Climate Change Sub-Group - 18 March 2020
Corporate Estate & Carbon Reduction

What is the Operational Estate

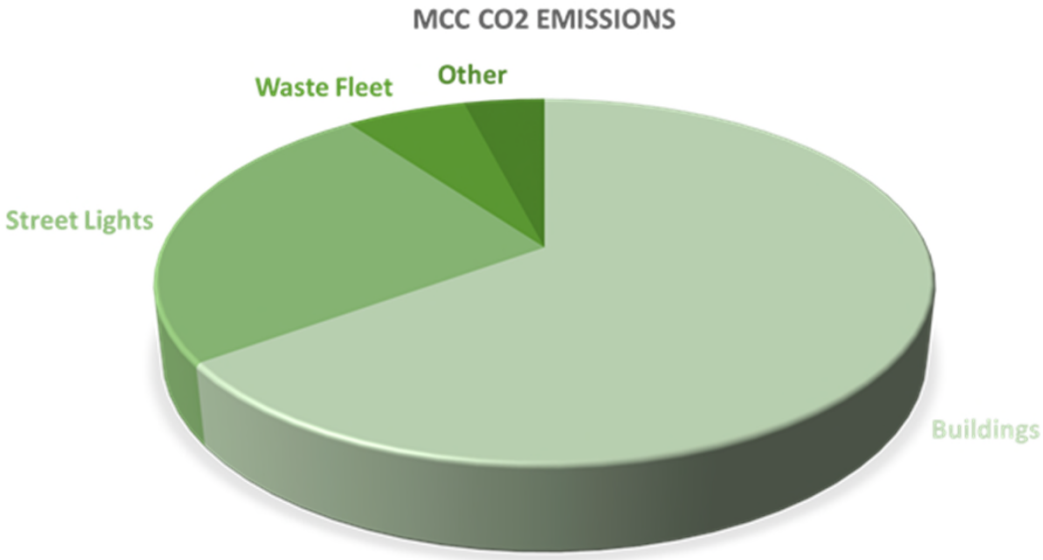
The operational Estate includes properties used or held to provide Council Services including unlet land (it excludes the investment estate, schools and housing stock).

It includes c350 buildings totalling c3.68M ft2, ranging from:

- The Town Hall Complex and other offices across the city
- High profile buildings such as Manchester Art Gallery, The National Football Museum, Bridgewater Hall, Manchester Aquatics Centre, The Velodrome
- Neighbourhood facilities including leisure centres, libraries, community centres, parks buildings, markets, cemeteries, children's centres, supported accommodation and hostels
- Heritage buildings such as Heaton Hall, Wythenshawe Hall, Clayton Hall, and Platt Hall

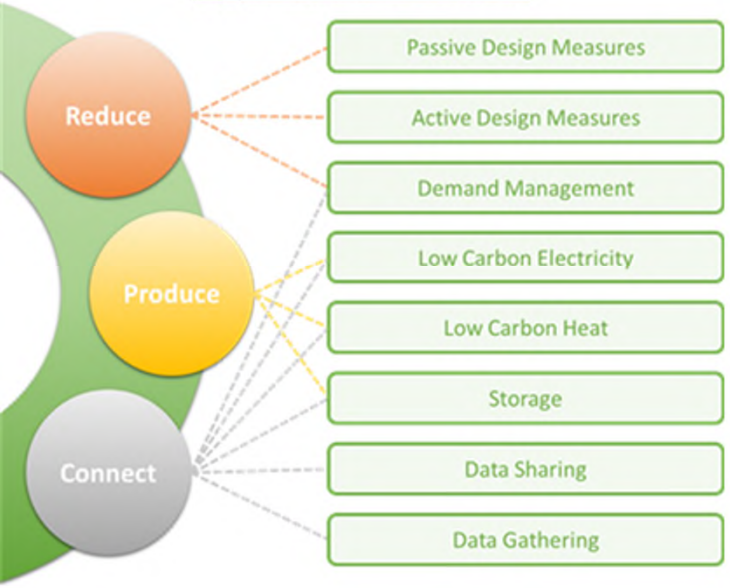
Carbon Emissions from the Operational Estate

Heating & powering MCC's buildings in 2018/19 produced 25,789 tCO2, 68.9% of the Authorities direct emissions.



Our Approach to Reducing Carbon Emissions

Approach & Rationale

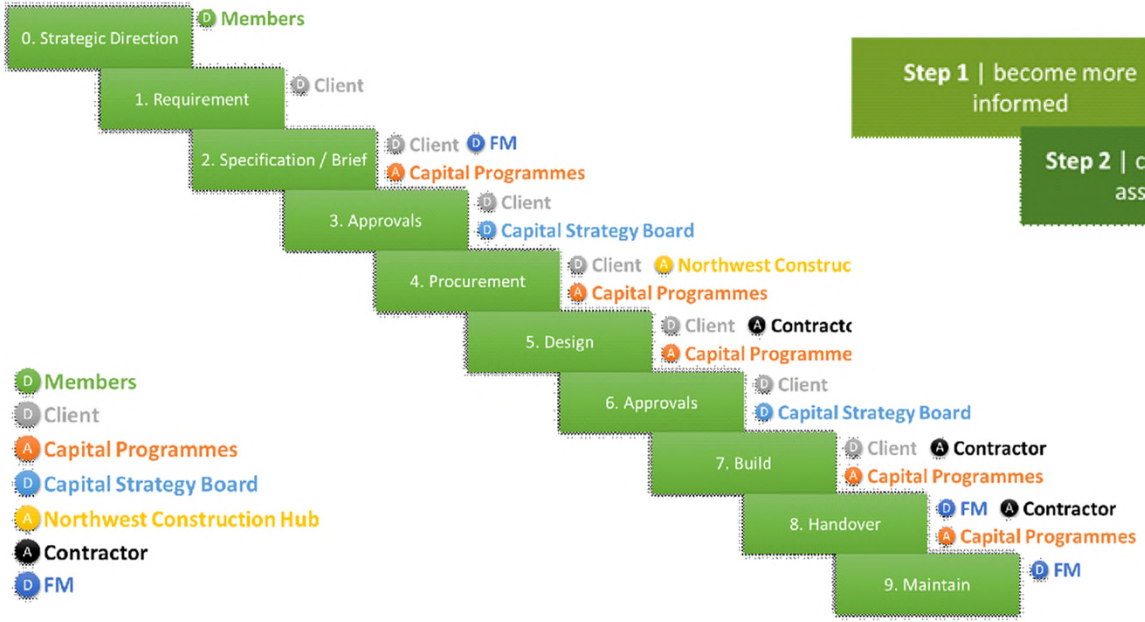


Projects & Activity

Theme	Programme Workstream	Project
Reduce	Active Design Measures	**ROI Retrofit of Individual Energy Conservation Measures**
Reduce	Passive Design Measures	**Zero Carbon whole building retrofit pilot**
Reduce	Controls	**BMS Roadmap**
Reduce	Controls	**Building Management System Expansion & Optimisation**
Reduce	Controls	**Data driven performance management**
Produce	Low Carbon Electricty	**Small to medium scale behind the meter Solar PV**
Produce	Low Carbon Electricty	**Large scale remote generation Solar PV**
Produce	Low Carbon Electricty	**Working with GM**
Produce	Low Carbon Heat	**Accelerated boiler replacement programme (electrify)**
Produce	Low Carbon Heat	**Gas phase out**
Produce	Energy Storage	**Time Shift**
Produce	Energy Storage	**Demand Side Response**
Connect	Data Gathering & Sharing	**GM Local Energy Market**

Our approach continued…

Building lifecycle



Decision making, policies and standards approach

What is already being done?

- **Carbon Reduction Programme (Phase 1)** - detail on the following slides
- **Civic Quarter Heat Network** - which will connect the Town Hall, Town Hall Extension, Art Gallery and Central Library, Manchester Central Convention Centre, The Bridgewater Hall and Heron House. The project is expected to reduce the Council's direct carbon emissions by approximately 1,600 tonnes of CO2 from 2020/21.
- **Refurbishment of Hulme District Office** – opened in May 2019 following a full refurbishment, the building benefits from new efficient mechanical and electrical equipment such as LED lighting, lighting controls, a new building management system (that enables more intelligent control of the installed equipment) and Solar Photovoltaic Panels on the roof. Improvements to the buildings fabric were also made to improve the overall thermal efficiency of the building, this included new windows and doors throughout and new roof coverings. No gas is used to heat the building.
- **Alexandra House -** Refurbishment underway, the building currently emits 42kg/CO2/m2/annum. Based on modelling completed by the appointed environmental consultants, this is estimated to be reduced to 12kg/CO2/m2/annum upon completion. This is an overall carbon saving for the building of 70% year-on-year.

What is already being done cont...

- **Gorton Hub** - in design phase, being designed to achieve BREEAM Excellent.
- **Hammerstone Road** (in RIBA 3 technical design) - will include a significant solar array, battery storage, electric vehicle charging points, new mechanical and electrical plant and fabric improvements.
- **Abraham Moss Leisure Centre** – At the end of RIBA 4, being designed to have an EPC A + 4 BREEAM Credits
- **Manchester Aquatics Centre** - In RIBA 2 – Concept / Feasibility (will include Carbon options appraisal at the end of this stage)
- **Velodrome** - In RIBA 2 – Concept / Feasibility (will include Carbon options appraisal at the end of this stage, including looking at the feasibility of a ground source heat pump)

What is the Estates Carbon Reduction Programme?

- The Carbon Reduction Programme was established to identify and deliver a wide range of energy efficiency and generation opportunities across the operational estate
- The programme has been funded on an invest to save basis, the capital being repaid by savings in utilities over time
- The 1st Phase of delivery includes an investment of circa £8.5m, this will see the Authority's carbon emissions reduce by in excess of 1,400 tCO2e per annum, this is forecast to complete by Q4 2020/21
- The 1st energy conservation measures are expected to start delivering carbon savings from Jun20 onwards, with full year savings being achieved from the start of the next financial year.
- Phase 1 (a) is a further £2.9m (£1.7m MCC Match Funding, £1.2m ERDF – Decision Due May20)
  - £700k - x 717 kWp Solar Array & battery storage at the refurbished Hammerstone Rd Depot, leading to 169 tCO2 savings per annum
  - £2.1m- x 915 kWp Solar Car Port Array at the National Cycling Centre, leading to 246 tCO2 savings per annum

Phase 1 Summary

Building	Route	Annual Savings tCO2	Solar PV	LED Lighting	Lighting Controls	Building Mgmt System Upgrade	Variable Speed Drives	Pipework Insulation	Boiler Upgrade	Transformer Tap Down	Combined Heat & Power Engine	Heating Controls	Pool cover
Wythenshawe Forum	Re:fit	295	x	x	x	x	x				x		x
Town Hall Extension	Re:fit	169		x	x		x						
East Manchester Leisure Centre	Re:fit	101	x	x		x	x			x			
The Sharp Project	Re:fit	295	x	x	x	x							
Space Project	Re:fit	112	x										
Hough End Leisure Centre	Re:fit	74	x	x			x			x		x	
Arcadia Sports Centre	Re:fit	59	x	x		x	x						
Moss Side Leisure Centre	Re:fit	23	x										
North City Family and Fitness Centre	Re:fit	78	x	x	x	x	x	x					
Belle Vue Sport Centre	Re:fit	169	x	x			x		x			x	
Manchester Tennis and Football Centre	Re:fit	61	x	x		x							
Sub total		**1,436**											

Phase 1 (a)

Building	Route	Annual Savings tCO2
Hammerstone Rd (Insulation)	Refurbishment	TBC

Phase 1 (b) ERDF Bid

Building	Route	Annual Savings tCO2
National Cycling Centre Solar Car Ports	ERDF	246
Hammerstone Road, Solar PV & Storage	ERDF	169
Sub total		**415**

Total Annual Savings (tCO2)	**1,851**

How did we develop the programme?

- The programme was developed by looking at the Authorities highest energy consuming buildings first, the result is a mixed bag in terms of location, function, age and condition. There are office buildings, community leisure facilities, elite leisure facilities and markets.

- We then undertook a competitive procurement process to appoint an Energy Services Company (Ameresco) to work with us to develop investment grade proposals and designs for conservation work. The following audit process was followed:

  - In-depth interviews with facility occupants, staff and operators
  - Operating hours analysis
  - Inventory of all major energy consuming equipment
  - Energy rates and cost figures for all utilities
  - Analysis of at least one year of historical utility billing data
  - Identification of the major energy consuming equipment and processes in the building
  - Analysis of opportunities for energy efficiency measures and their potential savings and payback periods
  - Identification of suitable retrofits and technology for these measures

- Nb. the proposals put forward by Ameresco are subject to an energy savings guarantee, so the kWh savings they say will be achieved are subject to a detailed annual measurement & verification process. Should a particular measure not perform as expected Ameresco would be required to complete remediation work or compensate MCC financially.

Key learning shaping our approach

- **Large scale remote electricity generation crucial** – it won't be possible to achieve the level of carbon savings as quickly as required over the next 5 years by delivering energy efficiency works and on site 'behind the meter' Solar PV alone. Large scale remote generation is considered essential, in the region of 25MW of capacity.

- **A flexible approach to delivery** - working across multiple existing buildings of varied function, age and condition inevitably results in unexpected issued being uncovered. Maintaining an agile approach to delivery and investment is key to enabling carbon savings to be achieved sooner.

- **Multi-occupancy buildings** - the buildings within the Authority's estate include multiple occupancy arrangements, with tenants in place on various terms, licenses and leases. This can present some challenges around completing the required works and agreeing a mechanism by which savings from utility bills can be recouped to repay the initial investment.

- **Methodical approach to savings takes time** – the programme has adopted a detailed and methodical approach to the measurement & verification of savings associated with the various energy conservation measures, this approach was adopted to ensure the Authority's capital investment was fully protected.

- **Mobilisation takes time** – the carbon savings from additional investment in future phases are forecast to begin to be achieved from Q1 2021/22. This is due to the time it takes to it takes to audit buildings, complete and agree design proposals and investment cases, develop works information and progress the legal agreements required for multiple buildings.

Priority next steps

- **Priority 1:** establish a dedicated team of passionate, knowledgeable and committed people to manage delivery of the actions identified in this strategy.
- **Priority 2:** develop the business case for large scale remote Solar PV generation projects.
- **Priority 3:** develop an ongoing pipeline of ROI investments through a series of building audits focussing on the deployment of proven energy efficiency measures across the 112 buildings shortlisted. This is an expansion and continuation of the existing Carbon Reduction Programme (i.e. Phase 2).
- **Priority 4:** procure a Solar PV partner to deliver a rolling programme of behind the meter generation feasibility studies, business case development and installation.
- **Priority 5:** develop proposals for a Zero Carbon whole building retrofit pilot. This will be an exemplar from which learning can be applied to all future design and investment decisions.

Priority next steps

- **Priority 6:** develop a Building Management System (BMS) Roadmap. Ensuring we are making the best use of BMS technology across the estate will drive efficiencies from our existing assets, it will also support us to move toward a more data driven approach to performance improvement.

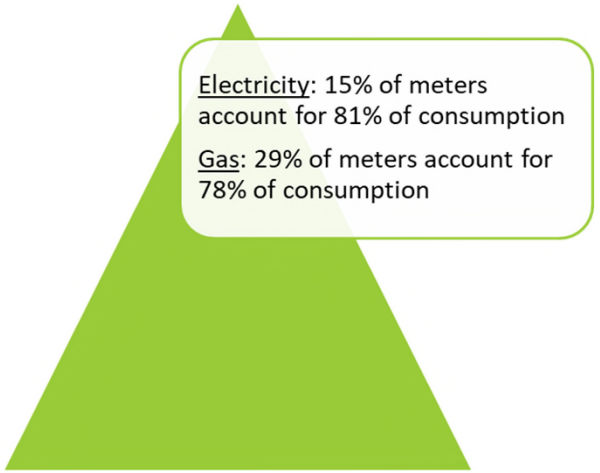
- **Priority 7:** develop an accelerated boiler replacement programme, complete a fresh review of the stock condition surveys to establish a priority pipeline of work focussed on low carbon heat.

- **Priority 8:** Agree the Manchester Build Standard / Standards to be used going forward and embed thus within decision making processes. Support colleagues involved in the management of the Capital Strategy Board identify proposals for additional assessment criterion to enable the Authority to develop a more rounded view of the environmental impact of its investments and assets. Including (but not limited to) the following: Net Present Value & Whole Life Costing, Internal Carbon Costing, and Energy Intensity Measures.

Priority next steps - developing Phase 2 CRP

Develop a pipeline of energy efficiency measures and energy production based on a Return on Investment approach across the operational estate . This is an expansion and continuation of the existing Carbon Reduction Programme.

- **Building Analysis -** shows that the majority of the emissions produced come from a small % of buildings
- **Priority Buildings** - although the operational estates consists of in excess of 300 buildings, 112 buildings account for the bulk of the emissions - buildings maybe revisited several times during different phases as we continue to challenge and learn.
- **Supplier Workshop** - an initial workshop has been held with our Energy Services Partner to agree buildings to focus on for Phase 2, a shortlist of buildings will be developed from March 20 and agreed in May 20 following initial site visits.
- **High Level Assessments -** of the buildings are expected to take place between Jun20 and Sep20, this will give us initial designs and budget costs.
- **Investment Grade Proposals -** are expected to take place between Oct20 and Nov20
- **Works & Savings** – the 1st new works are forecast to begin in Q4 2020/21 with the 1st carbon savings kicking in from Q1 2021/22.



Nb. This is based on all buildings fro which MCC procure utilities, not all of which are within MCC's direct control.

2020-2025 Plan and Targets (Operational Estate)

- **Complete Phase 1 and Phase 1 (a)** of the Carbon Reduction Plan (£10.2m, 1,800 tCO2)
- **Establish Phase 2** of the Carbon Reduction Programme which will run from 2020-25 (£15m, 3,000 tCO2)
- **Establish a Manchester Build Standard / Standards** to be used going forward for new MCC buildings, extensions and refurbishments and embed within decision making processes. To achieve lower carbon construction and more energy efficient end use in buildings.
- **Produce a Buildings and Energy Strategy** for the Council by April 2020. An agreed strategy setting out the response to the climate emergency across the Council's operational estate including continued procurement of green energy, infrastructure to support the roll out of electric vehicles, generation and storage.
- In conjunction with Commercial Leads, **deliver a feasibility study and business case for a large scale energy generation scheme** by December 2020. This will include an assessment of the different business models available in terms of capital cost, commercial risk and speed of deliverability.

2020-2025 Plan and Targets (Operational Estate)

Direct Emissions Action 2020-25	Annual Carbon Saving (tonnes CO2)
Completion of Phase 1 Buildings Carbon Reduction Programme	1,400
Completion of Phase 1 (a) Buildings Carbon Reduction Programme - ERDF Supported	400
Phase 2 of Carbon Reduction Programme	3,000
Large scale energy generation scheme	7,000