement Local supply route/ contract	Dependent on whether call off from a framework agreement, or new direct contract = 3-12 months	Can be provided with supply, or contracted separately.	Resource availability is a factor in readiness of the market to meet the volume required.	Lack of skilled resource to meet volumes required. Credentials of skilled installers. Registration of heat pumps with Ofgem (delay at present).

Project specific requirement	Potential sourcing route	Time to procure/ deliver	Market overview	Market readiness notes	Risks
Heat pump maintenance	NZN OpCo framework agreement Local supply route/ contract	Dependent on whether call off from a framework agreement, or new direct contract = 3-12 months	Specialist maintenance providers, or through supplier (e.g. extended warranty plan)	Annual maintenance/ service plan, plus replacement at around 25 years.	Skilled resource availability to meet volume.
Housing insulation (natural fibre – hemp and flax)	NZN OpCo framework agreement Local supply route/ contract	6-12 months	UK and Europe manufacture and supply. Industrial hemp grown in UK, flax in Europe. Life expectancy 100 years, no maintenance. Prices fixed with farmers for 3-5 years.	Production capacity limited at present while new factories emerge. Production does not require skilled labour. Supply capacity can be increased through sourcing of shared processing machine for farmers (needs central funding – c. £3M).	Crop yields (back-up sources available). Funding for processing machine.
Housing insulation installation	NZN OpCo framework agreement Local supply route/ contract Local Authority contract	C. 1-4 months (based on product already being available)	Generally through housing developers at present.		
Ev charging points	CCS RM 6213 (DPS) Vehicle Charging Infrastructure Solutions (VCIS) NZN OpCo framework agreement	6-12 months	UK distributors, sourcing from overseas (mainly China) manufacturers.		Component part availability.
Ev charging points installation	CCS RM 6213 Vehicle Charging Infrastructure Solutions (VCIS) NZN OpCo framework agreement Local supply route/ contract Local authority contract	6-12 months	Installation can be provided either by the supplier, an independent company, or occasionally by the house/property owner.		

Project specific requirement	Potential sourcing route	Time to procure/ deliver	Market overview	Market readiness notes	Risks
Ev charging points maintenance	CCS RM 6213 Vehicle Charging Infrastructure Solutions (VCIS) NZN OpCo framework agreement Local supply route/ contract Local Authority contract	N/A	Typical warranty of 3-5 years.		
Bike infrastructure-cycle pods	NZN OpCo framework agreement Local supply route/ contract	Up to 12 months (capacity driven).	Predominantly UK manufacturing, some in Europe. 10-year warranty on steel parts, 2 year on moving mechanisms. Life expectancy c. 10 years.	Current low production capacity, generally at maximum (full order book).	Steel supply. Vandalism risks. Availability of skilled labour for manufacture. Plant and machinery size.
Bike infrastructure-cycle pods installation	NZN OpCo framework agreement Local supply route/ contract Local Authority contract	Estimate 2-6 months	Can be provided by the distributor or carried out by the purchaser/ household.	Availability of skilled labour.	Availability of skilled labour.
Bike infrastructure-cycle pods maintenance	NZN OpCo framework agreement Local supply route/ contract Local Authority contract	N/A	Can be provided by the supplier.	Low level maintenance (if any) required – checking moving components and locks. Minimal parts replacement.	N/A

The quality attributes and performance measures associated with each requirement would be defined in the detailed tender phase, but would include product life expectancy, warranty, reliability, and ease of maintenance. Where possible, the use of output-based specifications is recommended to encourage broader, potentially innovative solutions to the process.

A.2.6 Risks

Effective and compliant procurement procedures will go a significant way to mitigating any potential risks, however these cannot be entirely eliminated. High-level potential risks have been summarised at Table 30 below.

Table 30: Outline high level risks

Risk	Likelihood	Impact	Mitigation
Insufficient bidders	Low	Medium	Proactive market engagement and awareness raising prior to tender Realistic, fair and unbiased tenders Supply chain engagement plan, including training if required
Procurement is challenged	Medium	High	Ensure compliant process Ensure alternative sourcing route available
Excessive lead-time	High	High	Engage suppliers early and understand potential capacity blockers Proactive supplier management and project overview practices
Excessive cost	Medium	Medium	Collate order requirements to achieve quantity discounts where possible Utilise framework agreements for supply where possible
Failure to deliver on time	High	High	Proactive supplier management Understand potential blockers, e.g. import delays Prepare stock of long lead-time components or sub-components (potential NZN OpCo. warehouse)
Product or component obsolescence	Medium	Medium	Ensure product specification, maintenance and repair schedule is known
Supplier insolvency	Low	Medium	Carry out (at regular intervals) supplier financial checks Limit percentage of suppliers' business that is awarded through the project/programme Maintain contingency supply list (framework providers, or awareness of alternate supply solutions)
Poor quality items delivered	Medium	High	Ensure tight specification (output-based) Review certification or accreditations Carry out supplier quality assurance reviews

The allocation of risk between the public entity (NZN company and/or the local authority) and the private sector provider would be considered and determined at the point of tender.

A.2.7 Contracting and payment model

A.2.7.1 Contract terms

The goods and services to be procured for the demonstrator projects would be procured using standard terms and conditions, either:

- Terms and conditions for supply of goods; or
- Terms and conditions for supply of services, or
- Terms and conditions for supply of goods and services.

Where use of an existing framework agreement was made, the terms and conditions would be those used in the framework agreement. Terms may vary where the NZN FinCo contracts directly with a local authority for an element of service provision. Contractual terms must ensure provision is made for (where required) NZN FinCo rights in any items/components paid for in advance. Contractual terms must ensure responsibility for contract slippage is addressed. Service contracts will typically include a service level agreement upon which payment for completion of services will be based.

A.2.7.2 Payment model

Payment for goods is typically made on delivery, however due to capacity issues and volumes required, some Contractors may require a proportion of contract value to be paid upfront and/or across the contract term.

The contractual arrangement will be established between the NZN FinCo and Contractor by the NZN OpCo. Payment will be direct between the NZN FinCo and Contractor. Service contracts could be established on either a 'per delivery' basis (e.g. on completion of each installation or maintenance) or as a set annual fee based on predicted volumes of work.

A.2.7.3 Order quantities

Most, not all, items required will be liable to potential quantity price brackets (for example heat pump order quantities may not attract volume discounts). Volume order brackets should be researched and utilised where feasible to ensure value for money is achieved – to this end, the most efficient procurement may be at a programme level, with purchased/secured items then attributed (costed) to projects as required. This purchase model will require a programme level purchase commitment, likely in advance of confirmation of number of households per NZN, and therefore carries a degree of risk associated with potential over (or under) ordering, however may be the most feasible route to secure both price discounting and supply.

A.2.7.4 Upfront/milestone payments

Due to the required product volumes, distributors/manufacturers may require the NZN OpCo. to agree a milestone payment plan, for example:

- X% on receipt of order to reserve manufacture capacity.
- Up to 100% for risk supply items/component parts or materials.
- X% on shipment of goods.
- X% on receipt of goods.

A.2.7.5 Ownership transfer

The contractual terms should make clear at which point ownership (and responsibility) for goods passes to the NZN FinCo, in particular where the NZN FinCo has made any payment upfront for goods, or component parts.

A.2.7.6 Household contracting

Engagement and contracting activity with (private ownership) households will be managed through a commercial function within the NZN OpCo, with formal contracts being set up between the household and the NZN FinCo.

Contract management will be undertaken by the commercial function of the NZN OpCo.

Contracts are expected to be linked to the property, as opposed to the named owner, as ownership may change over the expected period of NZN project. This will relate to the payment obligation mechanism which will be decided upon in the next phase of this work. The three potential options are outlined in both the Management Case and the Extended Management Case.

Contracts will be required to commit the property to participate in the relevant level of required retrofit, and to the agreed associated financial model. Financial recovery mechanisms will be explored in detail with demonstrator local authorities and may include an uplift to the property linked Council Tax, or via the property energy bills.

A.2.8 Personnel

No relevant personnel/people management/trade union implications, including Transfer of Undertakings (Protection of Employment) Regulations 1981 (TUPE) have been identified for this project.

It has been assumed local authority staff that are appointed to the project (for their NZN delivery) will remain in the employment of the local authority for the duration. Personnel utilised by the NZN OpCo in a shared service role would remain in the employment of the NZN FinCo, with resource costs recouped either from the local authority or budgeted within the allocated project costs.

Detailed Management Case

A.3.1 Introduction

This Management Case has been developed in the spirit of the Green Book, addressing the key questions raised therein. The key objectives of this case are to:

- Describe how the programme will work, with associated rationale.
- Describe what aspects of this require further research.
- Describe the next phase that will enable a Full Business Case to be developed.

These objectives are delivered through the following sections:

- **Project concept and logic mapping**. What is the programme and how does it deliver benefits?
- **Programmes and projects**. How the overall programme can deliver multiple implementation projects – and how they relate to each other.
- **Management structure and governance**. How both the programme and projects are structured and governed.
- **Funding and expenditure**. How both the programme and each project obtain funding and can make expenditures.
- **Specialist advisors**. Which specialist advisors are needed for the programme as a whole, and for each project.
- **Change control**. How change is managed both at the programme level, and in each project.
- **Contract management**. How contracts are managed for projects.
- **Benefits management**. How benefits and other impacts are monitored and evaluated for the programme as a whole, and for individual projects.
- **Risk management and contingency**. The approach to managing risks, the likely risks and the contingency for these risks at both the programme and individual project levels.
- **Demonstrator design**. The detail of what the next phase needs to be, in particular the demonstrator programme. This includes the key aspects to be tested in this phase and an indication of what success would be.

This Management Case sets out a viable approach to managing and delivering the programme; however, as it is a novel concept there will be many aspects that will need to be tested and refined in subsequent phases. What is set out here provides a starting point for these improvements.

A.3.2 Programme concept and theory of change

The fundamental concept of the programme has been set out in the Strategic Case which has identified the core objective of the project:

- Accelerating the UK's pace and scale of eliminating greenhouse gas (GHG) emissions by 2050.

This objective has been developed in order to address the primary failure identified as the focus of this programme:

- Market-based and asset-based approaches are not delivering decarbonisation of neighbourhoods at a pace in line with 2050 net zero.

This section addresses two aspects of the programme:

- The core 'unlocking' features of the programme that are designed to address the primary failure and the specific failures that underpin this.
- The theory of change that describes how the programme (with the features identified) delivers the outputs, outcomes and impacts that will deliver the core objective.

A.3.2.1 Specific failures and unlocking features

There are multiple specific failures that underpin the major failure identified. These are as follows:

- **Public opinion**: Lack of awareness means there is often resistance to change to homes and transport (in particular).
- **Local powers**: Local authorities lack the powers to drive action beyond their own assets. They do not own the assets that need to be changed.
- **Socio-economic – capturing of benefits**: It has been difficult to identify quantifiable benefits to drive investment in change.
- **Behaviour**: Building owners generally have other priorities, lack knowledge, don't have to act, and have split incentives.

- **Financial-commercial**: Low returns and lack of workable models for recovery of investment means it does not happen.
- **Socio-economic – affordability**: Cost of action falls disproportionately on poorer residents relative to wealth/assets making it unaffordable for a large proportion of the population.
- **Governance**: There is a lack of coordination and delivery vehicle to drive urgent action.
- **Supply chain**: Capacity, standards, and knowledge constrict scaling of action even if funding is obtained.
- **Human resource capacity**: Few resources devoted to a huge systemic challenge.
- **Technical**: Technology is mature but challenging to implement systemically and a lack of detailed reliable data limits delivery

The number of specific failures identified demonstrates the level and scale of challenge to be addressed to meet the objective. This implies that a more radical solution is required than simply proceeding along the same lines with greater ambition.

In order to address these specific failures, the following 'unlocking features' have been developed to drive the design of the programme such that it can address these specific failures.

Local design: By designing solutions locally for local areas it should be possible to address **public opinion** much more effectively.

Place-based: By developing whole solutions for specific places (or neighbourhoods) there is the potential to unlock several failures:

- It helps address **public opinion** challenges through tailoring the solution to the local area and local needs.
- It overcomes the lack of **powers** held by a local authority as it brings together a set of assets in a place for combined action.
- A place-based solution enables multiple **socio-economic benefits** to be identified, stacked, and realised for the local community.

Multi-intervention: Closely linked to the Place-based approach is the multi-intervention approach which addresses multiple emissions sources at the same time. This attempts to address three failures:

- It can improve **public opinion** through creating a package of attractive measures for the community.
- It enables the capturing of **socio-economic benefits** more effectively as it stacks them together from multiple interventions, enhancing them substantially.
- It addresses the low **financial-commercial** returns through creating a package of measures that can attract funding from multiple investment sources, creating scales of economy and building a package that is more than the sum of its parts.

Blended finance: Blending three sources of finance enables a larger investment than would be possible with individual investments, multiplying impact. It does this through addressing the following two failures:

- It enables the capturing of **socio-economic benefits** more effectively as it enables outcome purchasers (whether private or public) to invest in outcomes as part of the model.
- It addresses the low **financial-commercial** returns through using the high-returning components to fund return-seeking investments.

Contract with buildings: By creating contracts that remain with buildings over a longer-term period it is possible to attract long-term funding as returns can be guaranteed over a longer period of time. This addresses a number of failures:

- It addresses **behaviour** challenges where the building owners split incentives are overcome through the removal of them taking the risk on the investment.
- It improves the **financial-commercial** picture by enabling lower returns to be viable through attracting long-term patient capital that does not require high returns.
- It also addresses the **socio-economic affordability** challenge by enabling a longer period over which to repay investment, making payments more attractive relative to energy savings.

Return-seeking finance: By bringing in low return-seeking finance (patient, long-term capital) it is possible to dramatically exapand the amount of investment possible.

A centralised financial entity (FinCo): The concept is of one national or a handful of regional financial entities that are the primary vehicle for obtaining and distributing investment, as well as collecting fees from residents. This feature attempts to address multiple specific failures:

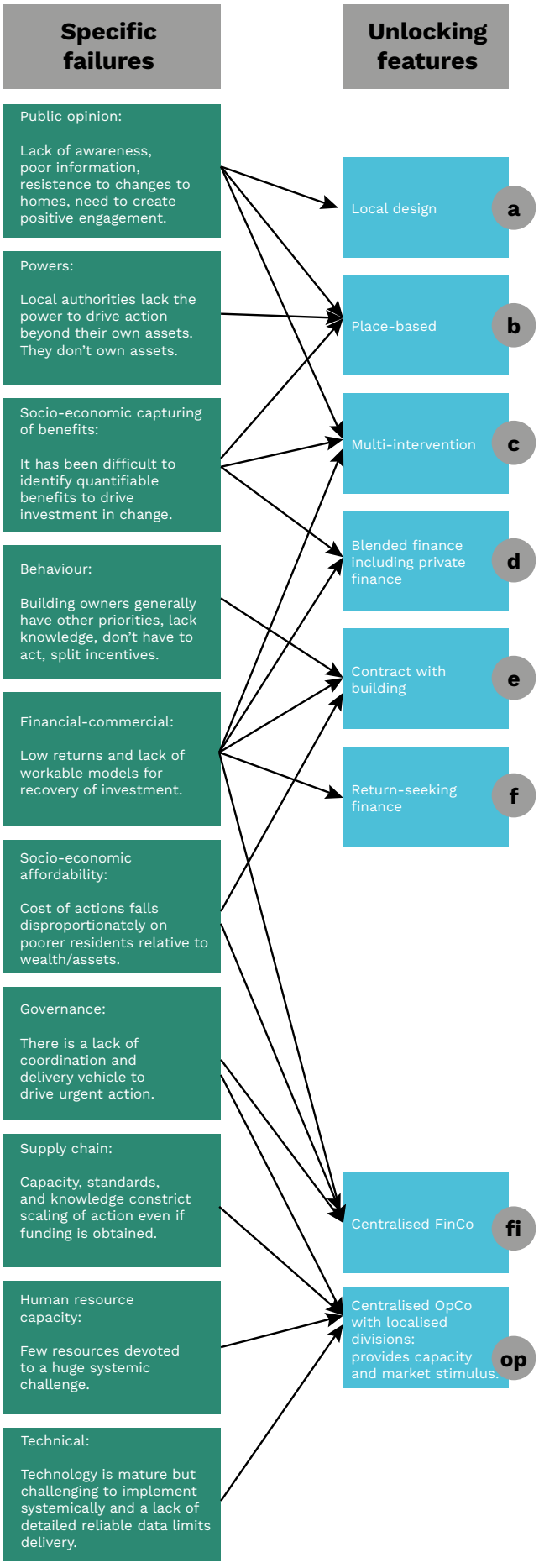
- By being a reliable and trusted investment vehicle, it can address **financial-commercial** challenges through providing a more attractive option.
- By being a centralised investment vehicle that invests and aggregates returns regardless of **socio-economic affordability** issues, this unlocks the challenge of affordability for residents.
- It also coordinates investments in a way that addresses **governance** challenges.

A centralised operational entity (OpCo): The concept is of a national entity with multiple regional divisions that provides technical capacity and project management expertise for design and delivery support. This feature attempts to address multiple specific failures:

- It coordinates support to the programme which addresses **governance** challenges.
- It provides clarity of demand to the **supply chain**, making it clear what capacity will be required moving forward, sending a signal to the market and supporting the market in upskilling where relevant.
- By bringing together certain expertise for support to local design and delivery, it can address the **human resource capacity** issue.
- By having a semi-centralised technical expert entity there can be a systematic approach to delivery and provision of reliable coordinated data which can address **technical** challenges.

These unlocking features have been the foundation of the design of the programme. The relationship between them and the specific failures is shown in Figure 31.

Figure 31: Specific failures and unlocking features (letters for reference)



A.3.2.2 Theory of change

The programme has been designed to drive change in a way that addresses the failures outlined above, and to deliver the core objective. The logic map of this theory of change is set out .

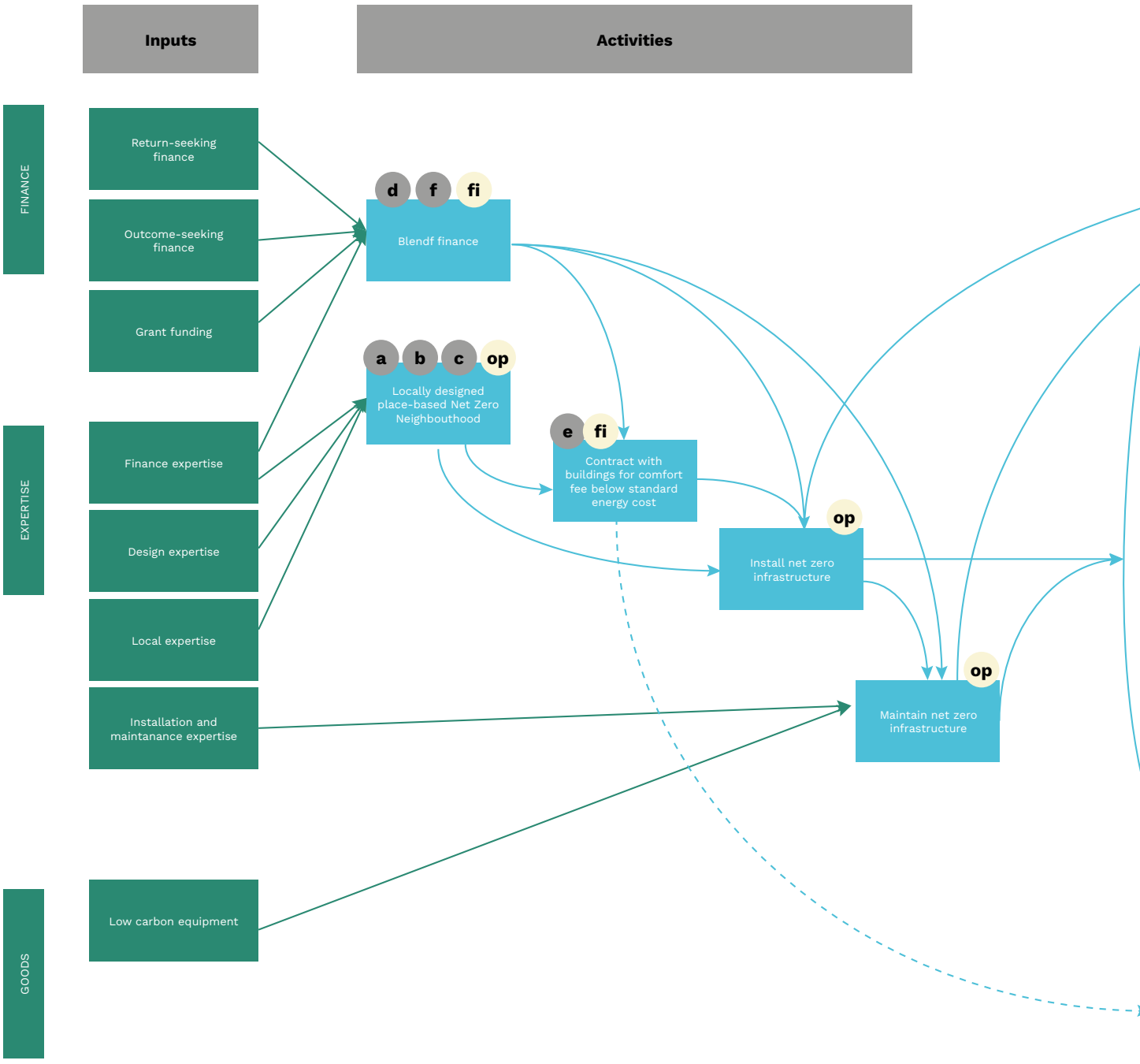
The logic map is a simplified version with some links removed and several aspects not addressed (for example education of residents about GHG emissions). It remains complex, with multiple links and dynamics, which reflects the challenges this programme is trying to address, and the detail of the solution.

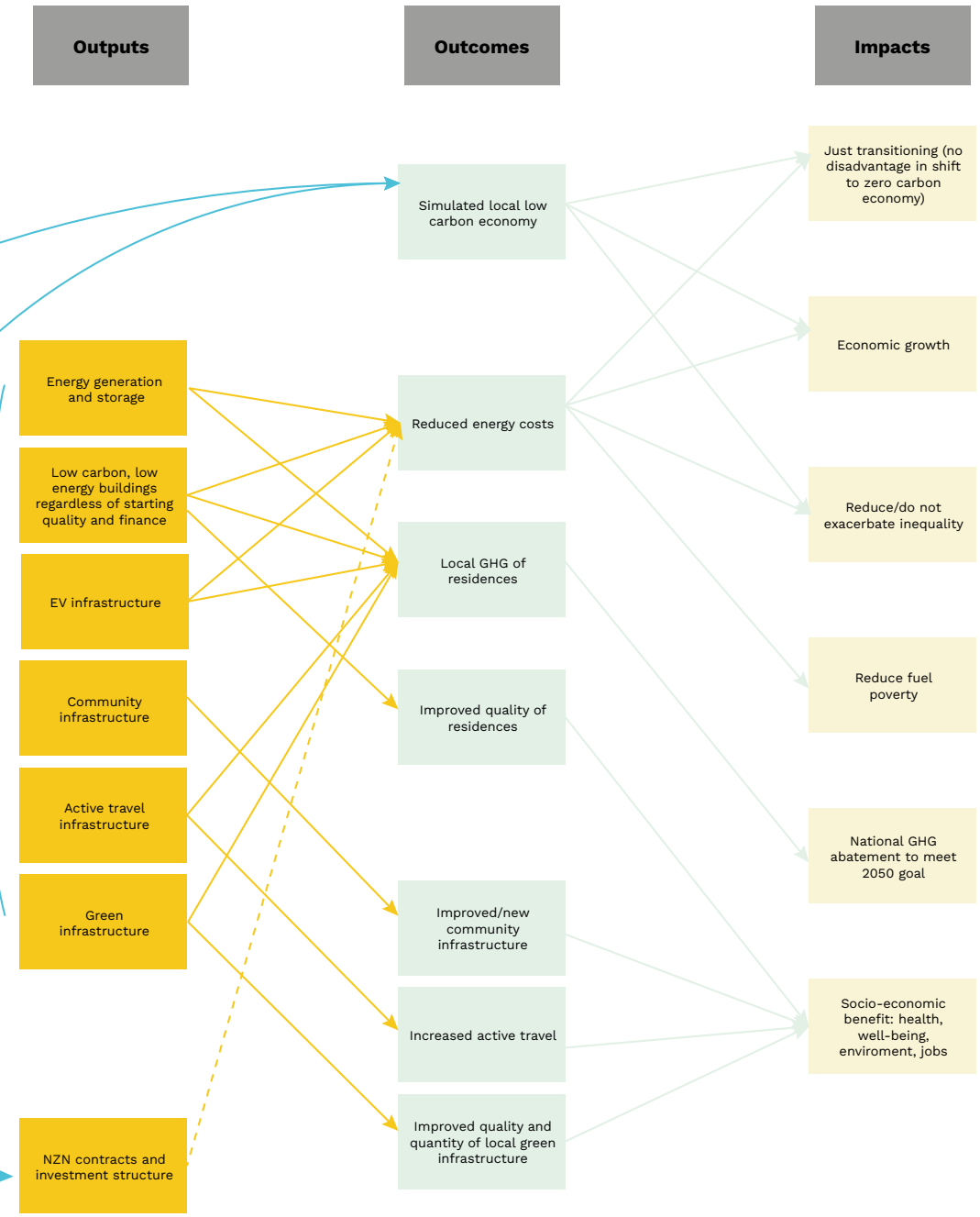
The specific features and approaches addressed in the following sections are indicated by the letters in circles in the activity section. For reference, the letters refer to:

- **a**: Local design
- **b**: Place-based
- **c**: Multi-intervention
- **d**: Blended finance
- **e**: Contract with building
- **f**: Return seeking finance
- **fi**: Centralised Financial Entity (FinCo)
- **op**: Centralised Operational Entity (OpCp)

The following sections explain the linkages in the theory of change, and the logic map for this is shown in Figure 32.

Figure 32: Programme theory of change




Outputs
Outcomes
Impacts
Simulated local low carbon economy
Energy generation and storage
Low carbon, low energy buildings regardless of starting quality and finance
EV infrastructure
Community infrastructure
Active travel infrastructure
Green infrastructure
NZN contracts and investment structure
Reduced energy costs
Local GHG of residences
Improved quality of residences
Improved/new community infrastructure
Increased active travel
Improved quality and quantity of local green infrastructure
Just transitioning (no disadvantage in shift to zero carbon economy)
Economic growth
Reduce/do not exacerbate inequality
Reduce fuel poverty
National GHG abatement to meet 2050 goal
Socio-economic benefit: health, well-being, enviroment, jobs

The following sections examine the logic flows that drive the theory of change. The logic flows focus on the major dynamics only. There are many other dynamics at play, but to address them all would be excessive in the scale of this OBC.

Inputs

The inputs are the things that are used to do the work. They are therefore resources of various forms – here classified into financial, expertise, and goods. There are obviously multiple processes and organisations these inputs will be shaped by, but these form part of the activities that are the next step on the logic chain. These inputs are self-explanatory, so no further description is given here.

Actions

The actions are the things that each project does. There will be hundreds of actions required to deliver an NZN, but these have been simplified into the very simplest categories of action that describe the model. Each is described in Table 31.

Table 31: Actions

Activity	Inputs	Unlocking Feature Association
Blend finance: bringing together different funding streams	Return-seeking finance Outcome-seeking finance Grant funding Finance expertise	This delivers the blended finance unlocking feature. This also includes return-seeking finance. The FinCo delivers this blending.
Locally designed nzn: A place-based, multi-intervention design specific to the neighbourhood	Locally Designed NZN: A place-based, multi-intervention design specific to the neighbourhood. Finance expertise to get the financial design right. Design expertise to get the technical design right. Local expertise to get the technical design and community engagement right.	This delivers local design. The design is place-based. The design is for a multi-intervention approach. The design is facilitated/ supported by the OpCo.
Contract with buildings for comfort fee (below standard energy costs) to enable the funding model to work	Blend Finance enables the project to be implemented and therefore contracts to be signed. Locally Designed NZN gives the design to which the contract commits.	This delivers a contract with the building. This is contracted by the FinCo (with OpCo support).
Install net zero infrastructure: delivering on improved neighbourhoods and reduced emissions (both actual and potential)	Blend finance enables the implementation to be paid for Locally designed NZN gives the design for implementation. Contract with buildings enables the work to be delivered. Low carbon equipment is what is installed. Installation expertise is what provides the installation.	This is facilitated by the OpCo.
Maintain net zero infrastructure: to ensure the project is operational throughout its life	Blend finance enables the maintenance to be paid for. The installed infrastructure is what will be maintained. Low Carbon Equipment for replacements as needed. Installation and maintenance Expertise is what provides the maintenance and replacement.	This is facilitated by the OpCo.

Outputs

The outputs are the things that are produced or delivered as part of each project. As can be seen from the diagram, most of the outputs are the changes developed in the NZN design. These are:

- **Energy generation and storage**. Generation and storage of energy for distribution to the neighbourhood when needed is a vital part of the financial model and will reduce energy demand from outside of the neighbourhood.
- **Low carbon, low energy buildings**. The retrofit and heat source replacement measures that make up a component of the design will ensure that buildings are both low carbon and low energy to operate, regardless of the means of the residents.
- **EV infrastructure**. This will most likely be EV charging points, either for each residence, or communally, or both. These make electrified vehicles more viable for the community, but don't guarantee replacement of internal combustion engine vehicles.
- **Community infrastructure**. This infrastructure could be in many and varied forms depending on the communities needs and wishes in the design process. It is unlikely this will have a direct impact on emissions, but is a vital component of making the package desirable to neighbourhoods.
- **Active travel infrastructure**. This is likely to take the form of improved cycle storage, cycle lanes, improved pedestrian footways etc. The exact nature of this will depend on the neighbourhood and also its location in relation to the wider area it is part of. It does not guarantee GHG emissions reductions, but it does make switching to active travel more attractive to residents.
- **Green infrastructure**. The exact nature of this will again depend on the neighbourhood, but it could include tree planting, sustainable urban drainage, restoration of ponds etc. Most of these will have limited GHG impacts but will significantly enhance the neighbourhood which has multiple other impacts, as well as provide a visible sense of positive change.

All of these are generated through the installation and maintenance of the net zero infrastructure each project is designed to provide.

Alongside these outputs is the output of the **NZN contracts and investment structure** for each project. which are the legal and financial structures which make the project viable.

Outcomes

Outcomes are those things that each project aims to achieve as a consequence of the outputs. They are not guaranteed in the way that the outputs are, but they are closely linked and so are anticipated and expected. The principal outcomes, and their key drivers, are shown in Table 32.

Table 32: Outcomes

Outcome	Drivers
Stimulated local low carbon economy. This outcome represents an increase in economic activity in the local area associated with low carbon technologies. This is likely to involve design and installation expertise, but also potentially manufacturing.	Install net zero infrastructure Maintain net zero infrastructure These activities will stimulate the local economy if work is awarded locally.
Reduced energy costs. This outcome is about reduced energy costs relative to the costs that would be paid for conventional technologies and supplied at market rates. These reduced costs would be experienced by all residents.	Energy generation and storage Low carbon, low energy buildings EV infrastructure These all contribute to reduced energy costs. The primary drivers are the first two which drive down energy consumption in residences and then replace some consumption with locally generated energy. The facilitation of this is achieved through the NZN contracts.
Local GHG abatement. This outcome is the primary focus of the NZN which is to reduce dramatically the emissions from the neighbourhood.	Energy generation and storage Low carbon, low energy buildings EV infrastructure Active travel infrastructure Green infrastructure These all contribute to reduced GHG emissions. Some have immediate direct impact such as the first two. Some are facilitatory (those associated with transport) which do not guarantee abatement, but makes it possible. Green infrastructure has the potential to sequester a small amount of carbon too.
Improved quality of residences. This outcome reflects the higher thermal quality of buildings that have been retrofitted, making them easier to heat and therefore easier to maintain at healthy temperatures. It also prevents issues such as damp.	Low carbon, low energy buildings This is a direct consequence of buildings with greatly improved thermal efficiency.
Improved/new community infrastructure. This outcome reflects the community infrastructure output.	Community infrastructure
Increased active travel. This outcome is about increased proportions of journeys taken by walking or cycling in or through the neighbourhood	Active travel infrastructure It is assumed that improved and/or new active travel infrastructure would increase the proportion of active travel journeys taken. The exact relationship will vary from neighbourhood to neighbourhood.
Increased quality and quantity of local green infrastructure. This outcome will be somewhat hard to measure as the quality of green infrastructure depends on multiple factors and is highly localised.	Green infrastructure It is assumed that locally designed green infrastructure will be appropriate and therefore enhance local quantity and quality.

Impacts

Impacts are those things that the programme as a whole aims to change as a consequence of the outcomes of each project. They are in many ways the aggregated outcomes across the UK. They are not guaranteed, but they are closely linked to the outcomes. The principal impacts and their key drivers are shown in Table 33.

Table 33: Impacts

Impacts	Drivers
Just transition. This focuses on ensuring that no group is disadvantaged in a transition to a zero carbon economy. This needs to be considered in socio-economic terms, and from a cultural angle.	Stimulated local low carbon economy. This should deliver a just transition if the economic stimulation is spread across the UK, not focused in a small number of areas. Reduced energy costs. By reducing energy costs for residents, people of all socio-economic groups will benefit from the transition, not just those who can afford to invest in lower bills.
Economic growth. This impact is about increased economic activity across the UK as a whole.	Stimulated local low carbon economy. Stimulating local economies will lead to the economy growing at a national level. Reduced energy costs. By reducing energy costs for residents, people will have more disposable income which may be used to spend in the economy, increasing GDP. The similar will be true for businesses which may reinvest these savings.
Reduce/do not exacerbate inequality. This impact is about ensuring that the programme, at a bare minimum, does not increase socio-economic inequalities. Ideally it would reduce them.	Stimulated local low carbon economy. Stimulating local economies will distribute economic benefits equitably across regions. Ensuring that the different types of new job are also distributed equally will also impact inequality. Reduced energy costs. Whilst reduced bills also benefit more affluent residents, they have a disproportionately beneficial impact on lower-income residents for whom energy is a greater proportion of expenditure. Therefore, reducing energy costs will reduce inequality. It is also possible to target the reduced energy costs at more deprived areas, further reducing inequality.
Reduced fuel poverty. A more specific impact than the above, this is a measure of the proportion of income a household spends on energy costs.	Reduced energy costs. By reducing energy costs, fuel poverty will drop. The dramatic reductions proposed in the programme will have a very large impact on fuel poverty in particular.
National GHG abatement to meet 2050 goal. This is the national policy and the primary impact of the programme as a whole.	Local GHG abatement. The aggregated abatement of GHG emissions across each NZN will greatly enhance the prospect of meeting the 2050 net zero target. Neighbourhoods are a major source of emissions and are particularly hard to decarbonise. Whilst this programme will not guarantee hitting the 2050 target, it does make one core component viable.
Socio-economic benefits: Health, well-being, environment, jobs. These are a variety of co-benefits that reflect the full range of socio-economic impacts associated with the programme.	Improved quality of residences. Improved residences will have significant health impacts for many residents contributing to improved health outcomes and improved sense of well-being. This in turn can improve economic activity. Improved/new community infrastructure. Community infrastructure can have a significant impact on community cohesion and resilience due to the improved connections and interactions in the community. This in leads to improved well-being. Increased active travel. Active travel has proven health benefits, as well as reducing air pollution. Improved quality and quantity of local green infrastructure. Green infrastructure impacts on multiple factors, in particular health and wellb-eing for people living and working in the vicinity.

As already discussed, there are many other outputs, outcomes, and impacts of the programme and each project, but these focus on the most important dynamics.

A.3.3 Programme and projects: The structure

The overall NZN programme will deliver numerous NZN projects. As highlighted in the introduction, there are potentially multiple phases over which the programme will be delivered.

Each NZN project that is delivered will also have distinct periods of different activity. It is therefore necessary to ensure that there is not confusion between talking about the programme as a whole, and the projects that it delivers.

Table 34: Programmes and projects

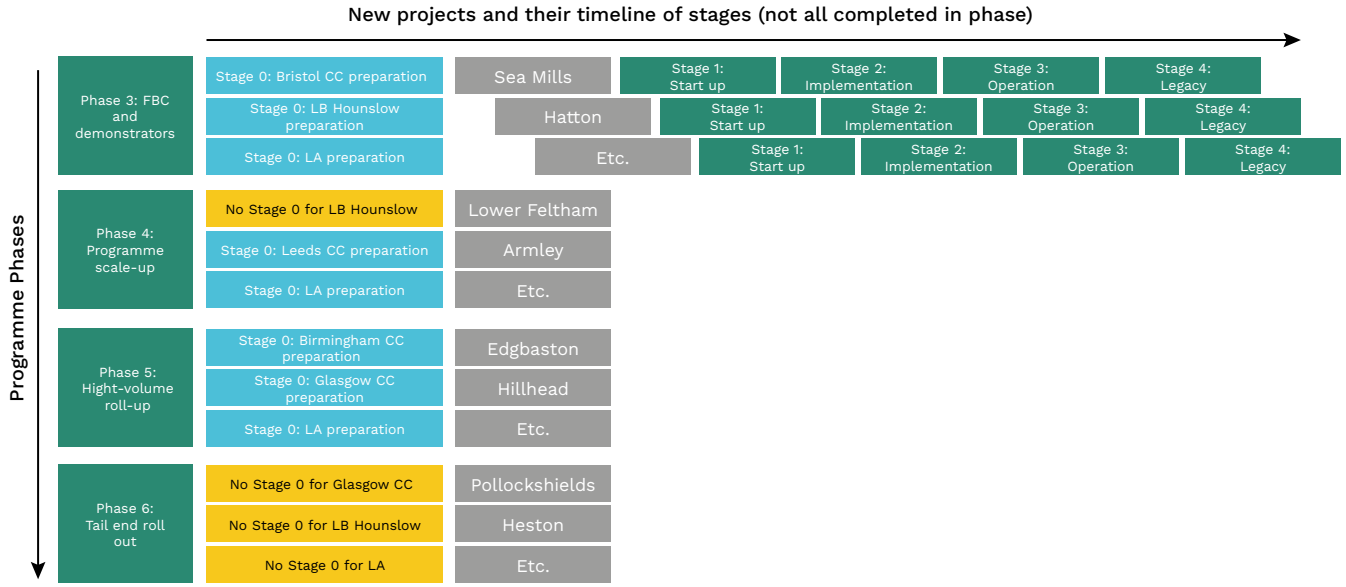
	Programme	Project
What is it?	The entire set of works that deliver NZNs across the UK	An individual set of activities that deliver an NZN for an individual neighbourhood
Name of subdivisions	Phase	Stage

The terminology identified in Table 34 is used throughout the business case.

The dynamics between the programme as a whole and the individual projects are demonstrated in Figure 33. This shows how there will be multiple projects in each phase. Each project itself has multiple stages. These will often run at different times to other projects, even if they are in the same phase. Additionally, this diagram shows NZN projects that are started in each phase. The projects themselves will continue to run even as the programme moves into a subsequent phase.

Figure 33 demonstrates that there will be many projects running at the same time. This shows how complex the programme could become, with dozens or even hundreds of projects at different stages at any given point in time. This Management Case proposes structures that are sufficiently flexible to deal with these dynamics.

Figure 33: Programme and projects (locations are for illustration only)



A.3.3.1 Programme stages

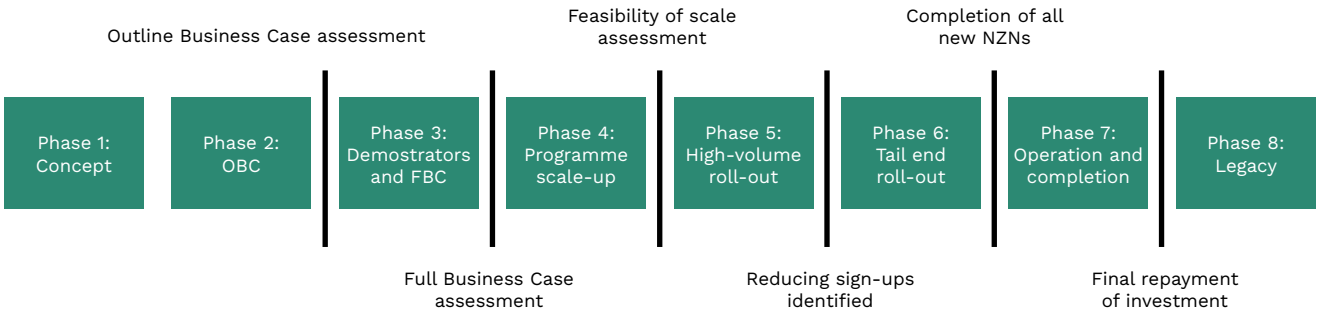
The Outline Business Case (OBC) that this Management Case is part of, is making the case for two things:

- The anticipated viability and benefit of the overall concept of a Net Zero Neighbourhood (NZN) programme; and
- The benefit of moving on to the next phase in the development of this programme to prove this.

It is therefore important to understand how this OBC relates to the overall proposed NZN programme.

The phases and associated gateway assessments both already conducted or anticipated in this programme are shown in Figure 34. Phase 1 is complete, and this document is a key output of Phase 2.

Figure 34: NZN programme phases



These phases are described in Table 35.

Table 35: NZN programme phase descriptions

Phase	Core contents and objective
Phase 1: Concept	Designing concept and testing as a Strategic Outline Case (SOC) – Complete
Phase 2: OBC [THIS PHASE]	Making the case for the programme as a whole Designing Phase 3
Phase 3: FBC and demonstrator	Testing key questions and designs in practice Drawing on these findings and further analysis to make the FBC to HM government (HMG) (if appropriate)
Phase 4: Programme scale-up	Beginning the roll out of the full programme Steadily increasing volume of NZNs that can be delivered at one time Proving capacity to deliver at peak volumes needed to meet net zero goals
Phase 5: High-volume roll-out	Steady-state roll out of new NZNs at maximum capacity aligned with net zero goals
Phase 6: Tail-end roll-out	Reducing volumes of new NZNs until no new NZNs implemented
Phase 7: Operation and completion	Ongoing support to NZNs Management of NZN completions
Phase 8: Legacy	Legacy operations (if required) to support NZNs

This demonstrates how this OBC fits within the bigger picture. The following Management Case therefore aims to:

- Describe how the programme as a whole can be managed in a viable and effective manner.
- Identify which elements of this proposed management structure need to be tested further to inform the FBC.
- Determine how Phase 3 should be designed to enable this testing; and
- Identify the financial ask being made at this OBC assessment gateway to progress with Phase 3.

A.3.3.2 Project stages

There are (up to) five stages an individual NZN project will need to go through, as can be seen in Figure 35. Details of each stage are provided in the subsequent Table 36.

Figure 35: Project stages and gateways

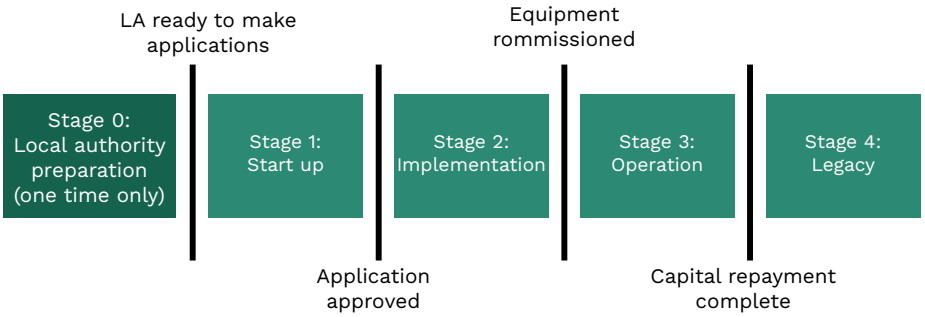


Table 36: NZN project stages

Stage	Contents
Stage 0: LA pPreparation	Local authorities (LA's) will start from widely varying positions with regards net zero ambitions, engagement with place-based solutions, internal team capabilities, and capacity etc. For many LAs there will need to be a preparatory stage where they are supported to develop their understanding and capabilities to enable them to be able to apply to the programme for funding. This stage would only be needed once for each LA (if at all). This is indicated in Figure 33 by the yellow blocks, where an LA has already been through this stage, so does not need to repeat it for subsequent NZN projects.
Stage 1: Start Up	This stage leads from the point at which an LA is ready to make an application (and applications are open) to the point of an application being accepted. It comprises a number of steps that lead to the detailed design of the project and obtaining reasonable levels of commitment from the residents and businesses. This process will take differing lengths of time depending on each project, the LAs approach, and whether the application meets the criteria for funding.
Stage 2: Implementation	The implementation stage is when the NZN is physically put into place, with equipment and infrastructure installed. Depending on the procurement procedures, this stage could be relatively rapid once the experience is built up on implementation. The end of this stage is marked by the commissioning of the equipment and the associated contractual payments by residents and businesses for the services.
Stage 3: Operation	This stage encompasses the majority of the project and sees the operation, maintenance, and replacement of the NZN infrastructure over the repayment period. This should be a largely steady-state stage where changes and interventions are minimal, aside from urgent repair or replacement of failed equipment.
Stage 4: Legacy	Following the repayment of the capital funding, the project will move to a legacy stage. At present it is not clear what the best approach to this is, but it could include: • Transfer of the project to a local or regional body that continues the model but uses the money generated to fund local benefits – or indeed, just reduces the payments to only cover operations. • Continuation of the project at a national scale, using the money as outlined above. • Termination of the project with assets being passed to local bodies and the model being abandoned. The approach should be determined by identifying what will bring the greatest local benefit.

Most of the following sections are split between programme and project subsections to ensure that both of these components are fully addressed.

A.3.4 Management structure and governance arrangements

A.3.4.1 Guiding pPrinciples

This section presents the principles behind the management and governance structure for the NZN programme, and the rationale for the proposed approach.

The key principles identified are:

Minimise intermediaries between funders and revenue generation. The more layers of organisations through which funds flow between funders and the revenue generation aspect of a programme, the greater the credit/counterparty risk that is perceived by funders. With greater risk comes a reduced willingness to lend, or an increased rate of return required. Both would hamper the potential success of the programme. The more money that can be borrowed at low rates, the less money required from government to deliver the programme. As a result, the structure of the programme, and associated governance, must keep the contractual and financial arrangements simple and direct.

Minimise risk of ownership structure. Related to the above principle is the broader principle of minimising risk for funders so as to attract the lowest rates possible. Another method of minimising risk to funders is by de-risking the ownership of the Net Zero Neighbourhood entities. Providing ownership that can back the programme in case of financial challenges can provide real confidence to investors, and so the ownership structure should deliver this.

Flexibility to work with authorities of different readiness and capacity. To be truly national, the programme would need to work in all of the UK's neighbourhoods and this requires it to work with local authorities of different structures, sizes and capacities. The structure developed needs to be able to offer support and guidance across this diversity. This means providing light-touch engagement to authorities that have capacity and capability, through to large-scale support for those that do not. There will likely be a need for greater support for LAs in the earlier phases of the programme (such as a set of demonstrators requiring significant support) and less in later phases once the programme is well established.

Primacy of local authorities in local decision making. The structure must reflect that local expertise is the best at determining what solutions will be needed in any given neighbourhood. This means that the structure must make space for local authorities to take a leading role in programme design. It cannot be a centralised, one-size fits all programme.

Primacy of place-based approach. The structure must also reflect the core tenet of this approach, which is that the projects should be place-based. This means that structures should ensure that places received joined-up support and service and not be reliant on potentially inaccessible centralised functions that do not understand place dynamics.

Scalability. The programme could become vast, and so the structure needs to be able to expand significantly without major structural impediments.

These principles have guided the proposed structure which is set out in the next section.

A.3.4.2 Programme structure and governance

The structure presented in this section is a preliminary proposal. It will need to be tested and refined in the demonstration phase, which will then lead to a refined proposal being put forward as part of the Full Business Case.

The nature of the Net Zero Neighbourhood programme is that there are multiple functions that the structure needs to deliver, and it needs to deliver different functions with different neighbourhoods at different times. Understanding this context helps to understand the structures recommended and this context is provided first. These differing phases are discussed in more detail in the previous section.

Core structural concept

At the heart of the proposed structure are the relevant Local authority and two new, central organisations:

- A financial organisation that deals with contractual and financial matters only. This is referred to in this paper as the FinCo.
- An organisation that provides the operational functions of the programme, primarily, support to local authorities, and oversight of NZN projects as an agent for the FinCo. This is referred to in this paper as the OpCo.

The reason for proposing two new organisations is to facilitate the principle of minimising intermediaries between funders and revenue generation. By keeping contracts and flows of finance coordinated by one organisation, the FinCo, the proposition to funders is simple and easy to understand. There is a single entity that can aggregate money from loans and grants and distribute this to the projects and then collects fees and repays investors.

Separating this function from the large and complex operational activities that the OpCo will deliver protects the FinCo from the risks that arise from this. The OpCo could go bankrupt, but the FinCo could still collect fees and repay investors.

This split also enables the FinCo to act as a client to each project, scrutinising it for adherence to criteria. There is the potential for there to be a conflict of interest if the FinCo was also delivering these projects, jeopardising good decision making and, through this, the reputation of the programme with investors.

This structure also allows there to be multiple models of project collaboration between the OpCo and local authorities without this impacting the FinCo – the contractual and financial arrangements will be near identical across all design and delivery variants. Again, this simplifies the proposition to investors.

A.3.4.3 Local authorities

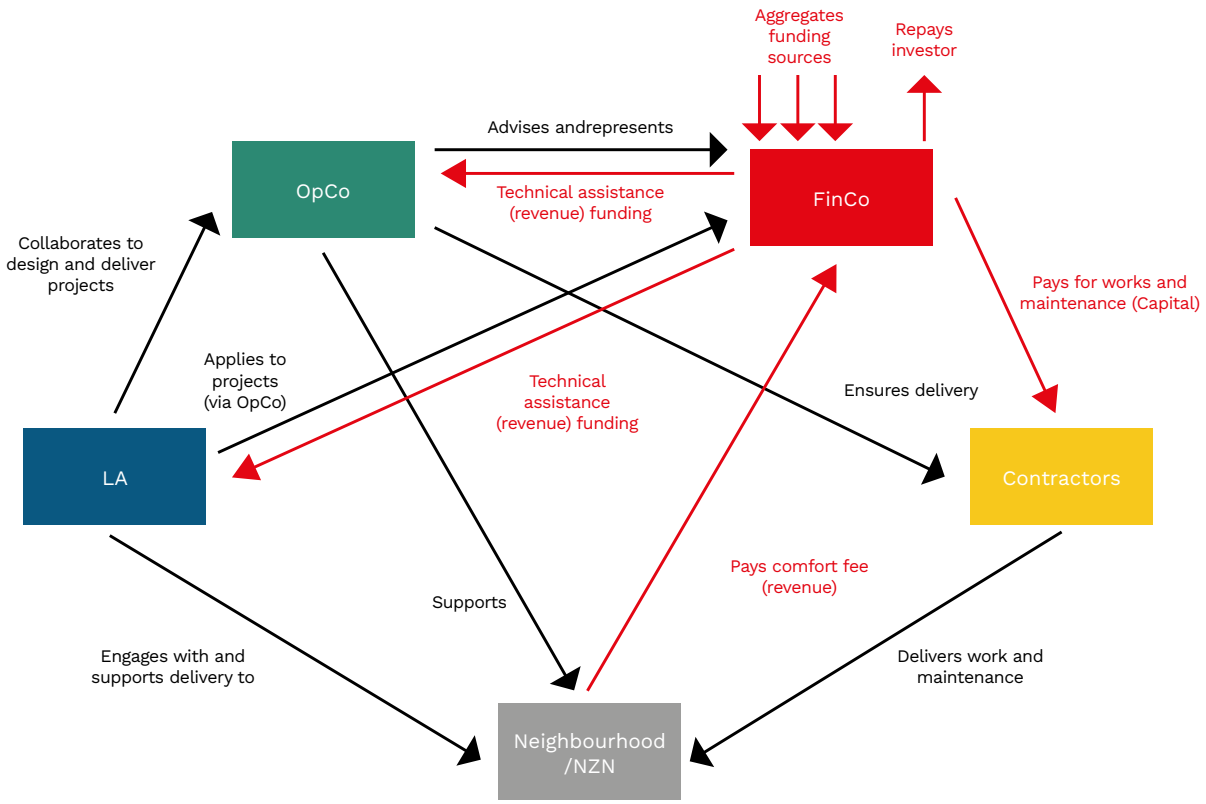
Local authorities are identified as playing a core role in each project, in particular as local experts and agents. They are anticipated to:

- Lead on local engagement (with support from the OpCo).
- Lead on design work (with support from the OpCo)
- Develop procurement specification (with support from the OpCo).
- Sit on the procurement panel.
- Sit on the implementation steering group alongside OpCo.

A localauthority may decide also to invest in the NZN in some form, but regardless of this, the local authority is central to the design of the NZN.

With this core concept in mind, the diagram in Figure 36 shows the primary actors engaged in the NZN programme and the primary ways in which they relate.

Figure 36: Major entities and interactions (red arrows are flows of money)



By necessity, the interactions shown here are at a high level, and these will vary and change as projects develop and move through different stages. This greater detail, and the variations, will be discussed in a later section. What follows is a more detailed look at the two organisations proposed to form the core of this structure.

Key areas of testing for demonstrator programme:
Is the split between FinCo and OpCo correct and is it a viable structure in practice?
Does this structure enable the OpCo to effectively support LAs in engaging with the programme?
Does this structure lead to successful community engagement?
Does this structure lead to effective Contractor procurement?
Does the structure appropriately support LAs at all stages of a project?

New entity: Financial company – 'FinCo'

Initially a company wholly owned by the government.

The FinCo is conceived as an entity that will enable private and public investment into the NZN programme in a manner that minimises risk (and therefore minimises required rates of return and maximises investment appetite) and enables aggregation of funding demand. It is therefore designed to be the sole entity that receives and pays out monies associated with the programme and each project that the programme develops. This provides simplicity and transparency for investors.

7.7.1.1 Primary roles and functions:

- Assessing viable scale of programme in 3-5 year planning process – which is then used to guide OpCo planning for scale.
- Receive funds from private and public sources.
- Provide operational funding to OpCo as part of contract for OpCo's services.
- Assess whether an NZN concept is ready for technical assistance funding to develop the design.
- Assess whether NZN projects meet criteria for funding.
- Provide technical assistance (revenue) funding to LAs and OpCo for each project design and delivery approved.
- Contract with properties and receive payments.
- Contract with Contractors and make payments.
- Centrally procures equipment on advice of OpCo.
- Repay finance where applicable.
- Owns infrastructure (in most instances).
- Managing financial risks.
- Managing delivery risks at programme level.

A.3.4.3.1 Relationships with other entities

The FinCo will interact either directly or indirectly with all major stakeholders in this programme. These relationships are set out in Table 37.

Table 37: FinCo relationships

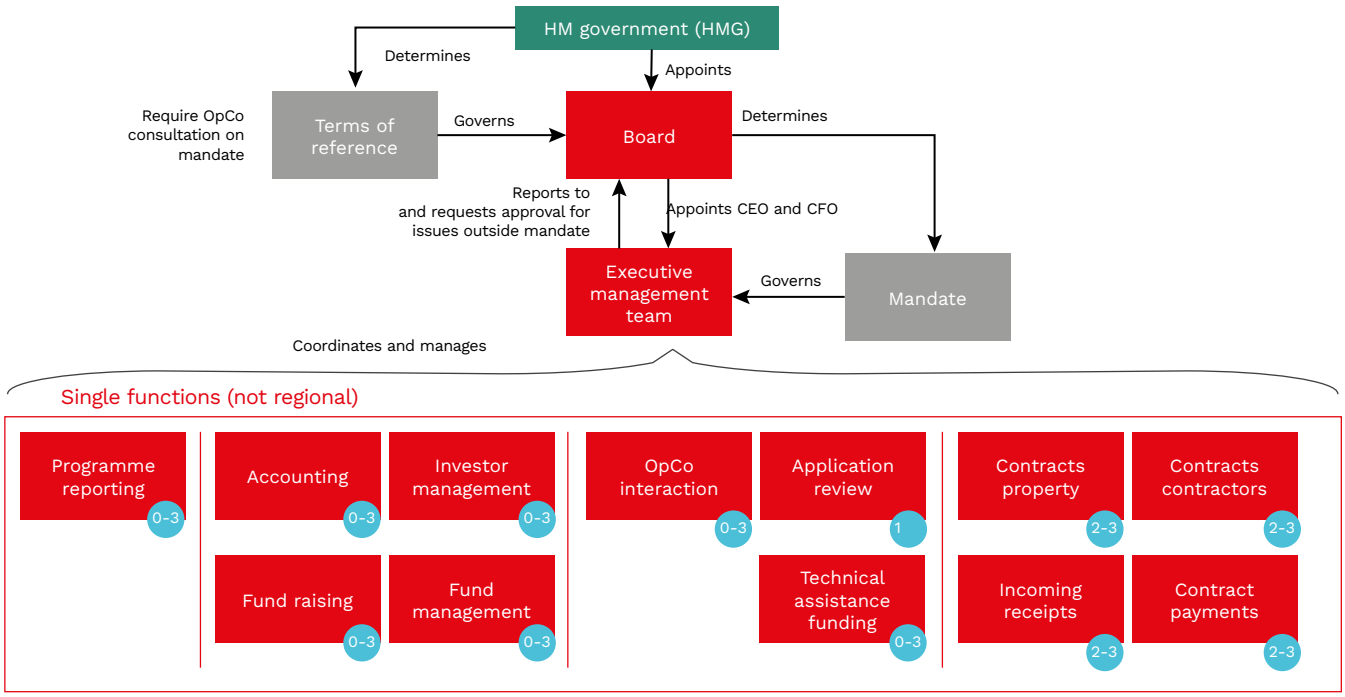
FinCo relationships with other entities	
OpCo	**Gatekeeper**: The OpCo acts as the gatekeeper for LA applications to the FinCo (both applications for technical assistance funds for design and delivery work, and CapEx funds for project implementation). It assesses applications against the criteria set by FinCo and only recommends LAs submit when they look likely to pass the FinCo's appraisal process. **Agent**: The OpCo acts as the agent of the FinCo in procurement processes and in management of Contractors. It advises: • Which Contractors to contract with based on the procurement process • When to make payments to Contractors based on delivery • When to commission the project (trigger payments) based on completion of the implementation work In all cases, the ultimate decision resides with the FinCo. **Representative**: Where contracts exist (for example with maintenance Contractors) the OpCo plays the role of enforcing those contracts as representative of the FinCo, and through this ensuring that the service to the neighbourhoods that has been contracted for is delivered. **Contractor**: The OpCo is contracted to the FinCo to deliver the above services. For this the FinCo pays the operational costs of the OpCo. In addition, for each project the OpCo will deliver specific functions, particularly relating to design and delivery oversight. These are funded on a project-by-project basis with technical assistance (revenue) funding from the FinCo.
Local authority	**Applicant**: The LA's primary relationship with the FinCo is one of an applicant for funding for an NZN project. However, their application will be supported and mediated by the OpCo, meaning that the FinCo will have relatively little direct engagement with each LA. **Fund recipient**: The FinCo will provide technical assistance (revenue) funding to enable projects to be designed by LAs in collaboration with the OpCo and/or third party Contractors that the LA chooses to appoint. There will also be a small amount of funding to enable the LA to have capacity to engage with project delivery through the steering group for each project. CapEx funding will not flow through LAs unless an LA bids successfully for delivery through the procurement process.
Neighbourhood/ NZN	**Customer**: Before the project is implemented, the neighbourhood as a whole will have no interaction with the FinCo. Once a decision is made to implement the project, those residents that sign up for the NZN will contract with the FinCo and pay for the service of comfort within their building(s) and delivery of community assets to their neighbourhood. They would make regular payments in return for this service. They are therefore effectively customers of the FinCo.
Contractors	**Provider**: Contractors will be contracted by the FinCo and will provide services both in terms of implementation and maintenance. These contracts will be overseen by the OpCo. These contracts will be performance-based and payments will be made by the FinCo in accordance with performance, as advised by the OpCo. The FinCo is not the beneficiary of these services.

A.3.4.3.2 Internal structure

The FinCo is envisaged as a simple organisation with relatively low numbers of staff delivering the functions already identified.

A diagrammatic representation of this structure and the critical governance components is shown in Figure 37. The key components of the FinCo are shown in red. How the functions map onto the project stages is shown by the numbers in the teal circles. The fourth stage – legacy – is not included as this is not yet determined. All of the functions identified can be provided by a central organisation and do not need to be focused on specific regions or areas of the country. This region/area focus will be delivered by the OpCo. Instead, the FinCo's primary relationships will be at the national level, and the structure reflects this.

Figure 37: FinCo structure



A.3.4.3.3 Governance arrangements

As shown in Figure 37, there are a number of components to the governance structure for the FinCo. These are in particular:

- A board appointed by the owner (proposed as hmg).
- A terms of reference for the board that guides decision-making.
- A ceo and cfo appointed by the board that lead the executive[73].
- A mandate approved by the board that governs the operational envelope of the executive.

The board must be designed to ensure that the FinCo is directed appropriately and reflects the insight of key stakeholders and perspectives. This is the justification for the board dynamic. The detail of participants in the board is shown in Figure 38.

Figure 38: FinCo board

FinCo Board	
CHAIR	• Independent chair
EXEC ROLES	• CEO • CFO *also on OpCo board
FULL BOARD MEMBER	HMG
NON EXECUTIVE DIRECTORS	• Strategic Finance rxpert • Environmental benefits expert • Social benefit expert

The board is responsible for:

- Holding the executive to account against targets.
- Setting and amending the executive's mandate.
- Appointing the ceo and cfo of the executive.
- Agreeing workplans for future years.
- Reviewing programme successes and failures.

The board's chairperson is recommended to be an independent chair, to enable them to focus on the effectiveness of the FinCo in delivering the programme and advocating for the FinCo externally where necessary.

To reflect HMG's ownership of the FinCo, and its primary role in directing the programme, there will be a full board member from HMG.

There will also be three non-executive directors (NEDs) who do not have voting rights:

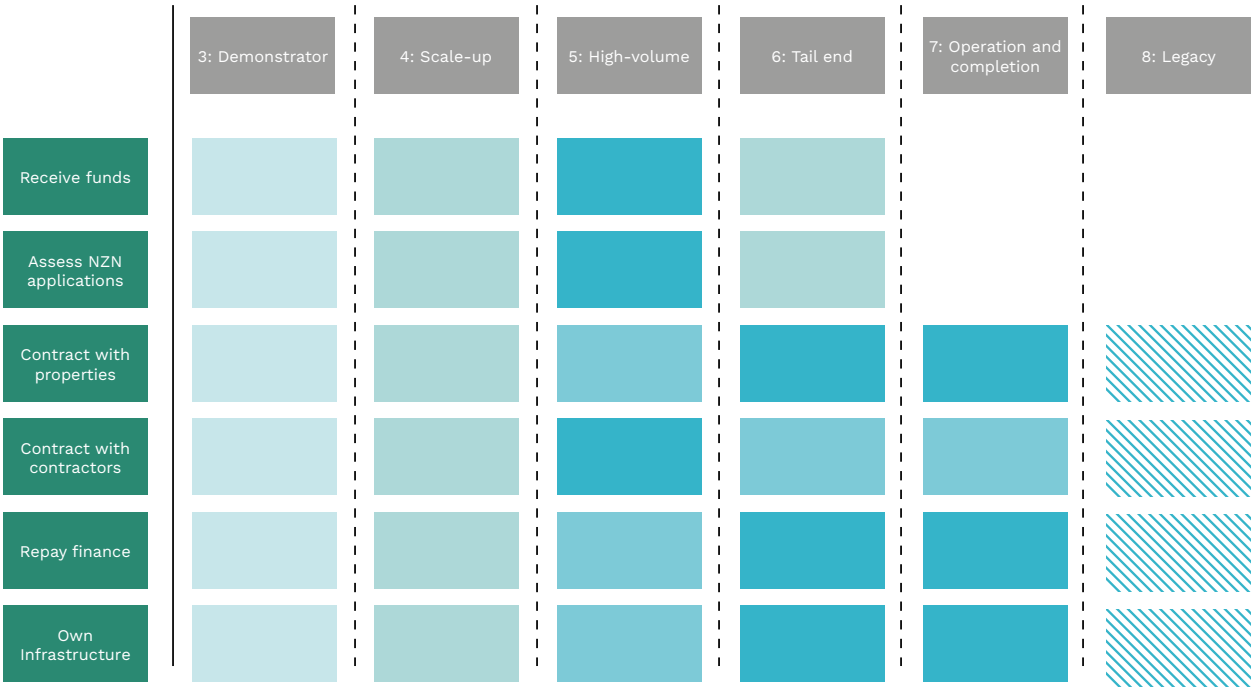
- **Strategic finance expert**. To ensure that the broader finance context is fully represented in board decision making, an NED with strategic finance expertise is required.
- **Environmental benefits expert**. Whilst the projects themselves will be designed by LAs and the OpCo, the FinCo sets the acceptance criteria for project proposals, and has the ultimate goal of reducing GHG emissions, as well as improving other environmental outcomes wherever possible. As a result, an environmental benefits expert is needed on the board.
- **Social value expert**. Alongside environmental benefits, social benefits are a core outcome of the programme, and so a social value expert is required for the board.

73 *Will be a Risk Manager/Officer*

A.3.4.3.4 Changes to FinCo through the programme phases

The FinCo delivers broadly the same functions through the majority of the programme phases. This is shown in Figure 39. The intensity of the blue colour indicates the amount of each function that the FinCo is delivering in each phase.

Figure 39: FinCo functions



The FinCo will therefore be delivering broadly the same functions through the majority of the programme, with the two functions associated with project commencement (receiving funds and assessing applications) concluding at the end of Phase 6.

The major changes are therefore in the changing capacity to deliver each of these functions. As can be seen from the diagram, this will generally increase in demand through the phases. Therefore, the structure of the FinCo will not need to change significantly through the programme except in the conclusion of an application assessment function and the ability to receive new funds (unless refinancing is determined to be a necessary or desirable approach)

A.3.4.4 Ownership

It is recommended that the FinCo be owned by HMG at the commencement of the programme. Government ownership of the FinCo would give high investor confidence in the structure that will receive and manage their investment, as there will be an implicit guarantee that the FinCo is government backed, giving confidence of a return of capital even in the instance that FinCo fails. This will reduce required return rates, which will reduce the total amount that HMG would need to put into the overall programme, reducing the overall cost to government.

Once the programme has commenced and the model proven, the FinCo could then be transferred to different ownership to remove it from HMG's balance sheet. It is possible that the FinCo could be a not-for-profit entity overseen by a set of trustees, of which HMG could be one. In this arrangement, the risk associated with the programme for investors would be higher as there would be no implicit guarantee; however this would be counterbalanced by the proof of concept already delivered in the early phases.

Key areas of testing for demonstrator programme:
Will the FinCo structure require further functions than those envisaged?
Is the FinCo structure attractive to investors (which is the justification for this structural approach)?
Are there risks created through the structure of the FinCo that cannot be realistically managed (for example, challenges in enforcing contracts)?
Is HMG ownership viable for the early phases of programme development?

New entity: Operational company (OpCo)

Initially a company wholly owned by the government.

The OpCo is conceived as an entity that provides a number of functions that will facilitate and enable the NZN Programme. It is designed to maximise the quality and quantity of NZN's that can be implemented across the UK, considering local diversity of neighbourhoods, local authorities, and private sector expertise. It will be contracted to the FinCo to deliver the outcomes. It will deliver a large number of roles and functions in the programme, and these are set out below.

Primary rRoles and functions:

- Design and refine monitoring and evaluation approach to both the programme and individual projects.
- Upskill LAs so that they are ready to make applications. This involves introducing the concept, providing background as to how and why it works, and the impact it can have, and the required in-house skills a LA would need to engage with the programme.
- Support LAs in-application development and submission. This could be both providing OpCo in-house expertise or identifying and contracting external expertise from the private sector as needed.
- Support LAs in local engagement design and delivery.
- Sigs up residents and businesses to contracts with FinCo.
- Run procurement processes for implementation Contractors and equipment.
- Oversee Contractors on behalf of FinCo.
- Assesse implementation completion and determines when equipment is commissioned.
- Run procurement for maintenance Contractors and equipment.
- Review whether equipment procurement can be better achieved centrally and advises FinCo on findings.
- Support NZN residents and businesses during implementation and operation of project.
- Oversee Contractors on behalf of FinCo.
- Monitor progress and performance of projects.
- Coordinate learning across projects.
- Maintain and re-letting Contractor and supplier frameworks.
- Manage delivery risks across the projects.

Relationships with other entities

The OpCo will interact directly with all major stakeholders in this programme. These relationships are set out in Table 38.

Table 38: OpCo relationships

OpCo relationships with other entities	
FinCo	**Client**: The FinCo is primarily a client to the OpCo, with the OpCo performing a number of representative and supportive roles. The FinCo is the ultimate arbiter regarding which projects are awarded funding and support beyond the start-up stage. The FinCo can also request and direct the OpCo to enforce contracts with Contractors.
Local Authority	**Collaborator**: The dominant relationship between LAs and the OpCo is one of collaboration. This includes collaboration on: • project design • application submission • neighbourhood engagement • Contractor procurement • monitoring progress and performance Beneficiary: LAs engaged in 'Stage 0' upskilling and preparation will be beneficiaries of the programme run by the OpCo.
Neighbourhood	**Collaborator**: The neighbourhoods will be collaborators with the OpCo and the LA in project design. **Client/customer**: with the OpCo acting on behalf of the FinCo and the contracts it holds with residents and businesses, the neighbourhoods will be customers of the OpCo in terms of requiring support during implementation of the project and in the subsequent operation of the project.
Contractors	**Provider**: Contractors will be providing services in their contracts with the FinCo, and the OpCo will oversee these and treat them as a provider.

Internal structure

The OpCo will need to be more complex than the FinCo as it will perform many more functions and have many more interfaces with other entities. There are many structures that could be developed, but there is a fundamental choice to be made between two options:

- A structure that reflects the stakeholders that are engaged with (for example, a unit that engages with the FinCo, a unit that engages with the Contractors etc.)
- A structure that reflects a set of projects clustered by region (for example a 'mid Wales' unit) that performs all the tasks across specific projects.

There are advantages and disadvantages to each approach. However, based on the principle of the primacy of the place-based approach, the second option is the appropriate one. A structure that provides a consistent interface and support to places, and understands their projects from start to finish, would provide a much more joined-up service. This structure could also have the benefit of, once there were enough projects in the programme, being distributed around the UK and being based in the areas that they were supporting, whilst still coordinated as part of the OpCo.

Alongside this region-/area-focused structure there also needs to be a central function that addresses two major functions of the OpCo:

- LA preparatory support in Stage 0 of a project to get an LA ready for the application process; and,
- shared learning and support functions

These will benefit from being national in their scope because of the relatively small number of LAs, and due to the benefit of learning across the whole country.

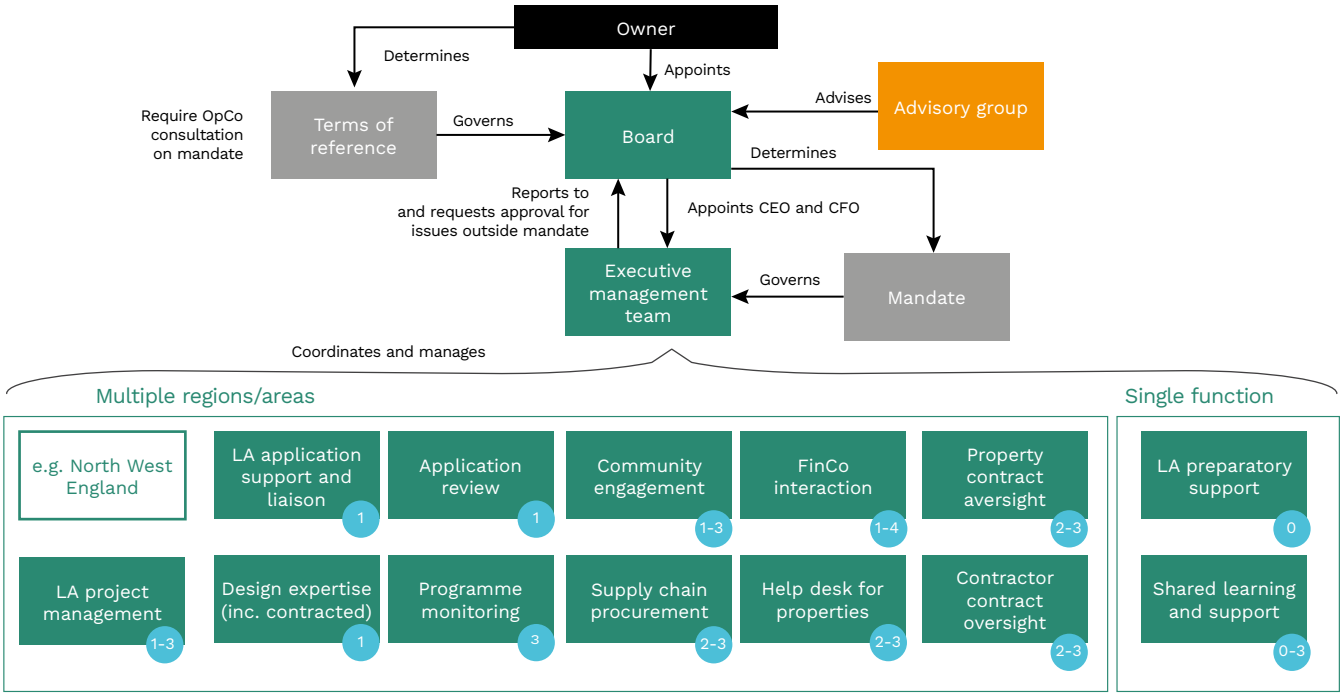
The proposed structure includes a board appointed by the owners (HMG) and an executive management team that is responsible for delivery and management of the key functions laid out. Below this will be both a centralised set of functions for those that make sense to be coordinated centrally, and a regional/area structure where functions are devolved to regions/areas to ensure they are closely aligned with local needs. All of these are departments of the OpCo legal entity and are governed by the executive management team.

A diagrammatic representation of this structure and the critical governance components is shown in Figure 40. The key components of the OpCo are shown in blue. How the functions map onto the project stages is shown by the numbers in the teal circles. The fourth stage – legacy – is not included as this is not yet determined.

The exact range of functions and internal structuring of these within the organisation will vary as the programme develops. The constant, however, needs to be the provision of a specific OpCo project manager for each LA project. This provides continuity for the LA, as well as ensuring the learning on the project is not lost as projects move through stages. The OpCo Project Manager is responsible for coordinating all of the LA's interactions with the OpCo and provision of support to the LA and associated neighbourhood. They could be managing multiple NZN projects concurrently.

Depending on the evolution of the programme, it may be the case that the OpCo PM needs to access functions from within their region/area structure and some functions that are still held nationally, depending on which functions are held regionally at any point in time. However, given the projected scale of the programme, the intent would be to have most of the functions held at regional or area level once the programme is live. This is to ensure that local expertise is brought into the programme, and also to ensure that the programme itself becomes rooted in local areas. The diagram shows this dynamic – where there are lots of functions rooted in local areas.

Figure 40: OpCo structure



Governance arrangements

As shown in Figure 40, there are a number of components to the governance structure for the OpCo. These are in particular:

- A board appointed by the owner.
- An advisory group that the board can consult.
- A terms of reference for the board that guides decision-making.
- A CEO and COO appointed by the board that lead the executive.
- A mandate approved by the board that governs the operational envelope of the executive.

The board must be designed to ensure that the OpCo is directed appropriately and reflects the insight of key stakeholders and perspectives. This is the justification for the board and advisory group dynamic. The detail of participants in the board and advisory group is shown in Figure 41.

Figure 41: OpCo board and bdvisory group

OpCo board	
CHAIR	• Independent chair
EXEC ROLES	• CEO • COO
NON-EXECUTIVE DIRECTORS	• Financial industry expert • La representative • Environmental benefit expert • Housing quality expert • FinCo CFO (or equivalent)

OpCo board advisory group	
Perspectives required	• National government • English • Welsh • Scottish • Northern Irish • Grassroots community • Industry

The board is responsible for:

- Holding the eExecutive to account against targets.
- Setting and amending the executive's mandate.
- Appointing the CEO and COO of the executive.
- Agreeing workplans for future years.
- Reviewing programme successes and failures.
- Consulting the advisory group on strategic decisions that will impact the programme significantly.

The board's chairperson is recommended to be an independent chair to enable them to focus on the effectiveness of the OpCo in delivering the programme and advocating for the OpCo externally where necessary.

Alongside key executive members, the non-executive directors (NED) include the CFO of the FinCo to ensure cross-collaboration between the boards. Alongside the FinCo CFO, there are four experts highlighted as vital to be on the board:

- **Financial industry expert**. Whilst the FinCo will coordinate and funnel the finances for the programme, it is vital that the OpCo is making decisions on project design and delivery that reflect the needs of the investors that are providing a proportion of the funding. As a result, a member of the financial industry is a necessary voice on the board of the OpCo to ensure alignment with this important stakeholder group.
- **Local authority representative**. The programme is heavily dependent on local authorities for design and community engagement of projects that are deliverable. Local authorities are the critical link that holds the programme together, and a key objective of the OpCo is to support this dynamic and act as an enabler for LAs. An LA voice on the board is therefore necessary to ensure that the OpCo remains focused on how best to deliver this support and enablement to the LA community.
- **Environmental benefit expert**. The programme has, as one of its core aims, the drastic reduction of GHG emissions. Alongside this central aim, there is also the intention to improve other environmental outcomes such as biodiversity and habitat where this is possible. Therefore, there needs to be an expert in environmental outcomes on the board who will ensure that the OpCo is oriented towards these outcomes and that the programme meets these intended aims.
- **Housing quality expert**. Alongside environmental benefits, the programme also intends to impact on a number of social issues such as fuel poverty, healthy lifestyles, access to green space, and many others. Perhaps the most critical of these is the improvement of the UK's housing stock to be healthier homes for residents, leading to reduced living costs and better health outcomes. As a result of this, it is necessary to have a housing quality expert on the board to ensure this issue is a core focus of the OpCo and that these outcomes are part of strategy and decision making.

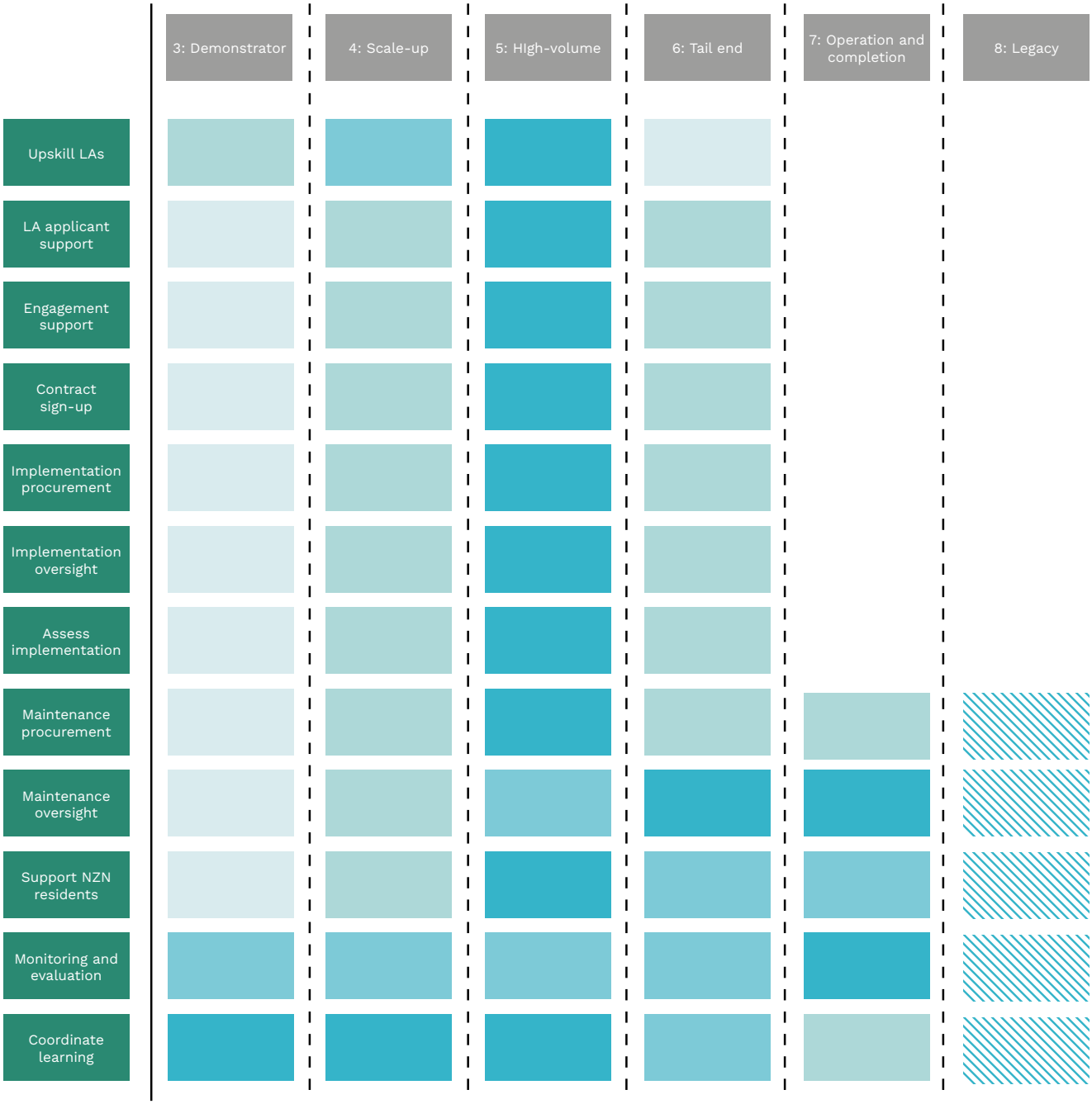
Other perspectives would of course be beneficial, and these are either already included in the advisory group or could be added to that group as necessary. The above four NEDs are recommended due to the fundamental focus of the programme.

Structure and role changes through the programme phases

The structure and governance outlined above is presented as static, but the OpCo will need to evolve as the programme shifts through multiple phases. Some aspects are unlikely to change; however, the functions the OpCo delivers will need to change over time, both in scale and in type. This will be aligned with structural changes that will reflect these different function needs.

Figure 42 demonstrates how the key functions of the OpCo change through the phases of the programme. Phase 2 is this OBC, and so it starts at Phase 3. The intensity of the purple colour indicates the amount of each function that the OpCo is delivering in each phase.

Figure 42: OpCo f unctions



Like the FinCo, there is a particular peak of activity in Phase 5, but unlike the FinCo, many of the functions are terminated following conclusion of the roll out. Nonetheless, significant responsibilities remain to the NZN residents and in ensuring maintenance and monitoring of the programme.

The proposed structure is one where there would be units that would address regions or areas with a service that took a local authority from the very beginning of an application through to operating a working NZN. This structure would need to be able to expand with the NZN programme and support increasing NZNs. After the roll out completes, this structure would still be appropriate as the services it would provide would still need to be local in nature, but the amount of work it would need to do would be significantly reduced. An example of how this might look is shown in Figure 43.

Figure 43: Evolution of OpCo structure

In all phases the structure presents a set of units that comprise the bulk of the OpCo. They are not separate entities, but do operate largely independently with central coordination. There would also be a central set of functions to enable the running of the OpCo and to provide coordination. The exact scale of the units would need to be determined, but the critical factor would be that each unit would need to be able to ensure a place-based understanding was supporting each LA in their area and each NZN project. In Phase 7, as the roll-out has completed, the amount of work to be delivered by the OpCo would reduce. This could result in a shift from areas to regions once again, but it could also be valid to retain the areas but with slimmed down operations. This is a question that would need to be answered later on in the programme, but one which should ensure that the principle of place-based primacy is reflected.

Ownership

Unlike the FinCo, there are not financial dynamics that would suggest a particular owner of the OpCo. The OpCo is intended to be a trusted partner of local authorities, as well as an agent for the FinCo. There are three possible choices for ownership:

- **Owned by HMG**, HMG ownership would provide OpCo with the same ownership as FinCo, presenting a simple dynamic between the organisations. However, this is not necessary as FinCo will be contracting OpCo, and these contracts will ensure that OpCo delivers to FinCo's requirements. Ownership by HMG could also impact the extent to which OpCo is seen as a collaborator by LAs. This is therefore not a preferred option.
- **Owned by entity with significant LA representation (e.g. 3CI)**: Ownership by an entity with LA representation would give much greater confidence to LAs that the OpCo was a trusted support and advisor, whilst its contractual arrangement with FinCo would ensure it remained bound to delivering value for money across the programme as a whole. An entity such as 3CI would provide this dynamic in a single owner. HMG's interest in the overall programme would be represented by FinCo, which would be owned by HMG. This is the preferred option.
- **Independent non-profit with trustees**. An independent OpCo would also provide a sense of independent support; however this would require reasonable reserves of funds in order to protect the OpCo from failure in the early stages of development when testing is occurring. This ownership approach is therefore recommended as one which could be considered in the longer term, but is not appropriate at the start of the programme. This is not a preferred option.

It is therefore recommended that the OpCo be owned by 3CI or an equivalent entity that includes LA representation in its governance. In time, perhaps at the point that the FinCo is turned into a not-for-profit entity, the ownership of the OpCo could be reviewed and possibly transferred to become an independent non-profit having proved the concept and the reliability of the delivery structure.

Key Areas of Testing for Demonstrator Programme:
Will the OpCo structure require further functions than those envisaged?
Does the OpCo structure provide appropriate support to LAs in project design and delivery?
Are there risks created through the structure of the OpCo that cannot be realistically managed (for example regional divergence that jeopardises the model)?
How much of the design support function should be in house versus contracted?

Existing entities: Local authorities (LAs)

Existing public sector bodies.

As existing entities, LAs do not need to be established, but they will require skills and capacities to be able to deliver on their responsibilities within each project, namely:

- Lead on local engagement (with support from the OpCo).
- Lead on design work (with support from the OpCo).
- Develop procurement specification (with support from the OpCo).
- Sit on the procurement panel.
- Sit on the implementation steering group alongside OpCo.

Given that each LA will be able to draw on OpCo support to differing degrees, based on local preferences and capacities, the exact capabilities cannot be specified, but a broad set can be outlined, with those that can be located outside LAs identified clearly.

Local authorities will be the design leads in most instances, as well as the key stakeholder engagement lead. They will be primarily responsible for identifying areas for applications (though it is proposed that once the programme is established, local residents could advocate for an NZN). Finally, they will be a major player in procurement assessment and in sitting on the implementation steering group to ensure that the design is delivered as planned. All of this activity requires significant resource, and this is provided for through the technical assistance funding from the FinCo to ensure that LA capacity can meet these demands.

Direction of the programme

The critical element of direction for the programme is determining the scale at which it will operate from year to year. The scale of ambition will need to be matched by:

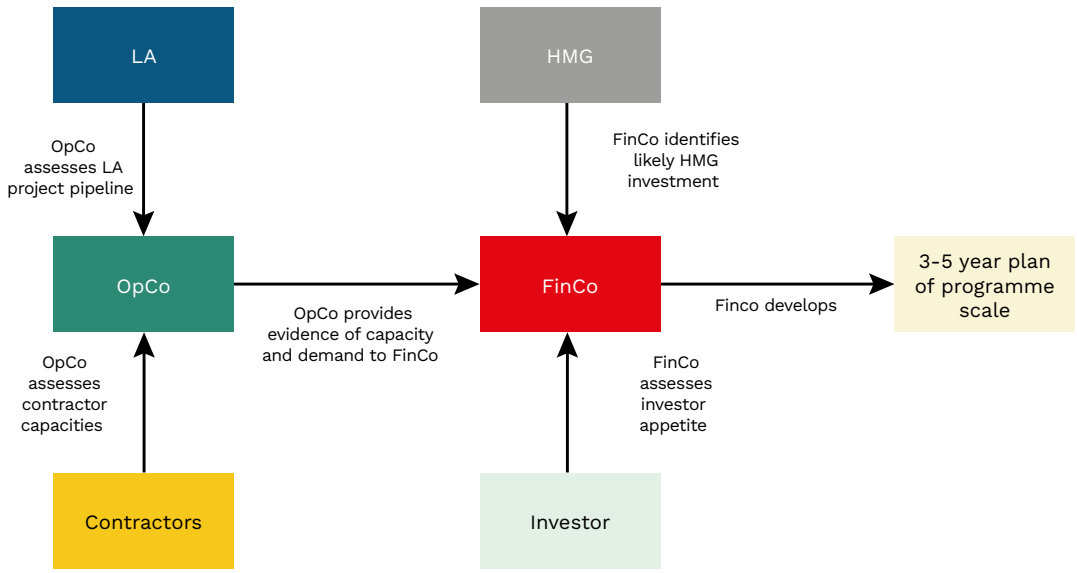
- The OpCo's support capacity.
- Funding supply from HMG and investors.
- The number of projects LAs can propose.
- The capacity of Contractors.

Any one of these factors can limit the scale of deployment. Therefore, effective planning for scale is vital to ensure:

- The OpCo is scaled appropriately to support the processes, without wasting resources on unused capacity.
- The correct amount of money is taken from investors so that returns can be provided and there is not a sense that the programme is 'falling short' in delivering projects among investors.
- That LAs do not design in detail, projects that will not be able to receive funding for a long time.

There therefore needs to be a clear process of assessing the appropriate scale of the programme and using this to plan. This should occur as part of a programme business plan. This setting of scale ambition needs to occur over a horizon of between three and five years to provide sufficient visibility for planning to the entities involved (FinCo, OpCo, LAs and Contractors). It is recommended that this process is owned by the FinCo as the entity that ultimately determines what can be spent and has the best view of the potential funding for the programme. The information flows for this process of scale assessment are shown in Figure 44.

Figure 44: Planning for programme scale



This planning involves both the OpCo and the FinCo. This is because each entity has closer relationships with different entities; however, the ultimate planning decision to be made is by the FinCo. As already identified, the planning should be for a three-to-five-year horizon, but the plan should be reassessed each year, to enable a rolling visibility of future scale for planning. This will also enable changes to be made to reflect changes in broader factors that may constrain or expand the programme such as macroeconomic dynamics.

This allocation of business planning to the FinCo means that the FinCo is ultimately responsible for the direction of the programme. The OpCo is a partner in delivering the programme, but the FinCo takes the ultimate decision on scale.

The business planning process should also extend to:

- technologies that can form part of an NZN; and
- future ownership models

The detail of the business planning process is provided in the business planning section of this Management Case.

A.3.4.4.1 Programme scale

The scale of the programme is to be determined according with the regular business planning undertaken by the FinCo. However, this planning may turn out to be erroneous. The component of the plan that could be most radically changed at short notice would be government funding during a period of policy, budget, or government change. Should government seek to reduce the scale of investment it is planning, the FinCo can:

- Reduce the scale of the programme accordingly.
- Reduce the proportion of funding provided by government by reducing the return available to private investors (if the market demand is sufficient for this).
- Increase the proportion of outcome-seeking funding from private sources to balance the loss of government sources.

Therefore, whilst the government has a significant level of control over the programme scale in terms of funding, the FinCo has the ability to set the scale of ambition semi-independently if it is able to draw on other sources of funding or change the dynamics with existing sources. This would enable the programme to remain flexible.

A.3.4.5 Programme reporting and governance

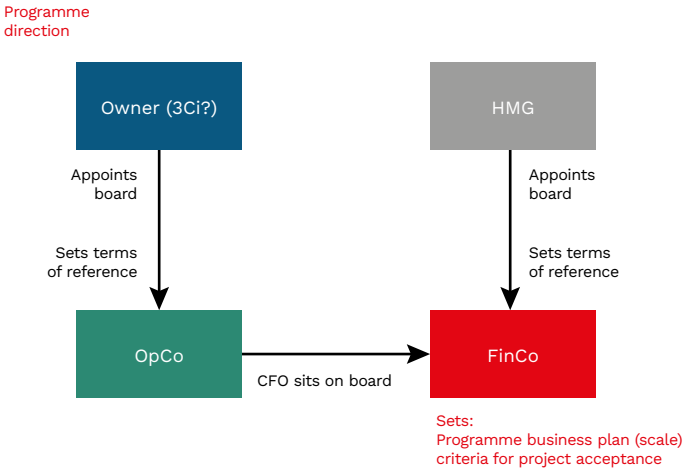
This section describes the overall reporting and governance for the programme. Reporting and governance within the two new entities created for the programme are discussed in the sections dealing with their constitution and operation.

The governance of the programme can be split into two components:

- oversight and direction of the organisations that will deliver the programme; and
- fundamental design of the programme (including scale of ambition and criteria for project acceptance)

The dynamic of these arrangements is shown in Figure 45.

Figure 45: Programme governance



This diagram shows the relatively simple arrangement. HMG appoints the board of the FinCo. The FinCo in turn is the entity that develops and updates two critical documents:

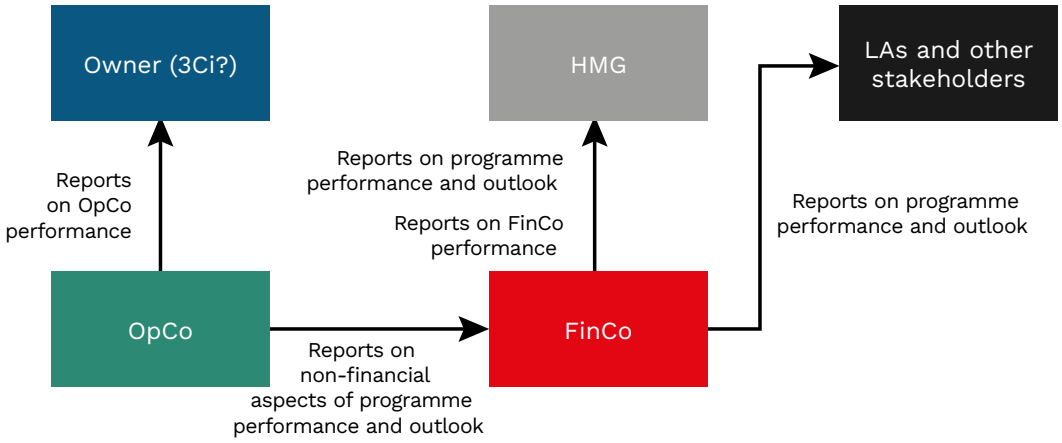
- **The programme business plan**. This plan sets out the 3-5 year ambitions of the programme based on investor, LA, Contractor, and Government capacities and plans. It is discussed in greater detail in the business plan section. The programme business plan determines the scale at which the entities plan to operate, amongst other factors.
- **Criteria for project acceptance**. The tool that will determine the standard of projects and their outcomes will be the criteria by which acceptance of projects for funding are made. These criteria will be set out in advance, but the FinCo is the custodian of these criteria and can update them (though the OpCo is required to be consulted on this).

The OpCo's board is appointed by its owner (potentially 3Ci), and includes the FinCo CFO as a NED. The OpCo is contracted by the FinCo to deliver in line with the business plan and to support applications to the point that they meet the criteria.

This governance structure is simple and does not include other entities, most notably local authorities. Local authorities will be present on the OpCo board, and are proposed to have a stake in the OpCo owner. Through these dynamics LAs should have a significant stake in the governance of the programme.

Reporting largely follows these governance lines, as shown in Figure 46, however, there is also reporting by the FinCo to other stakeholders, in particular local authorities and the owner of OpCo. This should include public reporting, so that there is a broader awareness of programme performance and impact.

Figure 46: Programme Reporting



key reporting contents

The content of each aspect of reporting is set out below in Table 39. The reporting programme for each of these is anticipated to be annual, but would be augmented by an evaluation of the whole programme on a periodic basis, usually every four to five years. This would be procured by the OpCo and paid for by the FinCo, with reporting of findings shared by the FinCo to stakeholders in the same way as performance and outlook reports are provided.

Table 39: Reporting content

Reporting component	Content
OpCo report on programme performance and outlook	**The performance component of this report would focus on:** The performance of the programme in delivering projects (timescales, quantity, regional distribution, socio-economic distribution etc.) The impact of the project portfolio (GHG impacts, other environmental impacts, socio-economic impacts, health impacts etc.) Proportion of residents signing up to NZNs in first, second, and subsequent rounds The relative uptake of optional components of the portfolio of interventions **The outlook component of this report would focus on**: LA readiness for applications and their distribution Pipeline of future projects and changes over time Capacity of Contractors by region or area and changes over time
FinCo report on programme performance and outlook	**This report would combine the above OpCo report on performance with**: Cost of programme compared to projections Cost of projects relative to benefits and variance between these, including correlation with factors such as region, socio-economic groupings, commencement dates, etc. Cost of projects relative to projected costs with variance and cost assessed relative to other factors Cost efficiency of projects relative to their scale **This report would combine the above OpCo report on outlook with**: Investor interest for programme Potential rates of return to be required or delivered in future projects and impact of this on the programme Outlook for outcome investment as a proportion of project costs

Reporting c omponent	Content
OpCo report on OpCo performance	**This report would examine:** Number of projects supported relative to planned numbers Regional and socio-economic variation in projects supported Projects supported longitudinal trends (over time) £ spent per project supported, variance between projects and trends over time Regional variation in £ spent in support of projects Proportion of £ spent on external experts compared to internal experts Time between LA registration of interest and award of funding to an application (a measure of OpCo's impact)
FinCo report on FinCo performance	**This report would examine the above issues taken from the OpCo report along with:** Proportion of £ invested by investor type (government, outcome-seeking, return-seeking etc.) Cost of FinCo operation as proportion of funding delivered to projects Proportion of approved projects that have to be redesigned Time between receipt of application and approval/request for reworking Total non-government investments made

Key areas of testing for demonstrator programme:
Does the proposed governance structure enable a healthy balance of oversight and independence?
What additional KPIs should be included in the reporting structure?
Is the reporting content adequate and appropriate to enable effective governance?

Role of business plan

The major business planning document will be the three-to-five-year plan developed by the FinCo each year to guide planning of the programme. The core components of this document will be:

- **Capacity planning**. Drawing on information from all key stakeholders, the business plan will project the activity to be delivered by the programme over a three to five year horizon to enable capacity planning across the programme, both in terms of delivery capacity and in terms of the scale of funding sought from investors. The capacity planning component will seek to maximise the NZNs delivered whilst recognising realistic constraints. This component of the business plan will determine:
  - The number of applications the OpCo will allow in each round.
  - The scale of the funding sought from private entities by the FinCo.
  - The scale of operations of the OpCo, which will impact on the regions/areas each unit will focus on.
- **Finance blend**. Alongside capacity planning would be an assessment of the future finance blend between government funding, private outcome investment, and private return-seeking investment. This blend will be vital in determining the potential limitations on the programme, though access to capital and projections of this balance will be necessary to enable planning. The decisions over this blend may alter the rate of return offered to investors, which then impacts the FinCo's offering to investors and the periods over which investments are sought.
- **NZN components**. Over the course of the programme there will be technical advances and potentially new sources of revenue associated with these. As each arises, these will be reviewed for applicability to the programme and a decision made as to whether they should be included in either the mandatory or optional components of the programme. It may be that these replace existing approaches. The business plan must set out which technologies will be included in future NZNs to guide inclusion and/or exclusion of new technologies.
- **Focus for LA preparation**. Many LAs will need to go through a preparation process to enable them to be ready to apply to the programme. There will be an OpCo administered programme to prepare LAs, but it will not be possible to prepare all LAs immediately. Therefore, in the early stages of the programme, there may need to be a prioritisation of LAs into this process, and the justification for prioritisation should be set out in the business plan whilst this is an issue. This is likely to include prioritisation based on deprivation, amongst other criteria.

- **Focus for procurement**. There are decisions to be made around the emphasis of procurement. Particular decisions could include whether to procure equipment centrally or allow Contractors to procure themselves, and to what extent the procurement process should support small local entities to be able to apply for implementation and maintenance contracts. These are unlikely to change significantly, but principals should be laid out in the business plan.

The business plan will be updated annually and used to guide the activity of the OpCo in delivering its contract for the FinCo, as well as the FinCo's activities. It will be developed by the FinCo's executive and approved by the board (which includes an OpCo executive as a NED).

Acceptance criteria

A specific aspect that is not necessarily part of the business plan but is a vital component of the programme are the acceptance criteria. These should also be reviewed and updated alongside the annual business planning cycle and are therefore included here as they are ultimately a vital tool in directing the programme. They should be published so that all entities involved can clearly see the requirements for funding and to ensure transparency in the programme.

The criteria will cover every aspect of acceptance for projects. If they are met, then projects should be awarded, and so changes to these criteria can drive the direction of the programme overall. Given that it will take months for a project to be designed, it will be very important that the acceptance criteria are largely stable; however, there may be the need to change or enhance them in order to improve outcomes, for example following learnings from the first group of implemented projects. Therefore, changes will need to be flagged significantly in advance of their enforcement, so that there is clarity for project developers.

The criteria must cover as a minimum the following factors:

- criteria for neighbourhood selection
- criteria for scale of neighbourhood
- criteria for the content of the project changes
- minimum requirements for stakeholder engagement
- minimum technical design standards
- specified detail for technical design
- minimum proportion of signed-up residents
- minimum thresholds for value for money
- clear delineation of implementation responsibilities between LA and OpCo
- minimum budgeting requirements.
- Fundamental checks (grid capacity etc.).

This list will need to be extended and refined in the next phase during the demonstrator design.

Key areas of testing for demonstrator programme:
Are the contents of the business plan adequate for directing the programme?
What information needs to be collected to maximise the quality of the plan?
What should the detailed acceptance criteria be?

A.3.4.6 Project Structure and Governance

Each project that forms part of the programme will need to be designed, implemented, operated and concluded. This section describes the entities involved, their responsibilities, and governance of the projects.

Project governance

Each project will be unique as there will be variables associated with the neighbourhood itself, but also with the local authority responsible and the Contractors available to deliver the work. The structure for running and governing a project must reflect this diversity.

In addition, each project goes through multiple stages. For governance there are four stages where there are differing relationships and therefore governance of the project:

- Stage 1: Project development
- Stage 2.1: Procurement
- Stage 2: Implementation
- Stage 3: Operation

The following sections explain the governance of the project through these stages.

The principles that have been used to design the governance structures are that:

- As far as possible, FinCo should be the contracting entity.
- Where FinCo has a significant stake in the output of work, OpCo should be contracted to oversee and support delivery. For example, when a Contractor is delivering key infrastructure.

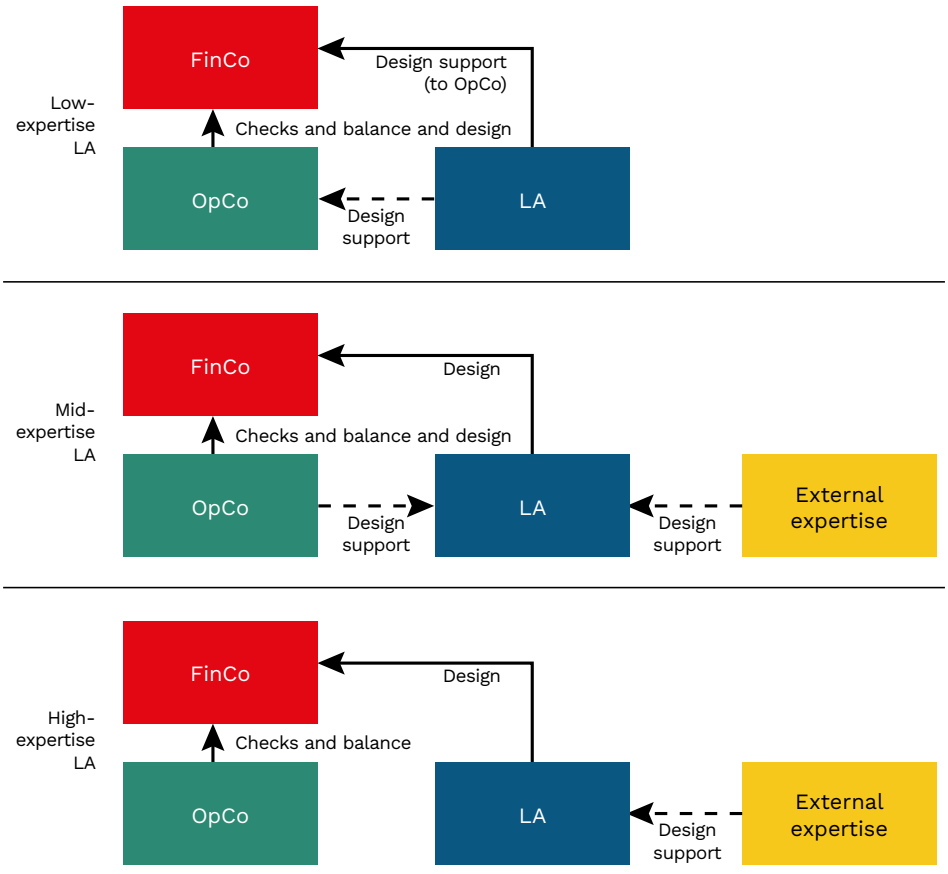
Governance of project development (Stage 1)

There are multiple ways by which a project can be governed in Stage 1, and these relate to the different capacities of each LA that would engage with the programme. Three examples are provided here to illustrate this:

- **Low-expertise LA**: This LA has limited capacity and in-house skill to develop an NZN design. In this scenario the OpCo is contracted by the FinCo to deliver the design, and consults with the LA. The LA is contracted by the FinCo to provide design support to the OpCo in this process. The LA is still critical to design, but is not primarily responsible.
- **Mid-expertise LA**: This LA has some capacity to develop a design, but insufficient breadth of skills to drive the majority of it through. It wishes to lead the design, however. In this dynamic, the FinCo contracts the LA to deliver the design. The LA can then contract external expertise to support it. The FinCo also contracts the OpCo to provide oversight, checks and balances to the process, as well as support to the LA.
- **High-expertise LA**: This LA has capacity in-house to deliver the vast majority of a design. It may still seek some small components of external support, but this is small in scope. In this case, the FinCo contracts the LA to deliver the design. The FinCo contracts with the OpCo to provide oversight and check progress with minimal support to the LA.

All of these scenarios are shown in Figure 47. In this figure, solid lines are contractual relationships, demonstrating the goods/services being procured through the contract. The flow of money runs opposite to the direction of the arrow. Dashed lines indicate a non-contractual support.

Figure 47: Governance of project development

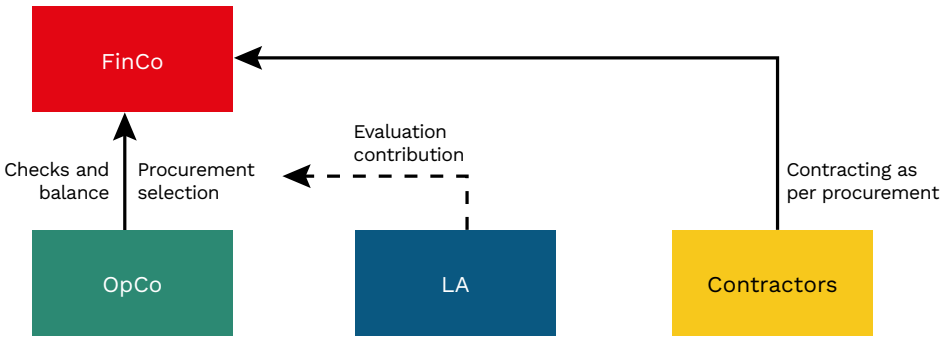


In all cases, the FinCo is the client and will ultimately receive the design and determine whether it should be progressed. At this stage, the design can be managed by the lead designer as a project, with sub-Contractors from other entities as need be. There is no need for more detailed governance.

Governance of procurement (Stage 2.1)

If a project is approved then the next stage includes two critical components: procurement and delivery. These are split out to demonstrate the details of each, though in reality procurement is a subset of the delivery stage as a whole. Here we address procurement – it is examined before implementation as it is the first part of implementation. The relationship is demonstrated in Figure 48.

Figure 48: Governance of procurement



For procurement, FinCo contracts OpCo to deliver the procurement process and select Contractors on its behalf which it then contracts with. The LA has no formal role in this, but is expected to sit on the evaluation panel for procurement. It should be noted, however, that the LA could potentially put an application in to be a Contractor for part of the delivery work. In this instance the LA would have to recuse itself from the evaluation panel.

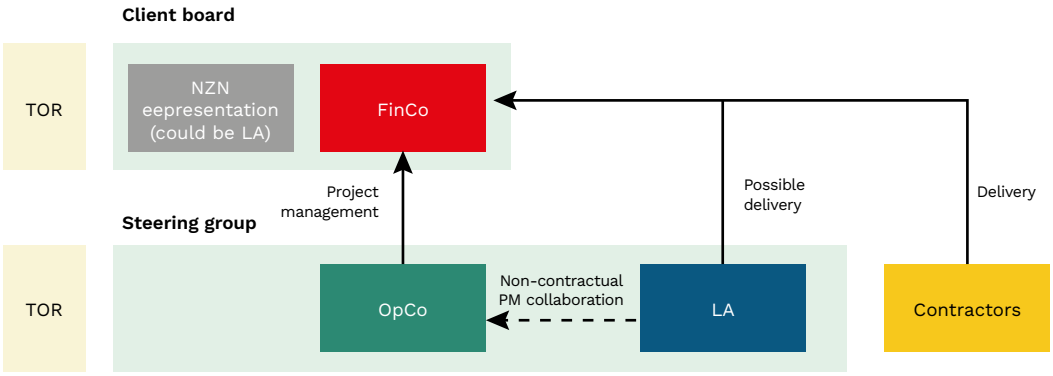
The method of procurement (framework etc.) would be specified by the FinCo, unless it chooses to devolve this decision to the OpCo.

Alongside this, the OpCo will periodically review whether equipment can be best procured centrally at scale. If this is identified as beneficial then it will advise FinCo of the potential to do this and FinCo can instruct OpCo to deliver this centralised procurement if the evidence is compelling. In this instance, there may then be centrally held equipment that can be procured internally from the programme.

Governance of implementation (Stage 2)

At the point of implementation there will become a need for a more structured project governance that reflects the various interests in implementation. The structure for this is shown in Figure 49.

Figure 49: Governance of implementation



The key contractual relationships are once again relatively simple, with the FinCo as the contracting entity. It contracts the OpCo to manage delivery. It also contracts the Contractors for delivery (which could include the LA). The LA contributes to project management in collaboration with the OpCo, but the OpCo is ultimately responsible as it is the entity that ensures the investment of the FinCo is correctly implemented.

Alongside these contractual relationships is a governance structure that comprises a client board and a steering group. The client board is intended to represent the interests of the major parties who will be engaged in the NZN once implemented: the NZN itself and the FinCo. This client board is responsible for project oversight, in particular scrutinising changes and approving or rejecting them if they are brought forward by the steering group. The NZN representation may need to be from the LA depending on the nature of the community engagement in the project.

The steering group is effectively the project direction group that makes strategic decisions about implementation and raises any significant variations to the client board. It comprises members of the OpCo and the LA, and the OpCo project manager reports to this group. The steering group reviews project budgets and Contractor performance.

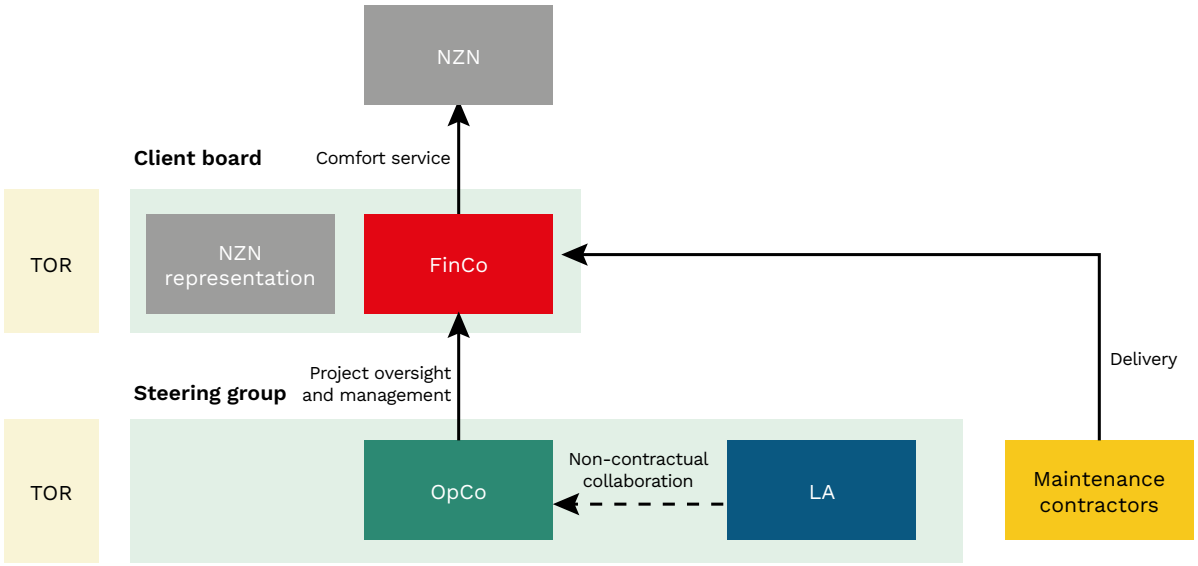
Both the client board and the steering group are governed by terms of reference (TOR in Figure 49), outlining key responsibilities and the remit of the body within the context of the contractual relationship. These terms of reference are set by the FinCo as the project funder. These terms will vary depending on whether the LA is a delivery Contractor itself, as they would then need to require separation between the steering group members and the section of the LA responsible for delivery.

Governance of operation (Stage 3)

The change from governance of implementation to governance of operation is relatively small. The major contractual changes are that there may be new maintenance Contractors to replace the delivery Contractors, and there will be a new contractual relationship between the NZN itself and the FinCo for the service provided.

The broad structures remain the same. During operation, there should be fewer issues to address and so these structures will need relatively little resource for input except at periods of change or crisis in the project (for example, failure of a major proportion of equipment). The structures are shown in Figure 50.

Figure 50: Governance of operation



There would also need to be appraisal of what the legacy governance would be, but this is beyond the scope of this OBC at present. It would need to be tested in the next programme phase.

Key areas of testing for demonstrator programme:
Do the structures proposed provide adequate governance of project design and implementation? Are they excessive and able to be made more efficient?
How much does the contribution of the LA vary between authorities, and does this variation have implications for these structures?

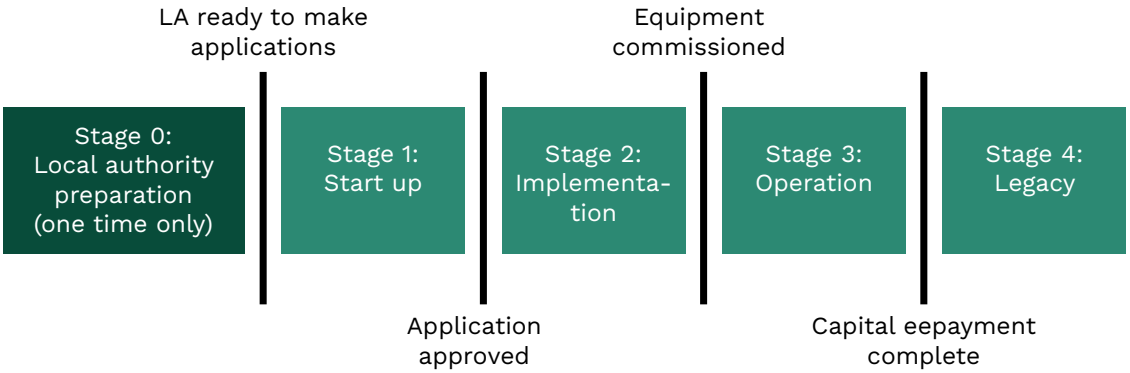
Project stages – flow of actions and responsibilities within the structure

This section provides a detailed description of each of the four stages every project goes through alongside the one-off Stage 0: LA preparation. It then breaks each stage down into specific actions by each major stakeholder, accompanied by a diagram showing the flow of these actions and their relationships.

There are four key stages to each project to be delivered, and a preparatory stage to be worked through with each LA. These are shown in Figure 51 and outlined as follows:

- **Stage 0: LA preparation**. For each LA that requires it, a process of upskilling to be prepared for making applications to the programme.
- **Stage 1: project start up**. From initial registration of interest to acceptance of an application for an NZN project.
- **Stage 2: Implementation**. The practical delivery of infrastructure and contracting for the NZN.
- **Stage 3: Operation**. The operation of the NZN.
- **Stage 4: Legacy**. The arrangements following completion of capital repayment.

Figure 51: Project stages and gateways



There will be different levels and types of activity and engagement by key entities during these different phases. Table 40 demonstrates this.

The actions and responsibilities for each project stage are detailed in the additional appendix at the end of this document.

Table 40: mMajor activities at each project stage

Entity	Stage 0: LA preparation	Stage 1: Start up	Stage 2: Implementation	Stage 3: Operation	Stage 4: Legacy
FinCo		• Technical assistance funding to LA applicants and OpCo for each project • Assess applications	• Technical assistance funding to LAs and OpCo for each project • Contract with properties • Contract with implementation Contractors	• Contract with maintenance Contractors • Repay finance • Collect comfort fees	• Potentially continue role
OpCo	• Potentially continue role • Deliver support programme to first cohort	• Support LA applications • Support neighbourhood engagement • Monitoring & evaluation design	• Contract sign-up • Organise procurement of Contractors • Implementation oversight • Implementation assessment • Support NZN residents • Coordinate learning	• Procurement of Contractors • Maintenance oversight • Support NZN residents • Monitoring and Evaluation • Coordinate learning	• Determine appropriate approach alongside other stakeholders
LAs	• First cohort engage with programme	• Register interest • Design NZN project and make application • Neighbourhood engagement	• Support NZN residents • Support oversight of implementation	• Support NZN residents • Support monitoring and evaluation	• Contribute to legacy decisions
Neighbourhoods /NZNs		• Contribute towards NZN design for the area • Register intent to contract into the NZN	• Contract with the NZN • Engage with implementation work	• Contract with FinCo and pay comfort charge • Identify and flag maintenance and replacement issues	• Contribute to legacy decisions
Contractors			• Respond to Procurement • Deliver implementation	• Respond to procurement • Deliver maintenance	

A.3.4.7 Stakeholder engagement and testing

Throughout the development of the OBC, ongoing stakeholder engagement was undertaken to ensure that the management design is fit for purpose and reflects on-the-ground realities. Stakeholder engagement was particularly focused on:

- local authorities
- investors
- key network and facilitatory entities (e.g. Ofgem)

Much of this engagement provided information for both the Management and Financial Cases.

For local authorities and investors, there were both informal conversations to test specific concepts and gather evidence, and formal workshops to road test ideas once they had been brought to draft stage.

These engagements enabled the design of the programme to be refined in a manner that reflected the experience of key entities in these sectors.

The Financial Case details the engagement with investors and other financial institutions, so the focus here is on local authorities. A range of engagements were held with the following authorities:

- Belfast City Council
- Birmingham City Council
- Bristol City Council*
- Cornwall County Council
- Essex County Council*
- Glasgow City Council
- Leeds City Council*
- London Borough of Enfield Council
- London Borough of Hackney Council
- London Borough of Hounslow Council
- London Borough of Kensington and Chelsea Council
- Oxfordshire County Council*
- Liverpool City Council
- Manchester City Council*
- Newcastle City Council
- •North Tyneside Combined Authority
- Sheffield City Council
- West Midlands Combined Authority*
- West Yorkshire Combined Authority

Those authorities denoted with a star (*) were authorities who were available for detailed workshops. These attempted to test the model from multiple perspectives at the same time and were attended by key personnel including roles such as the Deputy City Treasurers or Chief Financial Officers, Heads of Procurement and Commercial, Heads of Planning or Estates, Heads of Energy Services and Energy, and Low Carbon Leads or Managers.

Outcomes

The feedback from attendees during the workshops was extremely positive, with the outputs from the programme being fully aligned with the authorities' net zero or carbon targets. The attendees agreed with the theory behind the financial and operational model and expressed that they would be interested in following the progress of the programme further.

Common themes or those of particular interest arising from the workshops included:

- The strength of the model in addressing multiple policy areas systematically.
- Concern surrounding the reputational risk to local authorities.
- Interest in acting as a return-seeking investor;
- A sense that this was the missing piece needed to get financing into neighbourhood regeneration and net zero action.
- Interest in determining the real appetite of households for the programme, and plans for testing this.
- The resources and skillsets that might be required within the local authority; and
- Concern surrounding any dissatisfaction with the programme being directed towards the authority and its councillors, as opposed to the NZN vehicle.

A.3.5 Funding and e xpenditure

As with other sections, there are distinct programme and project funding elements that need to be addressed:

- Programme:
    - Funding and expenditure of the FinCo as an entity (not project funds). This would be entirely operational.
    - Funding and expenditure of the OpCo's core functions. This would be entirely operational.
    - Central fund-raising for the project investments.
- Project:
    - Technical assistance funding to the LA and the OpCo to design the project and oversee delivery.
    - Expenditure on the projects that comprise the core of the programme. This would be principally capital, with some operational expenditure on supporting the design and implementation process.

Each of these is dealt with separately in the following sections.

A.3.5.1 Programme

FinCo

The FinCo is intended to be a lean organisation with relatively few employees and limited infrastructure and so should not be costly to run. It can be funded by either:

- direct government funding; or
- a small proportion of the fees paid by residents

The choice is unlikely to impact the ultimate success or failure of the project as it will have minimal impact. As it is suggested that the OpCo is government funded, for simplicity it would be easier and neater for the FinCo to also be government funded, at least in the first instance until the model is proven, at which point funding from fee receipts could be considered.

The expenditure of the FinCo as an operation will be primarily on:

- salaries
- premises & equipment
- banking facilities

In each case, expenditure will need to be approved by the executive, with decisions made in alignment with the budget set by the board.

OpCo

The OpCo will be a much more substantive organisation than the FinCo and therefore require significantly more funding. In order to maximise the potential influx of private investment, it is proposed that it is funded by government. This will require a clear annual budget which will align with the projected volume of projects the OpCo will support LAs to develop and deliver. This budget would be prepared by the executive in consultation with the board and then submitted to HMG for approval. There would need to be a projected budget established during the demonstrator/FBC phase, in order to provide guidance on the level of expenditure anticipated within the context of ambition for the programme.

The expenditure of the OpCo would be primarily on:

- salaries
- procurement of additional expertise and skills to support LAs
- premises & equipment

In each case, expenditure will need to be approved by the executive, with decisions made in alignment with the budget set by the board.

A.3.5.2 Projects

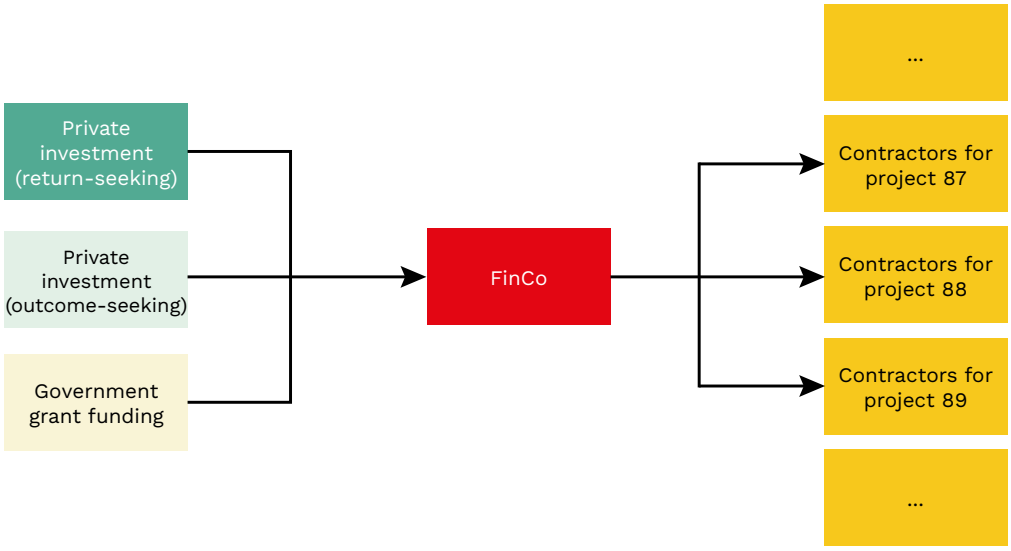
Technical assistance funding

In order to design each project, there will need to be funding to a combination of the LA and the OpCo to develop a high-quality detailed design. Similarly, there will need to be some funding for oversight of project implementation. This is classified as technical assistance funding and is awarded by the FinCo on a project-by-project basis. This funding is operational expenditure and contributes to headcount and expenditure of the LA and the OpCo.

Project implementation and operation funding

Delivery and operation of projects is achieved through the FinCo contracting Contractors to deliver work. This relationship is shown in Figure 52. This demonstrates that the FinCo aggregates funding from multiple sources and then distributes these to the Contractors to deliver each project that is approved as part of the programme. It should be noted that some of these Contractors might be LA units. The FinCo itself will hold funds in the period between receiving them and project payments being made.

Figure 52: Project funding flow



The exact dynamics of the funding mix are explored in much greater detail in the Financial Case.

The process for managing expenditure has been outlined in the previous sections where the responsibilities of the OpCo and FinCo are set out, and the programme flows detailed. However, a simple description of expenditure control is provided below in Table 41.

Table 41: Project expenditure control points

Stage	Activity	Expenditure Control
Stage 1	Detail design by OpCo amd LA	Detailed design includes costing. Benchmark costs are provided with excessive costs flagged and requiring either a redesign or a justification for higher costs (e.g. very poor quality housing stock).
	Review of application by FinCo	Reviews application including costings. Approval only provided if value for money test met. This is the key point at which the FinCo can determine what expenditure on the project is appropriate.
Stage 2	Procurement of Contractors and equipment by OpCo	If most economically advantageous tender exceeds estimates of costs by more than 5%, then procurement is re-run or redesign occurs if there is good reason for changes.
	Contractor delivery is monitored by OpCo for compliance with contract and design	Payments are only made following evidence of appropriate delivery. This includes snagging at completion of implementation work.
Stage 3	Procurement of Contractors and equipment by OpCo	If most economically advantageous tender exceeds estimates of costs by more than 5%, then procurement is re-run or redesign occurs if there is good reason for changed.
	Contractor delivery is monitored by OpCo for compliance with contract and design	Payments are only made following evidence of appropriate delivery. This includes snagging at completion of implementation work.

This demonstrates that most of the expenditure control is delivered by the OpCo following the project plan agreed by the FinCo. This means that the FinCo's scrutiny of the plan is the critical component of expenditure control. The FinCo will be able to monitor each budget for each project and if expenditure is in excess of the planned quantities, then this can be flagged with the OpCo for investigation. If the OpCo fails to deliver a reasonable justification for excessive expenditure, the FinCo needs to have access to the capacity to investigate expenditure itself.

Key areas of testing for demonstrator programme:
What should the future OpCo budget projections be?
What price variance from design price should be permitted in procurement?

A.3.6 Specialist advisors

Specialist advisors are required at various points in the programme, but most particularly in:

- **Setting up the structures of the programme**: These will be one-off involvements so that, once the programme and the entities associated are established, specialist advisors will only be needed if there are changes to the programme or updates required.
- **Designing the projects**: These will be recurring inputs as they will likely be required for multiple LA projects.

Each of these aspects will be addressed in turn.

A.3.6.1 Advisors needed in setting up the programme

Specialist advisors will be necessary to assist in setting up the programme on a one-off basis.

Table 42 Project expenditure control points

Specialist advisor	When?	How to procure?	Who to report to?
Legal advice to set up/ incorporate the OpCo and FinCo	At the inception of the programme	As there will be no legal entity to procure these advisors, individuals should be contracted by the funding entity.	For similar reasons, legal advisors will report to the funding entity or their representatives.
Legal advice to design property-linked contracts	Pre-demonstrator phase	Standard legal procurement based on relevant expertise	FinCo
Local authority and NZN expertise to deliver preparation programme for LAs and project handbook/ LA guide	Pre-demonstrator phase	The OpCo should commission this assistance based on understanding of current status of NZN progress, issues surrounding delivering NZNs and ability to train for demonstrator application process.	OpCo
Procurement expertise to deliver procurement/harness procurement frameworks	Pre-demonstrator phase	May make use of existing LA expertise and knowledge of frameworks	OpCo

A.3.6.2 Advisors needed for projects

During the four states of each project, the stage when special advisors will be required will be Stage 1, which includes project design, where diverse skills will be required. There may be specialist advisors required during Stage 4, but this will depend on the ultimate model for legacy and so is not discussed further here.

Specialist advice expertise will include (but not be limited to):

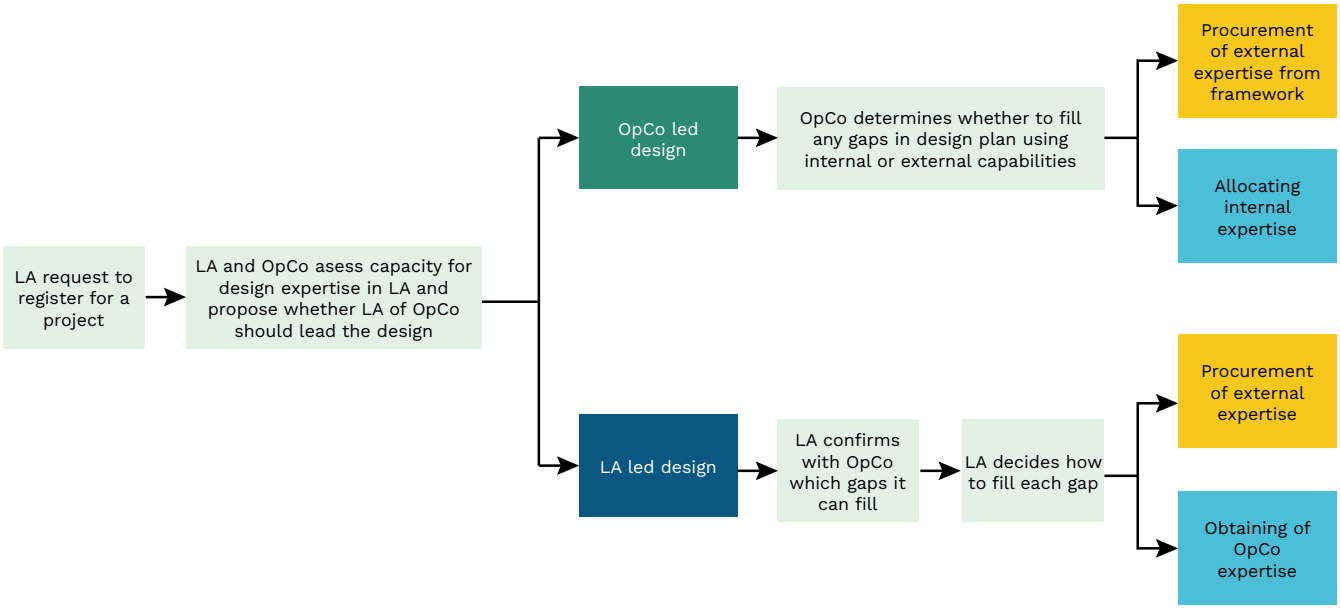
- community engagement
- legal advice
- technical design/evaluation
- environmental/social outcome accreditors + evaluation
- policy/political interaction expertise
- local planning expertise

They can be sourced from one of three locations:

- within the LA itself, if this capacity already exists
- within the OpCo and its teams that support project design
- external to either organisation

The commissioning of specialist advice will follow the process set out in Figure 53.

Figure 53: Commissioning specialist advice



This demonstrates that the exact nature of the specialist advice will vary from project to project. It will be influenced by factors such as the LA's own capabilities and the OpCo's capabilities and capacities, as well as which entity leads the design in each case. The exact set of skills that should be held within the OpCo and those that should be held by suppliers on a framework will need to be tested. The ultimate focus should be on efficiency and quality of design (as poor quality design will lead to huge inefficiencies elsewhere) and these criteria should be used to make this judgement. This should be tested in the demonstrator programme.

Once the OpCo knows what special advice is required, this will be commissioned from a framework of appropriate advisors. These will need to fall within the costs allocated to project design as part of the programme, but this should be achievable through the framework contracts.

The special advisors will feed into the design that will be led by the local authority. They will not be responsible for the overall design, but merely the design or provision of a specific component of the design.

The use of special advisors will vary from project to project as already highlighted. It is likely that as the programme progresses, use of special advisors may face pressures to both increase and decrease, and so it is hard to determine exactly how this will change over time:

- Decreasing use pressure: As the programme develops, more skills will be built up within LAs in particular, which may reduce the demand for some forms of special advice.
- Increasing use pressure: As the programme develops and designs become more standardised, there may be greater efficiency for roles that were once held in the OpCo to be provided by suppliers instead.

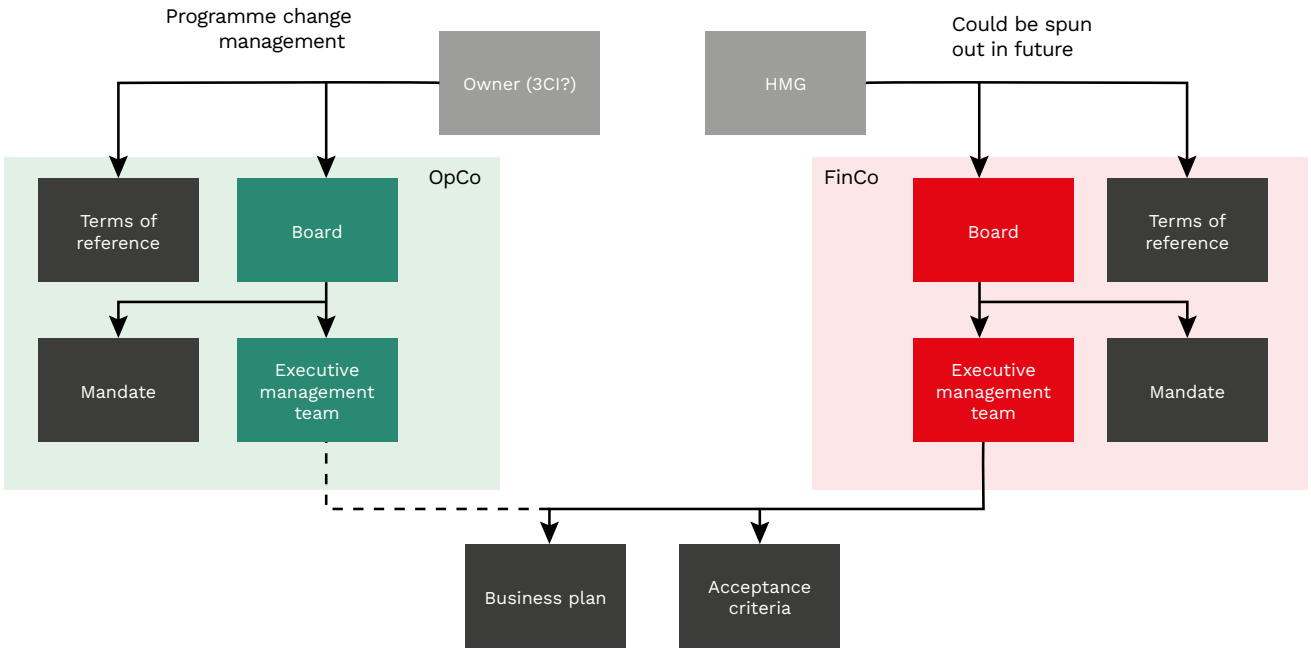
A.3.7 Change control

As with most components of the Management Case, it is necessary to consider change control at both the programme level and at individual project level.

A.3.7.1 Programme change control

Programme governance has already been described in the structure and governance sections. A summary of the key dynamics is shown in Figure 54.

Figure 54: Programme change control



The overarching programme is governed by the business plan and the acceptance criteria. These are owned and updated by the FinCo in consultation with the OpCo. Change to the programme can therefore come about at the following levels.

Table 43: Programme change control

Level	Examples of change	Enacted by
FinCo or OpCo board	Change board composition to change organisational strategic emphasis	Owner
FinCo or OpCo TOR	Change to TOR in order to change organisational strategic emphasis	Owner
FinCo or OpCo executive	Change to executive leaders in order to change: • Strategic direction • Effectiveness of executive	Respective board
FinCo or OpCo mandate	Change to mandate in order to change: • Bounds of operation of executive • Strategic emphasis of executive	Respective boards
Business plan	Change strategic direction in business plan to change: • Scale of programme • Emphasis on variables such as regions, socio-economics etc.	FinCo executive
Acceptance criteria	Change the project acceptance criteria for funding to change: • Content of project applications • Focus of project design • Quality of project design	FinCo executive

A.3.7.2 Project change control

Each project goes through multiple stages, and as already demonstrated, these stages have different governance arrangements. The key differentiation is between the project development stage and the implementation and operation stages:

- Stage 1: Project development. In this stage the project is being designed and so change control is relatively simple.
- Stage 2 Onwards. Once the project is approved, the client board and steering group form the basis of change control. Throughout these stages, the key document that will drive the project is the project design document as this details what is included in the NZN and the ways it will operate.

These stages are outlined below.

Change control in project development (Stage 1)

Change control at this stage is relatively simple as this stage is the design process of the project, and the project design document is being developed.

The one aspect of change that may be necessary is to change the contracted entity that is responsible for design. This entity will be either the OpCo or the LA. If the OpCo is contracted to deliver the design, then a change may occur if the LA wishes to take control. In this instance the LA can then approach the FinCo with a case to request that the contract for design with the OpCo be terminated and a new one instigated with the LA to complete the process. The LA would have to present evidence as to why this was beneficial, and the FinCo would have ultimate say on whether to make this change. The opinion of the OpCo would be sought. If the request was made with the support of the OpCo, it would be likely the FinCo would accede. If the change were made, the OpCo would remain contracted to deliver oversight.

If the LA was the contracted design entity, and it wished to transfer this to the OpCo, once again the LA could request this change of the FinCo. The OpCo would be expected to provide supporting evidence to demonstrate that this was agreed to be the correct change, and that there was capacity in OpCo to deliver this. FinCo would have the ultimate decision in this instance as well.

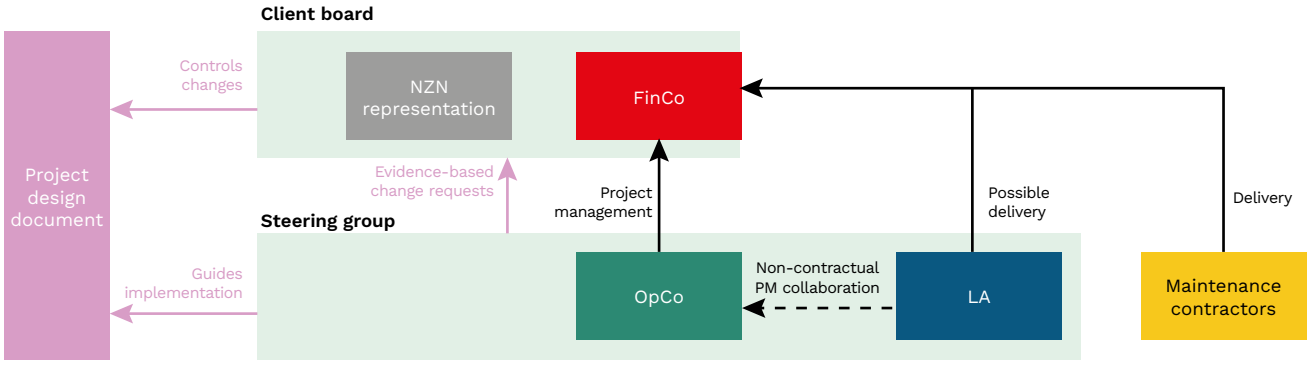
Change control in project implementation and operation (Stage 2 onwards)

Change control during these stages primarily relates to changing the specification for the NZN. This would mean a change to the project design document which would contain the specifications. There would be two categories of change that could occur:

- Changes within ranges specified in the design document. These could be changing numbers of buildings that would be included in the NZN, for example. These changes would not require sign-off beyond the project management, as they would be specified in the design document.
- Changes outside ranges specified in the design document. These could be the same as above, but outside ranges set, or a fundamental redesign such as the replacement of a community centre with extra green infrastructure. Changes such as these would need to be passed through change control.

Whilst the structure varies somewhat through these stages, it is broadly similar, and an example (from implementation) is show in Figure 55.

Figure 55: Governance of implementation



The pink arrows demonstrate the change control process. The project design document governs implementation and operation of the project, and is referenced by the steering group and delivery team. If a change is required that is outside the ranges prescribed in the document, then the steering group can request this of the client board. The client board can then review the evidence provided for a change and amend or reject the request accordingly. FinCo will have a majority representation on the client board and so can veto changes if necessary.

Change control in project governance (Stage 2 onwards)

The client board and the steering group are governed by respective terms of reference. These can be changed by the FinCo. If there is need for change to this structure, it would require the OpCo, the LA, or the FinCo itself to request a change with evidence to support the necessity of this change. The FinCo would have ultimate determination of whether this change would be made.

A.3.8 Contract management

There are multiple types of contract to be considered as part of the programme and individual projects. Some of these may run for multiple years across the programme (such as an OpCo contract with the FinCo, or a the FinCo's contract with a property) whilst others will be relatively brief and focused on a specific part of a project (e.g. the FinCo's contract with an LA for the design work). Each of these different contracts will need to be engaged, contracted, and managed in an appropriate manner.

A.3.8.1 Types of contract

The different types of contract envisaged in the programme are summarised in Table 44 which also outlines the approach to management of each contract. This demonstrates that both the OpCo and the FinCo will need to have internal contract management functions and the legal expertise to support this.

Table 44: Types of contract

Component of programme	Contract Purpose	Legal counterparties	Contract management
Programme management	Contracting OpCo to represent FinCo and provide support capacity in this regard	FinCo, OpCo	Contract set up by FinCo on establishment of OpCo. Reviewed and managed by FinCo and OpCo legal teams. FinCo reviews OpCo performance in line with contract and business plan.
	Contractors to support or improve OpCo or FinCo operations	FinCo or OpCo, Contractor	Any external advice or support required for programme operations will be identified by each entity separately. They can then be procured by OpCo and contracted to the relevant entity that requires the services.
Project design [Stage 1]	Contracting LA to design/support NZN project design	FinCo, LA	FinCo establishes contract on registration submission by LA meeting criteria and space existing in the funding round. FinCo OpCo reviews progress of LA work and reports back to FinCo, which manages the contract.
	Contracting OpCo to design/support NZN project design	FinCo, OpCo	FinCo establishes contract on registration submission by LA meeting criteria and space existing in the funding round. FinCo achieves this contract either in a separate contract or through a variation on the main contract held with OpCo. To be tested in demonstrator.
	Contracting design/ engagement expertise	OpCo or LA, Contractor	The lead designer may wish to contract additional expertise to deliver the design. The OpCo or LA will tender for these skills and then contract directly with the Contractor, managing the contract through their usual processes.
Project Implementation [stage 2]	Implementation Contractors	FinCo, Contractor	FinCo contracts with multiple Contractors for capital expenditure on advice of OpCo that runs procurement process according to design specification and procurement rules set out by FinCo. OpCo acts as agent for FinCo in overseeing contract with Contractors. Any contractual issues that cannot be resolved are escalated to FinCo legal team.
	Project management	FinCo, OpCo	OpCo will be contracted to manage the implementation stage on behalf of FinCo. FinCo achieves this contract either in a separate contract or through a variation on the main contract held with OpCo. To be tested in demonstrator.
	Project oversight	FinCo, LA	The LA will receive some revenue funding to provide oversight of implementation from a local perspective, and feed into the steering group that controls the project. FinCo will contract with LA, most likely through an extension to the design contract already in place.

Component of programme	Contract purpose	Legal counterparties	Contract management
Project operation [Stage 3]	Property-linked contract	Property owner (TBC dependent on contracting route), FinCo	The OpCo will be responsible for generating/procuring the contracts, FinCo will be legal counterparty once passed contract by OpCo and recommended to sign.
	Maintenance Contractors	FinCo, Contractor	FinCo contracts with multiple Contractors for maintenance and replacement work on the advice of OpCo that runs procurement process according to design specification and procurement rules set out by FinCo. OpCo acts as agent for FinCo in overseeing contract with Contractors. Any contractual issues that cannot be resolved are escalated to FinCo legal team.
	Project management	FinCo, OpCo	OpCo will be contracted to manage the operation stage on behalf of FinCo. FinCo achieves this contract either in a separate contract or through a variation on the main contract held with OpCo. To be tested in demonstrator.

The process of engagement, tendering, award, and management of most contracts associated with delivery of the NZN programme will all be managed through the NZN OpCo, with the NZN FinCo as the named contracting authority. The OpCo will be responsible for tracking performance of contracts and monitoring/mitigating risks. This is not the case for the contract between the FinCo and the OpCo.

Contract (and supplier) management shall ensure that the NZN projects are delivered efficiently and effectively, achieving value for money, avoidance of scope creep, and effective mitigation of risks and issues.

Contracting will be delivered at three levels by the NZN OpCo:

- **Programme operational procurement activity** – that is, procurement required to enable ongoing operation of the NZN programme structure.
- **Project specific procurement activity** – that is, procurement required to meet the needs of each NZN project.
- **Household contracts** – agreements established with households active within each NZN project.

Contract delivery shall be through two core functions of the NZN OpCo – the procurement function, and the commercial function.

- The procurement function shall be responsible for all supplier contracting activity (operational and project-specific).
- The commercial function shall be responsible for all household contracting activity.

A.3.8.2 Contract management approach – procurement

As outlined above, the procurement function of the OpCo will deal with all Contractors associated with delivery. The specific methods by which this can be achieved, and the role of the relevant functions in the OpCo are set out in Table 45.

Table 45 - Responsibilities of procurement function

	NZN OpCo central procurement team	NZN OpCo project-specific procurement support
NZN OpCo framework agreement	Run procurement activity and award of framework agreement. Define/set performance levels. Define/set supplier and framework management process and management information. Manage framework suppliers in line with framework management approach set out in the tender. Gather feedback and performance data from call off contracts. Manage any escalated performance issues.	Confirm suitability of framework agreement for requirement and run call off' contract. Manage contract delivery in line with agreed framework agreement and call off contract performance requirements. Manage contract level delivery/performance issues and escalate to central procurement team as required. Respond to requests for performance data/feedback as required by central procurement team.
NZN direct contract[74]	Run procurement activity and award of contract. Define/set performance levels. Define/set supplier management process and management information. Gather feedback and performance data. Manage any escalated performance issues.	Place request with central procurement team for goods/services/works to be ordered for project. Manage project related delivery/performance issues and escalate to central procurement team as required.
'Other' framework agreement[75]	Identify and promote suitable framework agreements for central and decentralised procurement team use. Gather feedback and performance data if requested. Manage any escalated performance issues, including dialogue/liaising with the framework agreement contracting body.	Confirm suitability of framework agreement for requirement and run call off contract. Manage contract delivery in line with agreed framework agreement and call off contract performance requirements. Manage contract level delivery/performance issues and escalate to framework agreement contracting body via the central procurement team as required. Respond to requests for performance data/feedback as required (e.g. from framework agreement contracting body).
LA contract	N/A	Project specific procurement team would establish any elements to be delivered by the LA and set up the contract and related performance measures.

A.3.8.3 Contract management approach - household

The management of contracts for households (and businesses) will be determined by the legal structure that enables payment obligations to be created. In particular, this will be a legal structure which has the outcome of creating a periodic payment obligation on the resident of the property (referred to as the payment obligation mechanism for shorthand).

This periodic payment obligation needs to be maintained over a multi-decade period and sustain when owners and/or tenants of the property change. It must be achieved without creating a financial charge on the property, in order to avoid a significant deterrent to participation.

74 *Under a direct OpCo contract, the NZN project specific procurement support would request an order be raised through the central procurement team (as no 'call off' functionality exists).*

75 *Including those awarded and managed by Government agencies such as Crown Commercial Services.*

While determining the exact mechanism is a core component of the demonstrator/FBC phase, initial legal advice suggests this is viable. The conclusions based on the advice received is summarised below, but this summary should not be taken as legal advice.

In addition to considerations regarding suitability in the long term, it has also been taken into account whether changes in law would be needed in order to make the option viable. There are options that could be implemented with no new secondary legislation, making them useable in early pathfinder demonstrators. Others that are perhaps more efficient might require secondary legislation to become usable, leading to them only becoming available subsequent to a demonstrator phase. The ultimate legal structure may therefore evolve over time.

The three key mechanisms that were considered that don't create a financial charge on the property were:

- Using the pre-existing Green New Deal legislation and financing mechanism to collect the cost of energy efficiency measures through the utility bill. Complexities arise because this legislation was designed to stimulate a private sector market focused on individual house retrofit (with an associated raft of consumer protection) and here it would be applied to a more centralised model. Further investigation is needed to determine whether this gives rise to any difficulties that would necessitate change via secondary legislation.
- Using a local land charge to create a payment obligation to the local authority, collected through the Council Tax billing mechanism. Complexities come from potentially placing the borrowing onto local government balance sheet rather than into the funding vehicle.
- Using a deed of covenant to create a direct payment obligation to the funding vehicle subject to a stipulation that required the original recipient to procure a matching obligation as a condition of transferring ownership of the property. Complexities come from this being unusual in conveyancing and with cost and administration on each change of ownership.

The viability of each option is provided in Table 46. A fourth mechanism was discussed briefly but not included in the written advice, which was whether the legal mechanism by which energy suppliers can recoup the cost of capital equipment, e.g. smart meters, through the standing charge of the utility bill could be adapted at greater scale to recoup the wider energy efficiency costs. This merits further exploration but would likely require secondary legislation.

Table 46: Possible payment obligation methods

Option	Pros	Cons
Green New Deal mechanism	Existing legislation.	Complexity of consumer protection components of legislation (required when underpinning private sector solution; not required in NZN model but still subject to these obligations).
	Designed to bind property and successive owners.	Would be difficult to avoid using Green New Deal terminology, so means remarketing what was seen as a failed model.
	Energy related cost recovered through energy bill.	
Local land charge	Designed to bind property and successive owners.	Can only create obligation to local authority, making off balance sheet funding difficult if not impossible, impacting scale up.
	No registration fees.	Legislation required to create new category of local land charge.
	No admin burden on individual on transfer of title.	
	Local land charges common in conveyancing.	
Deed of covenant	Private arrangement not requiring legislation.	Unusual in conveyancing market.
	Simple structure.	Existing lender will need to consent when first issued.
	Will bind property successors.	Cost and administration to set up new deed of covenant on each property transaction.

In summary, a deed of covenant may be the most easily implementable structure in the short term for a demonstrator as it is a private contractual arrangement that requires no secondary legislation but would require buy-in from the major mortgage providers (many of whom are already engaged around this model).

Local land charges may also be a short-term approach, provided that a new land charge category can be created. However, unless a way can be found to back-to-back the income payment to the funding vehicle, without creating a consolidated debt on local government balance sheet, that will limit ability to scale the model in the long term.

Adapting (simplifying) the Green New Deal legislation for a local government-driven centralised model may be the best long-term solution but would be likely to require more complex secondary legislation.

Ultimately the contracting approach with households and businesses would be driven by this decision.

A.3.8.4 Risk management

Each framework agreement and direct contract awarded by the NZN OpCo will establish:

- minimum performance levels/service levels
- reporting requirements/management information requirements
- reporting frequency and process
- escalation procedure

The central procurement function will maintain a risk and issues log of all pertinent issues using a standard red, amber, green (RAG) matrix. Any issues reaching red status shall be added to the overall governance risk register.

A.3.8.5 Contract and supplier management (CSM) process and ownership

The Head of Procurement shall establish a CSM framework structure that defines minimum reporting requirements, ownership and segmentation (based on risk and value), in order to apply a proportionate level of management to all contracts.

CSM will fall under levels of either:

- routine (low risk, low volume, and/or low value)
- managed (medium risk, medium volume, and/or medium value); or
- strategic (high risk, high volume, and/or high value)

The requirements for data management, performance reporting and supplier review meetings shall be defined for each level of CSM.

CSM shall be undertaken by the procurement function (see Table 45).

A.3.9 Benefits management strategy

The nature of the programme is that there are multiple outcomes that arise from each project, and together these aggregate into the impacts of the programme as a whole. The programme has been designed to try and ensure the outcomes and the impacts are all positive, or at worst, neutral and so most focus will be on managing and monitoring benefits.

However, it is also important to monitor components of each project to provide an overall picture of the programme in order to learn lessons and maximise benefits.

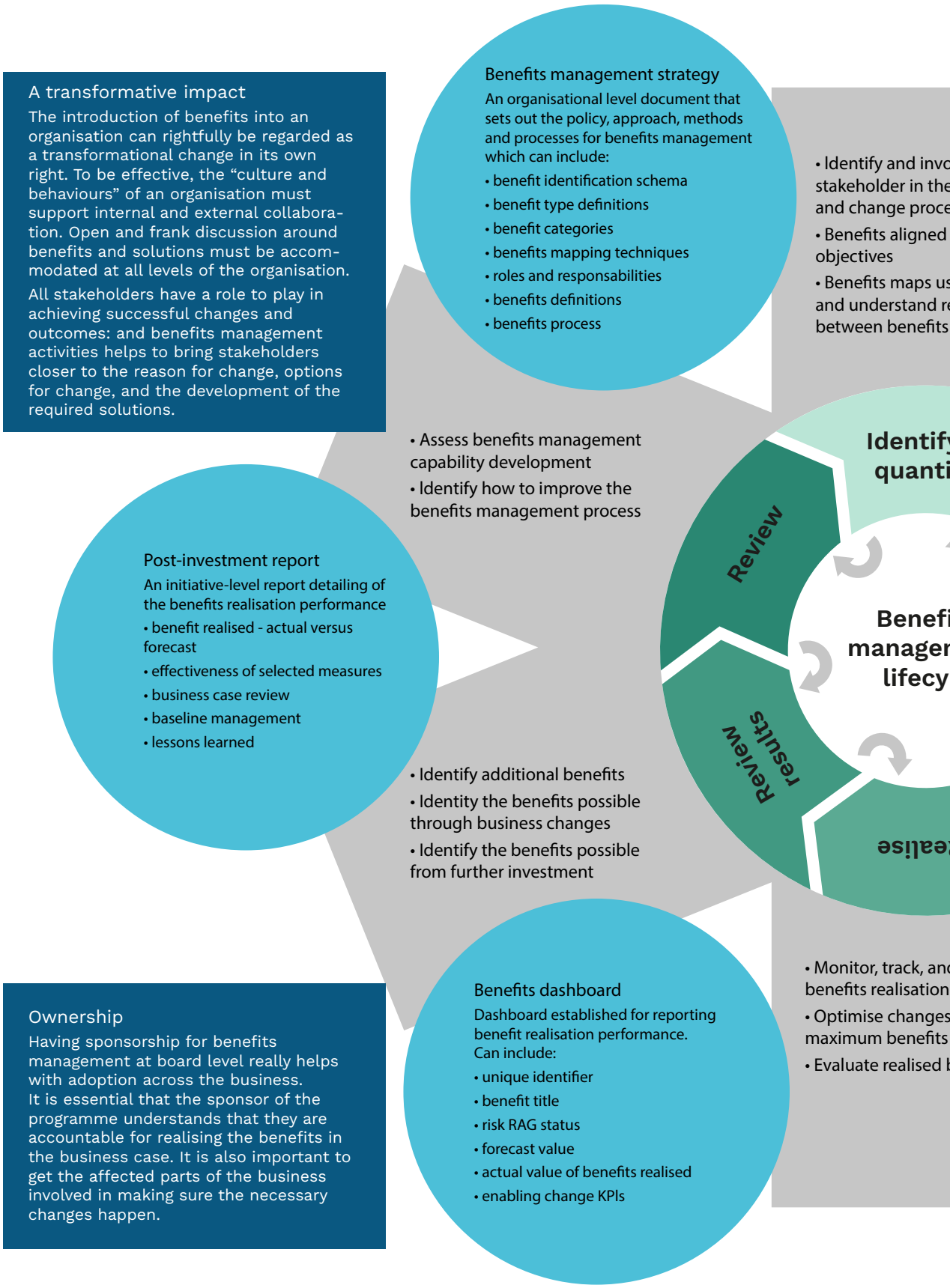
This section therefore sets out an approach to benefits management that also includes monitoring and evaluation of aspects that might not always be classified as benefits.

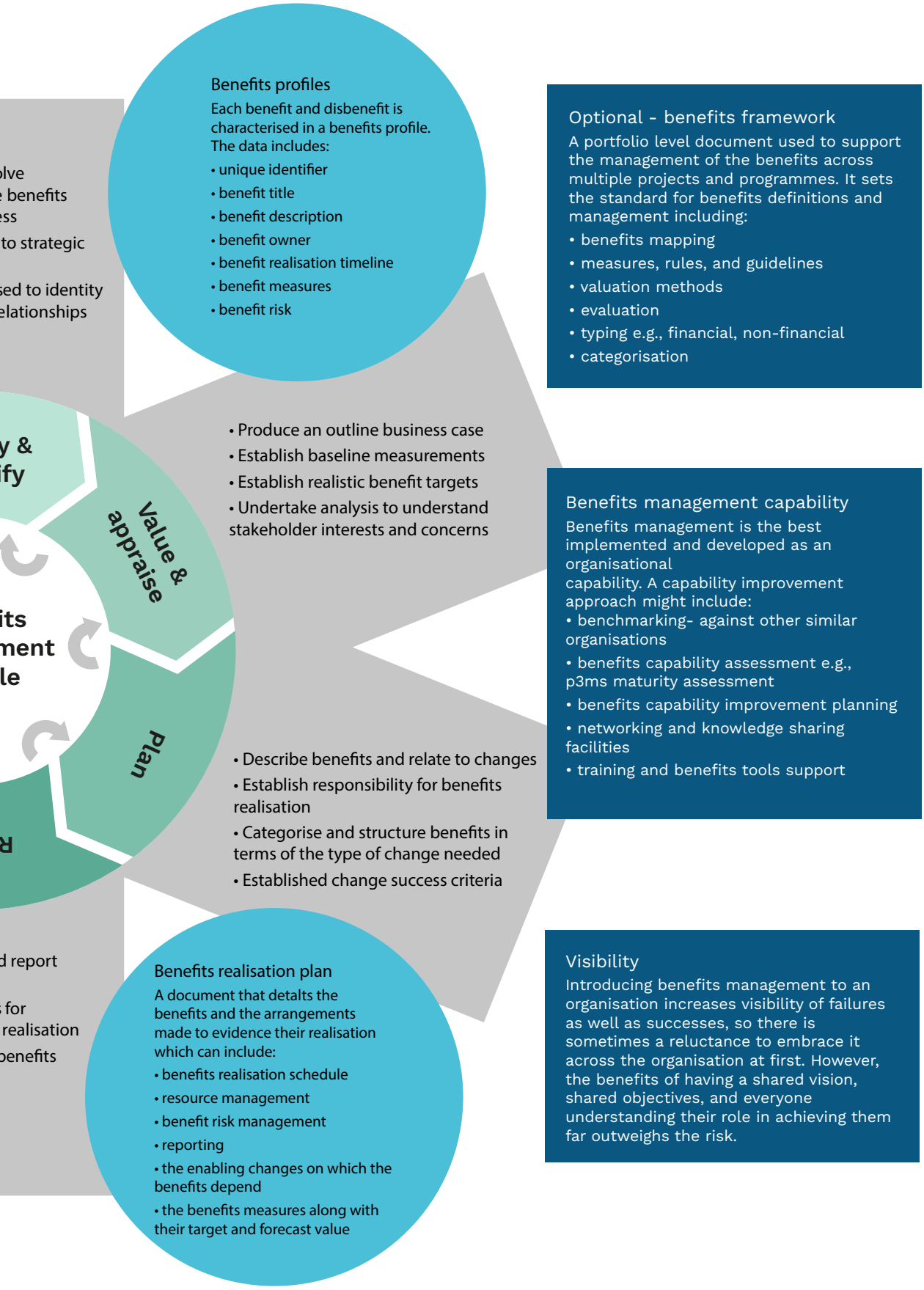
A.3.9.1 Benefits management concept

The Association for Project Management provides a structure for developing and delivering benefits through a benefits management strategy. This is replicated in Figure 56. This framework is detailed and provides a strong foundation for a management strategy; however, many of the components here are too detailed for exploration in an OBC. As a result, the focus of this section of the Management Case will be:

- Target benefits/success factors. These are primarily the intended outcomes and impacts of the programme and each project.
- Monitoring and evaluation against a baseline. These are the metrics that can be used to assess performance, with suggested baseline factors where these are relevant.
- Reporting approach. A recommendation for how project and programme benefits are reported.
- External auditing. An exploration of how these should be externally audited and verified so that benefits can be stated with confidence.
- Use of findings to refine existing and future programmes. How the monitoring and evaluation of benefits can feed back into project and programme design, to improve benefit realisation.

Figure 56: Benefits management lifecycle




Benefits profiles
Each benefit and disbenefit is characterised in a benefits profile. The data includes:
• unique identifier
• benefit title
• benefit description
• benefit owner
• benefit realisation timeline
• benefit measures
• benefit risk
Optional - benefits framework
A portfolio level document used to support the management of the benefits across multiple projects and programmes. It sets the standard for benefits definitions and management including:
• benefits mapping
• measures, rules, and guidelines
• valuation methods
• evaluation
• typing e.g., financial, non-financial
• categorisation
olve
benefits
ess
to strategic
sed to identity
elationships
y &
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Value & appraise
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ment
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Plan
R
• Produce an outline business case
• Establish baseline measurements
• Establish realistic benefit targets
• Undertake analysis to understand stakeholder interests and concerns
Benefits management capability
Benefits management is the best implemented and developed as an organisational capability. A capability improvement approach might include:
• benchmarking- against other similar organisations
• benefits capability assessment e.g., p3ms maturity assessment
• benefits capability improvement planning
• networking and knowledge sharing facilities
• training and benefits tools support
• Describe benefits and relate to changes
• Establish responsibility for benefits realisation
• Categorise and structure benefits in terms of the type of change needed
• Established change success criteria
d report
for
realisation
benefits
Benefits realisation plan
A document that detalts the benefits and the arrangements made to evidence their realisation which can include:
• benefits realisation schedule
• resource management
• benefit risk management
• reporting
• the enabling changes on which the benefits depend
• the benefits measures along with their target and forecast value
Visibility
Introducing benefits management to an organisation increases visibility of failures as well as successes, so there is sometimes a reluctance to embrace it across the organisation at first. However, the benefits of having a shared vision, shared objectives, and everyone understanding their role in achieving them far outweighs the risk.

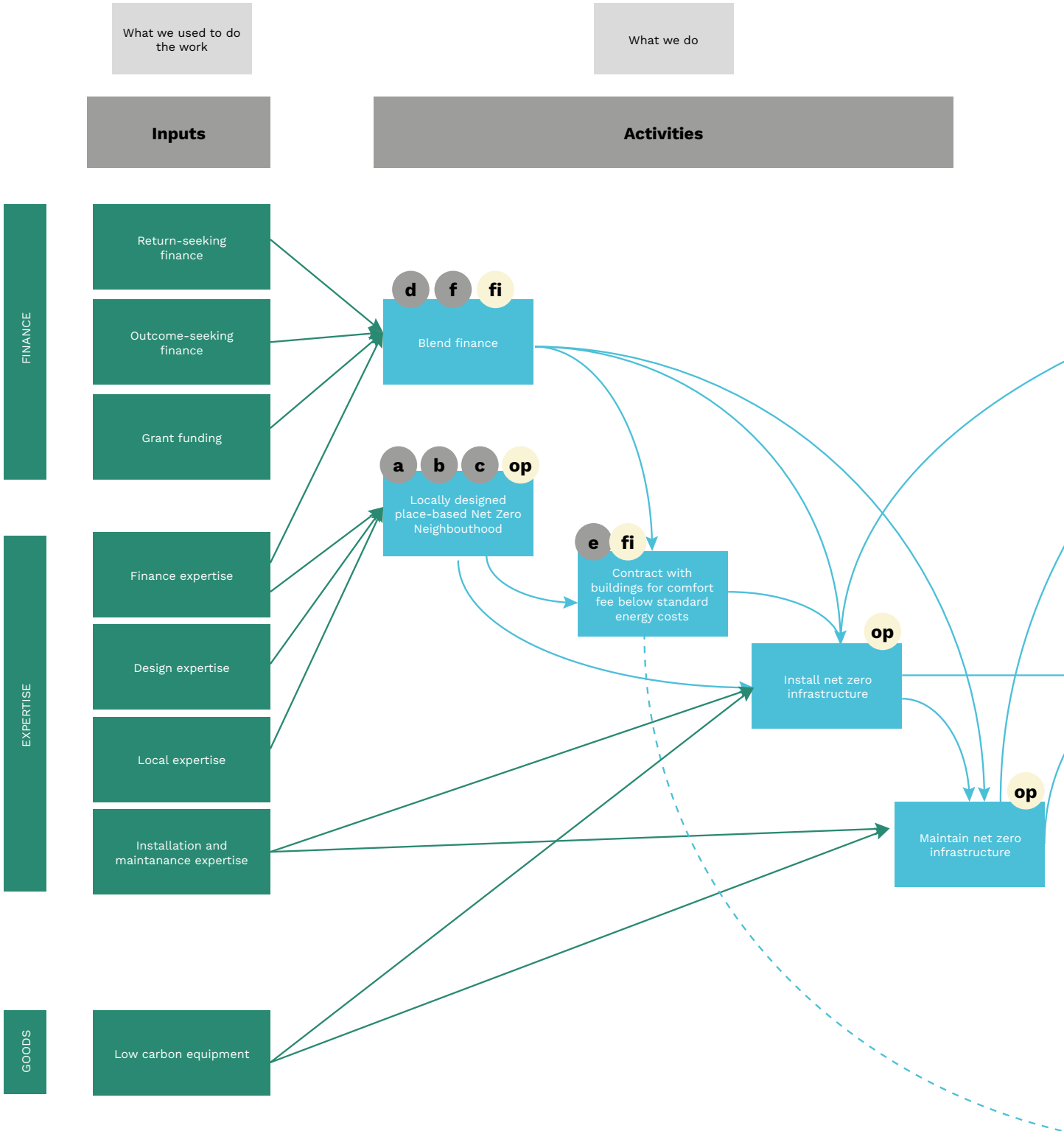
A.3.9.2 Target benefits/success factors

There are multiple categories of benefit/success factors that should be included in the programme.

Benefits

- programme impacts
- project outcomes

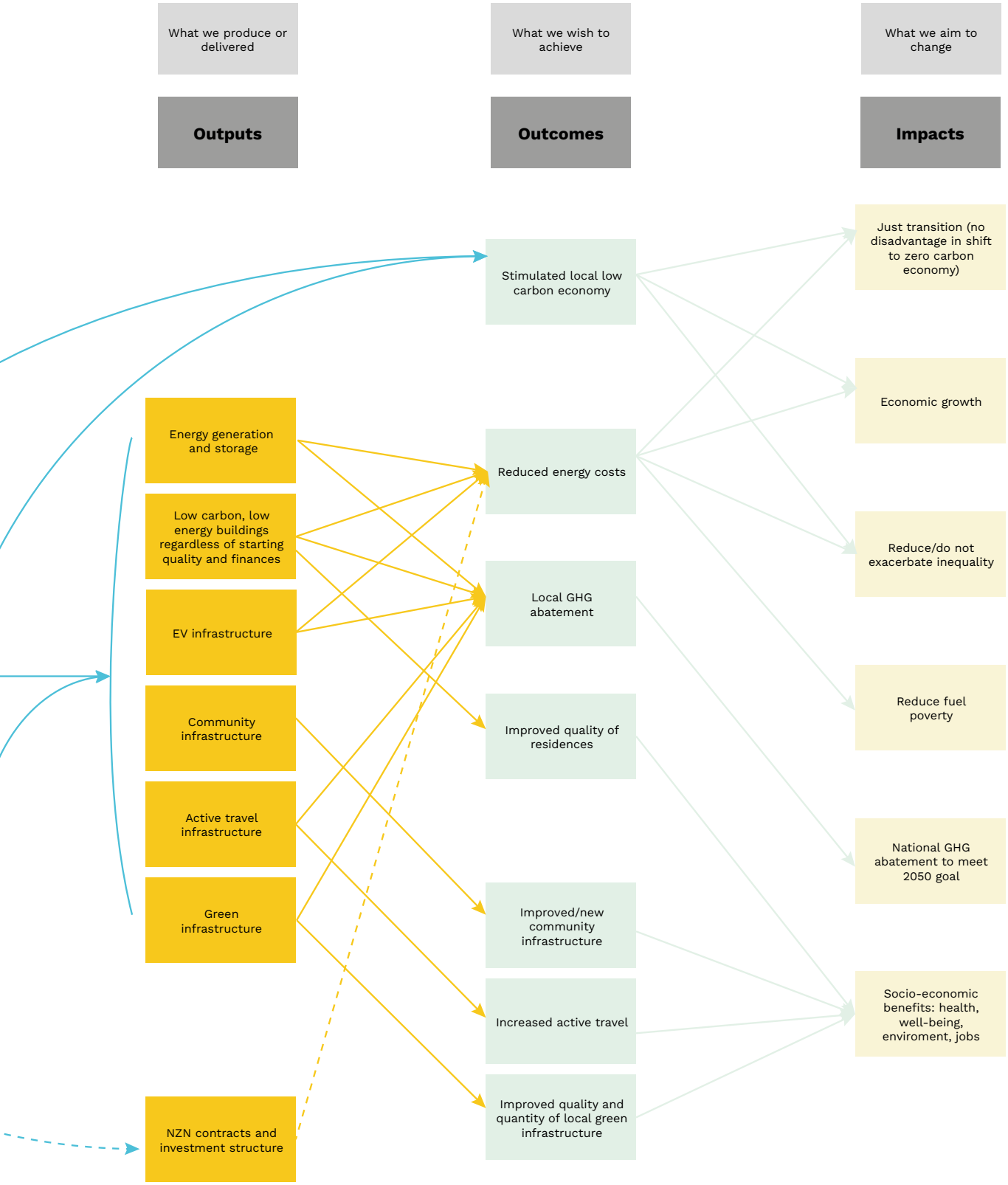
Figure 57: Theory of change



Success factors

- project outputs
- programme characteristics

Some of these are associated with the theory of change already described. For reference, the diagram is repeated here in Figure 57.



Benefits: Programme impacts

There are six programme impacts which are all benefits. These accrue at a national, programme scale, though can also be measurable at the local level in some cases. Each is set out in Table 47 with clear metrics for measurement proposed with sources identified where possible.

Table 47: Benefits: programme impacts

Benefit	Measurement metric(s)
Just transition	Number and national distribution of jobs in related sectors Relative bill costs by income decile
Economic growth	GDP [ONS] Employment and vacancies [ONS]
Reduce inequality	Productivity and income [ONS] Persistent poverty [ONS]
Reduce fuel poverty	Fuel poverty [ONS]
GHG abatement	GHG emissions [BEIS]
Socio-economic benefits	Employment and vacancies [ONS] Hospital admissions [NHS] Mortality [ONS] Morbidity [GOV] Biodiversity [GOV] Habitat [ONS] Air quality [GOV] Well-being surveys (if instituted with appropriate rigour)

Benefits: Projectoutcomes

There are seven project outcomes which are all benefits in themselves, though they drive the bigger-scale benefits associated with the impacts. These are summarised in Table 48 where proposed measurement metrics are also described.

Table 48: Benefits: Projecto outcomes

Benefit	Measurement Metric(s)
Stimulated low carbon economy	Local ‘standard industrial classification’ (SIC)’ activity data
Reduced energy costs	Energy bill comparisons between NZN costs and conventional costs in area Vehicle running costs comparison between NZN and non-NZN area
Local GHG abatement	GHG emissions [BEIS] Local footprint
Improved quality of residences	EPC ratings
Improved/new community infrastructure	No. of community spaces installed/improved
Increased active travel	National travel survey travel mode proportions
Improved quality and quantity of local green infrastructure	Local habitat survey Local biodiversity survey Access to green space mapping

Success factors: Project outputs

There are six project outputs which relate to NZN implementation, and one legal output. All of these need to be reviewed as success factors, as the more of these that are provided through a project, the more successful that project is likely to be in delivering the benefits.

These success factors and associated measurement metrics are shown in Table 49

Table 49: Success factors: Project outputs

Success factor	Measurement metric(s)
Energy generation and storage	kW capacity solar generation installed kW battery storage capacity installed Failure and repair rates
Low carbon, low energy buildings	EPC ratings changes No. of heating sources changed kWh consumption reduction Failure and repair rates
EV infrastructure	No. of EV charging points by type Community fleet profile Failure and repair rates
Community infrastructure	No. and type of community spaces installed/improved
Active travel infrastructure	No. of secure bicycle storage spaces Travel mode of local community
Green infrastructure	No. of trees planted Area of land returned to organic use (as opposed to built environment – not the organic growing standard)
NZN contracts and investment structure	No. of contracts taken up Percentage of neighbourhood signed up to NZN contracts No. of residents defaulting on contract payment terms Return delivered from investment structure

Success factors: programme characteristics

Each of the above sets have focused on the specific performance of the programme in delivering the impacts desired. However, there are wider considerations for the whole programme which will determine whether the programme is a success. There are provided here in Table 50.

Table 50: Success factors: Programme characteristics

Success factor	Justification
Regional distribution of NZNs	Proportional regional distribution is vital to the successful delivery of a national programme. This distribution needs to reflect the fact that the majority of the programme will be focused on towns and cities and not low-density rural areas.
Socio-economic profile of residences	The programme will only deliver the states benefits if it can deliver NZNs for all socio-economic groups and the buildings they live in or use. Assessing this profile therefore, will show whether this can be a successful national programme.
Overall uptake rate	In order to deliver the GHG abatement goal and generate economies of scale, a large percentage of residents will need to sign up to the programme. How this varies according to other factors (such as socio-economic profile and region) will provide insight into the potential success of the project as a whole.
Total number of NZNs	The number of NZNs is a key measure of success.
Overall payment delinquency	The model works on the basis of payments made by residents. The model needs to ensure a low percentage of payment delinquency to work. Payment delinquency should be monitored according to other factors such as socio-economic profile and region.
Project budget variance	Budgets will be developed for project implementation and maintenance. Variance from design budget to actual delivery (including contingency) needs to be assessed to ensure future budgeting is as accurate as possible to provide the returns needed in the model.
Return rate achieved for investors	The return rate to investors drives the attractiveness of the model and this needs to be monitored closely – especially if it varies significantly between projects in order to develop a proper understanding of the project portfolio.
Funding available for future NZNs	National roll-out is only viable with a steady stream of capital interested in investing. A view of the future pipeline of finance from all sources is a strong indicator of potential success.
Market capacity for delivery	The scale of capacity to deliver NZNs also is a major success factor and needs to be monitored to identify if the market needs stimulating to increase capacity.
Number of nzn designs in queue	The roll-out is also only viable if a steady stream of proposed NZNs is available for funding and implementation.

A.3.9.3 Monitoring and reporting against baseline

The previous section outlined many of the metrics that need to be monitored in order to assess the success of the programme and the delivery of benefits.

For the purposes of monitoring and reporting, it makes sense to consider metrics at two levels

- the programme as a whole
- each individual project

For each level there will need to be a baseline and set of KPI indicators developed against which performance can be measured. These are discussed in the following sections. Alongside this baseline is a method of data collation and review, as well as a reporting framework which enables the monitoring to be shared.

Individual projects

The metrics identified for individual projects comprise the following:

Table 51: Individual projectmetrics

Metrics	KPI/baseline
Local SIC activity data	Baseline at design stage
***Energy bill comparisons between NZN costs and conventional costs in area**	KPI comparison based on financial design
***Vehicle running costs comparison between NZN and non-NZN area**	KPI comparison based on financial design
GHG emissions [BEIS]	Baseline at design stage
***Local emissions footprint**	Baseline research at design stage
***kW capacity solar generation installed**	KPI based on technical design
***kW battery storage capacity installed**	KPI based on technical design
***Energy generation and storage failure and repair rates**	KPI based on programme targets
***No. of EV charging points by type**	KPI based on technical design
***Community fleet profile**	Baseline at design stage
***EV infrastructure failure and repair rates**	KPI based on programme targets
***Proportion of neighbourhood signed up to NZN contracts**	KPI based on design plans KPI based on programme targets
***No. of residents defaulting on contract payment terms**	KPI based on programme targets
EPC ratings	Baseline at design stage
No. of community spaces installed/improved	KPI based on programme targets
***Travel mode of local community**	Baseline at design stage
***Local habitat survey**	Baseline at design stage
***Local biodiversity survey**	Baseline at design stage
***Access to green space mapping**	Baseline at design stage
***No. of heating sources changed**	KPI based on design plans
***kWh consumption reduction**	KPI based on design plans
***Building infrastructure failure and repair rates**	KPI based on programme targets
***No. of secure bicycle storage spaces**	KPI based on design plans
***No. of trees planted**	KPI based on design plans
***Area of land returned to organic use (as opposed to built environment – not the organic growing standard)**	KPI based on design plans
***Return delivered from investment structure**	KPI comparison based on financial design

This table demonstrates the extent of the metrics that will be needed to monitor the programme. Those in green and bold are those that will require significant effort to build a baseline before the project is implemented in order to enable a reference state to be determined. The others are less intensive in terms of effort.

It is suggested that the following reporting approach is taken:

- A monitoring baseline report is produced as part of the design, setting out baseline states and the KPIs that will be associated with the design for the neighbourhood. This sets out all metrics.
- Following implementation there is an annual update of the monitoring report for the first five years, reflecting progress against the metrics.
- After the first five years, this can be reduced in frequency to biennially as changes may occur more slowly by this stage once the project has bedded in.

It is suggested that the OpCo is responsible for coordinating this monitoring reporting and data collection, but that this will be done in collaboration with the LAs.

Programme

The metrics identified for the overall programme comprise the following:

Table 52: Programme metrics

Metrics	KPI/Baseline
Number and national distribution of jobs in related sectors	Baseline at programme inception [ideally regional data]
Relative bill costs by income decile	Baseline at programme inception [ideally regional data]
GDP [ONS]	Baseline at programme inception [ideally regional data]
Employment and vacancies [ONS]	Baseline at programme inception [ideally regional data]
Productivity and income [ONS]	Baseline at programme inception [ideally regional data]
Persistent poverty [ONS]	Baseline at programme inception [ideally regional data]
Fuel poverty [ONS]	Baseline at programme inception [ideally regional data]
GHG emissions [BEIS]	Baseline at programme inception [ideally regional data]
Employment and vacancies [ONS]	Baseline at programme inception [ideally regional data]
Hospital admissions [NHS]	Baseline at programme inception [ideally regional data]
Mortality [ONS]	Baseline at programme inception [ideally regional data]
Morbidity [GOV]	Baseline at programme inception [ideally regional data]
Biodiversity [GOV]	Baseline at programme inception [ideally regional data]
Habitat [ONS]	Baseline at programme inception [ideally regional data]
Air Quality [GOV]	Baseline at programme inception [ideally regional data]
Well-being surveys (if instituted with appropriate rigour)	Baseline at programme inception [ideally regional data]
Overall Uptake Rate	KPI based on programme design plans
Overall payment delinquency	Baseline against payment method used
Project budget variance	KPI based on programme design plans
Return rate achieved for investors	KPI based on programme design plans
Funding available for future NZNs	KPI based on programme design plans
Market capacity for delivery	KPI based on programme design plans
Number of NZN designs in queue	KPI based on programme design plans
	KPI based on programme design plans

This table demonstrates that there are a set of baseline references that are required and a set of KPIs that need to be developed for the programme.

It is suggested that the following reporting approach is taken:

- A monitoring baseline report is produced at the commencement of the programme proper, which also sets out the KPIs to be used.
- There is an annual programme monitoring report which reports on the KPIs.

It is suggested that the OpCo is responsible for collating the data for this monitoring.

A.3.9.4 External auditing

The two layers of monitoring imply two layers of evaluation. Not all projects will need to be evaluated in depth, but a sample should be to ensure that they are delivering as reported. Alongside this, the entire programme will need to be evaluated.

The OpCo will be responsible for commissioning external auditors to evaluate the performance of a set of individual projects and the programme as a whole on a three-yearly cycle. This avoids too much interference with evaluation each year, but also ensures that useful checks and balances are provided frequently enough to capture problems and changes required.

Ultimately the OpCo will be responsible for any changes to projects, whilst the FinCo will be responsible for changes to the programme as a whole.

A.3.9.5 Refining the programme

The monitoring (and auditing) regime will be used to feed into the annual review of the programme, as well as the implementation performance of each project. The annual programme review will be conducted by the FinCo and used to feed into the 3-5 year business plan and the acceptance criteria that drives the NZN design.

Review of the performance of projects will be conducted by the OpCo and used to refine designs for future NZNs in particular, bringing findings to the design in support of LAs.

From the monitoring and evaluation assessments it may become clear that there would be additional or refined data requirements in the future. This may include setting new KPIs for performance.

A.3.10 Risk management

This section outlines our approach to risk management. It is critical to both:

- understand and plan for risks that we currently foresee; and
- develop a framework for detecting, managing, and mitigating unforeseen risks which arise during the programme

The first sub-section presents our high-level approach to managing known and unknown risks associated with this project. The second sub-section presents a risk register of risks which have already been identified, their expected magnitude, and how they will be mitigated throughout the course of the programme.

The risk register is itself divided into two. The first half identifies ***programme*** risks, risk management, and contingency (i.e. things that could derail the whole Net Zero Neighbourhood programme) whilst the second half covers ***project*** risks, risk management and contingency for individual neighbourhood projects.

A.3.10.1 Risk management approach

The unprecedented nature of this programme means that many risks are atypical and must be mitigated using novel approaches. The programme structure has been designed with this in mind. A demonstrator phase will be used to:

- identify and understand the risks that may be associated with rolling out the programme at full scale; and
- test approaches to mitigating and apportioning these risks

This demonstrator programme is the foundation of the risk management approach.

The FinCo will manage financial risks and programme-level delivery risks, while the OpCo will manage project-level delivery risks. A senior member of each department will be assigned as departmental risk manager, who then reports to the organisation's ultimate risk manager, a member of the executive management team. A risk register will be kept internally and monitored on a regular basis by operational staff with subject knowledge; Risk managers will hold monthly risk discussion meetings with key team members to monitor known risks (i.e.

using red-amber-green analysis) and discuss possible future risks. Changes to risk likelihood will be escalated to the overall Risk manager and ultimately escalated to the board. Risks which are realised, or very close to being realised, will be transferred to an 'issues log', whereby active steps will be taken to resolve the issue. Details of issue resolution will be tested during the demonstrator phase. As well as tracking and mitigating known risks, the OpCo will also perform 'horizon scanning' for new ones. The following are some methods which will be used to track and identify risks:

- Structured review meetings – these involve the project team and encourage participation and ownership of the risks by key personnel.
- Risk audit interviews – these are conducted by experienced managers and/or advisers, with all those involved in the project with experience of risk.
- Risk brainstorming workshops – these include all members of the project team and encourage imaginative ideas.

Once identified (and added to the risk register), a risk will then be 'measured': it will be scored for its likelihood and severity if it were to occur.

This will then inform a strategy to manage and mitigate risks, led by departmental risk managers with advice from the ultimate risk manager.

Details of issue resolution will be tested during the demonstrator phase.

A.3.10.2 Risk register

Table 53 is an initial list of the key programme risks identified at this stage of the project, containing high-level mitigation strategies, whilst Table 54 is a register of the project risks identified.

table 53: Initial programme risk register

Risk Category (programme)	Reference	Description	Likelihood (remote, unlikely, possible,probable, highly probable)	Impact magnitude (low, med., high)	What is the impact?	How could/have the risks be/been mitigated?
Performance	PGM 01	The programme does not generate the expected greenhouse gas (GHG) emissions reductions.	Possible – it is difficult to predict the impact of decarbonisation interventions accurately.	Medium	The projects do not meet their objectives and funders are not satisfied with their investment; particularly 'outcome buyers'. This could lead to lower investment or the failure of the programme.	Performance will be regularly monitored and reported to identify and resolve issues.
Interest/ engagement	PGM 02	There is a lack of interest from local authorities, and they do not approach the OpCo to apply for funding.	Unlikely – appetite for deep decarbonisation and local regeneration have been proved in the literature and tested during OBC phase.	Medium-high	The programme will not meet its objectives due to lack of sign up – this will result in less decarbonisation.	Programme has included significant LA engagement to determine appetite; this will be continued. Ongoing publicity including sharing the successes and benefits during demonstrator phase will promote the programme. The OpCo will also support this effort.
	PGM 03	If a LAs initial application is declined, they lose interest and are not motivated to amend the application and reapply.	Unlikely	Low	The programme will not meet its objectives due to lack of sign up.	The OpCo is on hand to assist LAs at the first application stage, and further application stages, to reduce the likelihood of applications being rejected.

Risk Category (programme)	Reference	Description	Likelihood (remote, unlikely, possible,probable, highly probable)	Impact magnitude (low, med., high)	What is the impact?	How could/have the risks be/been mitigated?
Programme intelligence	PGM 04	Demonstrator planning does not select a set of demonstrator sites which provide extensive enough evidence (i.e. covers an appropriate demographic and geographical range) to inform later phases of the programme.	Possible	High	Learnings from the demonstrator phases are insufficient to plan later phases of the work, giving investors insufficient confidence to fund wider roll-out.	A rigorous demonstrator selection process will be developed, including business case development experts identifying all essential requirements.
Cost	PGM 05	Programme capital or ongoing costs are higher than anticipated.	Possible	High	Funders do not have their investment returned. They become unwilling to continue investment. Government has to fund a greater proportion of home decarbonisation than anticipated.	Initial phases of the programme will be based largely on non-repayable finance, such that financial performance (i.e. costs vs. income) can be fully assessed at low risk. In the long term, the deal has been designed such that income from an individual resident is fixed, reducing risk. The financial model is set up such that inflation risk is carried by the resident rather than the organisation.
Monitoring	PGM 06	Appropriate monitoring and evaluation methodologies do not exist for key project and programme outcomes. For example, an appropriate method to quantify the GHG emissions avoided due to the programme does not exist.	Possible	High	The programme is not able to validate impact and is therefore unattractive to HM Treasury and/ or private funding	Expert evaluators will be employed on an ongoing basis as 'special advisors'. For example, an institution like Gold Standard will be employed to establish reliable baseline and decarbonisation scenarios to report GHG savings.
Technology	PGM 07	New, emerging technologies cannot be utilised due to contractual agreements with suppliers.	Unlikely – but likelihood increases the further into the future you consider.	Medium	Cannot make use of the newest technologies and benefit from their improved carbon savings, efficiencies etc.	Contracts will be designed to be flexible. Regular maintenance and asset replacement is planned as part of each project.

Risk Category (programme)	Reference	Description	Likelihood (remote, unlikely, possible,probable, highly probable)	Impact magnitude (low, med., high)	What is the impact?	How could/have the risks be/been mitigated?
Funding	PGM 08	Demonstrators are unable to prove the concept sufficiently to attract private capital.	Possible	High	Ability to raise private capital is a foundational element of this concept; without this the programme would fail. The main impact here is unlikely to be a binary yes/ no investment decision from private capital, rather a limit on the extent that private capital can be raised. The lower the proportion of capital coming from private investors, the greater the burden on HM HM Treasury..	Institutional and short-term investors have been extensively surveyed and engaged with during this OBC phase, and the appetite to invest – for both environmental and financial reasons – has been confirmed. This stakeholder engagement has included an understanding of financers' 'risk appetite', such that an appreciation of this risk has been well-developed.
Policy	PGM 09	Proposed changes to public procurement legislation in England and Wales in the next 2 years.	Probable	Low	Amends will have to be made to the model to accommodate the changes.	?
	PGM 10	Regulations in Scotland potentially not changing and no longer aligning with England and Wales legislation.	Probable	Low	Two separate models will have to be followed and monitored, potentially causing confusion.	?
Heterogeneity of location and local complexities	PGM 11	Different prices of materials and services in different local areas will make the roll out of some projects more expensive.	Highly probable	Medium	Some projects are more expensive overall due to local complexities.	Differences in local costs have been built into the financial model. (?)

Risk Category (programme)	Reference	Description	Likelihood (remote, unlikely, possible,probable, highly probable)	Impact magnitude (low, med., high)	What is the impact?	How could/have the risks be/been mitigated?
Supply chain	PGM 12	Instability of the production and supply chain. Lead times are longer than anticipated or expected. Brexit means that import laws must be complied with, and the supply chain may be disrupted.	Possible-probable	High	Contractors are delayed in being able to complete their work due to lack of materials.	To an extent, this risk falls outside the influence of the programme. During the demonstrator phase, we will seek funding for local supply chain training and awareness campaigns.
	PGM 13	Insufficient Contractor/installer base for both installation and maintenance.	Possible-probable	High	A local NZN may not be delivered, resulting in a failure of the programme. If Contractors from further-afield are required, this will increase costs.	During the demonstrator phase, we will seek funding for local supply chain training and awareness campaigns.
	PGM 14	Sustainability of raw materials and environmental risks associated at the raw material source locations.	Unlikely	Low	Secondary environmental damage could cause reputational damage.	Sourced material will be audited to comply with certifications that ensure sustainability criteria are met.
Social benefit	PGM 15	Reduced social benefit through larger, national framework or contracts will reduce direct social benefit from local investment e.g. smaller local funders want to see their money used locally.	Probable	Medium	Less likely to invest if they cannot see directly where their money is being used to prove it is in the local area.	Investment can be tracked and utilised locally where this is a requirement of the funder (?).
Funding	PMG 16	Change to government funding during a period of policy, budget, or government change.	Possible	High	Lower public funding reduces private capital that can be 'crowded in' and subsequently the number of NZNs that can be delivered.	Ensure that benefits are well-publicised nationally and within appropriate political domains.
	PMG 17	The scale of the programme is impacted by changes to available government funding.	Possible	Medium to High	As above - lower public funding reduces private capital that can be 'crowded in' and subsequently the number of NZNs that can be delivered.	Possible mitigation is that the FinCo can attract funding from multiple sources, and may be able to make up shortfall if this risk occurs.

Table 54: Initial project risk register

Risk Category (programme)	Reference	Description	Likelihood (remote, unlikely, possible,probable, highly probable)	Impact magnitude (low, med., high)	What is the impact?	How could/have the risks be/been mitigated?
Performance	PGM 01	The programme does not generate the expected greenhouse gas (GHG) emissions reductions.	Possible – it is difficult to predict the impact of decarbonisation interventions accurately.	Medium	The projects do not meet their objectives and funders are not satisfied with their investment; particularly 'outcome buyers'. This could lead to lower investment or the failure of the programme.	Performance will be regularly monitored and reported to identify and resolve issue. The deal has not been designed with GHG reductions as a key financial outcome; outcomes will only be sold once they have been fully accredited. The key risk here falls on society – what happens if we do not decarbonise?
Interest/ engagement	PGM 02	There is a lack of interest from local authorities, and they do not approach the OpCo to apply for funding.	Unlikely – appetite for deep decarbonisation and local regeneration have been proved in the literature and tested during OBC phase.	Medium-high	The programme will not meet its objectives due to lack of sign up – this will result in less decarbonisation.	Programme has included significant LA engagement to determine appetite; this will be continued. Ongoing publicity including sharing the successes and benefits during demonstrator phase will promote the programme. The OpCo will also support this effort.
	PGM 03	If an LA's initial application is declined, they lose interest and are not motivated to amend the application and reapply.	Unlikely	Low	The programme will not meet its objectives due to lack of sign up.	The OpCo is on hand to assist LAs at the first application stage, and further application stages, to reduce the likelihood of applications being rejected.
Programme intelligence	PGM 04	Demonstrator planning does not select a set of demonstrator sites which provide extensive enough evidence (i.e. covers an appropriate demographic and geographical range) to inform later phases of the programme.	Possible	High	Learnings from the demonstrator phases are insufficient to plan later phases of the work, giving investors insufficient confidence to fund wider roll-out.	A rigorous demonstrator selection process will be developed, including business case development experts identifying all essential requirements.

Risk Category (programme)	Reference	Description	Likelihood (remote, unlikely, possible,probable, highly probable)	Impact magnitude (low, med., high)	What is the impact?	How could/have the risks be/been mitigated?
Cost	PGM 05	Programme capital or ongoing costs are higher than anticipated.	Possible	High	Funders do not have their investment returned. They become unwilling to continue investment. Government has to fund a greater proportion of home decarbonisation than anticipated.	Initial phases of the programme will be based largely on non-repayable finance, such that financial performance (i.e. costs vs. income) can be fully assessed at low risk. In the long term, the deal has been designed such that income from an individual resident is fixed, reducing risk. The financial model is set up such that inflation risk is carried by the resident rather than the organisation.
Monitoring	PGM 06	Appropriate monitoring and evaluation methodologies do not exist for key project and programme outcomes. For example, an appropriate method to quantify the GHG emissions avoided due to the programme does not exist.	Possible	High	The programme is not able to validate impact and is therefore unattractive to HM Treasury and/ or private funding	Expert evaluators will be employed on an ongoing basis as 'special advisors'. For example, an institution like Gold Standard will be employed to establish reliable baseline and decarbonisation scenarios to report GHG savings.
Technology	PGM 07	New emerging technologies cannot be utilised due to contractual agreements with suppliers.	Unlikely – but likelihood increases the further into the future you consider.	Medium	Cannot make use of the newest technologies and benefit from their improved carbon savings, efficiencies etc.	Contracts will be designed to be flexible. Regular maintenance and asset replacement is planned as part of each project.

Risk Category (programme)	Reference	Description	Likelihood (remote, unlikely, possible,probable, highly probable)	Impact magnitude (low, med., high)	What is the impact?	How could/have the risks be/been mitigated?
Funding	PGM 08	Demonstrators are unable to prove the concept sufficiently to attract private capital.	Possible	High	Ability to raise private capital is a foundational element of this concept; without this the programme would fail. The main impact here is unlikely to be a binary yes/ no investment decision from private capital, rather a limit on the extent that private capital can be raised. The lower the proportion of capital coming from private investors, the greater the burden on HM Treasury.	Institutional and short-term investors have been extensively surveyed and engaged with during this OBC phase, and the appetite to invest – for both environmental and financial reasons – has been confirmed. This stakeholder engagement has included an understanding of financers' 'risk appetite', such that an appreciation of this risk has been well-developed.
Policy	PGM 09	Proposed changes to public procurement legislation in England and Wales in the next two years.	Probable	Low	Amends will have to be made to the model to accommodate the changes.	?
	PGM 10	Regulations in Scotland potentially not changing and no longer aligning with England and Wales legislation.	Probable	Low	Two separate models will have to be followed and monitored, potentially causing confusion.	?
Heterogeneity of location and local complexities	PGM 11	Different prices of materials and services in different local areas will make the roll out of some projects more expensive.	Highly probable	Medium	Some projects are more expensive overall due to local complexities.	Differences in local costs have been built into the financial model (?).

Risk Category (programme)	Reference	Description	Likelihood (remote, unlikely, possible,probable, highly probable)	Impact magnitude (low, med., high)	What is the impact?	How could/have the risks be/been mitigated?
Supply Chain	PGM 12	Instability of the production and supply chain. Lead times are longer than anticipated or expected. Brexit means that import laws must be complied with, and the supply chain may be disrupted.	Possible-probable	High	Contractors are delayed in being able to complete their work due to lack of materials.	To an extent, this risk falls outside the influence of the programme. During the demonstrator phase, we will seek funding for local supply chain training and awareness campaigns.
	PGM 13	Insufficient Contractor/installer base for both installation and maintenance.	Possible-probable	High	A local NZN may not be delivered resulting in a failure of the programme. If Contractors from further-afield are required, this will increase costs.	During the demonstrator phase, we will seek funding for local supply chain training and awareness campaigns.
	PGM 14	Sustainability of raw materials and environmental risks associated at the raw material source locations.	Unlikely	Low	Secondary environmental damage could cause reputational damage.	Sourced material will be audited to comply with certifications that ensure sustainability criteria are met.
Social benefit	PGM 15	Reduced social benefit through larger, national framework or contracts will reduce direct social benefit from local investment e.g. Smaller local funders want to see their money used locally.	Probable	Medium	Less likely to invest if they cannot see directly where their money is being used to prove it is in the local area.	Investment can be tracked and utilised locally where this is a requirement of the funder (?).
Funding	PMG 16	Change to government funding during a period of policy, budget, or government change.	Possible	High	Lower public funding reduces private capital that can be 'crowded in' and subsequently the number of NZNs that can be delivered.	Ensure that benefits are well-publicised nationally and within appropriate political domains.

A.3.11 Demonstrator design

This section sets out to explain the 3ci model demonstrators, in particular:

- The context in which they will be delivered.
- How they are designed and why they have been designed that way; and
- An indication of the key actions and their timings should the demonstrators be funded.

A.3.11.1 Background and context

As part of this programme, previous programmes have been examined to identify learnings for this proposal to ensure that lessons learnt are transferred and key obstacles are taking into account.

In terms of direct comparisons, no schemes or projects have been attempted that share all the key features of Net Zero Neighbourhoods, namely: place-based; funded with public and private capital; multi-asset interventions including whole-building retrofits; and aim at wider urban regeneration. This means that there is no project that is directly comparable or any that comprises most of the key features. There are some that have reflected one or at most two features, and two of these are examined here. Both of these resulted in 'failure', which provides lessons for the demonstrator programme discussed here. Both of these were related to the Green Deal, which is the only national programme which has any significant components in common with the NZN concept.

Birmingham energy savers

The Birmingham Energy Savers scheme aimed to install efficient heating systems and insulation in up to 60,000 homes in the Birmingham region by 2020, 'funnelling' money from the Green Deal programme.

Like the NZN programme, this scheme used a mixture of funding sources, combining Green Deal and Energy Company Obligation (ECO) capital funding with council borrowing and individual resident capital. It aimed to generate revenue by installing solar panels on roofs to earn returns from the Feed-in-Tariff subsidy. The scheme was designed so that this revenue could then be used to help finance energy efficiency improvements in fuel-poor homes. This financial model is not dissimilar to NZNs in that it installed assets to generate revenue. However that revenue was planned to finance further asset installations rather than repay a portion of the initial investment. According to the Birmingham City Council press release, the scheme failed for the following reasons – many of which are relevant to the NZN programme[76]:

The lack of national marketing to drive demand for the uptake of the Green Deal. The local focus of NZNs will mean extensive community engagement, which should mitigate this issue to an extent; however if the programme is rolled out, it will benefit from a positive reputation nationally which will require some marketing to achieve.

- **The time taken to complete the Green Deal process being extensive and complex**. A common criticism levelled at the Green Deal and related projects was the challenge of administration. Minimising this for NZNs is also critical as a slow process is likely to reduce sign-up from residents – even if their engagement is relatively simple.
- **The ECO subsidy that was due to be committed by energy companies towards the installation of energy efficiency measures was lower than initially expected. Therefore this required the householder to provide a much larger financial contribution to implement Green Deal measures than previously expected**. The concept of NZNs is that the householder has no financial input into the capital expenditure on the property, so this should not be an issue.
- **Doubts over the central tenet of the "golden rule", whereby the costs of repayment never outweigh the savings on the bill**. The amount of discount in the NZN model can be varied to ensure that this rule is not broken.
- **Landlords being unable to take advantage of Green Deal due to existing legislation surrounding the Consumer Credit Act which subsequently needed to be amended**. Not all legal challenges associated with private tenanted properties have been explored and so this will need to be an area further explored when the contract is developed.
- **Concerns that although the concept of a house holder passing the remaining repayments on to the next owner is attractive to them, buying a dwelling that has a Green Deal Finance arrangement tied to it, may make the property less attractive to a buyer**. This concern is one that will need to be addressed also by NZNs. The major consideration here is that the comfort fee should ultimately be shown to be delivering savings relative to other bill payers. Should this not be the case then there could be a very detrimental impact on selling residences.
- **A 7% interest rate set centrally by The Green Deal Finance Company to be paid for the financing of the Green Deal works against a personal loan rate of 3-4% available at the time, and therefore such works being done outside of the Green Deal framework**. The NZN model seeks to use patient, long-term capital to obtain rates of c. 1.5% over 40 years to deliver this, which will be far better than any other likely form of capital.

76 *Trickett, L. (2015) Plans to tackle fuel poverty to be reconsidered, 2015, https://www.birminghamnewsroom.com/plans-to-tackle-fuel-poverty-to-be-reconsidered/*

As discussed, there are some challenges here which do apply to NZNs and are considered in the subsequent demonstrator programme and full programme.

Warm Up North

The 'Warm Up North' scheme was a local authority partnership aimed at combining government Green Deal[77] and Energy Company Obligation (ECO)[78] funding to finance energy efficiency improvements in homes and small business in the UK. Like the NZN programme, this scheme was, to an extent, centrally co-ordinated. It aimed to deliver 50,000 improvements across five years, starting in 2013, using £200 million of investment[79].

Details and evaluation of the scheme are scarce. Between its commencement and mid-2014, Warm Up Homes enabled around £3 million worth of energy efficiency improvements in over 2,000 North East homes. This is significantly below the target of up to 10,000 per year[80].

Interventions funded via the Green Deal share one key feature with NZNs; they aimed to pay for interventions using private capital which is effectively paid back by savings on energy bills. Critically, it did not take a whole-house, or place-based approach to decarbonisation.

The key comparison to draw with Net Zero Neighbourhoods relates to the failure for the scheme to generate significant take-up. Although there is a lack of evaluation of the programme, it can be assumed that this is at least in part due to the high cost of borrowing within the Green Deal, something that should be addressed by the much lower rates required by long-term patient capital that forms the core of the NZN model.

Current/future schemes

BEIS has awarded £7.7 million to three councils in order to deliver projects aiming to reduce domestic retrofit costs, as part of the **Whole House Retrofit Innovation Competition**[81]. Although the scheme has not yet been implemented, it is of relevance to the NZN programme because councils must deliver whole-house retrofi,t. The extent to which costs can be brought down via delivery at scale, in one location, is of particular interest.

There is also the **Heat Pump Ready** programme[82] which is developing projects to determine the best way to achieve high-density heat pump roll-out. These are single asset projects and much of the initial work is on feasibility studies and surveys. Nonetheless, there will likely be useful findings in terms of how to maximise potential engagement with residents to achieve take-up of the technologies. There will also be lessons to learn in terms of work on grid capacity and some of the projects trialling novel financing models.

The **Green Home Finance Accelerator**[83] (GHFA) programme is another component of BEIS's approach to drive decarbonisation and aims to drive innovation in the green lending market. It intends to support the establishment of a diverse range of green finance products which incentivise domestic energy performance improvements for both owner-occupiers and private landlords. The GHFA programme will provide up to £20 million grant funding to support UK retail lenders to design, develop. and pilot a range of finance propositions which encourage domestic energy efficiency and low carbon heating retrofits. Our assessment is that this research will provide some insights but will fundamentally come up against the key challenge that the investment time horizon for individuals will be too short to make any of these products sufficiently attractive – which is one of the major components of the NZN model.

International best practice

There are no equivalent programmes internationally. There are some programmes that touch on one or two NZN factors, but these are very limited in number. Perhaps the most relevant example is the Italian retrofit scheme[84] which is assessed in detail in the full Financial Case. This scheme fundamentally provides 110% of costs to retrofit buildings, but has a take-up rate of less than 1% of the rate needed to deliver net zero in 2050. This demonstrates the challenges associated with taking a single-asset approach even when there is a clear financial benefit in taking action. Nonetheless, this is the best in class programme internationally, and can be used as a useful reference point for the NZN model.

77 *The Green Deal was a government policy between 2013-2015 in which loans were provided to homeowners to pay for energy-saving measures. The policy has generally been deemed a failure because of the low number of measures installed and the fact that it was scrapped after only two years. This failure is often blamed on the high interest rates attached to the loans, and the fact that the measures had to 'pay for themselves' in energy-savings terms ruled out many more impactful measures. The scheme was unique in that the loan was attached to the property, which required new legislation in English law.*

78 *The Energy Company Obligation forces energy suppliers (e.g. British Gas) to promote and pay for the installation of energy-saving measures in low-income and fuel poor households.*

79 *McLauchlan, K. (2013) Warm Up North: Landmark £200m energy project warms up North-east households, TeessideLive*

80 *Bdaily Business News (2014) Warm Up North helps residents access energy efficiency scheme worth £3 million, Bdaily Business News*

81 *https://www.gov.uk/government/publications/whole-house-retrofit-competition-successful-bids*

82 *https://www.gov.uk/government/publications/heat-pump-ready-programme-successful-projects/heat-pump-ready-programme-stream-1-phase-1-projects https://www.theguardian.com/world/2022/apr/13/italys-superbonus-110-scheme-prompts-surge-of-green-home-renovations*

83 *https://www.gov.uk/government/publications/green-home-finance-accelerator*

84 https://www.theguardian.com/world/2022/apr/13/italys-superbonus-110-scheme-prompts-surge-of-green-home-renovations

UK NZN activity

Through significant engagement with UK local authorities, BEIS, and investors, it has been possible to provide the following assessment of the landscape for NZN.

At present there are a number of local authorities pursuing some form of place-based model to decarbonisation. The furthest developed of these are only at the stage of considering the location of such a model. In all cases, these are looking at multi-asset interventions.

A greater number are pursuing some form of whole house retrofit, but looking at achieving this with funding from a model different to blended finance.

Most of these LAs are trying to understand how they can develop an NZN design, and how they can engage with potential finance. Their individual capacity is limited to deliver this due to thinly spread resources. Some have identified some funding to contribute towards this and others have applied to funding sources to obtain money to fund a design. There is not yet an LA with an NZN design.

Discussions with finance providers (discussed more in financial documentation) has yielded positive responses from multiple firms on their interest in investing in NZNs; however they are only (generally) interested in investing at scale (a minimum of £50m at a time) and once the investment is largely de-risked. This creates a big gap between the investment interests and where LAs are currently. This is where the demonstrators can bridge the gap, de-risking the investment and bringing enough projects at a scale that becomes investible.

One other organisation (Lloyds Bank) has been pursuing a similar model in concept but has yet to develop it to the detail that has been developed in the OBC that sits alongside this report.

A.3.11.2 Need for demonstrators

The need for demonstrators comes from the following facets of the 3Ci model:

- blended finance
- multi-asset, place-based interventions
- residents signing contracts that obligate a fee to be paid by the resident of each propert

Whilst some parts of each facet have been trialled before, they have not been trialled together and therefore they need to be tested to prove the concept of the model. By proving the concept, the investment opportunity can be de-risked, making it attractive to private investors. This is fundamentally achieved by proving that a steady return can be generated. This is only possible by investing in the initial demonstrator projects that then deliver the returns, proving viability.

The innovation that can de-risk the model for investors is the linking of the fee payable to the property, ensuring it is paid for 40-years (or similar period), thereby ensuring a return over the timescale required to make the investment viable for patient capital.

The scale of each demonstrator is outlined in the Financial Case of the OBC, but is of the order of magnitude of £2m for design and £40m for implementation. As discussed later, between 5 and 20 demonstrators may be appropriate.

Discussions with LAs have indicated that there may be money from some LAs to fund a small part of this, for example 25-50% of the design cost, but that large-scale investment of the kind required for implementation is not available, except in one or two potential locations. This means that there will not be a cohort of demonstrators without external funding.

Discussions with private investors indicate that whilst there may be some money forthcoming, this would be most likely if there was a coordinated programme with government backing.

A.3.11.3 Overarching demonstrator design

Design process

The demonstrators have been designed through an organic, iterative process based on multiple inputs. These inputs have included:

- **NZN project team**. We have drawn heavily on the expertise of the team across all organisations with expertise in finance, local authority implementation and procurement, net zero technical design and delivery.
- **Local authorities**. A number of workshops were held with more than a dozen local authorities. In order to obtain the widest possible views, we engaged LA officers with expertise in finance, procurement, transport, buildings, planning, green infrastructure, and community engagement from each authority. Additional local authorities were engaged with in smaller conversations to test specific areas of the concept.
- **Finance industry**. Two workshops were held with investors, and many dozen additional conversations to test specific aspects of the concept and to identify appetite for the programme.
- **Delivery Contractors**. Providers of the key technical interventions were engaged with one-to-one to identify lead in times, capacity to deliver, and appetite for delivery on this type of programme.
- **Broader stakeholder environment**. Other key stakeholders have been engaged with to ensure that the design is fit for purpose. These include BEIS and the Green Finance Institute (GFI).

These conversations have yielded the following major factors that need to be addressed by the model to make the demonstrators viable:

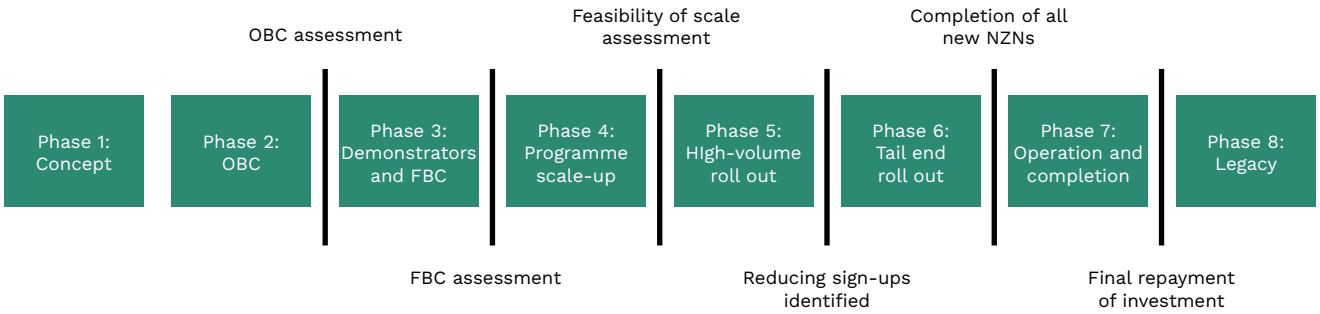
- Maximisation of resident sign-up rates.
- Need for evidence of return to de-risk proposition for investors.
- Market capacity to deliver heat pumps and solar panels in medium-term.
- Capacity for design work within local authorities.
- Protection of LA from financial risk (in particular avoiding Council Tax as collection mechanism).
- Protection of LAs from reputation risk.

These (and other more minor considerations) have all contributed to the design.

Demonstrator structure

The proposed demonstrator structure sits within a broader context of the programme (if fully delivered). The phases and associated gateway assessments both already conducted or anticipated in Net Zero Neighbourhood (NZN) programme are shown in Figure 58. Phase 1 is complete, and the development of the demonstrator design is part of the OBC being developed Phase 2. Phase 3 would be the delivery of the demonstrators.

Figure 58: NZN programme phases



Phase 3 itself is proposed to be split into two parts in order to reflect the need to both design and implement demonstrators. This will enable the allocation of finance to implementation activities only at a point where designs are of sufficient quality and demonstrate the potential for viable implementation. These two parts are labelled Phase 3a and Phase 3b. The core components of each Phase are:

- **Phase 3a**:
  - **Set up central entities and resources** ready to support demonstrator design and implementation, as well as convene local authorities together to maximise learning through a "community of practice" of engaged local authorities at all stages of progress. This would also include determining the payment obligation mechanism, contracts, and fund structures.
  - **Wave 1 demonstrators: Selection and design**. This wave of demonstrators will take a group of LAs that are acquainted with the concept and have capacity to build a design to a detailed project design for their NZN with associated business case. This will test the design process and demonstrate where authorities are ready to move to implementation. Once they have reached this point then, if funding is available, they can move to implementation (Phase 3b).
  - **Wave 2 demonstrators: Selection and preparation**. This wave of demonstrators will take a group of LAs that have limited background in this model or concept to a position of readiness to commence a design (effectively the position that Wave 1 demonstrators start from). This will test the preparation process for LAs.

- **Phase 3b**:
  - **Expansion and operation of central entities**. In particular to be able to deliver full support for implementation of Wave 1 and to solicit private investment following proof of concept. To continue to convene local authorities together to maximise learning.
  - **Wave 1 demonstrators: Implementation**. For those demonstrators that have adequate designs, funding will be provided to implement these. This will test the implementation concept, the support structure proposed, and ideally prove the concept which will generate an investment opportunity and therefore drive the model.
  - **Wave 2 demonstrators: Selection and design**. Wave 2 demonstrators would be funded for support to design their NZNs as in the previous phase for Wave 1.

Financing

The demonstrator phase is anticipated to be mostly, if not wholly, funded from the public purse. Conversations with private investors have identified some that may be interested in contributing to early-stage funds, but it is likely this will not be a significant portion of the ask – perhaps a few tens of million GBP compared to a full Phase 3 ask of c. £450m.

This dynamic is due to the novel and innovative approach of blended finance for place-based interventions that this model is proposing. This means there is high risk for investors. Part of Phase 3 is to demonstrate the viability of the model, de-risking the investment opportunity which will then bring future private investment into the programme.

As a result, the financing model set out in the Outline Business Case will still be used when the demonstrators are implemented, but public capital will replace private investment. This means that there is the potential for public capital to generate a return, which may then be sold onto further investors, reclaiming some of the initial outlay on the demonstrators.

Timings

Discussions with LAs that have developed concepts the furthest has yielded an expected design period of between 12 and 24 months. The design phase is heavily influenced by the extensive stakeholder engagement required to achieve a design that has local buy-in. Given the long lead times associated with community engagement work, it is assumed that at least 18 months will be needed to enable substantive engagement at the beginning and end of the design process. It is therefore assumed that Wave 1 designs will take between 18 and 24 months. This indicates that readiness to commence design work is a key criterion for Wave 1 demonstrator candidates as it is critical to progress at pace. Ideally the selection process would take fewer than three months to enable progress to be made quickly.

The ***implementation*** period will be heavily determined by the following factors:

- **The complexity of the design itself**. This is unknown at present as no designs have yet been developed. It has the potential to vary significantly between neighbourhoods. The complexity of the design will impact the coordination needed between procurements and implementation.
- **Speed of local sign-up**. It is not possible to proceed with procurement until sufficient residents have signed up to the design. This process can only be tested with a viable design, and so the potential variation is unknown.
- **Speed of procurement processes**. This will become repeatable, but at the start it is likely that the market will need additional time to adjust to the novel content of the procurements.
- **Capacity of product and service providers**. Our discussions with providers indicate that there are currently long lead times for some equipment (e.g. heat pumps) and implementation capacity is limited. These factors may constrain the speed of implementation for demonstrators.

All of these factors make it very hard to assess a time period for implementation. The following assumptions (to be tested in the demonstrators), have therefore been made:

- Sign up: 3 months (assuming 250 residents met each week and three meetings to achieve sign-up).
- Procurement: 5 months across all components (based on: 1month to preparing a tender, open call including supplier engagement 2.5 months, evaluation and standstill 1.5 months).
- Lead in: 2 months (based on conversations with suppliers).
- Delivery on ground: 12 months (assuming 20 residences completed each week for retrofit which will be the most intensive part of implementation).

This gives a total of 22 months, plus up to three months for selection, which has been rounded to 24 months for simplicity.

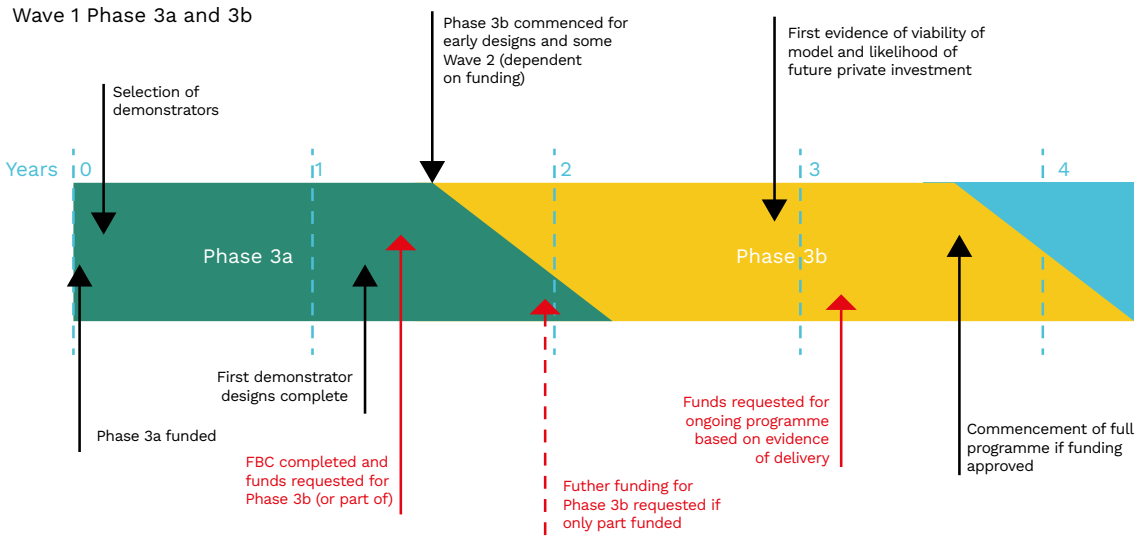
Based on the above, both Phase 3a and Phase 3b have been scheduled to last two years from a budgeting perspective. In reality, some NZN designs will be ready earlier and could progress to Phase 3b should funding be available. Implementation times will also vary; however two years was selected for each phase as this time appears appropriate for most (if not all) projects to move to the end of the phase. This then

provides a timeframe for funding ongoing expenditure, such as the running of the OpCo and FinCo.

This timing is shown in Figure 59. This shows potential funding asks in red.

It is important to recognise that not all designs from Wave 1 have to progress to implementation in Phase 3b, and not all Wave 2 authorities have to progress to design in Phase 3b. What is vital is that enough Wave 1 demonstrators are implemented to prove the model to determine whether full roll-out is appropriate.

Figure 59: Anticipated timeline of activity for Wave 1



Demonstrator quantities

The objective in selecting the number of ***Wave 1*** demonstrators is to ensure proof of concept both in terms of design and implementation.

Discussions with BEIS have highlighted that above the value of £1m, there is very little difference in the processes to go through to obtain funding. BEIS also raised questions as to whether 10,000 residences across 10 demonstrators would be sufficient to prove the concept.

Alongside this, conversations with local authorities have generated a relatively coherent narrative on potential for engagement:

- A small number that are actively engaged in trying to develop place-based implementation of net zero action; and
- A significant group that are interested and would always be open to funding, but have not specifically engaged in this topic.

Wave 1 demonstrators are only likely to come from the first grouping, and so this will likely limit the number of possibilities.

Ultimately the more demonstrators delivered the better the chance of proving the concept and the more learning will be achieved. BEIS have asked for the provision of a range which has been suggested as five to twenty, with a central value of ten demonstrators.

Five is suggested as a minimum that will enable the cohort to cover a number of key characteristics – in particular region, building typology and socio-economic groupings. Fewer than five and it will be very difficult to draw more general conclusions from the demonstrators.

Twenty is recommended as the maximum as it is unlikely that it will be possible to find twenty demonstrators ready to deliver in the first wave. It is likely that some authorities would have to deliver two demonstrators if twenty were funded.

Ten is set as the central number as this provides some redundancy about the minimum of five and reflects the numbers that have been identified through stakeholder engagement.

Wave 2 demonstrator quantities

Wave 2 is envisaged as a group that is prepared to subsequently develop designs, producing a pipeline of designs should the programme be progressed. The core of this is the funding of a small amount of resource for each Wave 2 LA to get up to speed with the model, socialise it within the authority, and begin to assess how this can be developed into a design at the local level. There is not a specific number that is needed to make the programme viable, and it depends on the appetite of funders.

If Wave 2 demonstrators end up being funded through to implementation, then it is likely that the programme will be ramping up. Given this, an order of magnitude number of 25 LAs is suggested for Wave 2 when compared to the central number of ten for Wave 1.

A.3.12 Phase 3a: Demonstrator design & implementation preparation

The aim of this phase is to deliver investment ready NZN designs that are ready for implementation. Separating out the design phase enables BEIS to determine whether the designs are fit for purpose and therefore whether the implementation funding should be assigned. A number of objectives need to be met in meeting this aim:

- Establish both the FinCo and OpCo functions.
- Select the most appropriate cohort of demonstrators.
- Demonstrate the viability of the Net Zero Neighbourhood design process led by local authorities.
- Produce a set of NZN projects that are at a detailed design stage, ready for implementation, and presentable to local residents.
- Identify the appetite among local residents to sign up to a Net Zero Neighbourhood based on the specific local design.

A.3.12.1 Management of Phase 3a

Phase 3a needs to be centrally coordinated by a single entity to ensure that the demonstrator design is fit for purpose and coordination is achieved. This aligns with elements of the OpCo functions that will need to be established. It is recommended that provision of OpCo functions and coordination of the overall Phase 3a is achieved through the coordinating entity being 3Ci. 3Ci is an entity that is representative of and trusted by local authorities, maximising the possibility of collaboration. 3Ci would lead some of this work itself and procure support to deliver the other elements. Table 55 describes the major components of Phase 3a. These comprise multiple activities and will require coordination as they will need to be delivered by multiple parties. The order of magnitude cost to deliver each of these is provided to justify the ask. These values reflect fixed costs of coordinating the programme, and variable costs that relate to the number of demonstrator designs delivered. It is anticipated that there would be minimal variation in the fixed central costs with number of demonstrators, unless the demonstrator numbers are vastly increased.

This gives the following:

- Fixed centralised costs: £4.90m.
- Wave 1 variable costs: £2.00m per demonstrator.
- Wave 2 variable costs: £0.08m per demonstrator.

This gives the following variation if the number of Wave 1 demonstrators is varied:

- 5 Wave 1 demonstrators: £16.9m.
- 10 Wave 1 demonstrators: £26.9m.
- 20 Wave 1 demonstrators: £46.9m[85] .

Table 55: Phase 3a core ask components

Component	What is included?	Delivered by	Outcome	Order of magnitude cost
Set up and skeleton running of FinCo	Set up of an entity ready to receive funds from multiple sources and develOpContracts with residences; Engagement with potential investors for funding of implementation.	3Ci/SPV expert Contractors FinCo once established	FinCo wntity	£0.7m
Set up and initial running of OpCo functions	Set up of technical assistance capacities to support LAs in design and future implementation; Delivery of: Wave 1 and 2 selections; Convening activities; Communications activities.	3Ci/technical expert Contractors	Coordinated	£2.5m
Centralised resources	Acceptance criteria; Property contract; Project assessment framework; Billing mechanism; Fund risk register.	OpCo function, outsourcing where necessary	Key, reusable resources	£1.7m
Wave 1 detailed design	Design of specific place-based Net Zero Neighbourhood across 10 authorities. Work packages: Baseline area; Heating; Energy; Transport; Green infrastructure; Design coordination; Community engagement; Financial design; Local authority Coordination; Design refinement.	Local authorities and OpCo in collaboration, outsourcing where necessary	Detailed designs for NZNs	£20.0m (£2.0m per demonstra-tor)
Wave 2 preparation	Capacity development for 25 authorities	LAs	25 LAs ready to progress a design	£2.0m
Total				£26.9m

85 *Though likely to require some additional funding to OpCo functions of c.£1m*

The critical activities that will drive the programme are explored in the following sections.

OpCo: Demonstrator selection

Selection of ***Wave 1*** demonstrators is one of the major activities that will drive the timings of Phase 3a. It is also vital to the potential success of the demonstrators.

The following process is proposed to maximise speed of allocation and to maximise collaboration. It is not a competitive process which can drive division and slows progress. It is designed to maximise the speed of action as proving the concept is ultimately what will lead to the best outcomes for all interested LAs. As a result, the criteria are broad and do not have absolute values associated with them.

An open call is made to 3Ci members and additional authorities known to be advanced in their thinking and planning on this topic. This open call will highlight the criteria that demonstrators need to meet in order to be ready for funding. These will be:

- Strong understanding of place-based NZN model.
- Existing internal capacity to lead the demonstrator (before funding of further FTEs by Phase 3a) and ability to align across multiple internal functions.
- Provisional place(s) identified with detailed knowledge of area characteristics.
- Member/cabinet support for NZN project.
- Mapping of existing policy and work and how it interacts with an NZN.
- Some funding in place.

Those authorities that believe that they can meet these broad criteria can then put themselves forward to be a demonstrator. If the number of authorities exceeds the specified number by a small amount, then all will be progressed. If there are fourteen or more applicants, then LAs will be requested to pair up where possible to reduce the total number. Alternatively additional funding may be sought to facilitate some additional Wave 1 demonstrators.

If there is a choice between applicants, the criteria the group should consider around the overall make-up of the cohort should be:

- Demonstration of NZN applied to a majority of building construction types.
- Demonstration of NZN applied to all major property ownership arrangements.
- Coverage of the greatest range of socio-economic groupings.
- Regional distribution across a minimum of five of the 12 regions of the UK, including a minimum of one region outside of England.

Alongside this, the potential to maximise success should be considered. Success is likely to be primarily determined by maximising sign-up. There are some factors that are likely to enhance the chances of success of an NZN:

- Avoiding requiring residents to move out of their buildings for any period (which relates to building fabric being of a reasonable standard).
- A sense of community in the area (rather than a highly transient population).
- Either:
    - A social dynamic that is concerned with environmental impact; or
    - A social dynamic that is concerned with quality of community space and infrastructure; or
    - A socio-economic profile that would be very strongly incentivised by reduced energy costs.
- Established local engagement entities which the LA has an established relationship with.
- Spare capacity in the local grid (reducing potential costs associated with grid upgrades if needed).
- Relatively uniform property construction (simplifying design process and therefore enabling a very clear offer to be made to residents).

The group of LAs are asked to come to a consensus decision (if there is an excess of applicants). Any authorities missing out should be paired with another authority.

Selection of Wave 2 demonstrators will depend on the numbers that are interested in becoming part of the wave. It is suggested that given the nature of Wave 2, if more than 25 authorities apply, then a lottery is held rather than any competitive assessment.

OpCo: Convening activities

Throughout Phase 3a the OpCo will be responsible for convening activities. These are set out in Table 56.

Table 56: Convening activities

Cohort	Purpose	Frequency
Wave 1	Sharing of learning experiences Sharing of best practice	Monthly check-in calls Quarterly in-person meetings to explore bigger issues
Wave 2	Sharing of findings from Wave 1 progress Sharing of experience in developing LA capacity	Monthly check-in calls Quarterly in-person meetings to explore bigger issues
Wave 1 and Wave 2	Bring together all LAs engaged in the programme	Annual conference
Broader stakeholders	Engage with widest possible group of interested parties in the development of the work, including LAs, Contractors, regulators etc.	Annual conference (with above) Monthly newsletter Irregular webinars when progress warrants

Central resource: acceptance criteria

A set of 'acceptance criteria' will be required for the programme as a whole to operate if it is rolled out. These criteria are the tool that the FinCo would use to decide whether a proposed project meets the standards for funding. If the criteria are all met, then funding is awarded, if any are not met then there would need to be a re-design. These therefore will be the key tool for driving the direction of NZN design and delivery.

The development of these criteria needs to be established early so that:

- They can be used to determine whether a demonstrator design is broadly complete and can be submitted for implementation funding.
- They can be tested and refined as the demonstrator phase progresses – it is important that they remain largely stable through the programme (to give clarity of design requirements) and so they need to be robust from the beginning of roll-out.

The criteria must cover every aspect of acceptance for projects. They must, as a minimum, address the following factors:

- Criteria for neighbourhood selection.
- Criteria for scale of neighbourhood.
- Criteria for the asset classes addressed by the project.
- Minimum requirements for stakeholder engagement.
- Minimum technical design standards.
- Specified detail for technical design.
- Minimum proportion of signed-up residents.
- Minimum thresholds for value for money.
- Clear delineation of implementation responsibilities between LA and OpCo.
- Minimum budgeting requirements.
- Fundamental checks (grid capacity etc.)

The criteria will be developed throughout Phase 3a.

Central resource: Project assessment framework

A detailed project assessment framework will need to be developed to enable the following:

- Baselining of the neighbourhood for GHG emissions and other factors that will be impacted by anticipated benefits from the programme so that impact can be monitored. This needs to be common across all NZNs' so that data can be collected in a reliable and comparable fashion, enabling the demonstrators to be compared.
- Appropriate monitoring regimes for all factors to be monitored as per the baseline.
- Additional metrics that monitor the overall demonstrator performance.

The metrics identified for monitoring individual projects comprise the following:

Table 57: Individual project metrics

Metrics	KPI/baseline
Local SIC activity data	Baseline at design stage
Energy bill comparisons between NZN costs and conventional costs in area	KPI comparison based on financial design
Vehicle running costs comparison between NZN and non-NZN area	KPI comparison based on financial design
GHG emissions [BEIS]	Baseline at design stage
Local emissions footprint	Baseline research at design stage
kW capacity solar generation installed	KPI based on technical design
kW battery storage capacity installed	KPI based on technical design
Energy generation and storage failure and repair rates	KPI based on programme targets
No. of EV charging points by type	KPI based on technical design
Community fleet profile	Baseline at design stage
EV Infrastructure failure and repair rates	KPI based on programme targets
Proportion of neighbourhood signed up to NZN contracts	KPI based on design plans KPI based on programme targets
No. of residents defaulting on contract payment terms	KPI based on programme targets
EPC ratings	Baseline at design stage
No. of community spaces installed/improved	KPI based on programme targets
Travel mode of local community	Baseline at design stage
Local habitat survey	Baseline at design stage
Local biodiversity survey	Baseline at design stage
Access to green space mapping	Baseline at design stage
No. of heating sources changed	KPI based on design plans
kWh consumption reduction	KPI based on design plans
Building infrastructure failure and repair rates	KPI based on programme targets
No. of secure bicycle storage spaces	KPI based on design plans
No. of trees planted	KPI based on design plans
Area of land returned to organic use (as opposed to built environment – not the organic growing standard)	KPI based on design plans
Return delivered from investment structure	KPI comparison based on financial design
Resident sentiment to NZN project	% approval % recommend to others

This table demonstrates the extent of the metrics that will be needed to monitor the programme. Those in green and bold are those that will require significant effort to build a baseline before the project is implemented, in order to enable a reference state to be determined. The others are less intensive in terms of effort.

The metrics identified for the overall programme should be aggregated versions of the above, with comparisons between demonstrators.

Central resource: Payment obligation mechanism

The implementation of a legal structure which has the outcome of creating a periodic payment obligation on the resident of the property is core to the success of the model. This periodic payment obligation needs to be maintained over a multi-decade period and 'sustained' when owners and/or tenants of the property change. It must be achieved without creating a financial charge on the property, in order to avoid a significant deterrent to participation.

While determining the exact mechanism is a core component of Phase 3a of this project, initial legal advice suggests this is viable. There are three possible options that would need to be thoroughly tested before selection of an initial option for the demonstrators. These are:

- Using the pre-existing Green New Deal legislation and financing mechanism to collect the cost of energy efficiency measures through the utility bill. Complexities arise because this legislation was designed to stimulate a private sector market focused on individual house retrofit (with an associated raft of consumer protection) and here it would be applied to a more centralised model. Further investigation is needed to determine whether this gives rise to any difficulties that would necessitate change via secondary legislation.
- Using a local land charge to create a payment obligation to the local authority, collected through the Council Tax billing mechanism. Complexities come from potentially placing the borrowing onto local government balance sheet rather than into the funding vehicle.
- Using a deed of covenant to create a direct payment obligation to the funding vehicle subject to a stipulation that required the original recipient to procure a matching obligation as a condition of transferring ownership of the property. Complexities come from this being unusual in conveyancing and with cost and administration on each change of ownership.

Once the mechanism has been determined, the billing approach and associated contract can be determined.

Central resource: Property contract

The property contract will be core to the viability of the programme as this will ensure that fees can be charged which will then fund maintenance and repay the investment. It will flow from the payment obligation mechanism.

This resource will need to be developed by lawyers based on the decision about the payment obligation mechanism. The key characteristics of the contract will be that:

- It links payment of a fee to a property so that the fee stays with the property, regardless of change of tenancy or owner
- It enables the clauses of the contract to only be enforceable if a certain number of these contracts have all been signed (if there is not enough take up then the FinCo is not liable to deliver the project).
- It is viable (or variants are viable) for different tenure situations including owner-occupiers, leaseholders, renters etc.

In building the contract it is vital that for each tenure arrangement it is clear which parties will need to be involved in signing and how agreement can be reached.

Wave 1 detailed design

Detailed design will be a collaborative process between Local authorities, the OpCo function, and any additional Contractors either party chooses to engage. £2.0m is identified as required to provide this detailed design. The components of this design are set out in Table 58.

The estimated costings are likely to be higher than would be the case once the programme is established, as design costs can be streamlined, and centralised efficiencies realised. In addition, these have been planned with the intention of ensuring a very high-quality design to maximise the initial chances of success. Once designs have been conducted, there would likely be substantial savings from reducing this headroom. Each design will require a different balance between OpCo and LA capacities, reflecting each LAs' unique situation. This means that it is not yet possible to provide an exact delineation of which design components (and therefore skills) need to be attributed to each organisation. Instead, the balance between the OpCo and the LA will need to be worked out at the commencement of design, with the OpCo confirming the approach and releasing funds accordingly.

However, there will be a core payment to the LA which will provide coverage for core activities. Similarly, there are certain tasks that are highly likely to be led by the LA (such as stakeholder engagement) which have been highlighted in the table.

A vital component of detailed design will be resident engagement. This will need to occur at a minimum of three points on the design journey, but it is recommended that engagement occurs more frequently than that. The three minimum points of engagement are:

- development of initial concept
- checking of first full draft of design for refinement
- confirmation of detailed design

A more successful approach will be to have local representatives regularly involved in design, inspecting progress on a monthly basis or possibly partly embedded in the design team. This should be explored in the demonstrators themselves.

Local residents are not the only grouping that should be engaged, however. Local business grounds, local Contractors and local interest groups should all be engaged early to maximise buy-in to the concept. Ideally there would be additional engagement at the points identified for the community above.

Table 58: Detailed design components

Design work package	Included elements	Key areas for central assistance	Order of magnitude cost
LA coordination	Internal LA capacity; Aligning internal departments as needed; Overall PM of design		£200k
Footprinting and monitoring area	Emissions baseline; Socio-economic profiling; Natural capital baseline	All	£200k
Community engagement	Mapping stakeholders; Resident engagement; Business engagement	Tools for stakeholder mapping	£300k
Procurement plan	Assessment of local capacity to deliver; Plan for procurement process of design		£50k
Heating (space and water)	Surveys of buildings; Design of building retrofit and heating systems (Heat Pump vs Heat Network); Heat network mapping	Heat network mapping	£300k
Energy generation and distribution	Solar PV location design; Battery and distribution system design; Local grid assessment and design	Battery and distribution system design; Local grid assessment and design	£200k
Transport	EV charge point type and location; Survey of community travel needs; Local active travel infrastructure design	Survey of community travel needs; Local active travel and infrastructure design	£100k
Green infrastructure	Green infrastructure planning and design		£50k
Behaviour change strategy design	Review of engagements with neighbourhood; Plan for engagement during implementation (including methods); Assessment of design factors that will maximise sign-up	All	£100k
Community infrastructure design	Review community assets and gap analysis; Confirmation of proposed infrastructure and testing with neighbourhood; Community infrastructure design		£50k
Financial design	Design of financial offer to residents based on cost of implementation; Design of billing mechanism		£100k
Design coordination	Coordinating above design elements; Designing community infrastructure components; Designing any optional elements such as waste/recycling infrastructure		£150k
Design refinement post review			£100k
Contingency			£100k
Total			£2.0m

Wave 2 preparation

Wave 2 demonstrators will be drawn from the wider LA community, regardless of their engagement with place-based, multi-asset concepts to this point. The objective is to get a number of additional LAs ready to design demonstrators and to learn from the Wave 1 demonstrators, providing a pipeline of high-quality designs that can be invested in should the concept be proven.

To prepare the Wave 2 demonstrators for design, the following support will be given to Wave 2 demonstrators:

- Funding for one FTE officer to be the central point of contact and convening within the local authority. They would attend all the 3Ci events and activities, and have capacity to learn from the other demonstrators (of both waves). They would be responsible for advocating for the model internally to build support for the approach, including explaining this to members and senior leadership. They would also have a responsibility to prepare the ground for a design, for example in the identification of area(s) for design, characterisation of these areas, research into local factors such as grid capacity, and initial stakeholder engagement to prepare the ground for future activity.
- Materials and technical advice around the 3Ci model to enable the above work.

This should enable Wave 2 demonstrators to be ready to develop a design in Phase 3b.

A.3.12.2 Phase 3a: Demonstrator journey

The journey that would be undertaken by each **Wave 1** LA would comprise the following core components:

- Determination of structure of project design process (including LA relationship to FinCo and OpCo).
- Initial testing with neighbourhood around project design concept.
- Initial design of project.
- Testing and refining of design (especially with local residents).
- Development of detailed design document.
- Obtaining registrations of interest by residents for the design.
- Development of application comprising detailed design document, funding request, and level of registered interest in project.

The journey that would be undertaken by each Wave 2 LA would comprise the following core components:

- Recruitment of dedicated NZN officer.
- Upskilling of local team in NZN concept and latest thinking.
- Regular sessions with wider cohort of NZN LAs to explore issues and share findings.
- Developing buy-in from authority decision-makers, in particular members.
- Building the evidence base for a demonstrator place, including preparation for design (e.g. place selection, place characterisation, policy mapping etc.)

Details of the project design stage as envisaged in the full programme are provided in the Appendix to this extended case.

A.3.12.3 Viability of delivering Phase 3a

Engagement with multiple authorities has proven that there is appetite amongst many (primarily core cities and London Boroughs) that are engaged in the concept and have an appetite to develop the concept further, with some already committing to developing their own designs. This indicates that it is viable to develop a set of designs with a number of LAs.

Alongside LA engagement, there will need to be design expertise to deliver these designs. This will be available as all of the technical solutions are known quantities and there are design experts available across the UK. They can be obtained through Contractors and consultants, or could be brought in-house by LAs and 3Ci with appropriate recruitment.

It is therefore assessed that there are no major obstacles to delivery of Phase 3a.

A.3.12.4 Phase 3a outcomes

The core outcomes of Phase 3a will be:

- Up to 10 (dependent on BEIS funding) investible NZN designs with buy-in from local communities demonstrating viability of an NZN design approach.
- A FinCo ready to receive and distribute investment to deliver implementation, and funded for first two years.
- OpCo functions established in 3Ci.
- A set of key common components for the programme (including standard contract and billing mechanism).
- A set of up to 25 additional authorities (Wave 2) ready to design future NZNs.

A.3.12.5 Testing focus

The learning on the way to delivering the outcomes is of equal importance to the outcomes. This section outlines the key areas for testing and the way in which they should be tested during Phase 3a. These are shared in Table 59.

Table 59: Wave 1, Phase 3a testing aspects

Testing aspect	Commentary	Testing approach
NZN design process	Testing whether the design process is fit for purpose and efficient, leading to high quality designs.	Review of designs by OpCo following completion, examining the quality and detail. Review by OpCo of variations in resource required (as spread across LA and OpCo) to deliver each design, and lessons learnt from those that require less resource to deliver. This would be mapped across to quality assessment. This should also be mapped against the speed of design to determine efficiency. Survey of LAs by entity outside of programme to review their experience and engagement with OpCo functions, including identification of areas for improvement.
Success of resident engagement (subset of above)	Whilst part of the design process, stakeholder engagement is a critical part that needs specific focus and so is included here. It would include reviewing how best to engage with residents to generate interest in the NZN concept and programme.	Review by OpCo of each approach to stakeholder engagement in NZN design and the variations this led to in community engagement with the design process. This would examine what approaches yield the best engagement and be a core lesson learnt for sharing with future projects and LAs. To achieve this, LAs must maintain detailed records of stakeholder engagement, in particular, the relative engagement of different components of the population when looking at demographics.
Acceptance criteria	If the programme is developed further, the acceptance criteria will effectively drive the designs as these criteria must be met to receive funding. Reviewing the acceptance criteria developed during Phase 3a against the actual designs delivered will enable these to be refined from lessons learnt in the design stage.	OpCo review of acceptance criteria against the end designs to identify where criteria may be too stringent, too relaxed, or missing. This then can lead to a refined set of acceptance criteria that will be used in future phases.
Resident appetite for NZN	Testing how much sign-up might be achieved (in principle) indicating whether an NZN is viable.	OpCo review of LA collected expression of interest figures. These should be mapped against a number of key factors: socio-economic distribution, building typology, saving level offered, approach to engagement, and contents of NZN design. Some of these will be qualitative. OpCo should then survey a sample of residents who have and have not signed up to review their reasons for signing up to identify how designs can be improved to increase sign-up. This will require records of engagement and permissions for contact to be kept by LAs.
Wave 2 readiness for design work	Following the engagement and support activities, as well as the dedicated resource, an assessment of the impact this has had on the readiness for Wave 2 demonstrators to design NZNs is needed.	OpCo assesses the Wave 2 demonstrators against the criteria that are to be used to determine Wave 1 demonstrators.

A.3.13 Phase 3b: Wave 1 implementation, Wave 2 design

The aim of this phase is to deliver implemented NZNs, (ideally) proving the concept and driving the future financial model by demonstrating returns for potential investors. To achieve this, a number of objectives need to be met:

- Expand the central OpCo and FinCo functions.
- Test the viability of the implementation process.
- Test the willingness of neighbourhood residents to contract with the FinCo for an NZN scheme.
- produce a set of NZN projects that are implemented and begin generating a return which can then demonstrate (or otherwise) the overall viability of the concept.
- Produce a set of additional designs that are ready for implementation.

A.3.13.1 Management of Phase 3b

Phase 3b once again needs to be centrally coordinated by a single entity to ensure that the demonstrator implementation is fit for purpose and coordination is achieved. Unlike Phase 3a, this phase sees the introduction of investment funds into the programme. The concept is that these should be managed by the FinCo. This phase therefore needs to be the responsibility of the FinCo; however, the OpCo is envisaged as the FinCo's representative, and so will effectively be the coordinator of Phase 3b on behalf of the FinCo.

In Phase 3a it was recommended that 3Ci provide the OpCo functions. At this stage it might be appropriate to move these to a separate entity owned by 3Ci due to the much greater scale of work being undertaken, as it would provide a simple, clear structure. The core ask for this phase is shown in Table 60. The order of magnitude cost to deliver each of these is provided to justify the ask. These values reflect costs of coordinating the programme, and variable costs that relate to the number of demonstrators implemented, and new demonstrators designed. It is anticipated that there would be some variation in the central costs with number of implemented demonstrators, which is reflected below.

This gives the following:

- Centralised costs: £8.9m of which £1.5m varying with Wave 1.
- Wave 1 variable costs: £39.0m per demonstrator.
- Wave 2 variable costs: £1.7m per demonstrator.

This gives the following variation if the number of Wave 1 demonstrators is varied:

- 5 Wave 1 demonstrators: £220.2m
- 10 Wave 1 demonstrators: £415.9m
- 20 Wave 1 demonstrators: £807.4m

Wave 2 variation is not explored as it does not dramatically impact the much greater costs of Wave 1 variation.

Table 60: Phase 3b core ask components

Component	What is included?	Delivered by	Outcome	Order of magnitude cost
Expansion and operation of FinCo	Expansion of FinCo to be able to contract with Contractors and residences, to manage invested monies, and to solicit for additional private investment to replace government money and for future programme investment.	FinCo once established	Investment into projects	£3.3m
Establishment and operation of OpCo functions in dedicated 3Ci owned entity	Establishment of dedicated OpCo organisation, support for Wave 1 implementation, support for Wave 2 design, procurement of additional expertise as needed, reporting on progress, representation of FinCo.	3Ci/technical expert Contractors OpCo once established as separate entity	Coordinated programme	£5.6m
Wave 1 implementation	Implementation of design developed in Phase 3a (capital expenditure), operational budget for LA oversight and ongoing stakeholder engagement.	Contractors funded by FinCo and overseen by OpCo and LA	Implemented NZNs and associated funding flows	£390.0m (£38.0m capital and £1.0m operational per demonstrator)
Wave 2 design	Design of specific place-based Net Zero Neighbourhood across 10 authorities. Work packages: Baseline area; Heating; Energy; Transport; Green infrastructure; Design coordination; Community engagement; Financial design; Local authority coordination; Design refinement.	Local authorities and OpCo in collaboration, outsourcing where necessary	Detailed designs for NZNs	£17.0m, assuming 10. (£1.7m per demonstrator –reduced from £2.0m to reflect efficiencies)
Total				£415.9m

The critical activities that are additional to those in Phase 3a are explored in the following sections.

A.3.13.1.1 FinCo: Contract with residences

To get the model to work, the contract (as developed in Phase 3a) will need to be signed between the FinCo and residents. This will require a careful and supported process. This is envisaged as:

- Once funding is awarded, an agent of the FinCo joins the stakeholder engagement team to go to each residence and meet to discuss the contract and the projected impact for that residence. In particular:
  - The work that will be conducted, its timing and likely level of disruption to the residents.
  - The projected financial impact of the programme for the residents.
  - The broader changes that will be delivered to the community.
- Following this sharing of information (which will also be provided in physical and/or electronic form), residents will be given one month consideration time where there is a free-to-call source of information for Q&A and additional visits can be requested. If residents are convinced they want to sign up, they can do so.
- Following the consideration period, the FinCo agent will return to identify whether the resident wishes to sign up. It is vital this is the same person in order to create a sense of trust. If the residents are still undecided, a further month is given to consider further with the same support available.
- A final (third) visit is made to make a final decision. If the decision is no, then residents are informed of the additional round of sign-ups that can happen (assuming the programme will go ahead)

In all of these meetings, it will be made clear that residents can and should bring a trusted advisor with them if they wish. If they would like one but do not know who to approach, then a community organisation is recommended to support them.

For those that agree to the proposal, the contract will be signed between the FinCo and the residents.

A.3.13.1.2 OpCo: Convening activities

Throughout Phase 3b the OpCo will be responsible for convening activities. These are set out in Table 61. These are broadly the same as Phase 3a.

Table 61: Convening activities

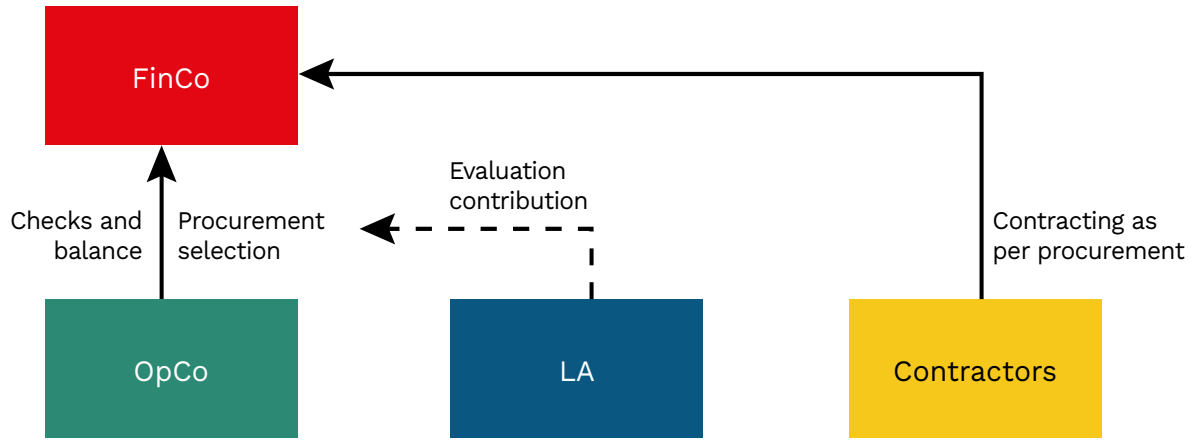
Cohort	Purpose	Frequency
Wave 1	Sharing of learning experiences Sharing of best practice	Monthly check-in calls Quarterly in-person meetings to explore bigger issues
Wave 2	Sharing of findings from Wave 1 progress Sharing of learning experiences Sharing of best practice	Monthly check-in calls Quarterly in-person meetings to explore bigger issues
Wave 1 and Wave 2	Bring together all LAs engaged in the programme	Annual conference
Broader stakeholders	Engage with widest possible group of interested parties in the development of the work, including LAs, Contractors, regulators etc.	Annual conference (with above) Monthly newsletter Irregular webinars when progress warrants

A.3.13.1.3 Wave 1 implementation

The implementation component will implement the designs developed in the previous phase. The detail of these designs will only be identified once they have been developed in Phase 3a.

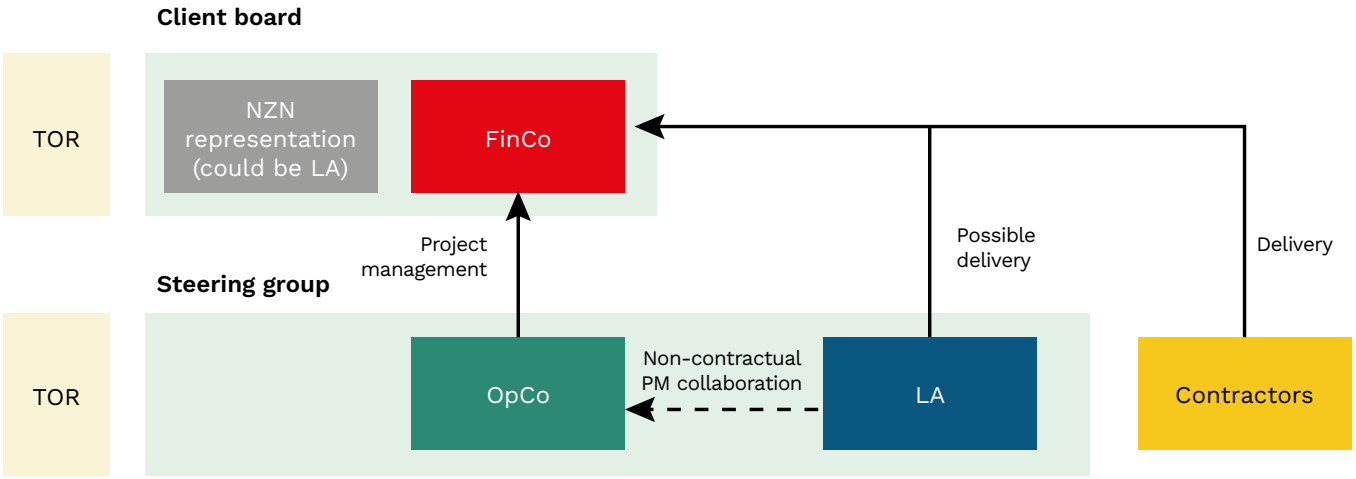
Implementation will be managed in two stages: procurement and implementation. Both of these stages are structured in a similar way. Management of procurement is shown in Figure 60. This demonstrates that the FinCo is the contracting entity, but that the OpCo conducts the procurement with LA support for evaluation. The procurement is conducted according to the specifications set out in the design delivered in Phase 3a.

Figure 60: Management of procurement



Following procurement, implementation will be managed as shown in Figure 61. This shows that implementation will be managed by the OpCo on behalf of the FinCo, and the LA can contribute to project management as part of the steering group. The client is effectively the FinCo, but a board is created that includes NZN representation.

Figure 61: Management of implementation



A.3.13.1.4 Wave 2 designs

These will follow the same pattern as the Wave 1 designs, just with refined knowledge and understanding.

A.3.13.2 Phase 3b: Demonstrator journey

The journey that would be undertaken by Wave 1 LAs would comprise the following core components:

- Commencement of procurement for implementation delivery.
- FinCo signing of contracts with residents for their properties.
- Confirmation of buildings for implementation.
- Implementation of changes.
- Snagging process before completion.
- Completion of implementation and sign-off of works.
- Activation of payment clauses in property contracts.
- Monitoring and evaluation against the set objectives of the demonstration – ensuring that we can answer the open questions that motivated the running of demonstrators in the first place.

The journey that would be undertaken by ***Wave 2*** LAs would comprise the same components that those in Wave 1 undertook in the previous phase.

Details of these journeys as envisaged in the full programme are provided in the appendix to this extended case.

A.3.13.2.1 Viability of delivering Phase 3b

Phase 3b differs from Phase 3a in terms of implementing the designs. This requires equipment and skills that are explored in the Commercial Case. At present it is likely that there are limits to the availability of these skills and equipment, and therefore early signalling to the market of the potential needs of Phase 3b will be vital to ensure that sufficient responses can be provided to the procurement processes.

The viability of this phase also depends on the buy-in from residents into the programme. This will have been tested in Phase 3a, but only acted on in Phase 3b. There is a threat that numbers actually signing up to the programme are dramatically down on those that indicated interest in Phase 3a. If this is the case then the viability of Phase 3b will be severely challenged, potentially preventing delivery. In this instance, there would need to be a process of research to identify what is leading to low sign-up, and designs altered to reflect these findings, with another attempt to raise the sign-up rate. It is therefore assessed that there are two potential obstacles to successful delivery of Phase 3b:

- lack of capacity in the market to deliver on implementation; and
- poor sign-up among communities

Management of these risks will be fundamental to successful delivery of Phase 3b. However, if these cannot be overcome, Phase 3b can be aborted before capital expenditure has been delivered.

A.3.13.2.2 Phase 3b outcomes

The core outcomes of Phase 3b are intended to be:

- Up to 10 implemented NZNs starting to generate income, proving model concept in practice and de-risking model for investors. Following the two-year period, these will tangibly deliver:
    - Infrastructure in each local area across multiple asset classes, including at a minimum, building decarbonisation, transport decarbonisation, and green infrastructure.
    - A significant proportion of neighbourhood residences signed up to the programme with reduced bills.
    - Contracts between the FinCo and residents for a comfort service.
    - Contracts between the FinCo and maintenance Contractors for maintenance of infrastructure.
- A FinCo capable of:
    - receiving and spending investment
    - contracting with Contractors
    - contracting with properties
    - receiving revenues from property residents
- An OpCo capable of:
    - supporting LAn NZN designs
    - project managing NZN implementation
    - coordinating the programme
    - ensuring value for money for the FinCo
- A set of additional designs from Wave 2 demonstrators ready for investment.
- An assessment of the likelihood of financial returns from the model.
- An assessment of the potential GHG emissions savings of the implemented NZNs.
- An assessment of the potential co-benefits associated with the implemented NZNs.
- An assessment of how to maximise local uptake of the model, include barriers to overcome and techniques for driving up engagement.

Together, these should provide the foundations for programme roll-out (Phase 4), should the model demonstrate viability in practice.

A.3.13.2.3 Testing focus

Phase 3b will test further questions, some of which are already addressed in the outcomes above. These are shared in Table 62.

Table 62: Wave 1, Phase 3b testing aspects

Testing aspect	Commentary	Testing approach
NZN implementation process	NZN implementation process Testing whether the implementation process is fit for purpose and efficient, leading to high quality implementation. Including an assessment of the variation in implementation processes.	• Review by OpCo of variations in resource required (as spread across LA and OpCo) to implement each design, and lessons learnt from those that required less resource to implement. This should be mapped against the speed of implementation to determine efficiency. • Review of OpCo PM approach by external entity to review practices and make recommendations for refinement. • Survey of LAs by entity outside of programme to review their experience and engagement with OpCo functions, including identification of areas for improvement.
Design quality	Testing the quality of designs as implemented and whether the acceptance criteria need to be further revised.	• Review of implemented designs by OpCo following completion, examining the quality of outcome and comparison to designs. This would include an assessment of the variation from design to implementation.
Contractor capacities	Testing the capacity and capability of existing and potential Contractors to deliver NZN implementation.	• Review by OpCo of number of viable tenders received for each NZN and the likely capacity this demonstrates in the market. • A survey by OpCo of Contractors that submitted tender responses to determine capacities and how these map onto NZN projects.
Speed of implementation	Testing the speed of the implementation process and how this is impacted by procurement processes.	• Review by OpCo of variance in time between tendered implementation plans and delivered implementation timescales. • Review by OpCo of variation in implementation timings across the demonstrators and drawing lessons learnt from those that are quicker.
Financial returns	An assessment of the success of the likelihood of financial returns from the model.	• Review by FinCo of receipts from residents relative to projected investment model. This would deliver an assessed rate of return for each NZN and collectively. There would also be a review of the amount of revenue that could be raised given a specific rate of return, projecting the extent to which outcome-seeking capital would be needed to fund the programme.

Testing aspect	Commentary	Testing approach
GHG impacts	An assessment of the potential GHG emissions savings of the implemented NZNs.	• Review by OpCo of the anticipated GHG emissions impacts. The footprinting of each area will have been developed in Phase 3a. This is anticipated to include a number of proxy indicators for review of progress, for example, number of heat pumps installed. These proxy indicators along with emissions factors will be used to develop a projected footprint for each area following implementation. These emissions can then be compared to the original footprint and used to provide a provisional estimate of current savings. • Review by OpCo of the GHG emissions that can potentially be reduced through the NZN. This is an assessment of the sources of emissions that could be eliminated if behaviour change is fully delivered. It is the potential of the NZN (even if not realised).
Co-benefits	An assessment of the potential co-benefits associated with the implemented NZNs.	• Review by OpCo of the anticipated co-benefits of the NZN. Alongside GHGs, other factors such as employment and air quality will have been footprinted in Phase 3a, and updated footprints will be developed where data is possible to provide a first assessment of potential co-benefit impacts.
Review of resident uptake	An assessment of how to maximise local uptake of the model, include barriers to overcome and techniques for driving up engagement.	• Review by OpCo of resident uptake figures and the level of engagement required to achieve these. For example what proportion of eligible residences signed up after one meeting, after two meetings and after three meetings etc. • Survey by OpCo of LA engagement teams to identify what factors influenced contract signing.
Resident views	An assessment of what residents think of the programme and what their experience has been. Have they made a good choice? What is the actual difference like? How does that compare to what was suggested?	• Survey by external Contractor to obtain resident views on the programme and benefits, and how they talk about it to others. Effectively an assessment of whether there will be good 'word of mouth'.

A.3.13.2.4 Delivering demonstrators plan

The delivery of the demonstrator programme depends primarily on funding being made available for Phase 3a and, ideally, for Phase 3b as well. There are multiple potential sources from which funding could be secured, but to operate the demonstrator programme fully, the majority will need to be obtained from HMG, which is the focus of the OBC.

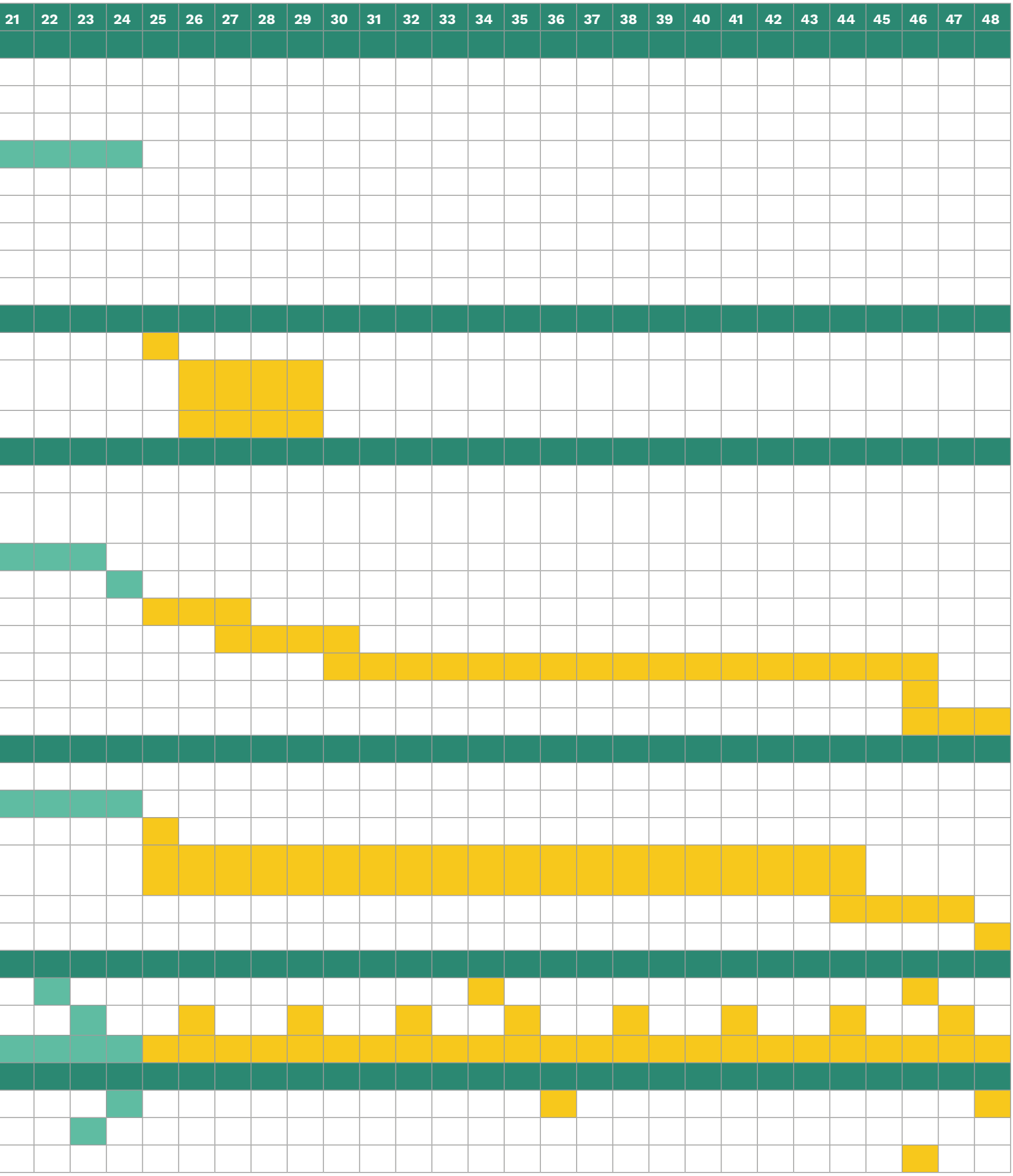
If funding is released as a result of the OBC, the timing is still uncertain as to when this will occur. However, the core roadmap of actions once this occurs is shown in Figure 62. This is provided in gantt chart form to provide a visual representation of the key tasks and their relative order. Where relevant, the delivery entity is identified. The teal colour indicates Phase 3a and the orange Phase 3b, though the two phases will likely somewhat overlap.

This demonstrates that there is substantial work after initial funding to commence the demonstrators and prepare central resources.

Detail of the design process is provided in the appendix to this extended case.

Figure 62: Indicative demonstrator roadmap

Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Phase 3a preliminary actions																				
Funding released																				
3ci establishes OpCo function																				
3ci procures central resources																				
Acceptance criteria																				
Property contract																				
Project assessment framework																				
Billing mechanism																				
Fund risk register																				
3ci establishes FinCo																				
Phase 3b preliminary actions																				
(Funding released)																				
Separate and expand OpCo function																				
Expand FinCo function																				
Wave 1																				
Wave 1 demonstrator selection																				
Local authority led demonstrator design																				
OpCo review of design																				
Design approval																				
FinCo contracts with residents																				
Procurement																				
Delivery (and oversight)																				
Commissioning of equipment																				
Commencement of fee collection																				
Wave2																				
Wave 2 demonstrator selection																				
Capacity building																				
Invitation to design																				
Local authority led demonstrator design																				
OpCo review of design																				
Design approval																				
Convening																				
Annual conference																				
Wave 1 and 2 gatherings																				
Monthy calls																				
Reporting																				
Annuai review																				
(Request for Phase 3b funding)																				
Implementation reporting																				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Of course, there is no guarantee of funding being obtained from central government, and there are still useful activities that could be undertaken to prepare for funding when it is obtained and/or increase the likelihood of other funding sources becoming available to engage in this model. This includes:

- Identifying and further supporting a cohort of authorities that are engaging with this concept to ensure they are as design-ready as possible, or have possibly even started designs.
- Preparing some of the central resources if some budget is available, with a particular focus on the contract and the billing mechanism.
- Continuing conversations with private investors, sharing the case that has been built in Phase 2.

A.3.13.2.5 Entities to Engage

The entities (stakeholders) that 3Ci would need to engage with to deliver the demonstrators include:

- Local and regional authorities
- National government entities (BEIS, DLUCH etc.) to ensure policy framework is appropriate and supportive
- Legal experts (for contract and billing)
- Energy industry experts (for billing)
- Professional entities and representative bodies
- Technical experts (for acceptance criteria and project assessment framework)
- Social impact experts (for acceptance criteria and project assessment framework)
- Private Investors
- Outcome buyers (e.g. wastewater companies)
- Suppliers

Alongside these, each LA developing a design will need to engage with:

- local residents
- local resident groups
- local businesses
- local business groups
- local technical and social impact experts
- enabling institutions such as universities, colleges etc.

Appendix II

A.4.1 Additional appendix for the extended OBC: Detailed project stages

A.4.1.1 Project structure and governance

The following five project stages are planned:

Project Stage 0 – LA preparation

Core objectives

The core objectives of this project stage is to support LAs to become ready to apply to the NZN programme.

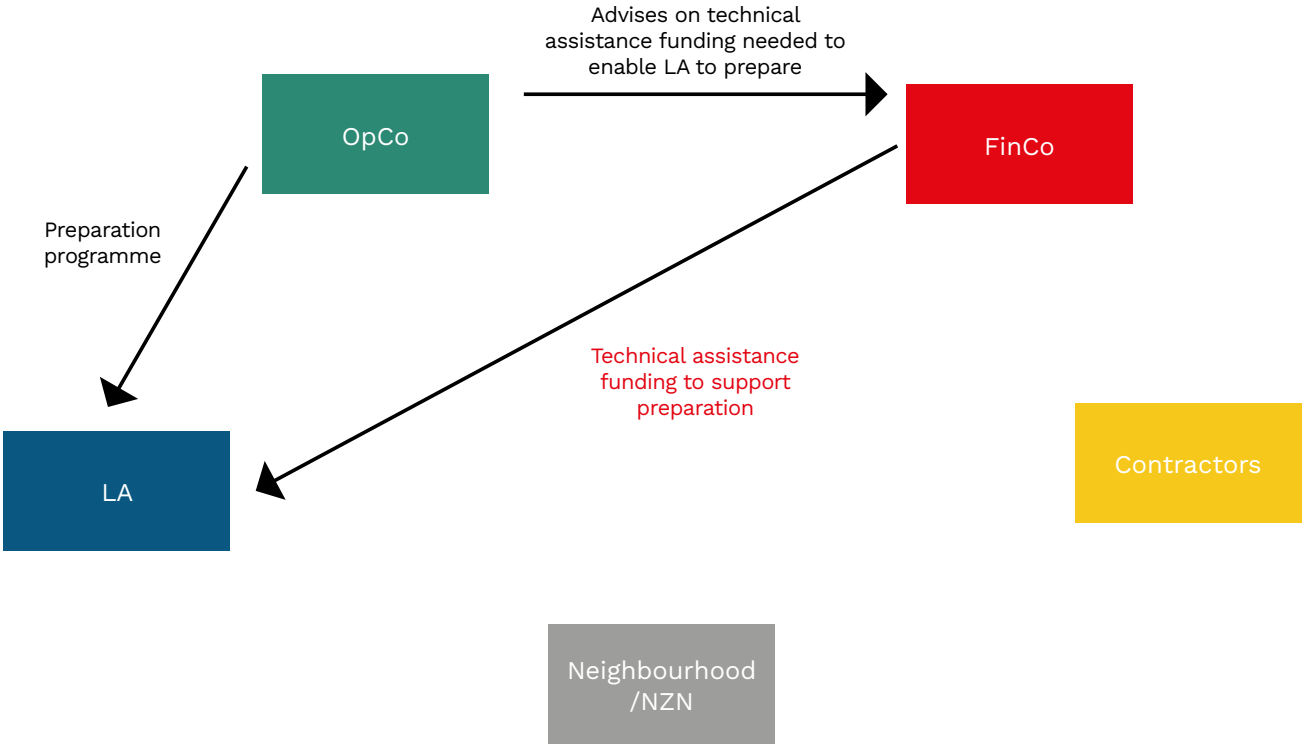
Key outputs

LAs with the knowledge, skill,s and capacity to make a quality application to the NZN programme, with the support of the OpCo.

Stage relationships

The major relationships in this stage are set out in Figure 63. This is a relatively simple stage and so there are few relationships to set out.

Figure 63: Stage 0 relationships



Actions to deliver stage

The OpCo would develop a preparation programme and deliver this to LAs, with support from other LAs that can bring their experience to the shared learning process. The OpCo could deliver this preparation programme to tranches of LAs, enabling cohorts to share their learning together and build communities of practice around this work.

The content of the preparation programme would include:

- An NZN primer. An explanation of the concept, key principles and practical implications of the programme. This would include an exploration of why the programme was worth engaging in and how it aligns with policy priorities at both national and local levels.
- NZN design principles and practice. This would be a component that supported LAs to develop understanding of the skills and knowledge needed to develop an NZN design and application. It would explore the extent to which an LA would need or wish to hold skills in-house and the extent to which it would seek to draw on support from the OpCo. It would also address the criteria that need to be met for a successful NZN design and the major challenges and how to overcome them for a design to be successful.
- NZN stakeholder engagement. A specific component that examines the approach to stakeholder engagement – in particular neighbourhood engagement – and how to design this for a successful NZN design and delivery. This would include lessons learnt from other LAs and their engagements, and a particular focus on typologies of neighbourhood and the different approaches that are likely to yield good engagement in each.
- NZN team design and implementation. This component would support the LA to build a team internally that could interface with the OpCo and develop applications. This team may need grant funding from the FinCo to achieve depending on the LA and its existing structure. The design and implementation of the team would be unique to each LA but would also need to deliver a set of basic skills. Once the team was established, this would be the trigger that enabled LAs to move on to making potential applications.

Timings

This preparatory programme would be run cyclically with cohorts working through it together. New programmes could be started perhaps four times a year and last around six months depending on the level of support a LA requires. Cohorts on each programme could be perhaps twenty strong, giving a good number to support each other without being excessively large to support properly by the OpCo. The exact scales and timings of this stage would need to be tested in the demonstrator phase.

Project Stage 1 – Project Start up

Core objectives

The core objective of this project stage is to deliver high quality NZN project proposals that are accepted for funding by the FinCo.

Key outputs

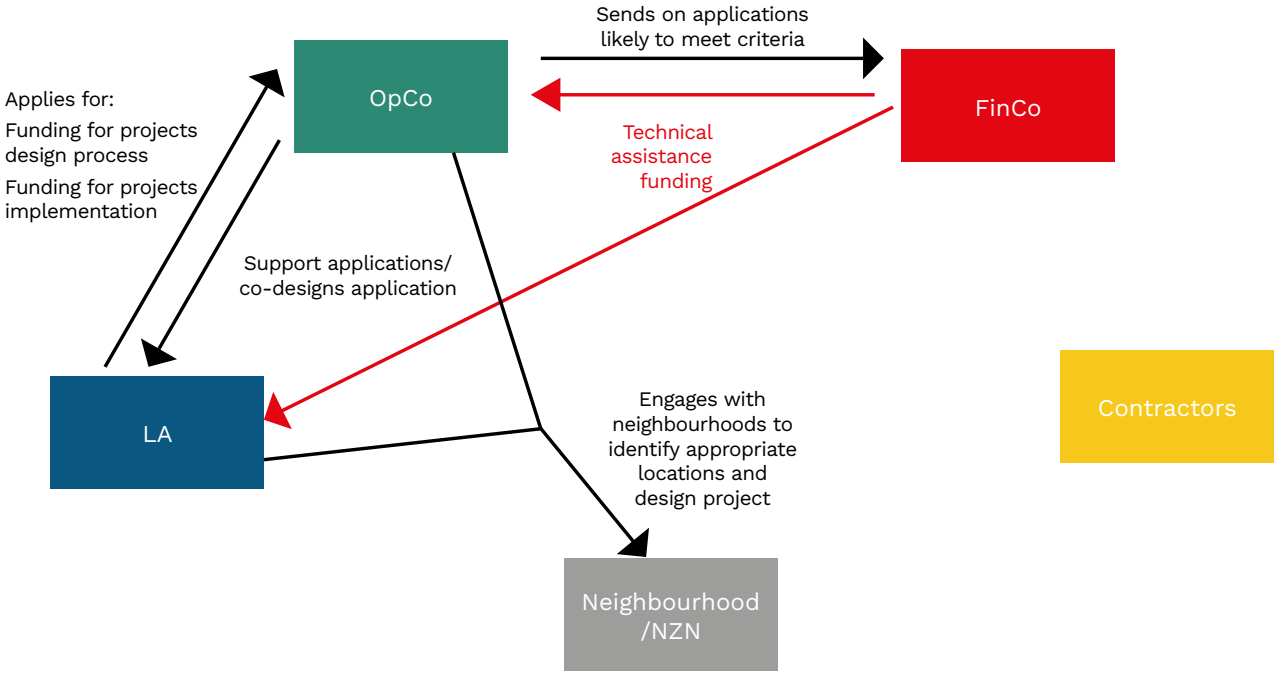
At the end of this stage, there would be for each successful project:

- An allocated OpCo project manager for specific NZN project.
- A detailed design for the project.
- An implementation plan that identifies the balance of support to the project between the LA and the OpCo, in particular which party will take overall responsibility for delivery.
- Registered interest from residents and businesses in the project.
- An agreement of funding from the FinCo.

Stage relationships

The major relationships in this stage are set out in Figure 64. As can be seen, the majority of interaction will be between the local authority and the OpCo, with collaboration between them in engaging with the Neighbourhood.

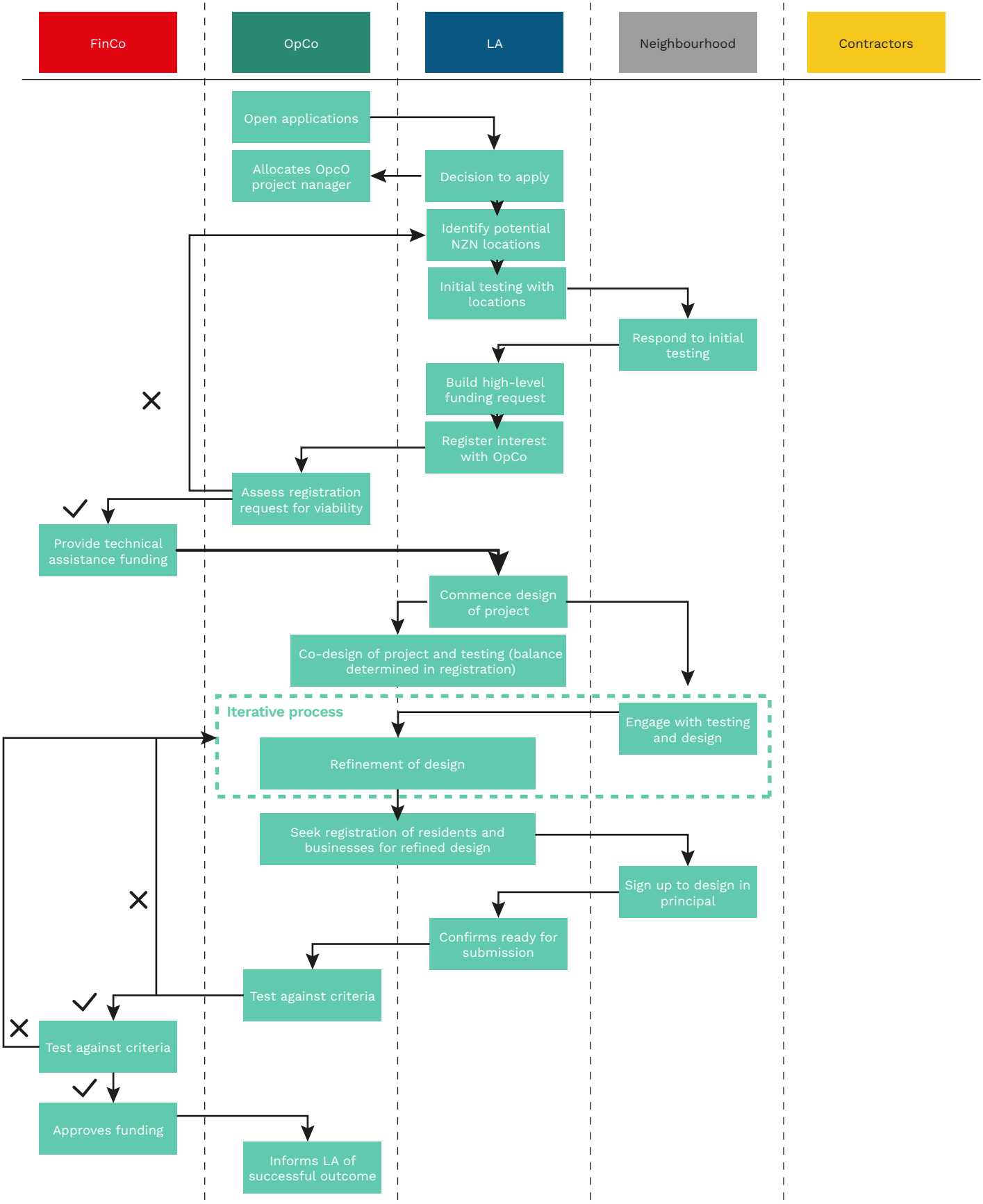
Figure 64: Stage 1 relationships



Actions to deliver stage

This stage requires a number of activities to occur in order to meet the objective and deliver the outcomes required. The broad flow of these actions is shown below in Figure 65.

Figure 65: Stage 1 actionsflow



This demonstrates the flow of activities. As can be seen, the majority of the activity in this stage is undertaken by the OpCo and the LA, often in collaboration. Nonetheless, there is extensive neighbourhood engagement required to ensure the design is correct.

This also demonstrates that there are two sets of applications to be made to the FinCo for funding:

- **A registration application**. This application is relatively light as it is for technical assistance funding for the LA/OpCo to develop the design of the NZN. This application will include:
  - A suggested location for the NZN with justification as to why it is viable.
  - A suggested balance of design effort between the OpCo and the LA, with justification.
  - An indication as to which entity (LA or OpCo) will be the lead designer (and therefore what the contracting arrangement will be).
  - Any lessons learnt from previous projects that will be incorporated into the design.

Figure 66: Stage 1 activities - detail

				Project Stag
Activity	**Action owner(s)**	**Action**	**Supporting entities**	**Platform rol**
1	OpCo	Opens applications for funding and actively advertises to LAs and approaches LAs to put in requests. There will be maximum capacity of support from the OpCo and so this will be limited in numbers at any time.		Application all the infor LAs for an a
2	LA	Decision to apply.	OpCo	
3	LA	Identification of viable places and testing with these neighbourhoods to determine potential viability of project.	OpCo	
4	LA	Develop high-level funding request and register interest in applying, demonstrating meeting of any minimum criteria and proposed design lead (LA or OpCo).	OpCo	Registration
5	OpCo	Reviews registrations to confirm appropriateness of applications.		
6	FinCo	Reviews registrations and provides grant funding for project design to those registrations that pass OpCo assessment.		Mechanism award.

- **A full funding application**. This application is a detailed process seeking full capital funding for the NZN project. It is submitted by the LA even if it has been principally designed by the OpCo on the LAs behalf. This application will include:
  - The detailed design of the project, including location and interventions
  - Levels of interest reported from the neighbourhood
  - Procurement specification
  - Budget
  - Recommendation for NZN representation on client board

Once Technical Assistance funding is awarded, the most important component of the flow is the iterative design process whereby the LA and OpCo collaborate on developing the detailed design. The iterations arise out of the need to refine with the neighbourhood, particularly in regards the specific measures that will be included in the NZN implementation.

The detail of the activities involved in this flow is shown in Figure 66.

ge 1: Start up			
le	**Neighbourhood engagement**	**Notes**	**Testing opportunities for demonstrators**
portal providing mation needed to pplication.			How should this be communicated to LAs?
		Decisions supported by OpCo and other LAs. LA informs OpCo of decision and at this stage the OpCo allocates a project manager that supports the LA throughout the following process.	What does LA need in order to make decision?
	Focused testing of initial resident interest for the programme.		What is the correct approach to engaging with residents and businesses at this early stage?
process.			What should the minimum criteria be for determining whether the LA should receive support to develop an application?
		If not appropriate, returns registration request to LA with feedback for improvements.	
for informing of			What level of support do LAs need for this?

				Project Stag
Activity	**Action owner(s)**	**Action**	**Supporting entities**	**Platform rol**
7	LA	Development of full project application with support of OpCo. The extent of skill support from the OpCo will depend on LA capacity. It may be that OpCo support is embedded in the LA team during this period. Minimum contents of application will include: • Neighbourhood identification (following initial community engagement) • Programme detail design including which optional components are included (will require detailed community engagement) • Detailed specifications for goods and services including engineering design of interventions • Identifies if an LA entity plans to deliver any of the project itself (e.g. construction or maintenance) • Assessment of support needed from OpCo for implementation and the respective roles of the LA and OpCo in the proposed project (unique for every project) • Anticipated Benefits • Projected budget (based on standardised cost provided by OpCo) • Assessment against key failure factors that could prevent success (e.g. grid capacity)	OpCo	Communica OpCo and L
8	LA	Seeks registration of interest from residents based on detailed design of programme - this is used to refine estimates of scale and budget requirements.	OpCo	Registration process
9	LA	Submits application.		Submission
10	OpCo	Reviews submissions for adherence to standards and requirements set out for the programme. These will include potential impacts and value for money. Applications that fall short of these are sent back to LAs with an exaplanation as regards how they need to be improved. The OpCo will support this. Those that meet the criteria move onto the next activity.		Review feed
11	FinCo	Reviews submission against criteria and tests price assumptions. If criteria met then the project is approved and moves on to the next step. Funds are ringfenced within the FinCo for the project. If criteria not met then sent back to OpCo highlighting why criteria are not met.		Review proc FinCo and m FinCo and C
12	OpCo	Informs LA of successful outcome and next steps.		Award notifi

Timings

It is likely that the OpCo will only have capacity to support development of a finite number of projects at a time, even when the programme has scaled up extensively. This means that there will be periods when it is possible to start an application and periods when applications would need to be closed. There should be at least two rounds of application commencements possible each year to enable a steady flow of new applications to the programme, but to ensure that the capacity of the OpCo is not exceeded. The numbers in each round of applications can increase as the OpCo capacity increases.

ge 1: Start up			
le	**Neighbourhood engagement**	**Notes**	**Testing opportunities for demonstrators**
tion between A as needed	Initial engagement followed by detailed engagement to determine appetite for programme and components for inclusion.	This will be an iterative process whereby a design is developed, then tested, then refined. There may need to be multiple iterations. As an application is supported by the OpCo, it should be possible to ensure that the application is of sufficient quality before submission. If it is not, then the proposal can be resubmitted twice more, after which if it has still failed it will need to await a new round. OpCo will need to have access to a number of skills to deliver this, many of these could be third parties on a framework that can be commissioned to help the design of the NZN.	How much of each skill do the LAs need to be supplied from outside their organisation?
of interest	Registration of interest engagement	No commitment is made at this stage, but it could perhaps come with some benefits (financial) for those that register AND commit to the project in Stage 2.	
portal			
back capture		As the OpCo will have supported the application development, it is anticipated that rejections at this stage would be limited in proportion to applications. Failed applications return to activity six.	What is the right balance of criteria? Are the criteria fit for purpose?
ess support for nessaging between pCo			What is the right balance of criteria? Are the criteria fit for purpose?
cation process			

The length of time that this stage will last is not fixed as it will depend on many factors, including:

- The quality of the proposal.
- The response of the selected neighbourhood.
- The capacity of the LA to develop the proposal.

As a result, this stage is anticipated to last between 12 and 24 months. It is also anticipated that this stage will become quicker as the programme progresses and the entities involved develop knowledge and experience of the process.

Project Stage 2 – Project implementation

Core objectives

The core objective of this project stage is to implement the accepted NZN project proposal to the point that contracts with residents can be activated for payment with all equipment installed and commissioned.

Key outputs

At the end of this stage, there would be for each successful project:

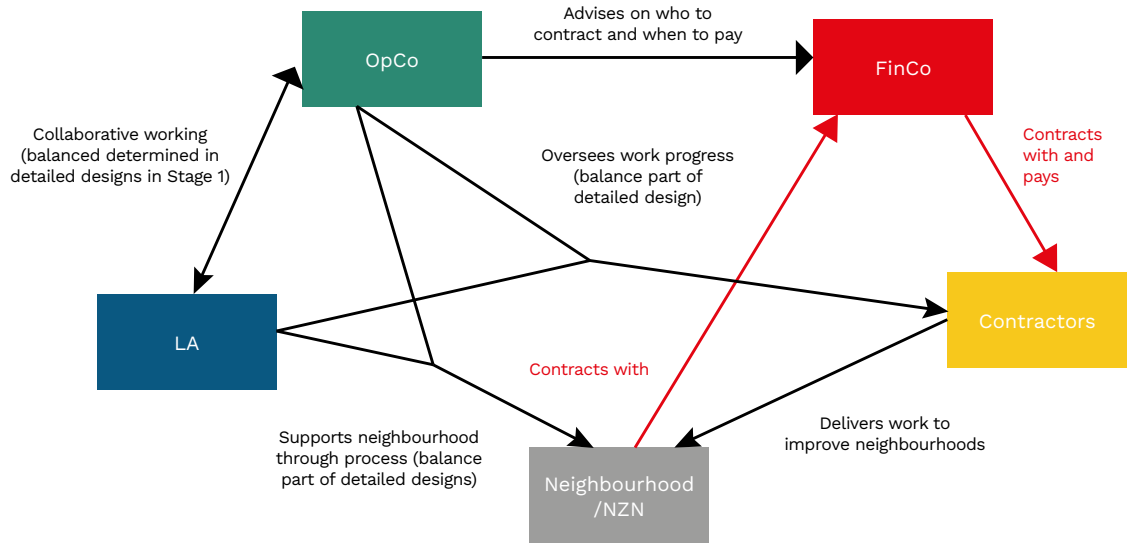
- Fully installed, commissioned, and working equipment/changes.
- Contracts between the FinCo and all engaged residents and businesses in the NZN.
- Activated payment clauses with residents and businesses.
- New, revenue generating infrastructure owned by the FinCo.
- Completed contracts with Contractors for delivery of the new equipment and changes.

Stage relationships

The major relationships in this stage are set out in Figure 67. Ongoing technical assistance funding from the FinCo to the LA and the OpCo for supporting delivery is omitted for simplicity.

This is the first stage when there are interactions between all major entities or groups of entity. Once again, the majority of the activity is undertaken by a combination of the LA and the OpCo. The exact balance of this activity will have been designed and agreed as part of the detail design of the project in Stage 1.

Figure 67: Stage 2 relationships



Actions to deliver stage

As with Stage 1, this stage requires a number of activities to occur in order to meet the objective and deliver the outcomes required. The broad flow of these actions is shown in Figure 68. As demonstrated in the diagram, this is a stage with extensive interaction between the major entities. If there has been poor design in Stage 1, then this flow of activities is very likely to expand to include project redesign – which would severely lengthen the project timescales. This is why it is vital that Stage 1 delivers a workable detail design that is ready for implementation, and why that stage includes significant design iteration.

There are a number of activities where there is a potential for either the LA or the OpCo to take a lead. The exact decision over this will need to be made in the detailed design of the programme as it is critical that there is an ultimate accountable entity for delivery of the project successfully. Even where the LA takes a major role in implementation oversight, the OpCo will take an ultimate review role as it will be responsible for advising the FinCo that payments should be made at delivery milestones for implementation.

The detail of the activities involved in this flow is shown in the subsequent Figure 69.

Figure 68: Stage 2 actions flow

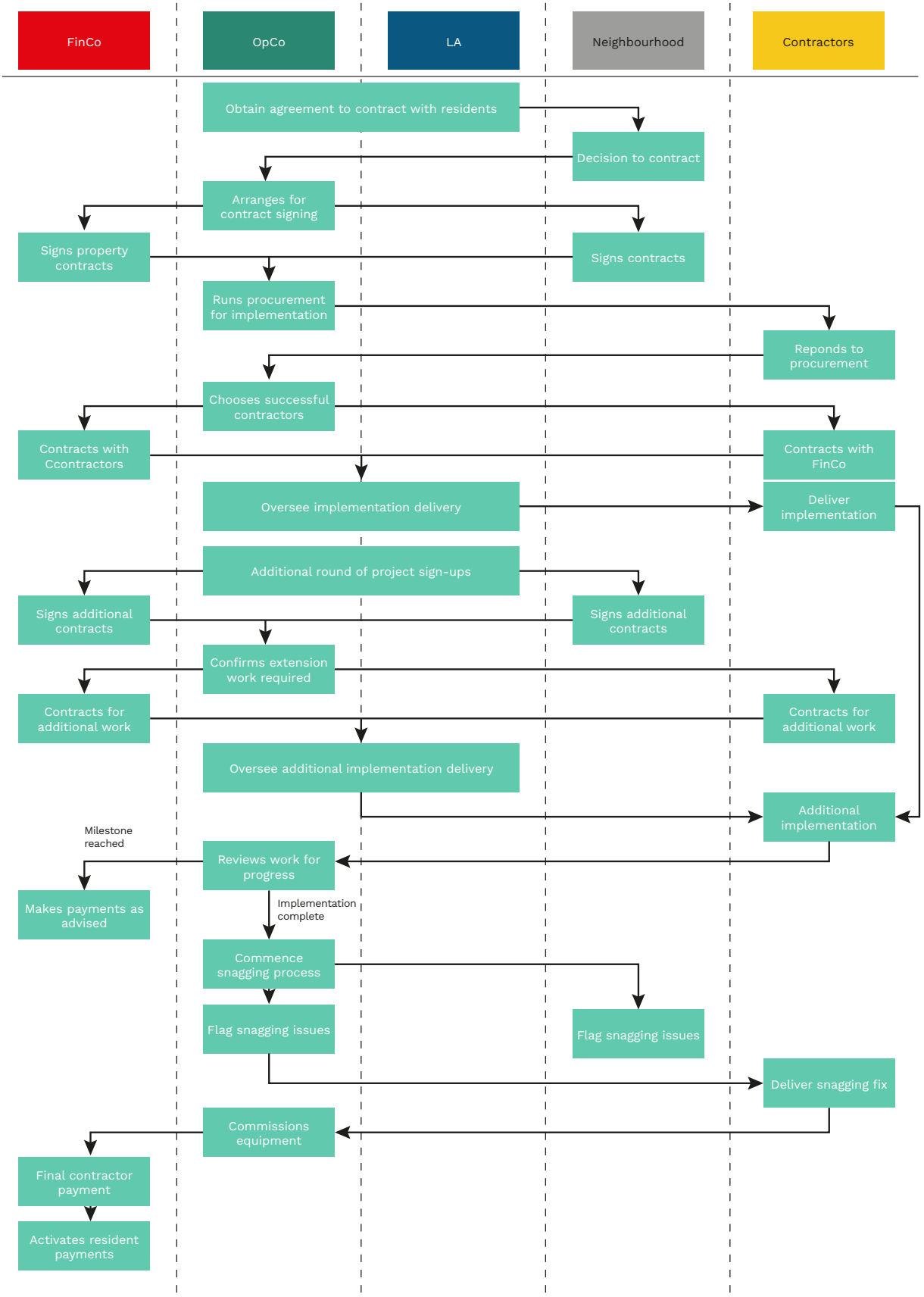


Figure 69: Stage 2 activities - detail

Project stage 2:				
Activity	**Action owner(s)**	**Action**	**Supporting entities**	**Platform rol**
1	LA	Systematically engages with neighbourhood residents and businesses to obtain agreement over contracts to be held with the FinCo.	OpCo FinCo	Access to co
2	OpCo	Arranges contracts to be signed between FinCo and residents.	FinCo	Contract ref
3	OpCo	Reviews contract uptake and, when minimum threshold is met, determines that procurement can proceed.		Contract pro
4	OpCo	Runs framework call-off procurement exercise for delivery Contractors.		
5	FinCo	Contracts with Contractors identified through procurement.	OpCo	Contract ref
6	OpCo	Oversees the Contractors in delivering the interventions. This role will be ensuring projects meet the criteria set out. It could be performed by the LA, but the OpCo will have ultimate decision-making powers as it is the gateway to the FinCo money.	LA	Process mon
7	ContractorS	Delivering the NZN implementation.	OpCo LA	Process mon Neighbourho
8	LA	Conducts additional round of sign-up for contracts.	FinCo	Contract ref
9	OpCo	Confirms additional round of work required to deliver additional contracts.		
10	FinCo	Extends contracts with Contractors as required to meet second round delivery.	OpCo	Contract ref
11	ContractorS	Deliver the additional round of NZN investment work.	OpCo LA	Process mon Neighbourho
12	OpCo	Assesses work progress and advises on payments based on progress. Issues identified are fed back to Contractor for remediation.	LA	Process mon
13	FinCo	Makes payments as advised by OpCo.	OpCo	
14	OpCo	Assesses Contractor work and either requires additional works to complete the delivery, or signs off the work to release final payments. Includes snagging process for residents.	LA	

Implementation			
le	**Neighbourhood engagement**	**Notes**	**Testing opportunities for demonstrators**
ontracts	Direct engagement with regards contracts	FinCo provides the contract, OpCo provides engagement support.	
ference point	Contract signing		Sign-up rate compared to registration of interest,
ogress			Do we procure without final confirmation of sign-up?
			Ability of framework procurement to deliver value for money,
ference point			
nitoring			The extent to which LAs wish to oversee the works in collaboration with the OpCo and which, if either, structure is most effective (to recommend a default),
nitoring ood updates	LA/OpCo ensure interface between Contractors and residents is appropriately facilitated	Delivery of the work needs to be smooth and in a supportive manner for the residents and so the service provided to them needs to be high quality - this will lead to word of mouth support for the programme as a whole.	Test how best provide interface between Contractors and residents.
ference point			Test the ability to sign up in a second round and what drives increased uptake.
ference point			
nitoring ood updates	LA/OpCo ensure interface between Contractors and residents is appropriately facilitated.	Delivery of the work needs to be smooth and in a supportive manner for the residents and so the service provided to them needs to be high quality - this will lead to word of mouth support for the programme as a whole.	Test how best provide interface between Contractors and residents.
nitoring	Feedback from neighbourhood on rollout		
	Snagging process		Testing of snagging process overseen by OpCo.

Project Stage 2:				
Activity	**Action owner(s)**	**Action**	**Supporting entities**	**Platform rol**
15	Contractors	Complete snagging.		
16	OpCo	Commissions the equipment.	LA	Commission residents
17	FinCo	Activates project including payment clauses in contracts.		Payment pro
18	FinCo	Takes ownership of assets.		

Timings

Once project design applications have been approved, there should be no delay before implementation, as with increasing time there is the risk of changes being needed that might then delay delivery further and thereby lead to reduced confidence in the project and loss of contracting residents.

Given there will be a limited number of applications approved at any given time, due to the limited number of applications permitted in each round, there will be a natural restriction of the numbers in implementation at any point in time, though this will likely increase as the programme ramps up.

Implementation			
le	**Neighbourhood engagement**	**Notes**	**Testing opportunities for demonstrators**
ning information to	Informing of commissioning of project.		Criteria for approving implementation and therefore commissioning.
ocessing			Test efficiency of payments activations process.

The implementation stage itself is likely to take between 12 and 24 months, though it is possible that it could extend beyond this period if a project is poorly specified, or supply chain restrictions occur.

As with Stage 1, there is likely to be an increase in speed of delivery once the process has been run multiple times.

Project Stage 3 – ongoing operation

Core objectives

The core objective of this project stage is to successfully operate the NZN that was completed in the previous stage and deliver the model.

Key outputs

At the end of this stage, there would be for each project:

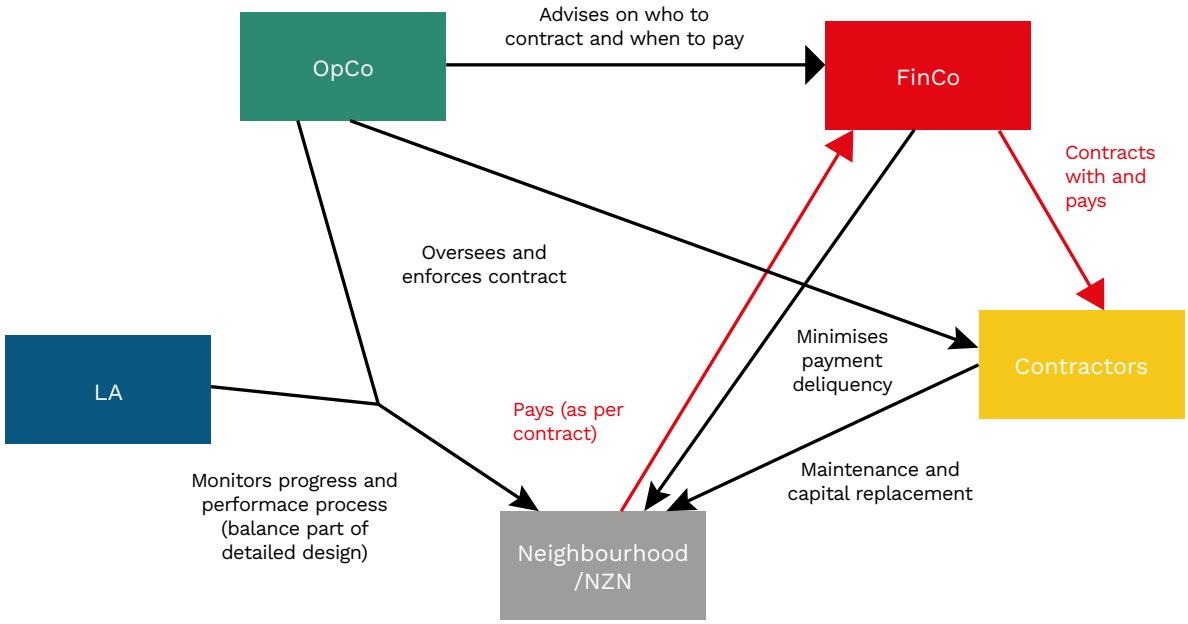
- Successful management of properties through ownership and occupancy changes.
- Fully repaid private capital.
- Working NZN equipment and operational model available for legacy stage.

Stage relationships

The major relationships in this stage are set out in Figure 70. In this stage, the FinCo plays a greater role as this is the period when payments for services are at the forefront of activity.

Outside of this diagram will be the repayment of capital to investors by the FinCo, but this is addressed in detail in the Financial Case and not extensively discussed here.

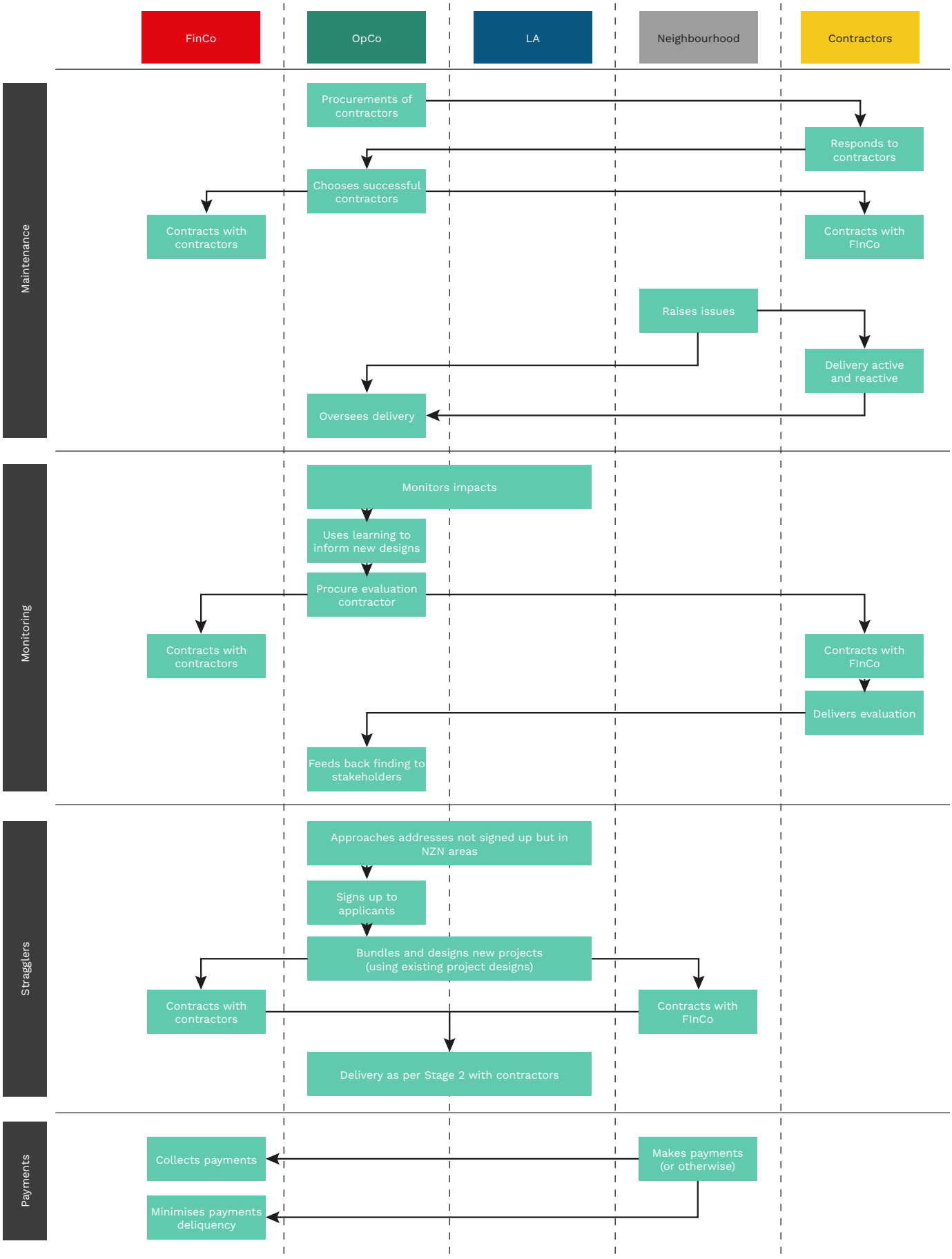
Figure 70: Stage 3 relationships



Actions to deliver stage

Moving into Stage 3 there is a much simpler dynamic at play, and this is demonstrated in Figure 71.

Figure 71: Stage 3 action flows



The nature of Stage 3 is that there are a number of different activity cycles running in parallel, in particular:

- **Maintenance and replacement**. The financial model enables maintenance and replacement of the equipment, such that the service is provided to residents for the entire period of capital repayment. As a result, a process is needed to address this. This is achieved by allocating Contractor(s) to deliver this work, overseen by the OpCo. There is an open question as to whether the residents should be directly approaching the Contractor to ensure delivery of maintenance and replacements, or whether this would be more effectively delivered by the OpCo to ensure a high standard or experience for the NZN residents, thereby assuring a positive reputation for the programme. Negative publicity about failed or poorly maintained equipment would be catastrophic for uptake.
- **Monitoring**. The monitoring of impacts will be important for demonstrating the benefits of the project, identifying progress towards local and national targets, and making the case for further NZN projects in the area. A coordinated monitoring framework will need to be developed for use across the NZNs, which enables different parties to deliver this as many LAs will want to take this on as an action. Alongside regular monitoring will be programme-wide evaluation which will require procurement of external Contractors to deliver this for assessments of overall programme impact, effectiveness, and value for money among other assessments.

Figure 72: Stage 3 activities - detail

					Project Stage
Aspect	**Activity**	**Action owner(s)**	**Action**	**Supporting entities**	**Platfo**
Maintenance	**1**	OpCo	Runs procurement for Contractors for maintenance of equipment and installations.	LA	
	2	FinCo	Contracts with maintenance Contractors.	OpCo	
	3	OpCo	Coordinates maintenance to ensure residents receive required support.	LA	Metho maint issues
	4	Contractor	Delivers maintenance.		
Monitoring	**1**	OpCo	Monitors impacts from NZN for reporting and learning.	LA	Monito
	2	OpCo	Uses learning to inform design support for new project.		
	3	OpCo	Identifies independent evaluations providers to periodically evaluate programme for government and funders.		
	4	FinCo	Contracts evaluation providers.		
	5	OpCo	Feeds back findings to stakeholders.		
Stragglers	**1**	LA	Periodically approaches addresses not signed up to identify additional parties to engage with.		
	2	OpCo	Combines new entrants in neighbourhoods into new packages for funding if possible and rolls out additional interventions.	FinCo	
Payments	**1**	FinCo	Collect payments.		
	2	FinCo	Enforced payment adherence.		

Timings

Once the project has been approved as implemented, the project immediately moves into Stage 3. There is an argument that maintenance contracts should already be in place; however, it may be advantageous to contract for these once the contracts for delivery are complete, to avoid complexities associated with overlap.

- **Straggler sign-Up**. In almost all NZNs there will be those who do not sign up to the programme in the first or second rounds built into the model. If residents of these properties change their decision subsequently there needs to be mechanism to capture these and include them. There will therefor, need to be a periodic sweep of the NZNs for additional sign-ups, perhaps on rolling 5-year process so as to not harass residents too often. For those that sign-up, new projects will be needed, but these will need to use the shared infrastructure of existing projects and likely be bundled across a number of proximate areas. Additionally, their payment arrangements would need to conclude at the same time as the NZN which they are attached to for shared infrastructure, otherwise there will be challenges with the legacy arrangements.
- **Payments**. Perhaps the core of this phase is the simple process of payment collection by the FinCo for the service provided to residents. The FinCo will be responsible for minimising avoided and missed payments as part of this. This is expanded on subsequently.

The detail of the activities involved in this flow is shown in Figure 72.

e 3: Operation			
rm role	**Neighbourhood engagement**	**Notes**	**Testing opportunities for demonstrators**
		Could occur before Stage 3 but kept here for completeness.	Is a set frameworks an effective model for procurement of maintenance and replacement?
d of contacting enance and escalating	Support for residents if problems arise	Needs clear process for obtaining maintenance and replacements.	Is the OpCo the correct vehicle for maintenance coordination? To what extent should the NZN residents engage directly with the Contractor?
			What criteria need to be met for contracts to be retained?
oring data reporting		Needs monitoring framework.	What should the monitoring framework be?
			How often should stragglers be approached? How should they be approached?
			How many stragglers are needed across a number of NZNs to make workable additional projects?
		As a purely financial matter, this should rest with the FinCo.	What are the appropriate methods of enforcing payment adherence?

This stage will last for approximately the length of the repayment period for the investment. At present, the working assumption is 40 years. The stragglers programme would likely need a cut-off before then otherwise the payment period for repayment would become too short to enable significant savings to be passed to the resident.

Project Stage 4 – legacy

Core objectives

The core objective of this project stage is to maximise benefits to the local community of the programme once the capital is repaid.

Key outputs

At the end of this stage, there would be for each project (or group of projects):

- Clear structure for ongoing operation; or
- Process for winding the programme up and transfer of assets.

Stage relationships

Ultimately the decision over the legacy stage needs to be taken for the benefit of local communities. The decision as to the next steps needs to sit outside of the programme structure and should be informed by a combination of:

- LA representatives
- Community representatives
- HMG representatives

The ultimate decision would need to enable residents to opt-out as their original contracts would expire following completion of the repayments. Therefore, a case will need to be made to residents identifying the benefit of the proposed approach.

It is likely that the decision needs to be made at a regional or even national level, rather than project level, even if ultimately the decision is to distribute the NZN projects into local community interest company (CIC) ownership.

Timings

A decision about legacy would need to be made at least two years in advance of Stage 3 completing, to enable time to prepare for the changes and inform contracted residents.

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