Heat Networks - Pathway to Net Zero 2050

Policy position on Heat Networks for Milton Keynes – 2025 - 2050

April 2025
Version 1

Contents

Net Zero Ambitions

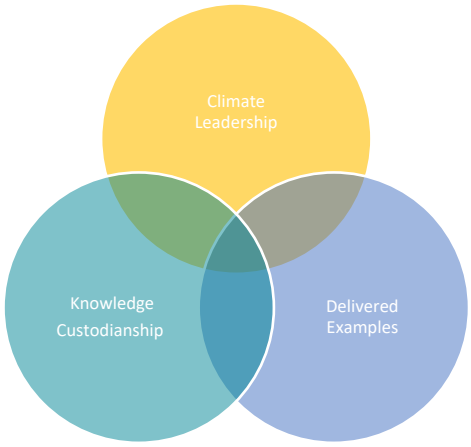
In order to drive Climate Change Leadership, Milton Keynes City Council must be an exemplar of change. This policy solution aims to support the development of district heating networks by identifying and designating zones where heat networks could provide the lowest-cost, low carbon heating option for our city.

According to the Department of Energy Security and Net Zero (DESNZ) analysis, heat networks could provide up to 20% of total UK heat by 2050.

This is supported by the Energy Act 2023 (the Act) which provides future regulation for in the heat network sector as well as powers for the government to implement Heat Network Zoning (HNZ) in England.

Heat Networks provide Milton Keynes City Council with a mechanism to reduce its carbon footprint and area wide emissions as well as support the design, development and delivery of inward investment within the city aligning with wider regional growth plans.

We know that electrical grid capacity for Milton Keynes is constrained. Existing growth plans represent a challenge for supply of low carbon heating, electricity and transport, particularly in line with local and national climate ambitions. This document outlines a series of approaches to support the design, development and delivery of the scale of investment needed to match growth.

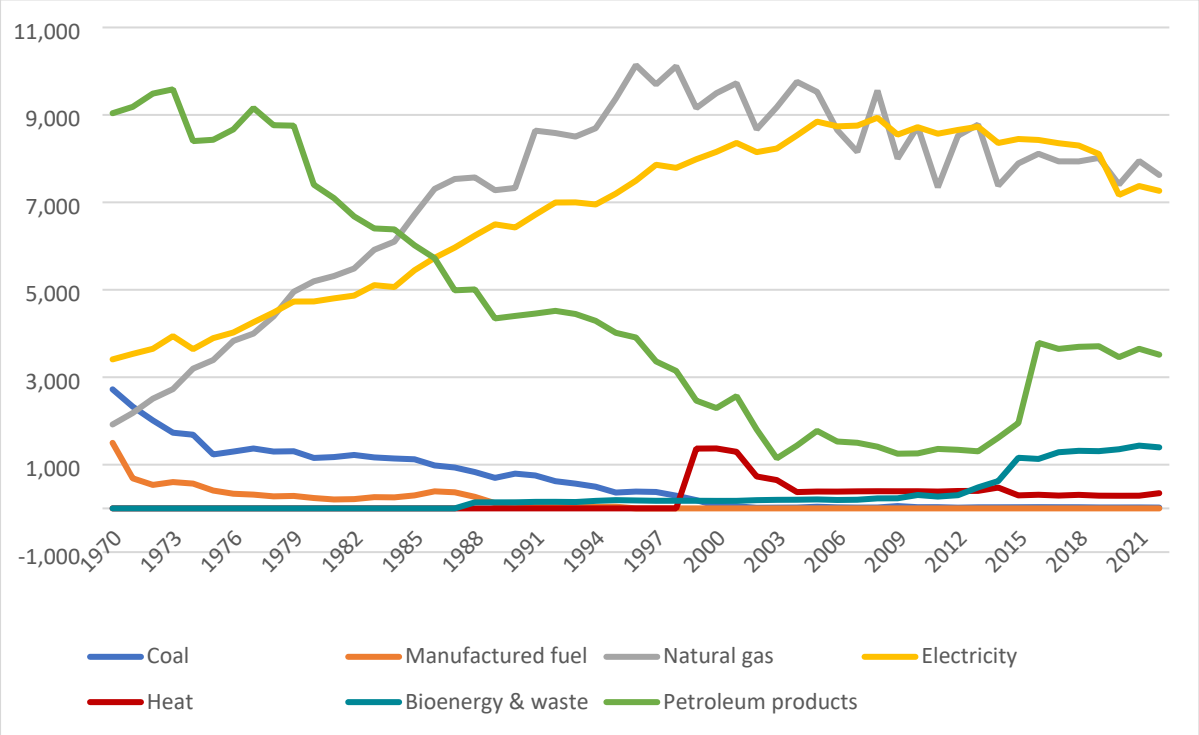


This plan also embeds our Heat Networks Policy position and ambitions and supports our Environment and Waste Net Zero Action Plan and the MKCC Pathway to Net Zero Plan 2030.

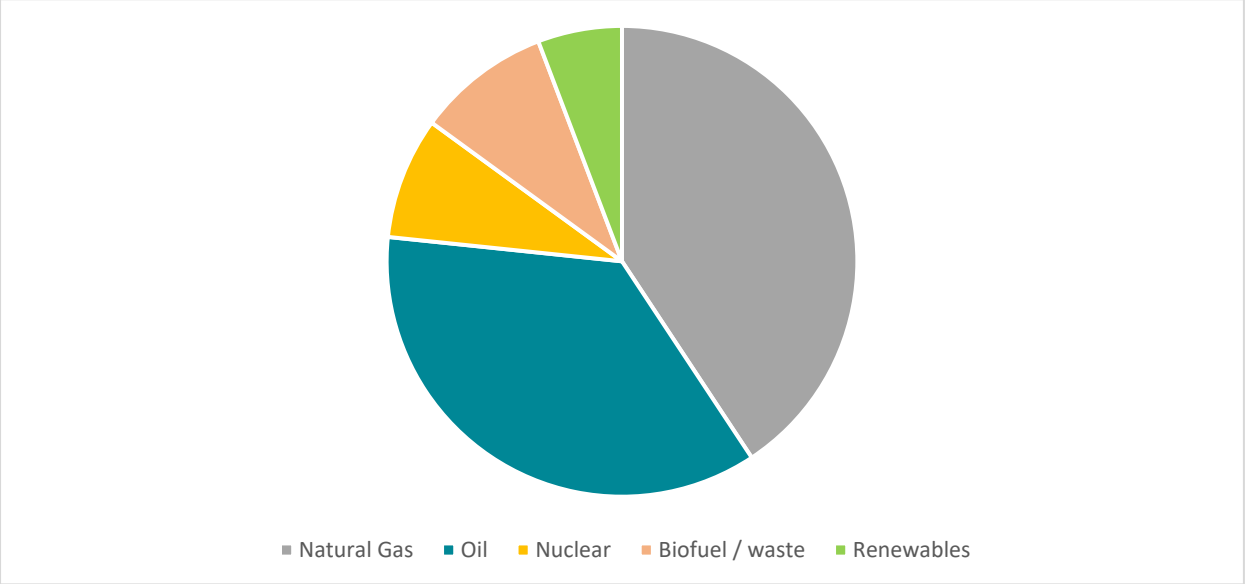
This document outlines Milton Keynes City Councils pivotal role supporting the design, development and delivery of city wide heat networks.

UK Energy Picture

The blend of the how the UK has produced energy over the past 50 years has changed. It has migrated from a fossilised fuel driven composition of coal, manufactured fuels and petrol through to an increased blend of renewables and nuclear.

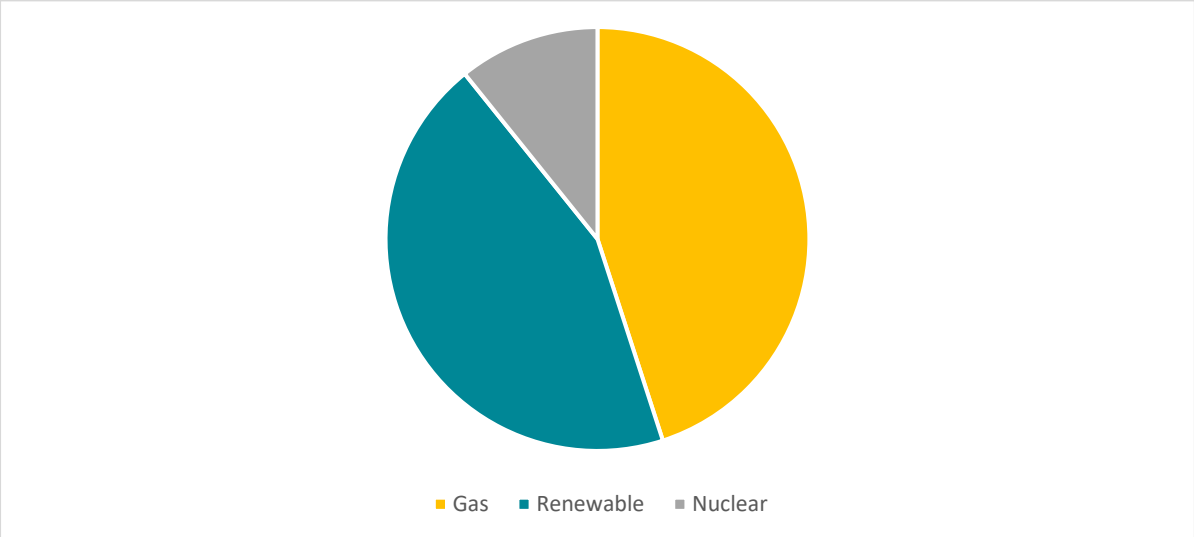


Total energy consumption in the United Kingdom was 142.0 million tonnes of oil equivalent (1,651 TWh) in 2019. The production of energy across the UK is still mostly fossil fuel driven largely from natural gas and oil accounting for nearly 75% of the total energy consumed within the UK.



The Heating Sector

Heat in buildings is one of the biggest sources of UK Emissions. Of total 468MtCO_2e in the UK the Heat sector accounts for 37% - higher than any other sector.



In line with Government policy and legislation under the Energy Act 2023 electricity generation in the UK is moving towards decarbonisation with the increase in renewable electricity production. The electricity sector's grid supply in 2023 came from 36.1% from renewables, 33% natural gas, 14.2% nuclear power and 5% from biomass.

So what does Heat Sector demand look like?

Almost half of the final energy consumed in the UK is to provide heat (760 TWh) – more than that used to produce electricity or for transport. At approximately 300GW, peak demand for heat is up to five times greater than that for electricity.

This is driven predominantly gas boilers providing heat on demand for domestic properties, commercial units, and industrial premises. The UK imports 70% of the gas it requires, and Norway has supplied the majority of the gas to the UK for the past two decades and North Sea gas providing around 30%.

Gas provided a vital role in decarbonisation through supporting the transition from coal. However, a transition to net zero will mean it will need to be replaced with low carbon alternative across the economy.

The decarbonisation of heat is one of the biggest challenges in energy policy for the next 25 years.

Can our heating needs be met by a transition to renewable electricity?

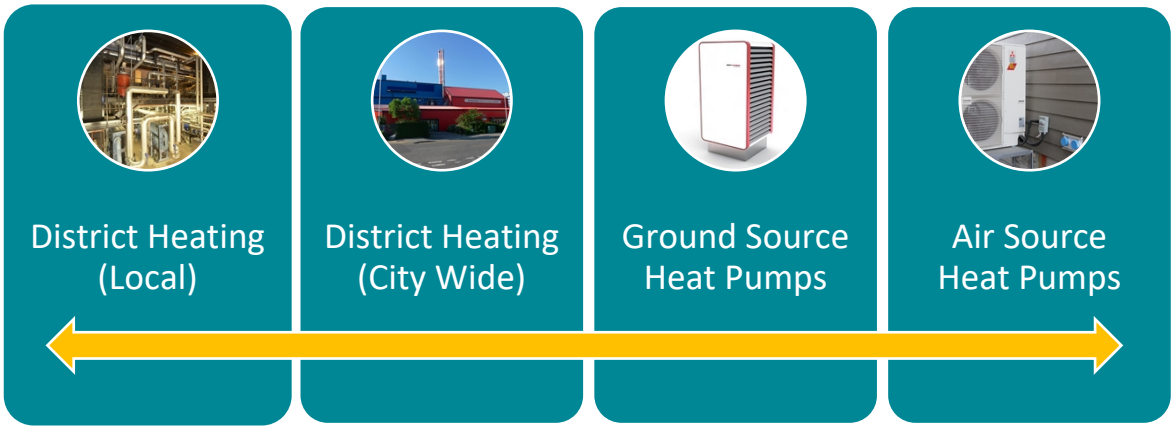
If we switched to provide heat from electricity, the costs of providing a peak of 300GW would be excessive – effectively needing to double electrical output and as stated, grid capacity is currently constrained.

What does this mean for Milton Keynes?

The UK government has created a framework to encourage low carbon developments and promote private sector investment into low carbon heating infrastructure.

Achieving this target will require the government from now until 2050 to move towards heating networks that are based on renewable sources to enable phasing out of natural gas.

So what are the alternatives to Natural Gas?



Local District Heating Schemes

Local District Heating Schemes are systems that typically use a singular central heat source to distribute hot water through a network of insulated pipes to multiple dwellings. In a local setting the heat source is usually only of a sufficient size to power the surrounding estates or industrial / commercial premises. Traditionally, these are built where there is an 'anchor tenant' that can use a large amount of heat such as Mars on the Slough Trading Estate.

City Wide Heating Network

Where multiple LDHS are connected together, or the heat source is sufficient to be piped larger distances then a city wide heat network can be established. The heat can be topped up or provided by dedicated energy and transmission centres which comprise of both ground and air sourced heat pumps and thermal storage. There are a number of examples of these across the UK, predominantly fuelled by gas. Under the Energy Act 2023, existing Heat Networks will be required to transition to low carbon technologies.

UK Government target of 17% of heat met by District heating by 2030.

Ground Source Heat Pumps

Ground Source heat pumps (GSHPs) harness heat stored underground to provide premises with heating and hot water. They use ambient heat from the ground in a central heating system instead of burning fossil fuels. GSHPs are more efficient than Air Sourced.

Air Source Heat Pumps

Air Source heat pumps (ASHPs) take warmth from the air outside and transfers it as usable heat even when temperatures are as low as -15C. They operate like a fridge-freezer in reverse, using electricity to extract heat from the air. ASHPs are more economically viable than Ground Sourced.

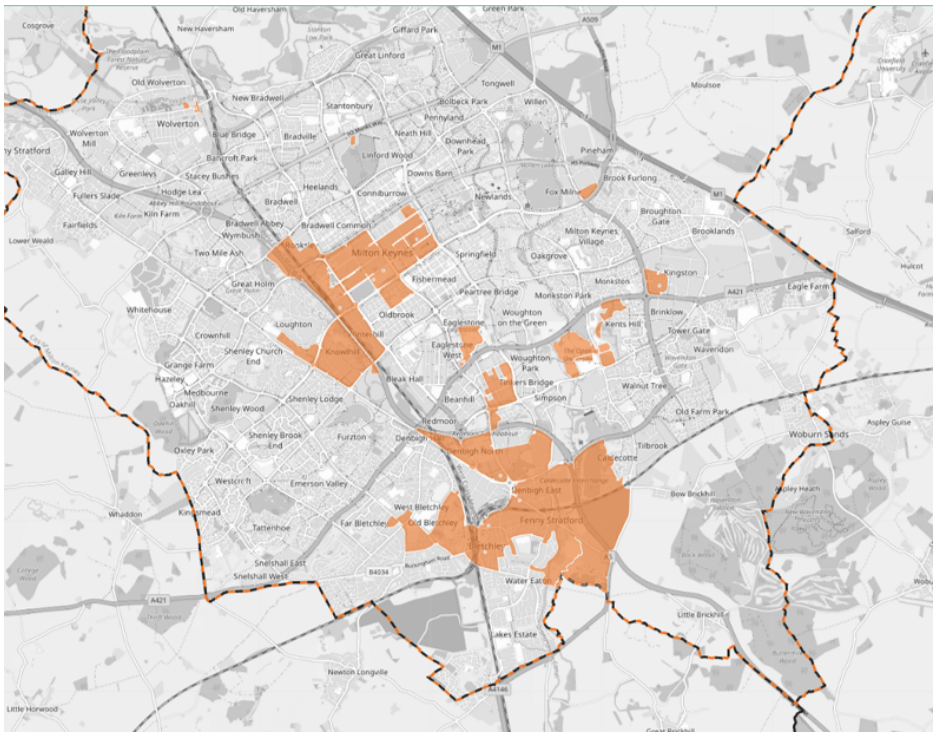
Heat Network Zoning

What is Heat Network Zoning?

This policy will mandate larger, non-domestic heat demands (with a threshold set at 100MWh heat demand p.a.) to connect to networks within certain designated zones where heat network heat provision can be demonstrated to be the least-cost low-carbon option.

What will this mean for Milton Keynes?

- There will be a need to designate zones where heat networks provide the lowest cost and a low carbon heat option.
- Certain buildings within these zones will be required to connect to a heat network within a designated zone within a specific timeframe.
- This provides a mechanism to accelerate and centralise delivery of the council's climate action strategy rather than rely on defragmented solutions.



What legislation is driving this?

The Energy Act 2023: This primary legislation outlines sector regulation, through consumer protections and frameworks and critically, the legislation also provides powers for the government to implement HNZ in England.

Heat Networks (Market Framework Regulations) 2025: The legislation will implement the regulation of heat networks similar to the role of Ofwat with Ofgem appointed as the UK's official regulator of heat networks.

What have MKCC done so far?

Milton Keynes City Council has progressed a series of development workstreams in this area. These are outlined below.

Based on mapping data, most properties across Milton Keynes appear to be served from the local gas distribution network, with only 5-25% having alternative solutions. In order to meet our duties, we will need to decarbonise these properties and they will need to consider either connection to heat networks, individual or communal heat pumps.

2022

- Application by MKCC for Heat Network Delivery Unit (HNDU) through the Department from Energy Security and Net Zero (DESNZ) to determine the feasibility of heat networks within Milton Keynes.
- Aims of the study were to determine the feasibility of a city-wide heat network compared to alternative methods for decarbonisation.

2023

- The report concluded district heating opportunities at Milton Keynes Waste Recovery Park (MKWRP) and Cotton Valley WWTW.
- Heat demand is Central Milton Keynes (CMK) and Milton Keynes Hospital.
- ThamesWey DHN, a Combined Heat and Power (CHP) in CMK has potential for future network configuration but must be decarbonised as it is currently gas powered

2024

- MKCC applied for Outline Business Case funding to HNDU for funding to progress MKWRP as a source of heat for a future heat work
- Options around how to interface with the heat market and procurement routing
- Involved dedicated technical and legal advisors to provide a recommendation based on keytechnical and contractual assumptions
- Submitted a preliminary PSDS application for Civic buildings to recevie heat

What were the findings of the feasibility of Heat Networks in MK?

Three heat sources have been identified:

Cotton Valley Waste Water Treatment Works (WWTW) – should be sufficient to serve most, if not all demand at Milton Keynes East but a commercial model must be negotiated.

Milton Keynes Waste Recovery Park (MKWRP) - Waste heat represents the lowest cost form of low carbon heat and as with Cities such as Cardiff and Exeter can be the catalyst for large scale heat network development. It is also co-owned by the Council which will ease discussions regarding future development of the site.

ThamesWey Energy Centre – currently under-utilised, needs to decarbonise and could be integrated into a wider city network, utilising existing energy assets.

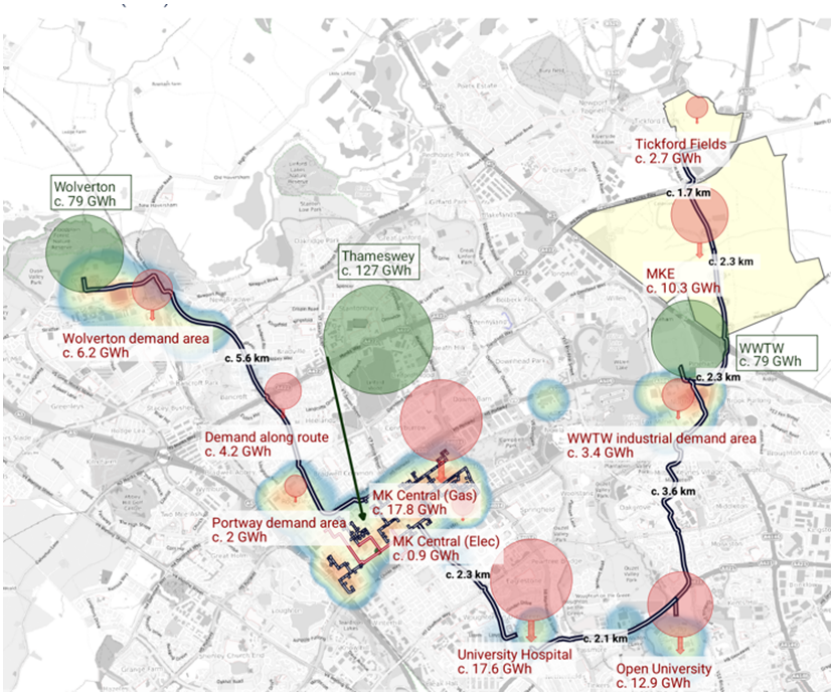
Milton Keynes Waste Recovery Park (MKWRP)

MKWRP will be the Authority's anchor asset for the MK Heat Network. It has the potential to provide decarbonised heat into a network from the city's solid waste.

The core focus of the work undertaken with DESNZ focused on the feasibility of extracting heat from the asset and upgrading it, storing it and transferring it.

What were the findings from the MKWRP for Outline Business Case?

- MKWRP was built combined heat and power (CHP) ready and can be used to capture heat from low grade steam at the exhaust end of the steam turbine (with minimal impact on power generation)
- Low grade heat (circa 55°C) can be sent to an Energy Centre where it can be topped up using Water Source Heat Pumps (WSHPs), distribution pumps, thermal storage and controls, to generate high grade heat
- High grade heat could be purchased at the boundary of the Energy Centre, for onward distribution and ultimate sale to end-users in a Heat Network



What are the next steps?

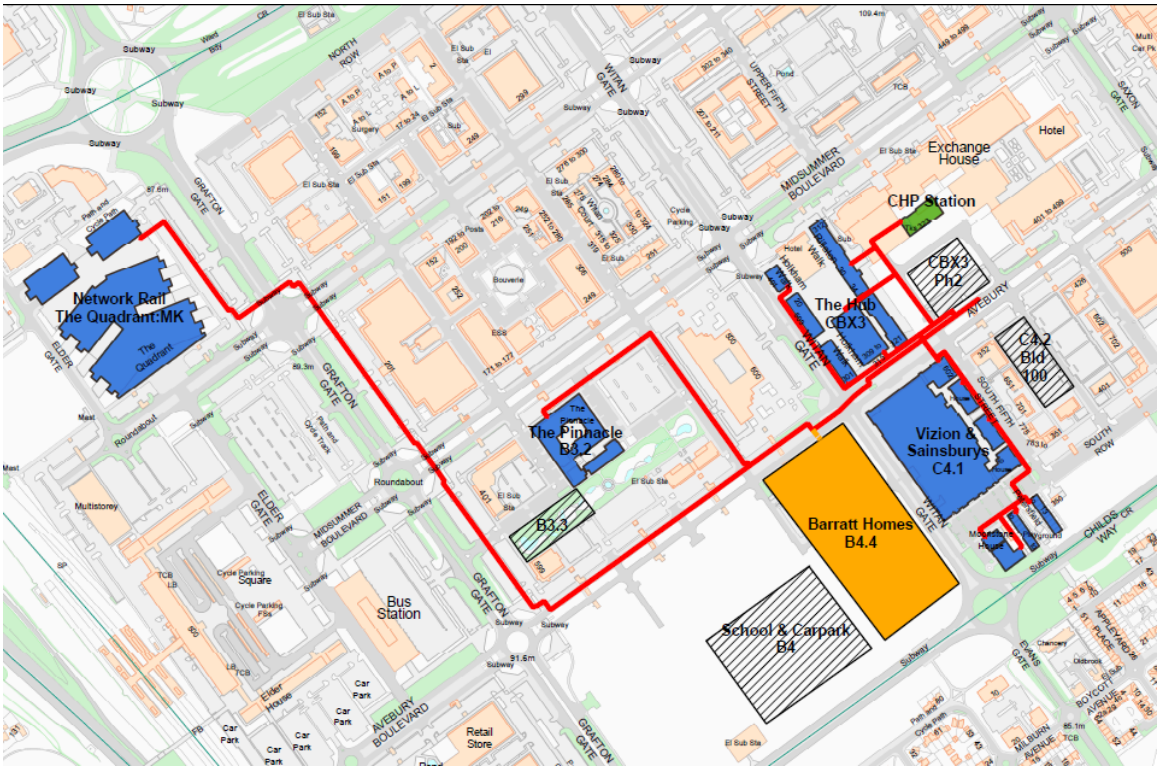
- We will assess if instead of exporting low grade heat to top up using electricity if we could consider high grade heat (pre-turbine) and using our electricity private wire to create an investment grade opportunity for the market
- We will work with our future MKWRP provider to look at how we tap off the heat and create an offtaker interface between MKWRP operator and heat offtaker
- We drive decarbonised heat to offset our costs of the Emissions Trading Scheme

In future we envision being able to sleeve decarbonised heat from MKWRP to our housing stock, Council buildings and across the city.

ThamesWey District Heating Network

Milton Keynes already has a local district heating scheme in CMK.

ThamesWey DHN owned by Woking Borough Council has been operational since 2013 serving CMK. The system is located in an area of high heat demand density although the current network is under-utilised.



Legend

- Pipe Layout
- Proposed Pipe Layout
- CHP Station
- Connected Buildings
- Future Connections
- Potential Future Connections

The ThamesWey network is two CHP units fuelled by natural gas and have an electrical output of 6.4 MW. The station supplies electricity and heat, via a district-heating and private wire network to The Hub, Vizion and The Pinnacle.

The network is owned by Woking Borough Council.

The asset will require investment to be decarbonised.

The district heating network is gas powered which means that it is not a decarbonised heat source. There are currently no plans for the network to be decarbonised and such a transition would need to be financially viable for an investor but might be unlocked by developments in other parts of the city.

The existing connections and proximity to future developments means that it has real potential opportunity for future network configuration and integration. It currently serves 17 connections and the area served currently has a radius of around 1.5 km.

We will assess existing opportunities and support an attractive policy position to attract inward infrastructure investment in our city

Cotton Valley Waste Water Treatment Works (WWTW)

Cotton Valley has the potential to produce a significant amount of heat. As one of the largest water treatment facilities in the UK, yielding heat from water waste of the city

Cotton Valley serves the Milton Keynes catchment with much of the load coming from domestic sources and a few industries around the periphery of Milton Keynes. The site serves a population equivalent of 330,000 which spans the catchment of Milton Keynes.

Treated effluent discharges via an outlet at the neck of the pit lagoon to the river Great Ouse or Great Ouzel.

The site comprises of:

- Preliminary treatment - screening & grit removal
- Primary treatment - horizontal flow primary sedimentation tanks
- Secondary biological treatment - activated sludge, chemical P removal, and conventional final settlement.
- Sludge Treatment Plant (STP) treating the indigenous sludge and imported sludge via a Cambi Thermal Hydrolysis Plant (THP) and digesters.
- Combined Heat and Power plant utilising biogas to produce renewable energy.
- Gas Holder of 2000m^3 capacity
- Alpheus Environmental Waste Treatment Centre receiving tankered trade wastes

It has been identified that up 79GWh of heat could be provided by Cotton Valley. This is a significant contribution to any heat network and as a major piece of infrastructure it is recommended that MKCC and Anglian Water work on strategic heat options for their assets.

We will work with our public service utility partners to support the coordination of a city wide heat network that uses heat from water waste

What are our next steps?

We will work to prioritise the design, development, and delivery of the Heat Network.

Design –We will support the design of Heat Networks in the city. This will mean working with proposed investors in the network to facilitate scaled development across the city linking to profiled demand and heat zones. This will include dedicated reference within our Local Plan and guidance to developers.

Develop – We will support the development of a city wide heat network. This will mean working to ensure that appropriate interfacing for construction or development is provided by our Environment, Highways, Planning and Property teams as required.

Deliver – We will drive delivery for a city wide Heat Network by both acting as a supplier and an offtaker for decarbonised heat in Milton Keynes.

What are our key themes for this work?

Two themes emerging themes for MKCC delivery linked to our Net Zero 2030 ambitions will be to act as both a supplier of heat into the network and in the future as an offtaker / recipient of heat.

Offtaker

- Our Civic buildings will receive heat via piped heat and return exchange
- Conversion will be required to our buildings to accommodate this receipt
- We have made a Public Sector Decarbonisation Scheme (PSDS) bid to fund these conversions

Supplier

- We will supply heat from MKWRP waste plant including upscaling the offer via energy centre
- We will work with the sector to 'offtake' our heat and the MKWRP contractor will facilitate
- The extraction will drive reduced ETS exposure

When engaging investors for heat opportunities we will deliver a relationship matrix managing interfacing across multiple Council services

Public Sector Decarbonisation Scheme

The Public Sector Decarbonisation Scheme (PSDS) provides grants for public sector bodies to fund heat decarbonisation and energy efficiency measures supporting the aim of reducing emissions from public buildings by 75% by 2037, compared to a 2017 baseline.

DESNZ confirmed the continuation of the PSDS and MKCC have applied for a £4.8M grant to convert the aged boiler systems in Civic Building, Central Library and Woughton Leisure Centre.

By bringing the **Civic Offices** onto a District Heating Network Milton Keynes City Council would lead the city and deliver a national first being completed heated by decarbonised heat.

It would save 115 tonnes of carbon a year and deliver 3,430 tonnes of carbon saved over the life of the heat exchangers which would be funded by the Salix grant.

We anticipate that use of the **Central Library** will intensify as a civic space over years to come. By converting to a District Heating Network it would save 63 tonnes of carbon per year. However, this would increase as use of the building intensifies over years to come.

The new roof will also improve further energy efficiency and the new heat exchangers will reinforce our commitment to this building.

The cost and use of heat in Leisure Centres is significant – especially those with swimming provision. Converting to a heat network at **Woughton Leisure Centre** would save 217 tonnes of carbon and decarbonise this asset.

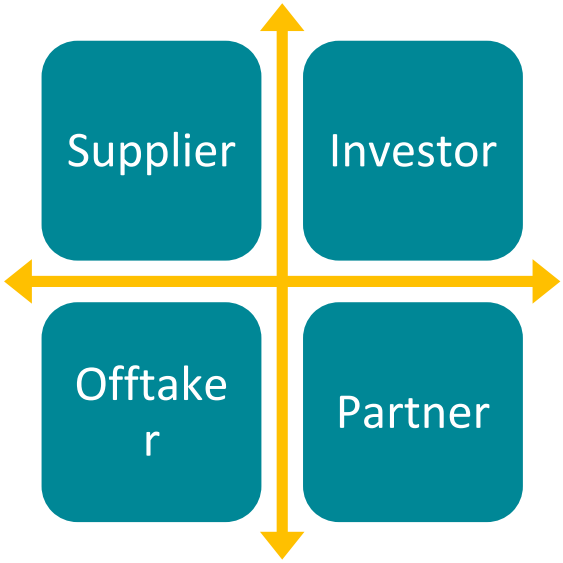
As part of the new Leisure contract we will offer the new heat exchange system in the leisure centre and decarbonised leisure centre as central to our offer to the sector.

We will lead the way with signing up our buildings to the City Heat Network and use grant funding to drive this transition.

Potential Heat Network Operators

The UK Government is working to build competitive and innovative market that delivers the construction of large scale, high value projects to create long term assets.

In order to deliver this funding is being made available to infrastructure investors and developers. As an emerging market where currently the network operator might also (for a time) be the commodity provider MKCC will need to manage and navigate these relationships which may be the same organisation operating through multiple lenses.



Supplier: Commercial opportunity to receive heat and an energy centre at MKWRP

Investor: Building of new infrastructure across Milton Keynes, including attractive low carbon heat offers to businesses.

Partner: Supporting inward investment and promoting regional integration of assets

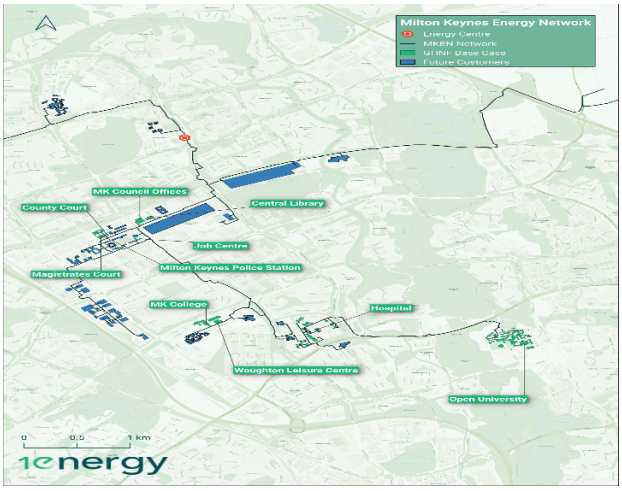
Offtaker: Provision of heat into our buildings and internal works

Case Study: 1Energy

1Energy have been successful in their application to the Green Heat Network Fund (GHNF) to build a Heat Network in Milton Keynes with £110M in construction funding awarded.

Who are 1Energy? 1Energy is one of the UK's largest developer and operator of district heating networks in the UK.

They are preparing a Planning Application for the development of a heat centre in Linford Wood that takes heat from data centres. The application will include the build out a dedicated heat network called as Phase 1.



Potential Phase 1 customers include the University Hospital, Magistrates Courts, Police, The Open University and Milton Keynes College. This includes new build residential developments, Milton Keynes East and Campbell Park - over 6,000 residential units in total.

What will the network look like?

A City Wide Heat Network will take several years to develop and is expected to be delivered in successive phases across the city potentially by multiple providers.

In order to manage the initial investment in a heat network core 'anchor' tenants will be needed including the public sector building, large residential and commercial premises and steady state consistent high yield heat demand centres.

We will work across the Public Sector

The initial sign ups to a heat network will likely come from public sector bodies. The largest single heat user is Milton Keynes University Hospital (MKUH). It is understood that other public sector bodies are reviewing their heat policies and procurement. Therefore, we will:

- Work with Public Sector to ensure a transparent approach to public sector procurement of heat against an emerging market and consistent position across baseload supplies
- Shared best practice on installation and costs together with experience on operators

In order to do this MKCC will host and manage a steering group with MKUH, TVP, Courts, Open and Cranfield Universities, MK College and The Parks Trust to:

- Provide a consistent approach and offer to the sector to meet investment thresholds.
- Provide a transparent position to the sector within our planning documents.

We will engage with Housing Developers

The facilitation with Housing Developers on the aspirations for Milton Keynes to embed a Heat Network will be important and this will be reinforced within our Local Plan. This will ensure future developers consider the houses they build are potentially heat network ready.

We will engage with the Private Sector

Through our forthcoming City Sustainability Plan we will work to promote the benefits of Heat Networks to our businesses and commercial sector to support the transition of decarbonised heat and supporting the cities ambitions for Net Zero by 2030.

We will ensure a consistent and transparent approach to procurement and opportunities arising from the heat sector.

What are we going to do?

Milton Keynes City Council Phase 1 – Heat Networks Programme		
- **Ensuring** consistent engagement with heat sector in a transparent and open manner - **Outlining** our ambitions, timescales and commitments as a thought leader for Heat Networks - **Investing** as both a supplier of heat and offtaker of heat to support development of the network		
Action	**Offtaker / Supplier**	**Timeline**
Set up a Task and Finish 'Heat Networks' team to deliver the ambitions and policy objectives of Heat Networks - Pathway to Net Zero 2050	**All**	**June 2025**
Publish Phase 1, Phase 2 findings and policy positions in Delegated Decision with new heat landing page on MKCC website.	**All**	**June 2025**
MKCC to approve Public Sector Decarbonisation Fund (PSDF) grant and provide £700K capital contribution to unlock £4.4M Government funding.	**Offtaker**	**April 2025**
Pending successful grant award from PSDS we will convert Civic, Library and Woughton Leisure Centre to receive heat from a district heating network as Phase 1 of MKCC corporate buildings.	**Offtaker**	**February 2026**
Undertake public procurement for heat provision to Civic buildings in CMK and Woughton Leisure Centre	**Offtaker**	**April 2026**
Finalise technical assessment for MKWRP CHP to extract low / high grade heat and feed into energy centre using private wire to top up.	**Supplier**	**July 2025**
Develop and refine investment grade financial model for development of Energy Centre within Wolverton Ecopark which can plug into the Heat Network.	**Supplier**	**July 2025**
Undertake procurement for offtaker and energy centre offer to sector	**Supplier**	**May 2026**
Review development of heat to Wolverton Ecopark buildings either through public / private investment profiles.	**Supplier / Offtaker**	**May 2026**
Facilitate hospital / TVP engagement for consistent public realm interfacing with heat sector and potential investors.	**Offtaker**	**April 2025**
Review the Emission Trading Scheme position on heat networks.	**Offtaker**	**December 2025**


Milton Keynes
City Council