Belfast

LOCAL AREA ENERGY PLAN

Belfast City Council

CATAPULT Energy Systems

March 2024

Belfast

Queen's Island Decarbonisation Plan

CATAPULT Energy Systems

Belfast City Council

Belfast

City wide programme of work 2024-28 Belfast Agenda – Our Planet

Re-naturing the city and increasing resilience to climate change

1. Increase the number of trees across the city.
2. Protect and enhance our local environment and natural eco-systems.
3. Promote the uptake of nature-based solutions across the city to support climate resilience.

- One Million Trees
- UPSURGE
- Mainstreaming
- Green/Blue Regeneration Plan

Creating a sustainable circular economy

1. Promote sustainable circular economy approaches.
2. Promote a Just Transition to Net Zero in Belfast.
3. Increase the use of Electric Vehicles in Belfast and improve access to charge points.
4. Reduce energy consumption (and bills) of housing and public /commercial buildings.
5. Decarbonise the heat supply to buildings in the city.
6. Embed sustainable food practices and partnership working in Belfast.

- Net Zero neighbourhood pilot
- Circular economy hubs
- Sustainable Waste
- Reduce emissions from municipal Waste
- Tourism carbon footprint
- EV Strategy
- Retrofit programme
- Heat network
- Community Energy projects
- Food Strategy + accreditation

Innovating to Net Zero

1. Enable the city to decarbonise at scale.
2. Create an exemplar Net Zero Tech Park in the Harbour Estate to develop, test and commercialise green technologies.
3. Develop a stable supply of green energy to the Net Zero Park and surrounding lands to support the industrial cluster.
4. Accelerate the transition to low carbon manufacturing.
5. Support Green Multi-Modal Mobility.

- 2 Decarbonisation projects developed
- Delivery of LAEP
- Net Zero Tech Park
- Green energy project
- Green shipping corridor study

Belfast Local Area Energy Plan

Infrastructure
Bonneagair
Infrastructure
RenewableNI
Belfast Harbour
Department for the Economy
SERC
action renewables
afbi
PCAN
BELFAST CLIMATE COMMISSION
Ulster University
Housing Executive
GSNI
northern ireland water
nice
Translink
Belfast City Council
SONI
Utility Regulator
Master Builders
Electricity Networks
Phoenix Energy
visit Belfast
HSC
Belfast Health and Social Care Trust
Artemis TECHNOLOGIES
QUEEN'S UNIVERSITY BELFAST
ADVANCED MANUFACTURING INNOVATION CENTRE
belfast met
C60
B9 Energy Ltd
HSC
Public Health Agency
The Strategic Investment Board
Department of Finance
Airgeadais
EVA NI
DPS
sustainableNI
NEA
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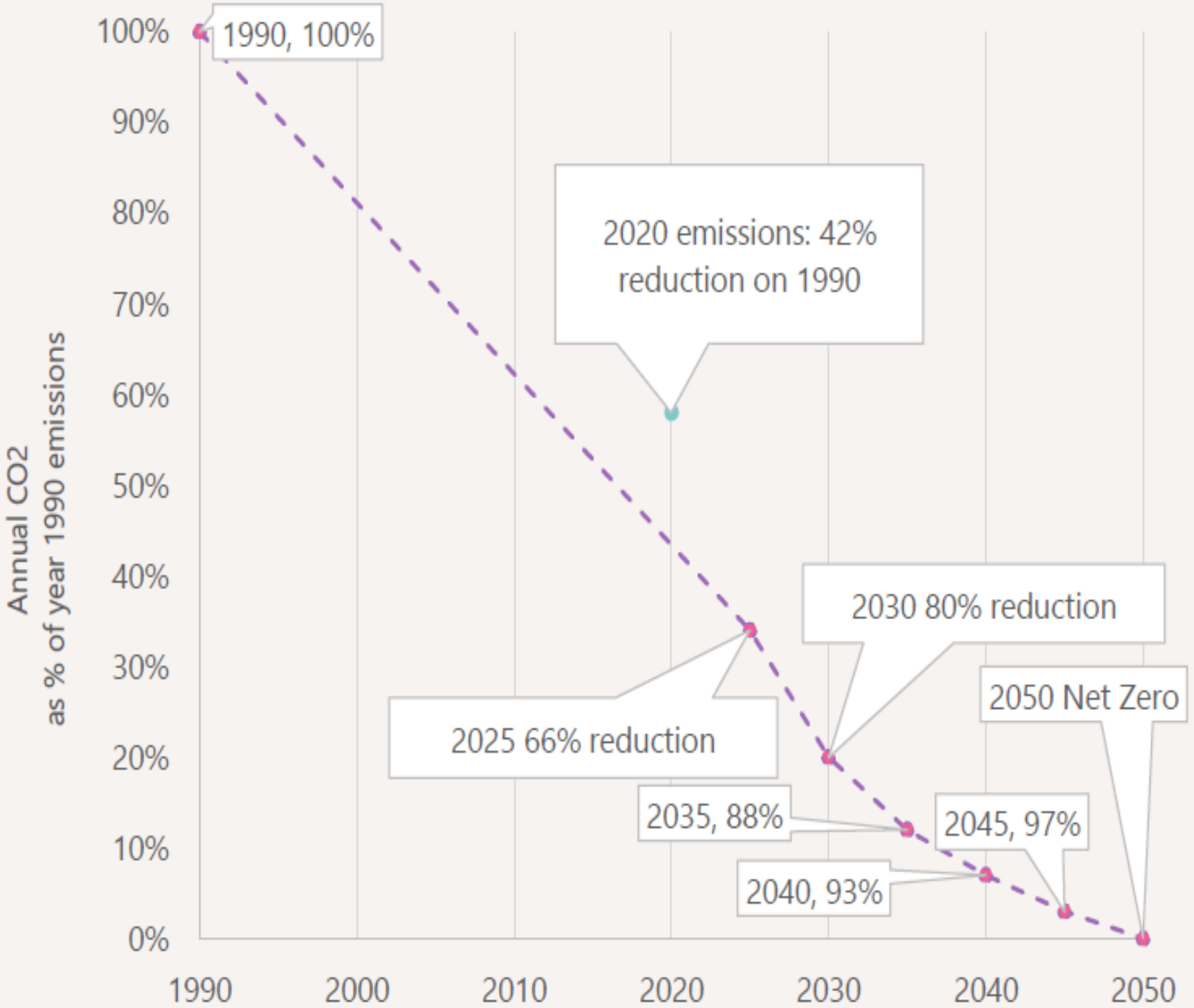


A NET-ZERO CARBON ROADMAP FOR BELFAST

Andy Gouldson, Andrew Sudmant, Jessica Boyd, Robert Fraser Williamson, John Barry & Amanda Slevin

PCAN PLACE-BASED CLIMATE ACTION NETWORK
UNIVERSITY OF LEEDS
WTC
QUEEN'S UNIVERSITY BELFAST
Belfast City Council

Belfast's Energy System Today

63%

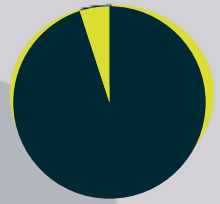
of dwellings EPC rated D – G

BUILDINGS

Currently 35% of of Belfast's existing domestic buildings are EPC rated D with 18% rated E, 8% rated F, and 2% rated G. These require energy efficiency improvements. Belfast must also ensure that 12 million square metres of public, commercial, and industrial floorspace is decarbonised by 2050.

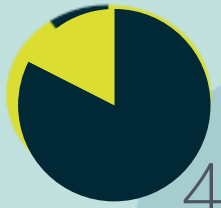
HEATING

66% of buildings currently use gas for heating with 29% using oil. There are small quantities (<5%) of buildings electric heating, solid fuel or biomass heating.



95%

of heating is fossil fuel based



4.5 MW

Capacity from existing public EV charging points

VEHICLES

Belfast currently has 170 Electric Vehicle charging points around the city delivering a total charging capacity of nearly 4.5 MW. Belfast's ambition is to deliver 800 charging points by 2027.

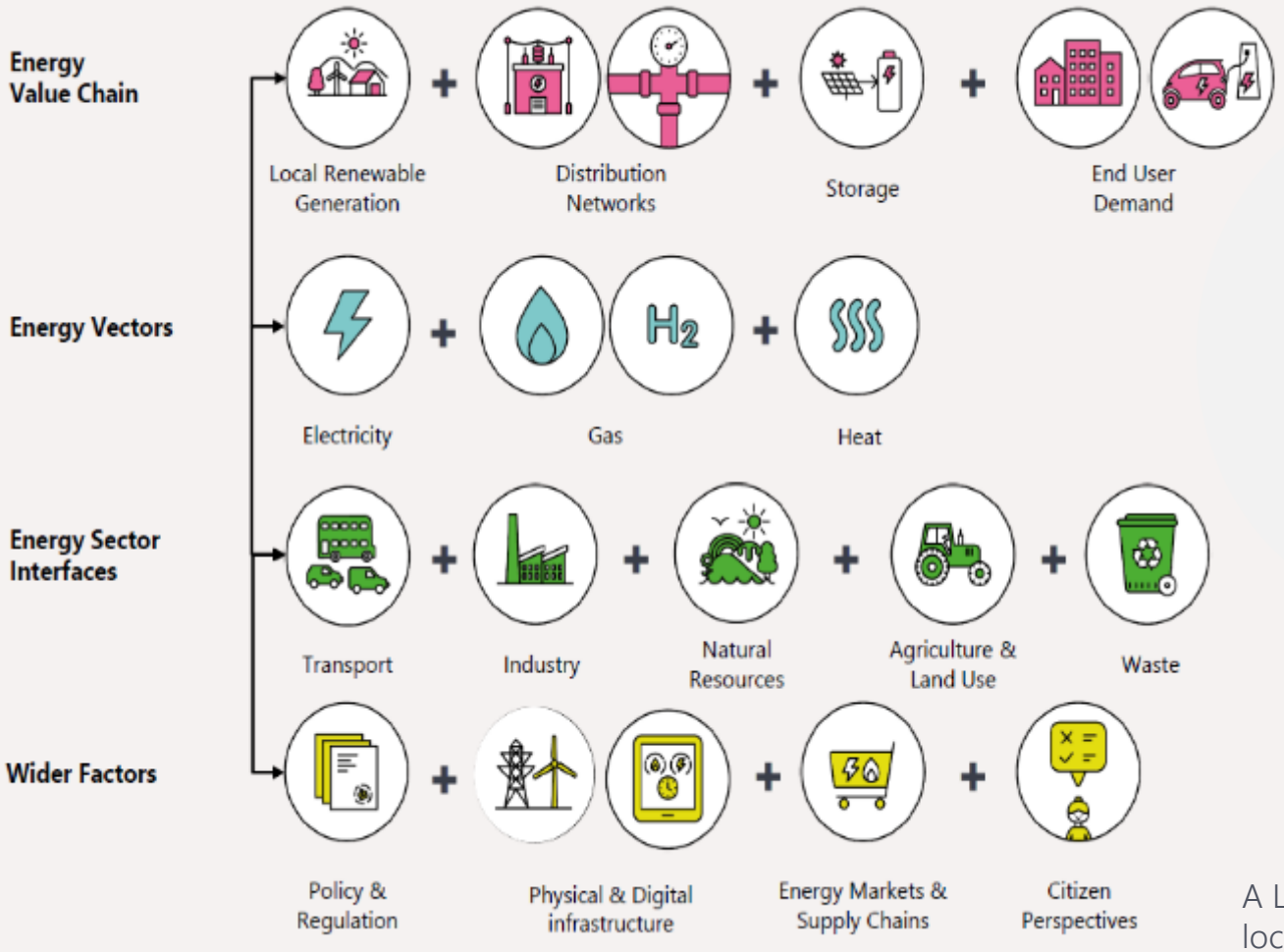
ENERGY

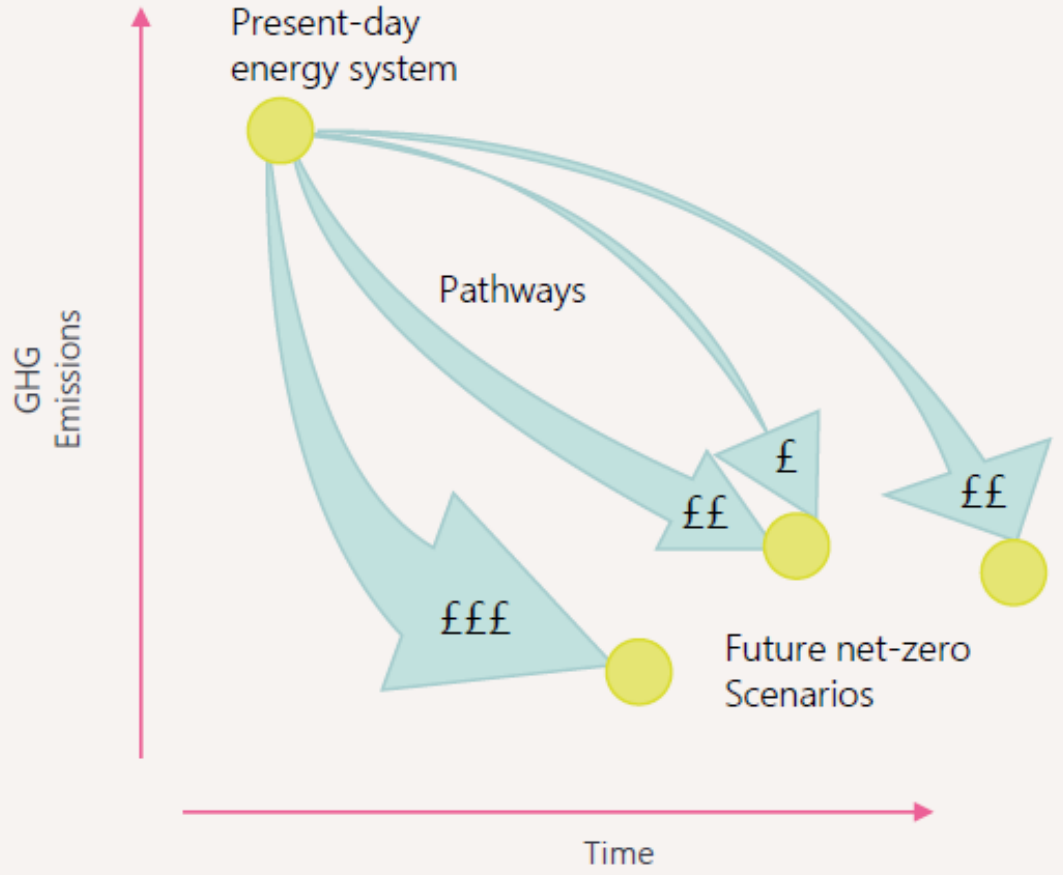
Belfast's metered energy consumption is 63% from gas and 37% from electricity. There are currently 1,311 domestic solar PV installations across Belfast contributing a total of 8.6 MW of renewable electricity to the local supply.

63%

of energy consumed in Belfast is from gas

Belfast Local Area Energy Plan



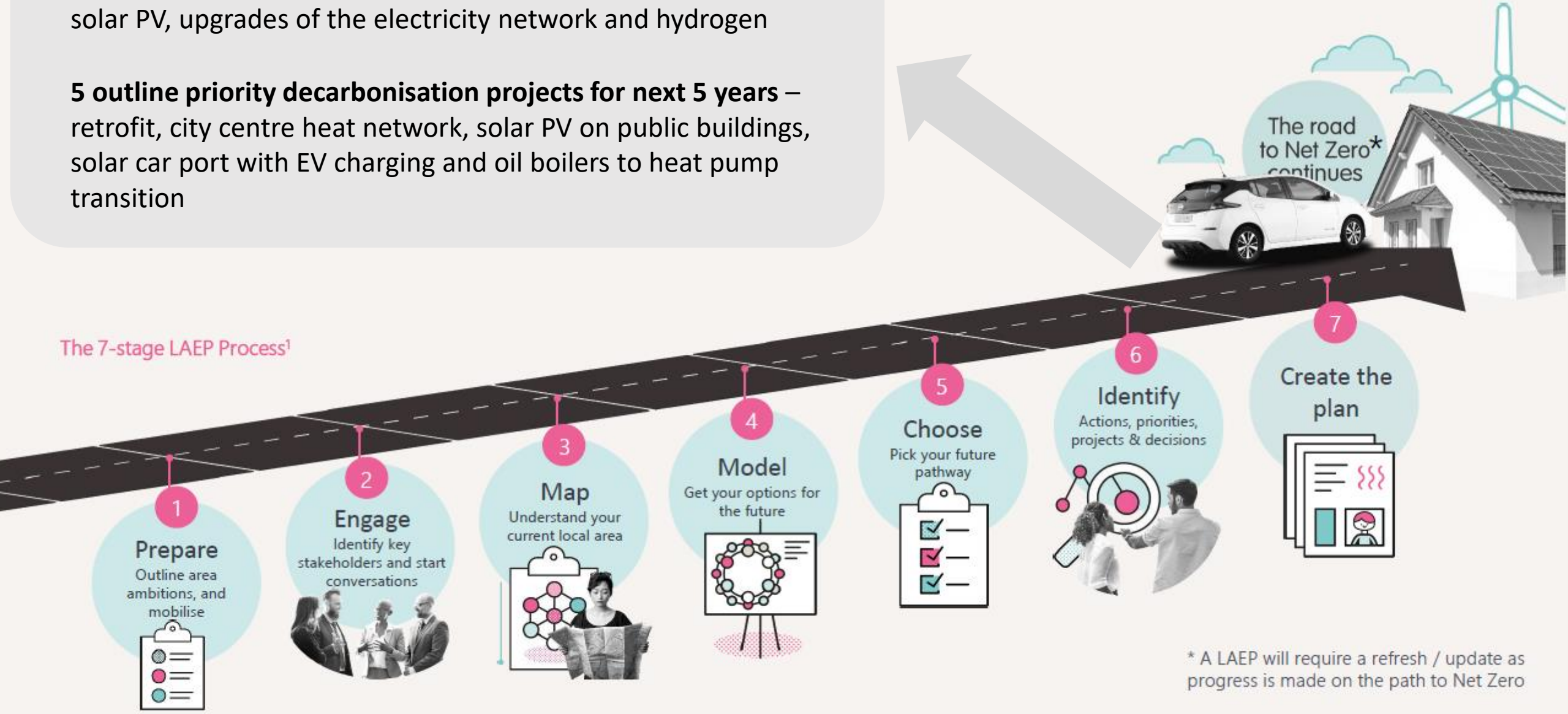


A Local Area Energy Plan (LAEP) is a **whole energy system** approach, led by local government, in collaboration with key stakeholders.

It **identifies the most cost-effective integrated plan** for the local area to contribute to timebound national and local Net Zero targets whilst maximising co-benefits to society.

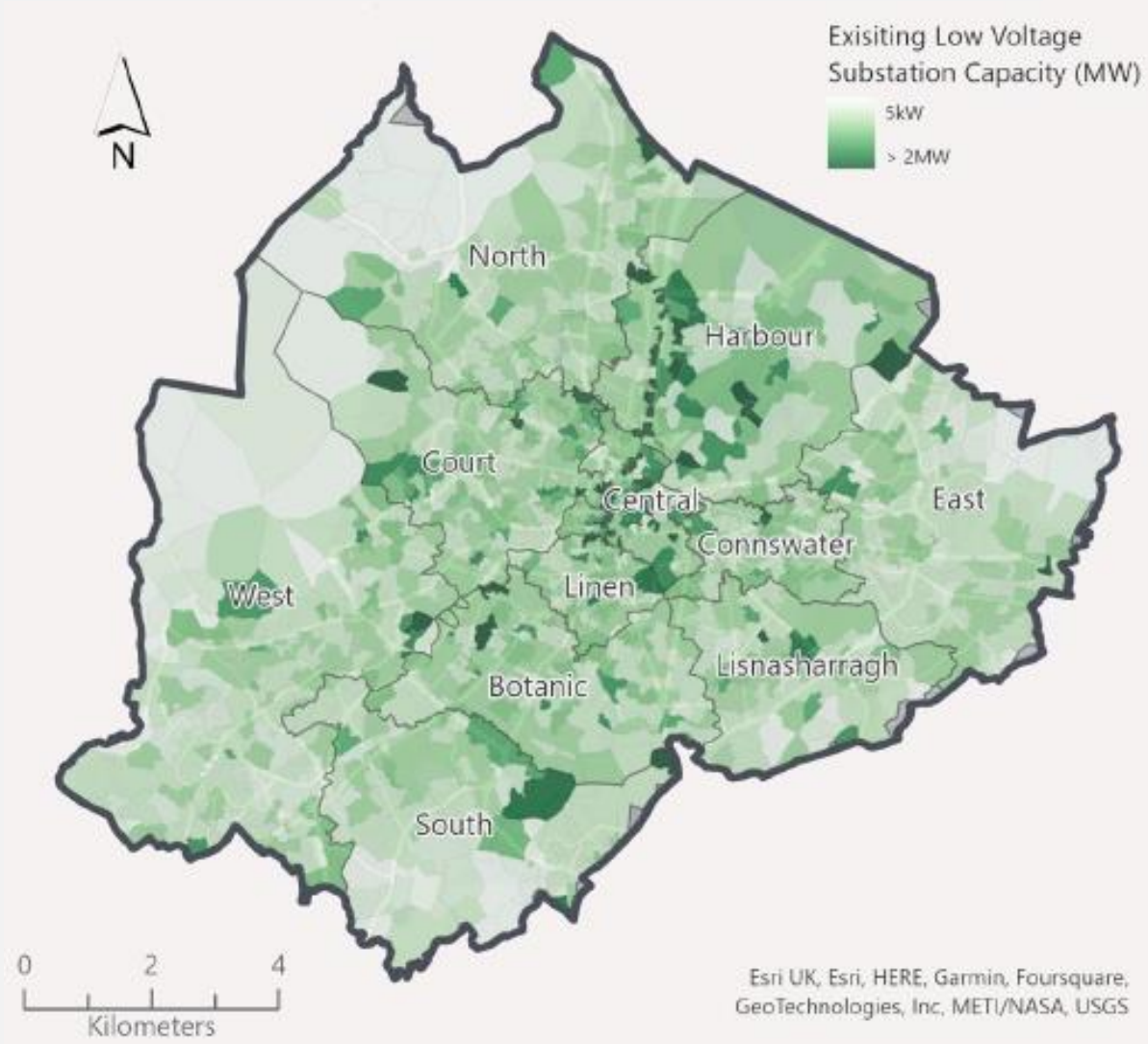
Opportunity areas and focus zones – fabric upgrades, heat networks, heat pumps, biomethane boilers, EV infrastructure, solar PV, upgrades of the electricity network and hydrogen

5 outline priority decarbonisation projects for next 5 years – retrofit, city centre heat network, solar PV on public buildings, solar car port with EV charging and oil boilers to heat pump transition

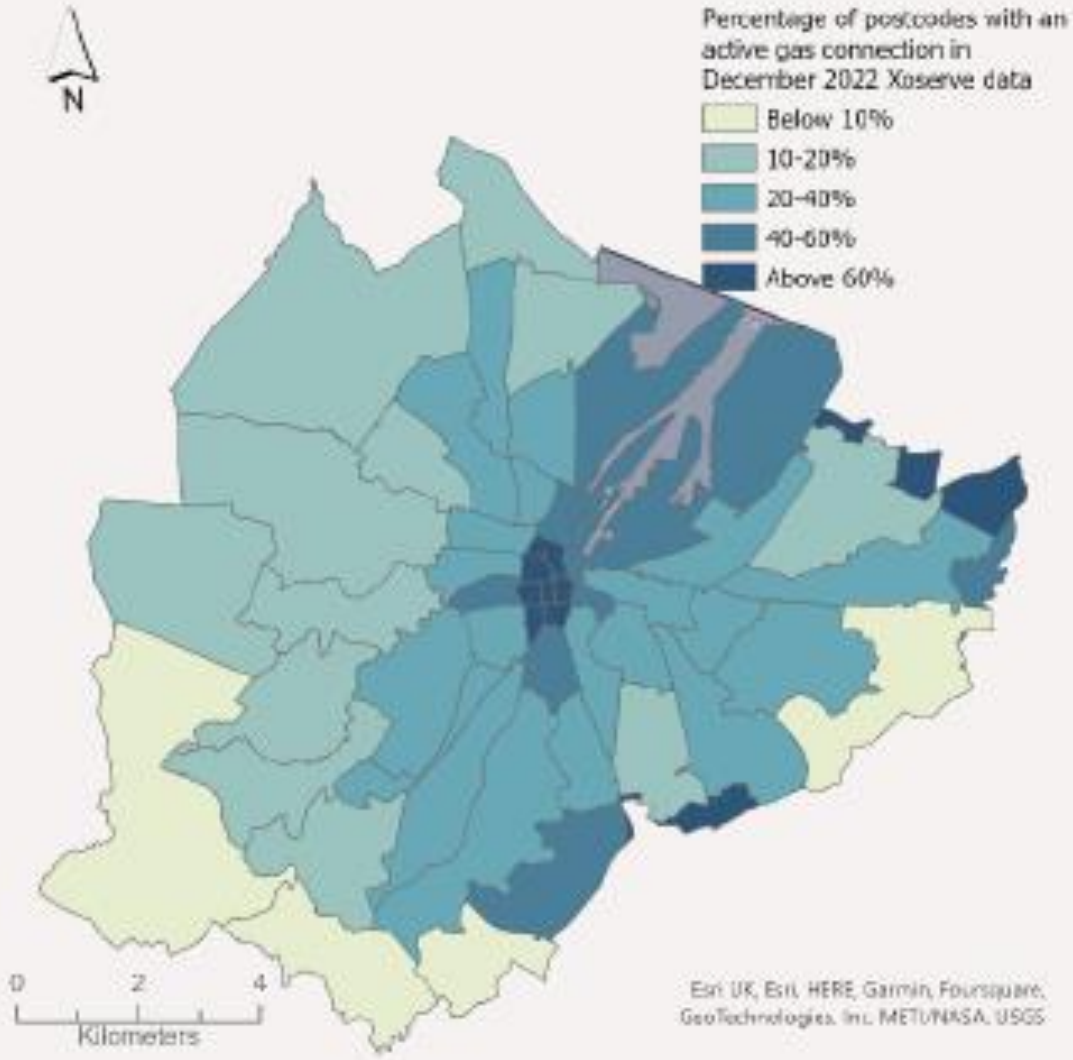


* A LAEP will require a refresh / update as progress is made on the path to Net Zero

Low voltage sub-station capacity



Gas connection

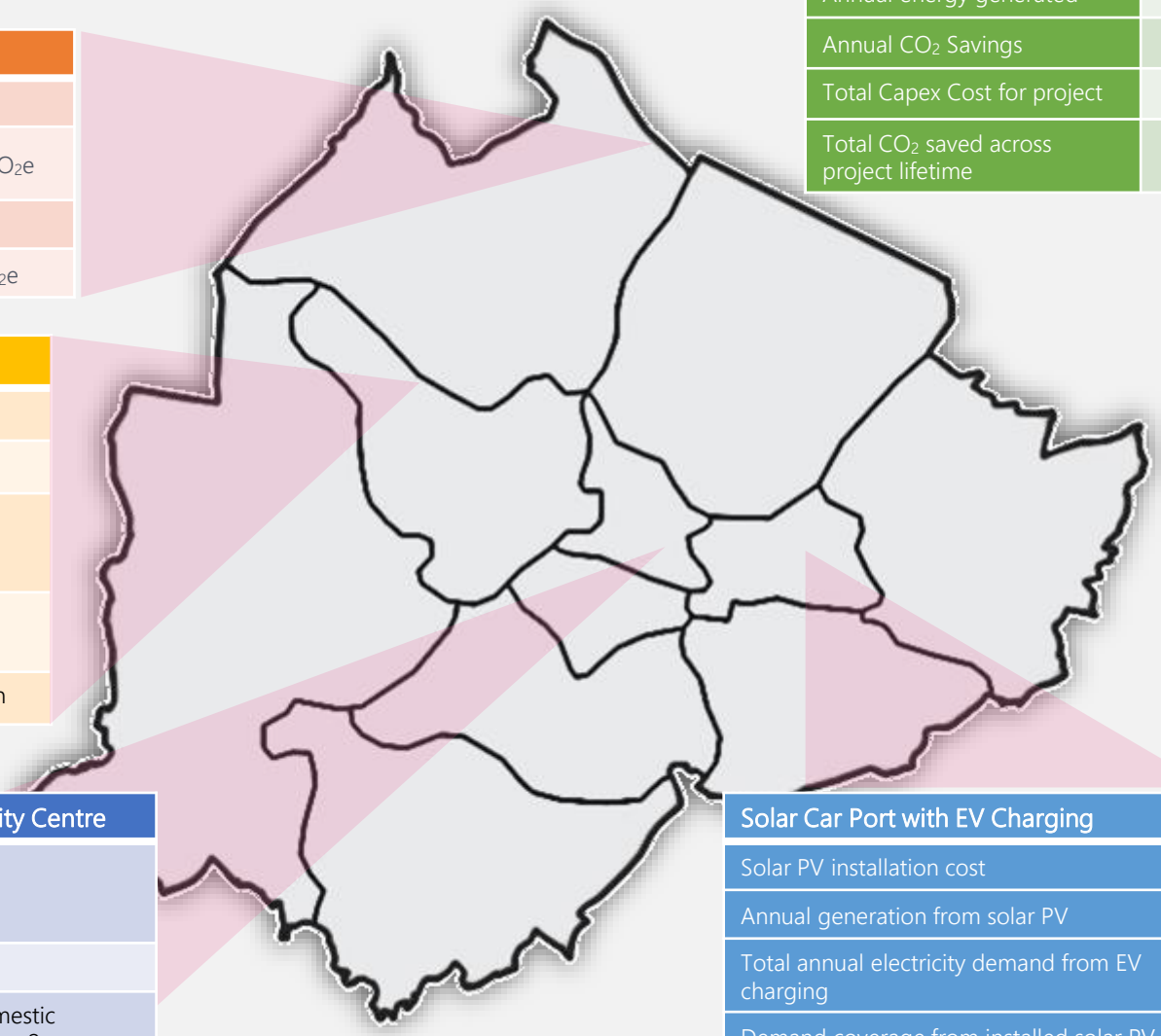


Outline Priority Projects

Oil to Low Carbon Heating Transition	
Number of homes transitioning	500
Annual CO2 Savings (per household)	4,400 $kgCO_2e$
Total Capex Cost for project	£7.0m
Total CO2 saved from project	2.2 $ktCO_2e$

Solar PV on Public Buildings	
Number of buildings	20
Annual energy generated	903 MWh
Annual CO_2 Savings	40 tCO2e
Total Capex Cost for project	£1.0m
Total CO_2 saved across project lifetime	606 tCO_2e

Domestic Retrofit Measures	
Number of Dwellings	Up to 2,000
Capital Investment	£2.7m – £5.6m
Annual bill savings per dwelling	£123 – £520
Annual carbon savings per dwelling	420 – 1,500 $kgCO_2e$
Additional benefit	Fuel poverty reduction



High Temperature District Heat Network in City Centre	
Potential annual energy demand (phase 1: Non-Domestic Buildings only)	2.8 GWh
Capital Investment	£4.2m
Additional benefit	Expansion to domestic properties in phase 2

Solar Car Port with EV Charging	
Solar PV installation cost	£21,100
Annual generation from solar PV	47,800 kWh
Total annual electricity demand from EV charging	3,432 MWh
Demand coverage from installed solar PV	1.4%
Annual CO_2 Savings	2,140 $kgCO_2e$

District Heat Networks

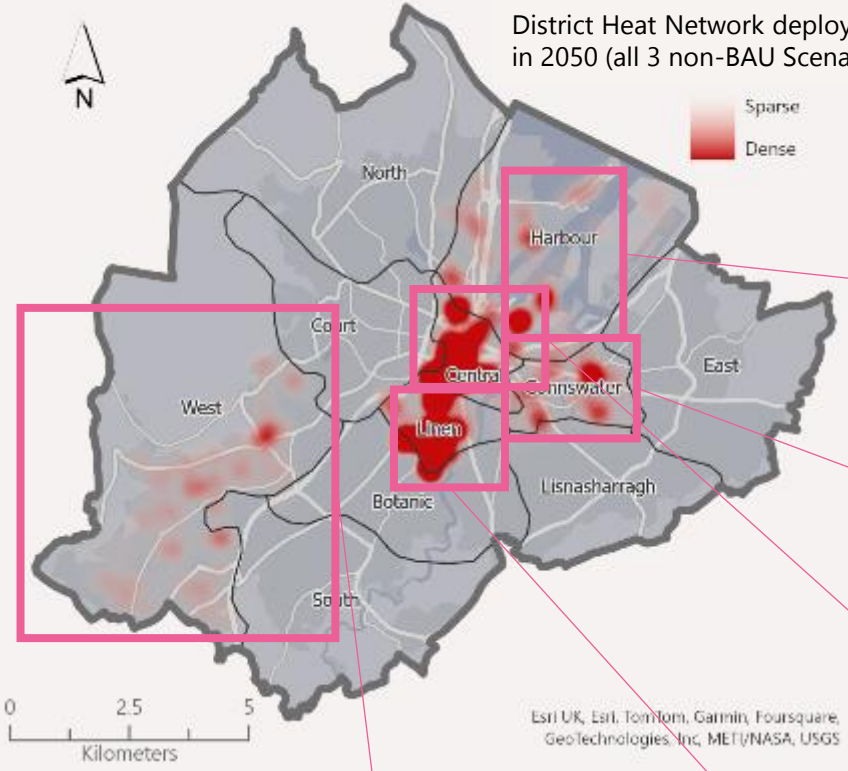
At least 30%

of Belfast's non-domestic heat demand is from District Heat Networks by 2050

Up to 58%

of Belfast's domestic buildings could be connected to District Heat Networks by 2050

District Heat Network deployment in 2050 (all 3 non-BAU Scenarios)



DHN In Harbour Area
- 12,346 homes in Harbour area in total
  - At least 1,100 connected to district heating (8.9%)
  - Potential to connect to the 6,250 emerging new build properties
- 1.95 million m^2 of non-domestic building floor area
  - At least 730,000 m^2 connected to district heating (37.4%)

DHN In Connswater
- 17,652 homes in Connswater in total
  - At least 4,900 connected to district heating (27.8%)
- 456,000 m^2 of non-domestic building floor area
  - At least 184,000 m^2 connected to district heating (40.4%)

DHN In Central
- 10,047 homes in Central Belfast in total
  - At least 1,700 connected to district heating (16.9%)
- 2.56 million m^2 of non-domestic building floor area
  - At least 1.61 million m^2 connected to district heating (62.9%)

DHN in West
- 28,000 homes in West Belfast in total
  - At least 16,000 connected to district heating (57.1%)
- 870,000 m^2 of non-domestic building floor area
  - At least 334,00 m^2 connected to district heating (38.4%)
- What does the HV network look like? Is upgrade required?

DHN In Linen
- 10,959 homes in Linen in total
  - At least 4,100 connected to district heating (37.4%)
- 1.28 million m^2 of non-domestic building floor area
  - At least 640,000 m^2 connected to district heating (50.0%)

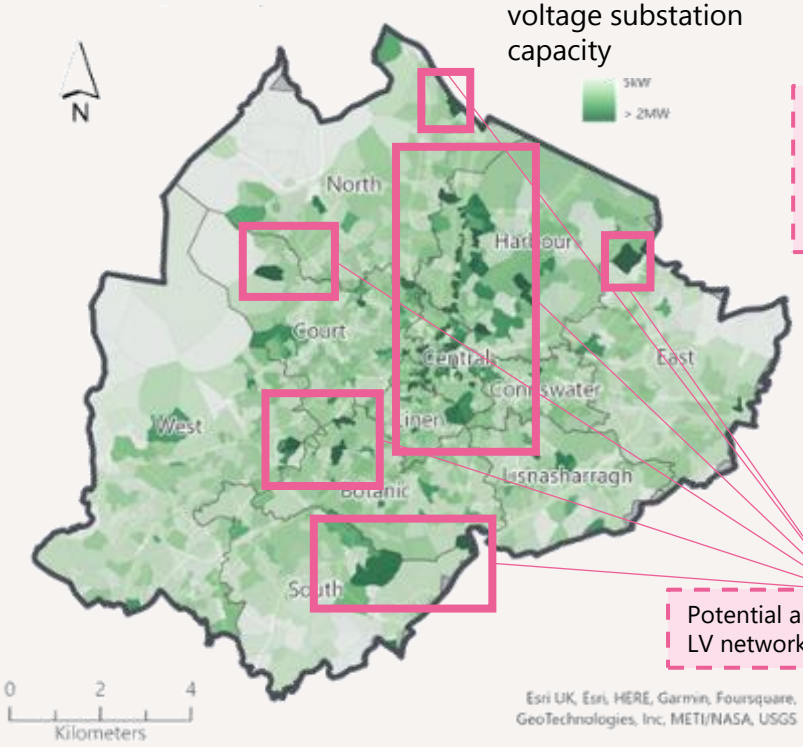
Electricity Networks

£117m
Potential cost to upgrade electricity distribution network around Belfast

57% - 166%
increase in peak electricity demand at night (due mainly to EV charging)

Enablers	Barriers	Actions
• Investment already planned for upgrades. • Network operator engaged and aligned with local authority over decarbonisation action. • Emerging flexibility markets may provide near-term low-cost mechanism to reduce or avoid level of required network upgrades	• Uncertainty over gas network re-purposing for biomethane may constrain near-term network upgrades. • Flexibility options not fully modelled in LAEP; uncertain impact and compatibility.	

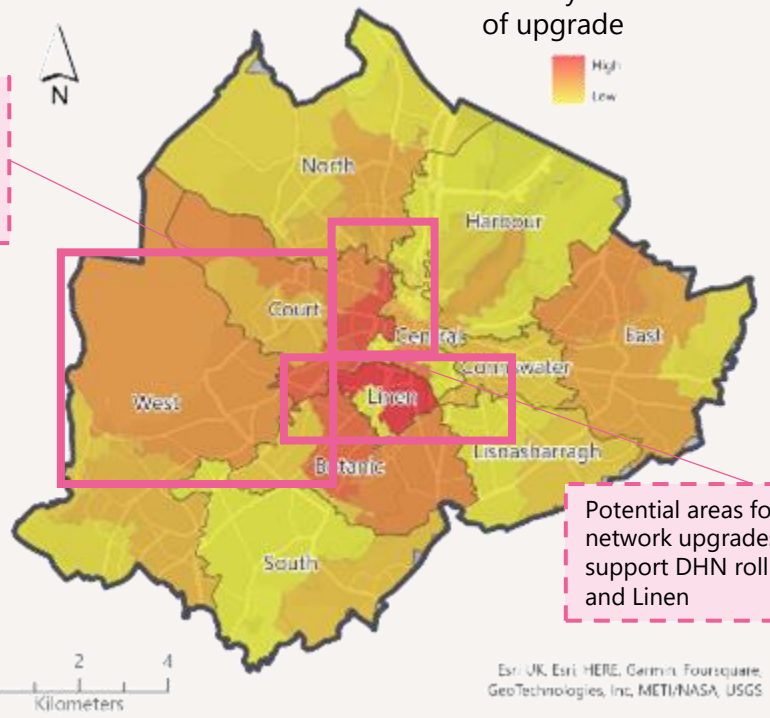
Estimated existing low voltage substation capacity



Potential area for priority HV network upgrades required to support DHN roll out in West Belfast

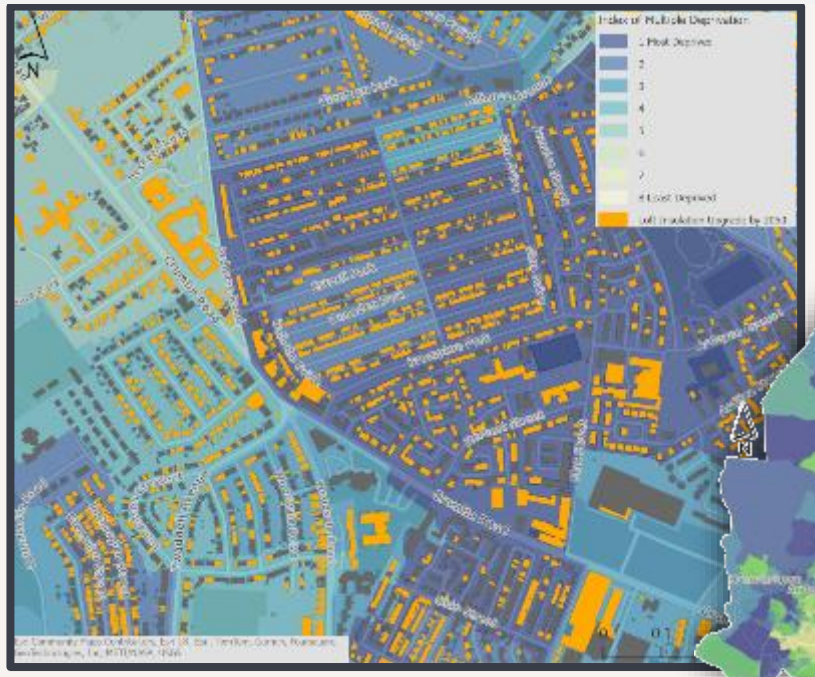
Potential areas for priority LV network upgrade

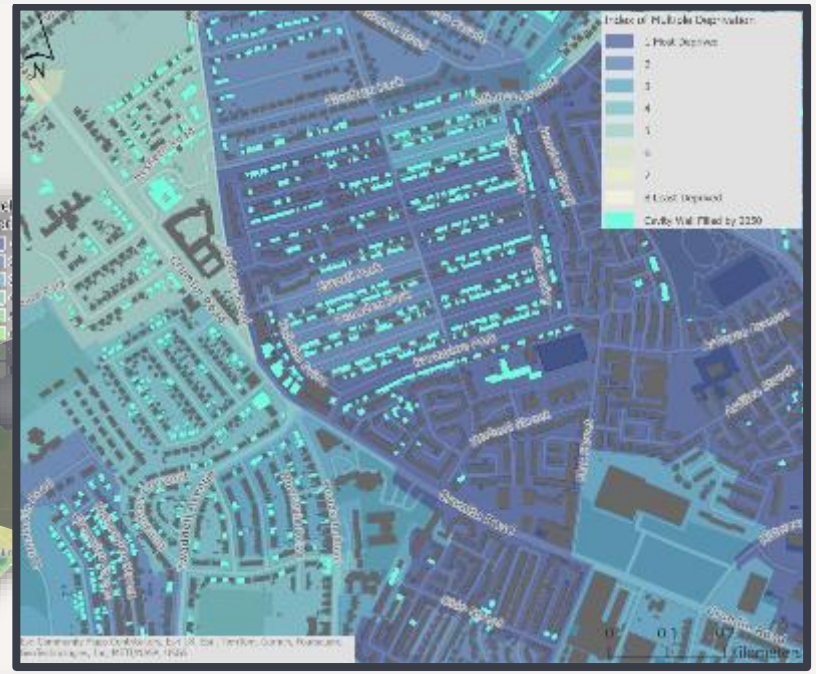
Primary substation level of upgrade



Potential areas for priority HV network upgrades required to support DHN roll out in Central and Linen

Loft insulation





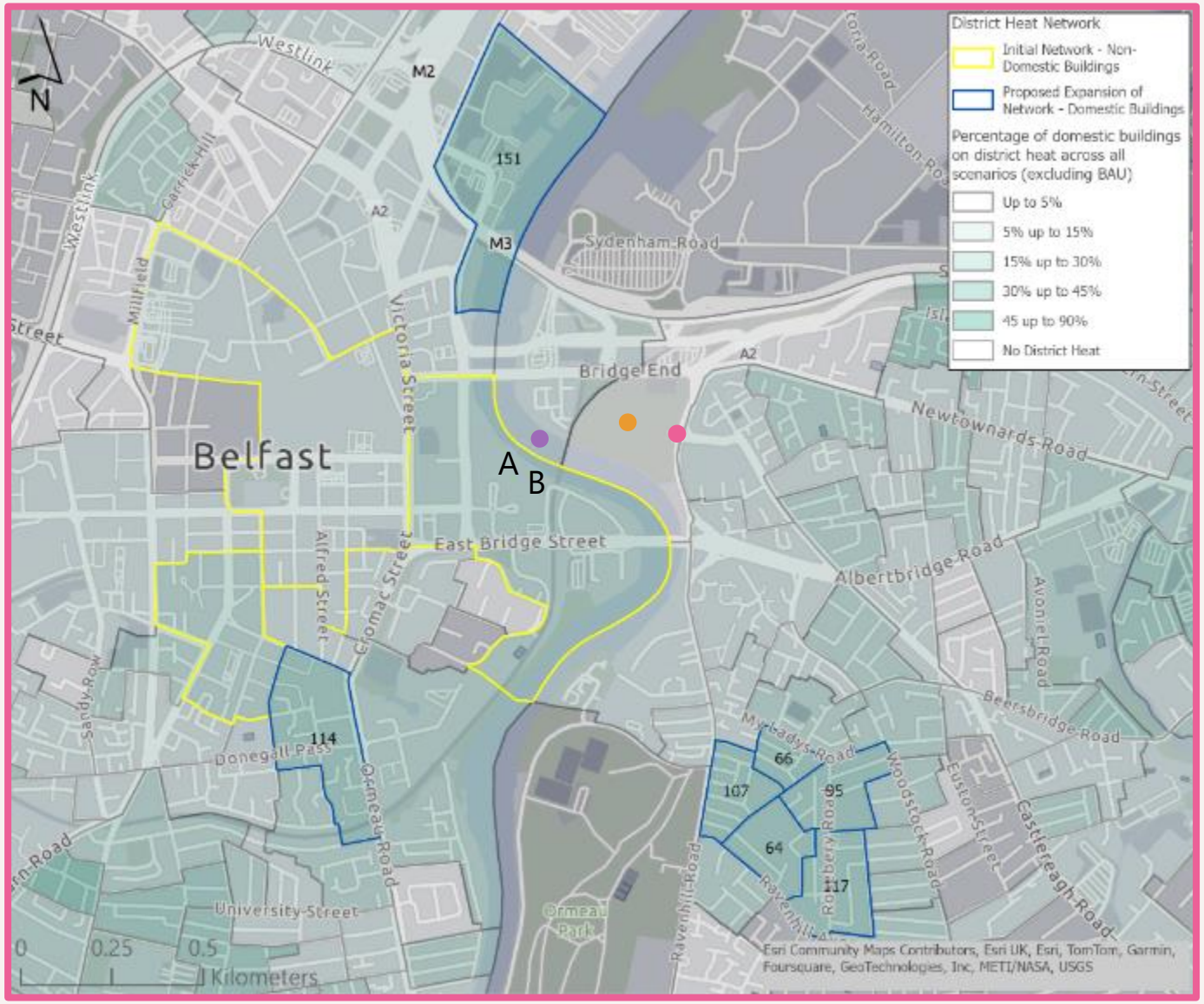
Cavity wall insulation

Glazing

Number of retrofit measures applied to properties in the area shown

	Loft Insulation	Cavity Wall Insulation	Single Glazing Window Replacement
Number of homes in area shown (% of all homes in Belfast)	6,615 (3.4%)		
Number of homes in area requiring retrofit measure	2,517	1,419	456
As a % of required measures across Belfast	3.4%	5.4%	6.1%

High-Temperature DHN in City Centre

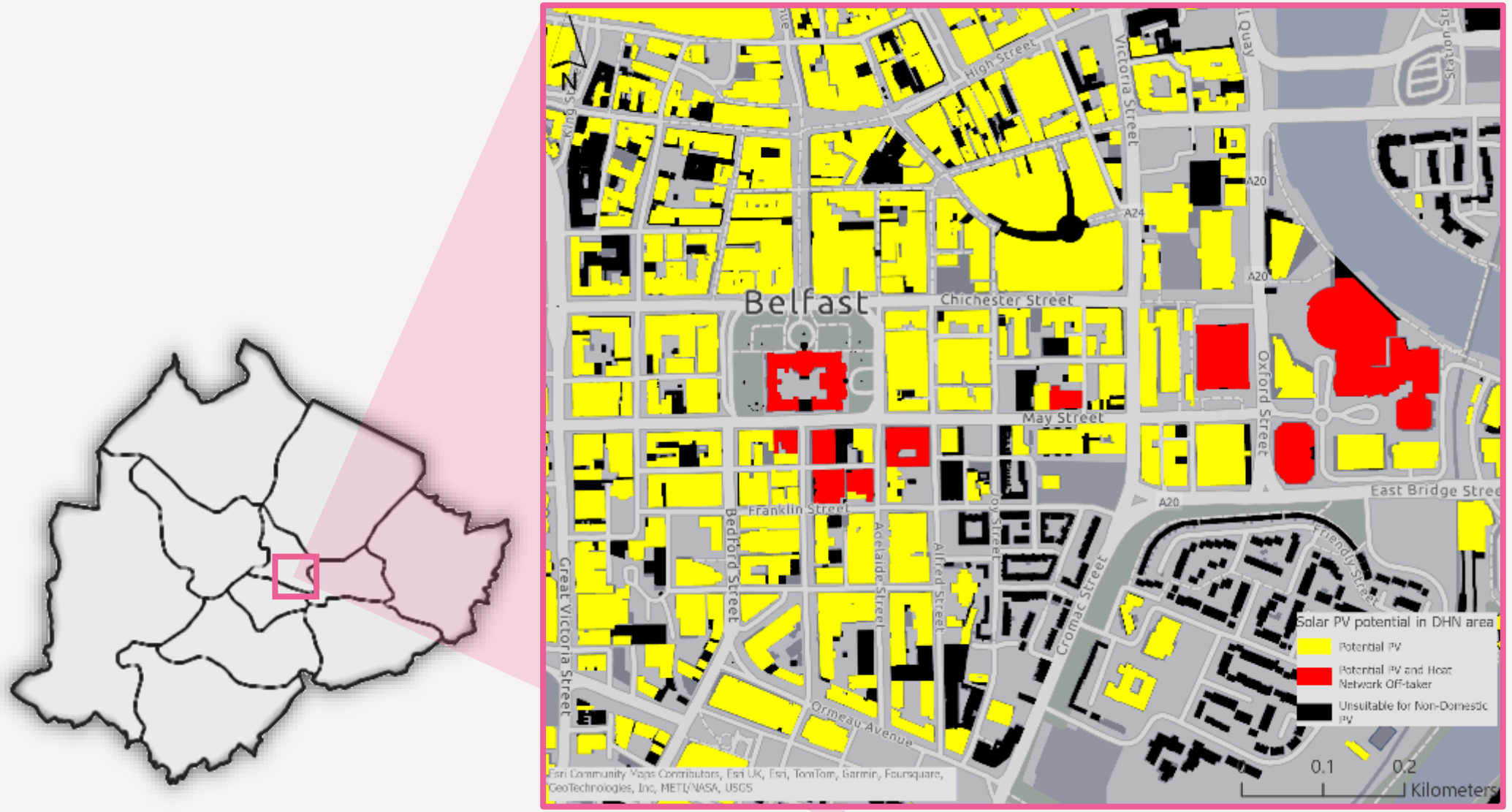


A. Waterfront Hall (annual heat demand 8 GWh)

B. Hilton Hotel, 4 Lanyon Place (annual heat demand 9 GWh)

- Potential river-sourced energy centre
- Potential land-based energy centre
- Potential geothermal boreholes for thermal underground storage

Solar PV potential on Non-Domestic Buildings in central Belfast potential DHN area



Belfast

Queen's Island Decarbonisation Plan

CATAPULT Energy Systems

Belfast City Council

Belfast

01 Citi Gateway Offices
05 Public Record Office of Northern Ireland
06 Belfast Metropolitan College
08 Titanic Belfast
15 Titanic Hotel Belfast

£15 million

Total net CapEx

Providing:

£2.5 million

Cumulative cost savings to 2050

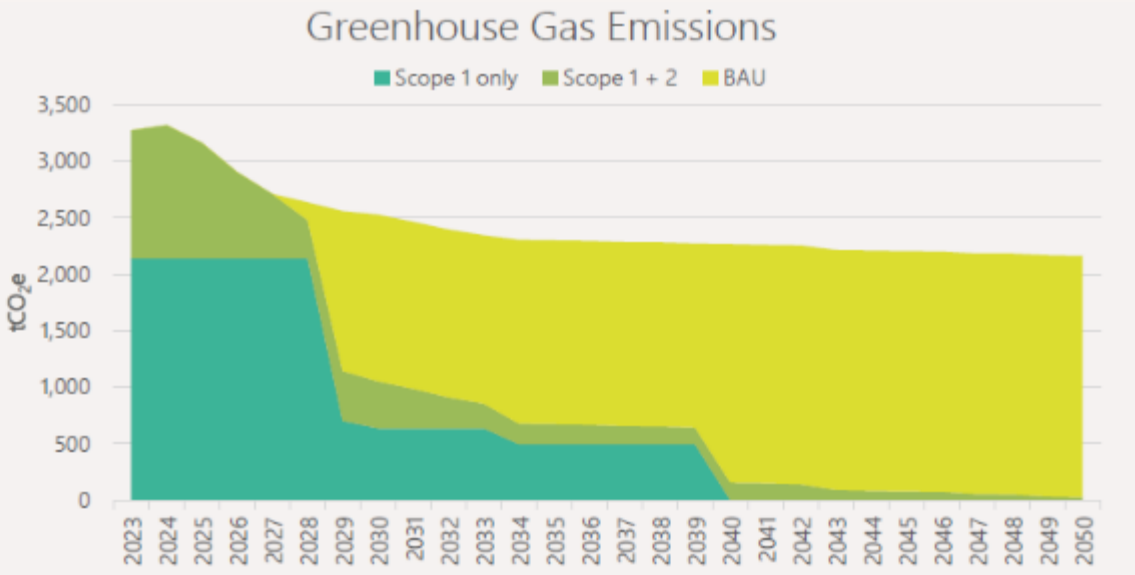
Saving:

2,136 tCO_2e

in 2050 against a business-as-usual pathway

7.3 GWh

energy in 2050 against a business-as-usual pathway



Phase 1* (2027 – 2029)

Start developing ambient loop network and connection of **Belfast Met, Citi** and **Titanic Belfast**

Phase 2 (2033 – 2034)

Connection of **PRONI**

Phase 3 (2039 – 2040)

Connection of **Titanic Hotel** and **Titanic House**

* Solar carports have been phased from 2026-27 alongside Phase 1 heat deployment

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Solar car port Odyssey

Heat network

Solar car port Catalyst

Option to extend network to future potential waste heat source (Global Innovation Institute)

Option to extend/replicate ambient loop for existing Catalyst buildings

Option to supply domestic hot water, heating or cooling to future site developments

Support development of Net Zero Technology Park

Next steps

Belfast Net Zero Pathfinder project

Form LAEP delivery group

Use the LAEP to build a pipeline of net-zero aligned investments

Develop investible business models

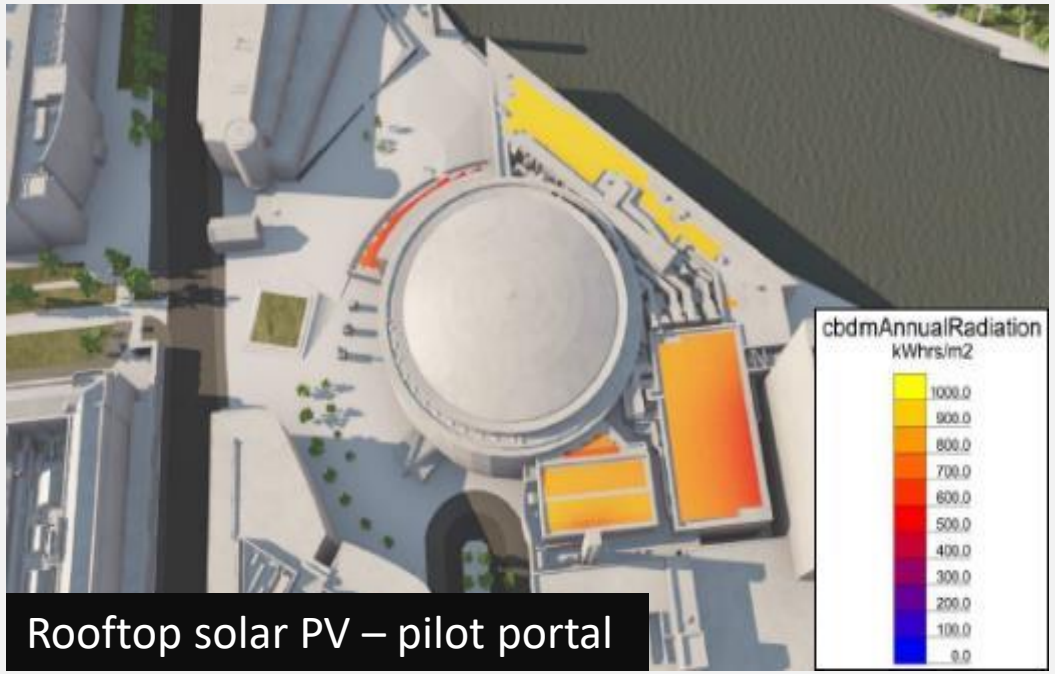
Engage citizens

Measure the decarbonisation and social co-benefits

Priority projects – work underway

Retrofit hub

District heat network



Rooftop solar PV – pilot portal

kWh

solar PV may contribute up to 107 GWh of renewable energy in 2030 which is 5% of Belfast's total energy demand in 2030 (2.13 TWh)

734 MW

Domestic Rooftop Solar PV potential by 2050

459 MW

Total Non-Domestic Building Rooftop Solar PV potential by 2050

Thankyou

Contact: Caldwelld@belfastcity.gov.uk