GREATER**LONDON**AUTHORITY

REQUEST FOR DIRECTOR DECISION – DD1454

Title: Fourth Generation District Heating Networks

Executive Summary:

Fourth Generation District Heating Networks are lower temperature heat networks designed to enable a more cost effective transition away from fossil fuels to a future heat supply that is from local renewable and secondary heat (environmental and waste heat) sources.

The project will look at two fundamental aspects in this transition:

1. Cost effective retrofit of existing buildings – that is buildings that are not currently communally heated so that they can be connected into existing or future heat networks;
2. Reducing operating temperature of heat networks – this will allow the most cost effective use of low grade waste heat sources and an understanding of to what extent we need to retrofit our existing building stock to accommodate lower operating temperatures.

Decision:

The Executive Director approves:

a) The receipt of the $125,000 grant funding from the Carbon Neutral Cities Alliance (CNCA) and

b) Associated expenditure of $125,000 to undertake the Fourth Generation District Heating Network project.

AUTHORISING DIRECTOR

I have reviewed the request and am satisfied it is correct and consistent with the Mayor's plans and priorities.
It has my approval.

Name: Fiona Fletcher-Smith

Position: Director for Development, Enterprise and Environment

Signature:

Date: 20.1.2016

PART I - NON-CONFIDENTIAL FACTS AND ADVICE

Decision required – supporting report

1. Introduction and background

1.1 This project was developed in response to the challenges that London's energy systems face in meeting the Mayor's 60% carbon dioxide reduction target and his 25% Decentralised Energy target by 2025 as well as the 80% carbon dioxide reduction target for 2050 as set out in the UK's Climate Change Act.

1.2 As part of our approach to decarbonising London's heat supply it is important to understand how much of our existing building stock could be connected to new and existing heat networks because the existing heat density means that heat networks are likely to be the most cost and carbon efficient way of supplying heat to consumers in these areas. Another part of this strategy is to understand what levels of energy efficiency retrofit may be required to the building fabric of communally heated buildings to allow us to reduce the operating temperatures of district heat networks and still maintain the required level of thermal comfort expected by consumers.

1.3 Through the London Energy Plan we will identify priority areas for the development of district heating networks. This Fourth Generation District Heating Project will help us understand how much of the existing building stock could easily be connected to these networks because it is communally heated and then how much of the remaining building stock could be connected if it was retrofitted so that it could be connected. This study will look at the technical and financial aspects of retrofitting various building types to assess which typologies could be retrofitted to connect to a heat network in a cost effective way. This project will also contribute to improving air quality in London by identifying if and how existing buildings that are individually heated by gas boilers can be replaced by connecting to a heat network and so removing the emissions associated with individual gas boilers. This project will also contribute to improving air quality in London by identifying if and how existing buildings that are individually heated by gas boilers can be replaced by connecting to a heat network and so removing the emissions associated with individual gas boilers.

1.4 The other part of this project will assess what levels of energy performance are required in buildings to allow the operating temperatures of heat networks to be reduced from a supply temperature of around 90°C to around 60°C. This will allow us to exploit a range of low grade secondary heat sources with the heat networks in the most cost effective way. It is important that as part of this project we assess the potential impact this could have on the thermal comfort of consumers within buildings to understand if there needs to be an improvement in the thermal fabric of the buildings to allow heat to be supplied at the new lower temperature and what level of retrofit activity this would require.

1.5 This project will make an important technical contribution to helping London meet its 25 per cent decentralised energy target. The market activity that will be stimulated through this and resulting activity in this area will also help realise the economic opportunities that delivering this target represents. It has been estimated, in annualised average figures, that our expected activity in rolling-out decentralised energy could ultimately deliver around £142m of direct GVA (Gross Value added) per year along with 848 direct jobs per year through to 2025. This could result in up to 2,500 permanent jobs being created in the decentralised energy sub-sector by 2025.

1.6 The London Low Carbon Market Snapshot Report undertaken in 2015 identified Geothermal, which includes decentralised energy and district heating, and Building Technologies, which relates to energy efficiency retrofit, as two of London's top five sub-sectors by sales and are areas of real

strength compared to other UK regions. Therefore increasing demand and opportunity in sub-sectors where London already has an inherent strength will create market opportunities for London's businesses and job opportunities for London's workers. Developing these sectors will also encourage London's businesses to develop the skills and expertise that can then be exported to other markets within the UK and globally.

1.7 **Carbon Neutral Cities Alliance (CNCA) Fund**
The Carbon Neutral Cities Alliance (CNCA) Fund ran a call in summer 2015 asking for projects that could support a significant acceleration in a city's transition to a low carbon economy and the Sustainable Energy Delivery Team submitted this bid into the Call. We were successful in the initial expression of interest and then again with our final bid. We have consequently been awarded US$125,000 from the CNCA to fund the delivery of this project. The Grant Agreement has been provided to us and we have asked for a number of minor alterations that have been agreed and we are now in a position to be able to sign it and start the project.

1.8 The Project will run through to 30th September 2016 by when we expect to have a finalised report addressing:

1. The technical and commercial challenges of retrofitting buildings so that they can connect to district heating networks and
2. Understanding the levels of energy performance required in buildings to allow district heating networks to reduce their operating temperatures to around 60°C.
3. Identifying, in conjunction with London Borough partners, up to four areas where we could scope out demonstration projects.

1.9 The proposed deliverables for the project are listed below along with the timings by when they are expected to be produced.

	Activity	**Deliverables**	**Timeline/Due Date**
1	Assess existing building typologies in London and develop a spatial map for district heating (DH) retrofit potential	Typology assessment of buildings and DH retrofit opportunity map for London	30th April 2016
2	Collect initial feedback from working group on the building typology assessment undertaken from the perspective of their city's building stock	Generic building typologies created from London base to increase relevance of approach to other cities	30th April 2016
3	Undertake technical and financial analysis of district heating retrofitting potential in a selection of the commonest building typologies in London	Report on technical and financial elements of retrofitting London's most common building typologies for connection to Third and/or Fourth Generation District Heating Networks (3G/4G-DHNs)	31st May 2016
4	Undertake assessment to understand the level of energy efficiency retrofit required to allow buildings to have their hot water and space heating efficiently supplied by Fourth Generation District Heating Networks (4G-DHNs)	Report on optimum level of building energy efficiency retrofit requirements to support connection to 4G-DHNs	30th June 2016
5	Identify priority areas for retrofitting existing buildings to connect to DHNs in London and prioritize up to 4 areas in London for proposed demonstration projects.	An opportunity map for prioritised retrofitting of existing buildings to connect to DHNs	31st July 2016

6	Working group teleconferences	Working Groups inputting into outputs of projects at appropriate times	30th June 2016
7	Explanation of methodology and approach and discussion with participating cities to understand what is needed to maximise replicability of approach in other cities.	Replicability report for other cities	31st July 2016
8	Synthesizing all the pieces of work and bringing them together into a Final Report	Final Report	30th September 2016

1.10 The project will be procured and a consultant appointed to undertake the project and the grant that the GLA receives from CNCA will pay for this work to be undertaken. The GLA staff time needed to procure and manage this project will be provided from the existing staff resources within the Sustainable Energy Delivery Team.

1.11 The role of the GLA in this project is:

1. To run the procurement process to appoint the consultants to undertake the project;
2. To manage the consultants and contribute to the development of the project to ensure the effective delivery of the project;
3. To engage identified partner cities in the project to maximise its replicability potential.

1.12 All procurement activity related to this project will be undertaken in conjunction with the Transport for London (TfL) Procurement Team just as with any other GLA project.

1.13 **Budget**

The grant of US$125,000 from CNCA provides a budget to pay for the consultancy support to deliver the project and has a small amount of budget allocated to cover hosting meetings and any travel that may be required in relation to delivery of the project. The Grant will be received in two payments, the first will be for 70% of its value ($87,500) on the signing of the Grant Agreement and the second will be for the remaining 30% of its value ($37,500) on successful completion of the project.

1.14 The table below illustrates the projected income and estimated expenditure profiles for the project as they currently stand:

Estimated financial splits	**2015-16**	**2016-17**	**Total**
Income	$87,500	$37,500	**$125,000**
Expenditure - Consultants	$25,000	$98,826	**$123,826**
Expenditure - Other	$300	$874	**$1,174**

2. Objectives and expected outcomes

2.1 Objectives

1. To support GLA in meeting the Mayor's 60% carbon dioxide reduction target and his 25% Decentralised Energy targets each by 2025;
2. To input into the outputs and subsequent work of the London Energy Plan and enable a comprehensive strategy for decarbonising heat supply to be developed;

3. To understand the opportunity and challenges for retrofitting existing buildings to connect to district heating networks;
4. To understand the optimum level of energy performance in existing buildings required to allow lower temperature heat networks to provide adequate thermal comfort for consumers.

2.2 Expected Outcomes

a) To make an active contribution to the outcomes and proposed workstreams of the London Energy Plan;

b) London will have an assessment of how best to retrofit existing building typologies to connect them to district heating networks, a detailed breakdown of the associated costs and technical challenges encountered for each of the building typologies identified;

c) London and other cities will have a way of making informed and evidence based decisions on the cost and carbon effectiveness of retrofitting existing buildings so that they can connect to district heating networks as compared to other low and zero carbon heat supply systems;

d) London and other cities will understand the optimum level of building retrofit required to allow their connection to lower temperature Fourth Generation District Heating Networks (4G-DHNs).

e) A City understands how the home heating system should be controlled and operated;

f) CNCA and member cities will have a comprehensive understanding of the levels of building energy efficiency and associated system design required to allow a range of building typologies to be connected to 4G-DHNs.

3. Equality comments

3.1 Gender Equality and Equal Opportunities are enshrined within the GLA's programmes and activities according to the Mayor's Framework for Equal Life Chances (June 2014). The framework aims to bring Londoners together rather than dividing them. It promotes outcomes for a diverse range of communities that seeks to bring real changes to the quality of life for all Londoners. Decentralised energy, along with energy efficiency, forms the framework's Environment Objective 1.2. The objective seeks to ensure protected groups such as old and young people and those who are vulnerable, are better able to afford domestic energy. DE specifically aims to help others develop and deliver energy supply projects that will reduce Londoners' energy costs by up to 10% on their current energy bills.

3.2 This is a research project looking at specific techno-economic aspects of rolling out district heating networks in London. We will ensure our equalities duty is met by implementing our equalities compliant approach to the procurement of this research project. We will ensure that this project looks at both a diverse range of buildings and that the results will be relevant and applicable to all people and groups in society.

4. Other considerations

a) Risk

The risks to the GLA of this project are around our ability to deliver on our contractual commitments within the Grant Agreement.

The main risks and mitigation actions are:

- *London not seen as a leading city within the decentralised energy and district heating sector* - By securing this funding and delivering this project we will ensure that we are tackling some of the most

pertinent questions facing the sector s well as sharing our knowledge and expertise with other leading cities in this field and this will allow us to be involved in developing and implementing innovative new approaches to rolling out district heating systems.

- *Not invited to sign the Grant Agreement* - The GLA have worked very closely with the CNCA and have got to a position where both parties are prepared to sign the Grant Agreement
- *Non-conformity with Grant Agreement* - The project specification has been developed by us and submitted to the CNCA and this will form an integral part of the contract, stating what will be delivered, by whom and by when. The GLA are consequently fully aware of what the project is seeking to deliver and how it will be delivered so we are able to develop a schedule of work and personnel that will ensure we are able to successfully deliver the project.
- *Not able to evidence spend on project* - The GLA has worked with the CNCA to ensure it understands what evidence is required to support expenditure claims that will be submitted to the CNCA. The GLA will also continue to discuss with the CNCA if any further information is required about how to record and evidence our activity and spend.
- *Fluctuation in US Dollar : GBP Exchange Rate* – If this fluctuates significantly it could mean that we do not receive enough US Dollars to cover the costs of our activities in GBPs. The GLA has been involved in other projects like this, for example EU projects and this is always an issue when applying for European funding. It has been agreed that 70% of the grant will be paid upfront to minimise the impact that exchange rate fluctuations could have during this project. In addition to this main mitigation we will also set aside upto £2,500 to mitigate any fluctuations in the exchange rate from between signing of the Grant Agreement and completion of the project.

b) Links to Mayoral strategies and corporate priorities

This project is explicitly linked to the Mayor's Climate Change Mitigation and Energy Strategy, published in October 2011 and also the developing London Energy Plan. Integral to the delivery of this Strategy and its 60 per cent carbon dioxide reduction target by 2025 is the 25 per cent decentralised energy target for London supported which in turn is supported by the Mayor's decentralised energy and low carbon capital programmes. This project is designed to develop detailed knowledge and understanding on the interface between buildings and district heating systems to support an accelerated and efficient transition to a low carbon economy by supplying secure, affordable and low carbon heat through district heating systems whilst supporting the realisation of economic and environmental opportunities in London that are associated with this transition.

The investment opportunity for London of meeting its 25 per cent decentralised energy target is estimated at between £5-7 billion and this project will help develop real momentum towards achieving this target.

This project will make an important technical contribution to helping London meet its 25 per cent decentralised energy target in the most cost effective way. The market activity that will be stimulated through this and resulting activity in this area will also help realise the economic opportunities that delivering this target represents. It has been estimated, in annualised average figures, that our expected activity in rolling-out decentralised energy could ultimately deliver around £142m of direct GVA per year along with 848 direct jobs per year through to 2025. This could result in up to 2,500 permanent jobs being created in the decentralised energy sub-sector by 2025.

The London Low Carbon Market Snapshot Report undertaken in 2015 identified Geothermal, which includes decentralised energy and district heating, and Building Technologies, which relates to energy efficiency retrofit, as two of London's top five sub-sectors by sales and are areas of real strength compared to other UK regions. Therefore increasing demand in sub-sectors where London already has an inherent strength will create market opportunities for London's businesses and job

opportunities for London's workers. Developing this sector will not only attract inward investment but will help London's businesses develop the skills and expertise that can also be exported to other markets within the UK and globally.

Decentralised energy not only provides an investment opportunity for London and its businesses but will also make sure that London remains competitive as a global city, by contributing to the capacity and resilience of a wider, smarter, lower carbon energy network within London.

The Mayor has a portfolio of policies and programmes aimed at supporting the development and delivery of decentralised energy in London. This project forms a very important part of that portfolio for it is developing new innovative approaches for accelerating the roll-out and penetration of district heating systems across London.

c) Impact assessments and Consultation

This project has been developed with the aim of developing and delivering a strategically important project that will contribute to the direct delivery of the Mayor's Climate Change Mitigation and Energy Strategy and his Economic Development Strategy. Decentralised energy and district heating systems have already been consulted on as part of the Mayor's Climate Change Mitigation and Energy Strategy and the specific elements of this project have been developed in response to issues and challenges that partners and stakeholders have raised in our discussions with them on developing and rolling-out district heating systems. As part of the development and delivery of the project we will continue to discuss the development and outcomes of the project with CNCA cities and London boroughs to ensure it is as relevant as possible.

An original impact assessment was undertaken for the Climate Change Mitigation and Energy Strategy and its associated programmes. As this bid will help deliver these objectives the original impact assessment is still relevant to the project. This project isn't actually delivering any physical development but subsequent workstreams stemming from this will and those will undertake the necessary levels of impact assessments and consultation.

5. Financial comments

5.1 Director's approval is sought to approve for receipt of grant of $125,000 (approximately £83,750 at the current dollar to pound exchange rate of 0.67) from the Carbon Neutral Cities Alliance (CNCA) for undertaking the Fourth Generation District Heating Network project.

5.2 The table in paragraph 1.14 details the proposed profile income and spend of the grant. The table indicates that around £41,052 ($62,200) is likely to be income in advance as not all of the grant income received in 2015-16 will be spent this financial year. Therefore approval will need to be obtained from CNCA to carry forward any income in advance paid in this financial year to 2016-17. A submission from the Environment team will be required to account for the income in advance at year end as part of financial year end closure.

5.3 As mentioned in section 4: Risks, the risk of adverse changes in exchange rate could mean that the GLA does not receive enough US Dollars to cover the costs of the activities in GBPs. This risk will be mitigated by receiving 70% of the grant upfront and up to £2,500 will be set aside to cover any fluctuations in the exchange rate from between signing of the Grant Agreement and completion of the project.

6. Legal comments

Power to Undertake the Requested Decision

6.1 Under section 30 of the Greater London Authority Act 1999 (the 'Act') the GLA, after appropriate consultation, is entitled to do anything that will further the promotion, within Greater London, of economic development and wealth creation, social development and the improvement of the environment.

6.2 Furthermore, section 34 of the Act allows the GLA, to do anything which is calculated to facilitate, or is conducive or incidental to, the exercise of any functions of the GLA. In this case, the receipt of the grant from the Carbon Neutral Cities Alliance (CNCA) in order to further the goal of a cost effective transition away from fossil fuels may be viewed as being calculated to facilitate and conducive and incidental to the improvement of the environment within Greater London.

Funding

6.3 Prior to receipt of any of the funding, the GLA will have to enter into a funding agreement on the CNCA's terms. The officers must ensure that the GLA comply with the terms of that funding agreement. Furthermore, if the officers have any queries in relation to any of the provisions of the said funding agreement, they should raise their queries with TfL's commercial law team.

7. Planned delivery approach and next steps

The project will be procured in conjunction with the Transport for London Procurement Team just as with any other GLA project. This will start once the DD has been signed off.

The successful consultant will be appointed and the project will then commence. It will carry on through to the end of September by which a Final Report will have been produced that synthesizes all the pieces of work and brings them together into the Final Report. There is a more detailed delivery plan in Section 1.

Activity	**Timeline**
Procurement of contract [for externally delivered projects]	W/C 4th January 2016
Announcement [if applicable]	W/C 1st February 2016
Delivery Start Date [for project proposals]	W/C 8th February 2016
Final evaluation start and finish (self) [delete as applicable]:	
Delivery End Date [for project proposals]	30th September 2016
Project Closure: [for project proposals]	31st October 2016

Appendices and supporting papers:

The CNCA Grant Agreement and the GLA's Project proposal.

Public access to information
Information in this form (Part 1) is subject to the Freedom of Information Act 2000 (FOI Act) and will be made available on the GLA website within one working day of approval.

If immediate publication risks compromising the implementation of the decision (for example, to complete a procurement process), it can be deferred until a specific date. Deferral periods should be kept to the shortest length strictly necessary.

Note: This form (Part 1) will either be published within one working day after approval or on the defer date.

Part 1 Deferral:

Is the publication of Part 1 of this approval to be deferred? YES
If YES, for what reason:
It contains information the disclosure of which would be likely to prejudice the Authority's commercial interests by distorting competitiveness in the markets for the services it requires to discharge its duties under the proposed grant funding agreements. Such distortion impacts upon the Authority's ability to secure competitive and sustainable bids for the provision of the required services and value for money which is not in the public interest

Until what date: On completion of project procurement process which we anticipate will be by 29th February 2016

Part 2 Confidentiality: Only the facts or advice considered to be exempt from disclosure under the FOI Act should be in the separate Part 2 form, together with the legal rationale for non-publication.

Is there a part 2 form –NO

ORIGINATING OFFICER DECLARATION:	Drafting officer to confirm the following (✓)
Drafting officer: Simon Wyke has drafted this report in accordance with GLA procedures and confirms that:	✓
Assistant Director/Head of Service: Patrick Feehily has reviewed the documentation and is satisfied for it to be referred to the Sponsoring Director for approval.	✓
Financial and Legal advice: The Finance and Legal teams have commented on this proposal, and this decision reflects their comments.	✓

EXECUTIVE DIRECTOR, RESOURCES:

I confirm that financial and legal implications have been appropriately considered in the preparation of this report.

Signature M. D. Gallo **Date** 19.1.16