City of London Climate Action Strategy

Barbican Association Response

June 2020

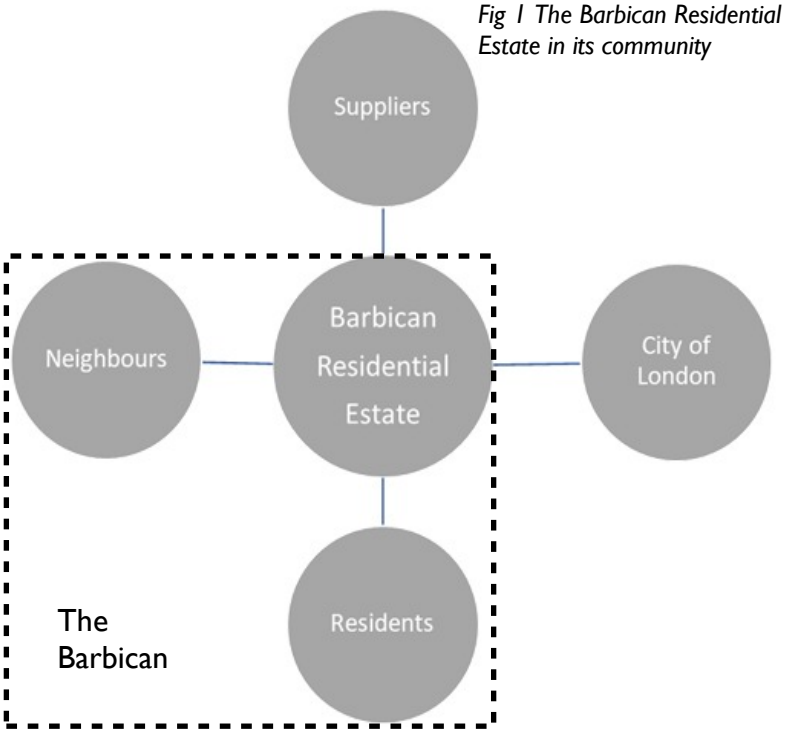
1 Context

On 11 June 2020 the Town Clerk outlined to the Policy and Resources committee the proposed governance route and engagement plan for the City of London Corporation's Climate Action Strategy. This note is the first stage of the Barbican Association's (BA) engagement in this process. There are over 2,000 flats in the Barbican with over 4,000 residents. These residents are, probably much more than the daily influx of City workers, committed to help the City achieve its ambitions in addressing climate change. Already, groups of residents, with the support of the BA and the City's Barbican Residential Consultation Committee have been working on these challenges. They are informed, committed and eager to help. This is a discussion note to show what might be possible and approaches worth exploring

2 Summary

The members briefing on 14 May showed that six sites were responsible for 40% of the City's 37k tonnes per annum of Carbon Dioxide equivalents (tCO2e). Of these six sites, the largest contribution, 14%, came from the Barbican underfloor heating system. Altogether the Barbican Residential Estate (BRE) generates an annual total of 7.7 ktCO2e. Reducing emissions associated with existing buildings is much more challenging than new build, especially when these buildings enjoy listed building status. Recognising these challenges, this note identifies opportunities to reduce this output by up to 30%. The set of actions necessary to achieve this reduction is outlined in Section 9 Next Steps. This note also identifies the role that the BA can take as an influencer of its neighbours, suppliers, residents and the City. Figure 1 shows how the BRE sits in its Community

Fig 1 The Barbican Residential Estate in its community



3 The Barbican Residential Estate

The BRE total annual greenhouse gas emissions are estimated at 7.7 ktCO2e. These emissions result from three main activities as shown in Figure 2.

3.1 Underfloor Heating This is a monolithic system, with primitive controls based on 1960s technology (See box on the next page). Despite this, the system is robust and reliable, with low maintenance costs.

3.2 Common parts This includes the energy to run the BRE that is not within the demise of individual flats. The major components of this are lifts, lighting and the heating of common areas.

3.3 Residents private This is energy that is under the direct control of residents including, cooking, lighting, domestic appliances and supplementary heating.

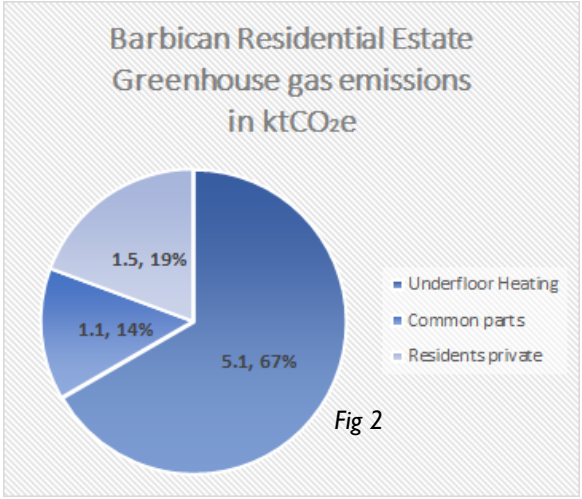
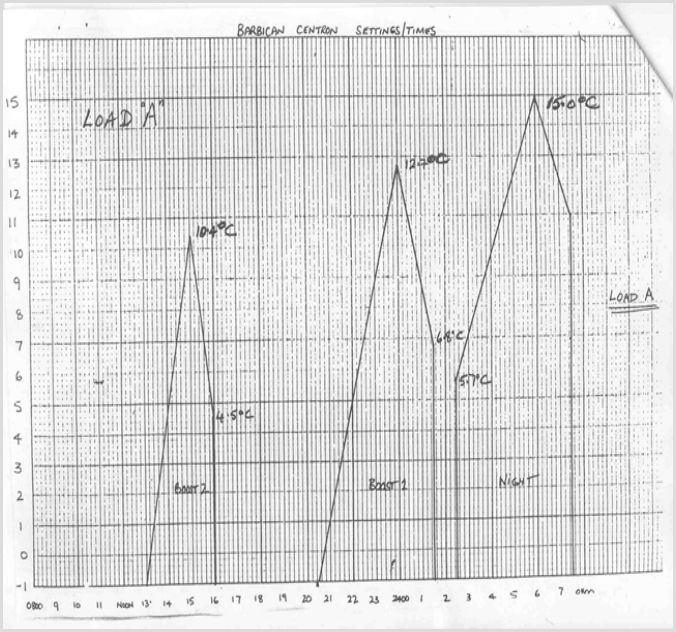


Fig 2

The Barbican underfloor heating system

Barbican flats are heated by electrically heated floor pads embedded in the concrete floors about 50 mm below the surface. The system both within the flats and the distribution network is robust, reliable and has low maintenance costs. Recently surveyed, the physical elements of the system are "good for another 20 years at least". However, the control system is primitive; still based on the technology available at the time of its design in the 1960s. This is evidenced by this much photocopied graph, which until 2018 was the guide against which the control system was monitored. This shows the periods when energy is potentially input into the system and the external temperature which determines whether the heating is on or off. The system is monolithic in that the power is either on or off for the whole estate. The system was designed when energy was cheap and there was limited awareness of the impact of emissions on climate change. The state of the system is determined by the outside temperature. There is no thermostat, and the heat load inputs were determined for the occupancy profiles that applied for a mainly working population in the 1960s. The system has never been modelled, nor does the heat load profile reflect the current variation in the price of power over the day. Updating the control system will generate a significant reduction in electricity consumption, with the consequent reduction in greenhouse gas emissions.

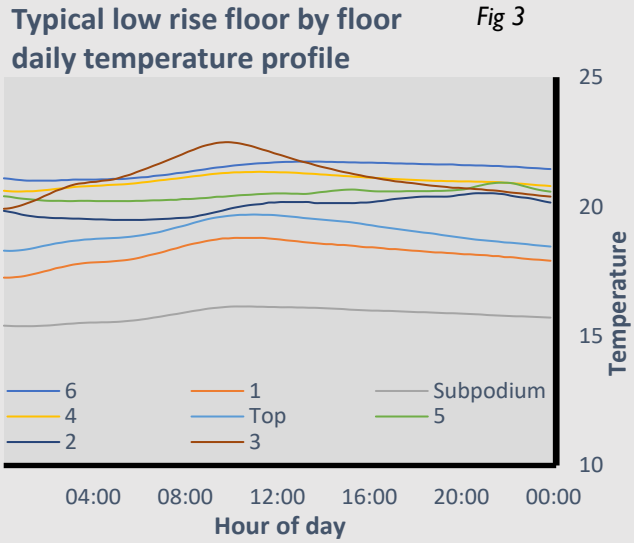


4 Whole Estate emission reduction possibilities

There are opportunities to reduce emissions, some related to the underfloor heating system and some more general. They are listed in Appendix 1. Two of these opportunities are examined here.

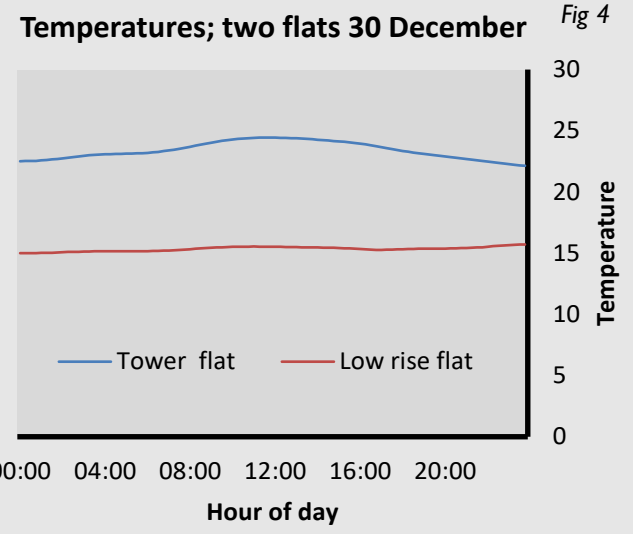
4.1 Building insulation

Figure 3 shows a typical daily temperature profile floor by floor for a stack of flats in Defoe house in late December. The three lowest profiles on the chart, starting at the lowest are a sub podium flat, a first floor flat and a top floor flat. In an attempt to keep these three flat types at a tolerable background temperature, the remaining flats are kept at a much higher temperature. Insulating these flats would enable a comfortable temperature level to be maintained in the whole building with a lower energy input. There are varying challenges in insulating these three flat types; insulating first floor flats involves the technically simple and inexpensive exterior insulation of the soffits. This is unlikely to have any listed building impacts. Insulation of the barrel vaulted top floor flats; and the paved space above sub-podium flats is more challenging, but solutions could be implemented during routine maintenance, which would reduce costs. There is more detail on these insulations in Appendix 2



4.2 Individual flat heating controls

Figure 4 shows a typical midwinter temperature profile of a tower block flat compared to a below podium low rise flat on exactly the same day. The tower block flat is clearly overheated. The only mechanism available to reduce the temperature is to open a window and waste the excess heat. Individual heating controls would enable a significant reduction in emissions and would, additionally, provide improved comfort.



4.3 Further emission reduction opportunities

There are at least six further opportunities for estate-wide emission savings. These are outlined in Appendix 1

5 Suppliers

5.1 Demand time shifting

Electricity procurement for the BRE is bundled up with a City of London procurement package. This procurement package does not reflect the flexible nature of this heating demand. The Barbican underfloor heating system is essentially a huge heat storage radiator. Within reasonable bounds, it doesn't matter much when the load is delivered to the system over the day. A procurement package which reflects this could enable suppliers to bias our delivery on a day to day basis in favour of times when renewable supplies were available. This could be achieved with no capital expenditure.

5.2 Demand side response

The underfloor heating system has a total load of 18 Megawatts: equivalent to a medium sized hydroelectric scheme. Balancing demand by the National Grid sometimes requires firing up, or closing down quick-response generators, usually gas-fired. Giving the National Grid the opportunity to turn our system off or on for short periods can avoid the use of these quick response generators, with the associated reduction in greenhouse gas emissions. This can be achieved with modest cost.

6 Residents

Residents are almost entirely responsible for their own greenhouse gas emissions, but we can encourage them to examine and mitigate their emissions. If the top up marginal cost of their underfloor heating was paid for by residents individually, rather than as an uncontrollable component of their service charge they would be inclined to adopt some of the mitigations that are outlined in Appendix 1.
Carbon footprint calculators can be useful in identifying routes to reducing emissions. These are often out of date and too general to inspire confidence. We could provide a Barbican-specific, regularly updated calculator, which would inspire confidence and encourage use and stimulate a consequent reduction in emissions.

7 Neighbours

Barbican residents could stimulate emission reduction by their neighbours by encouragement and acceptance. An example of this might be the potential installation of a photo voltaic farm on the roofs of our neighbours in the Barbican (the Arts Centre, GSMD, and CLSG). Such a farm, about 6,000m_2 could generate around 375,000KWh annually with associated savings of around 0.1 $ktCO_2e$. The BA could also encourage other neighbours outside the estate to make similar installations and be proactive in their promotion during planning negotiations.

8 The City

The City operates as our freeholder, local authority and major property owner. In all these roles Barbican residents have a duty to ensure that the City pays as much attention to the emissions that it generates or might generate as it does to the financial impact. The BA will be a critical friend of the City.

8.1 Freeholder

The common parts constitute about 14% of the BRE's total greenhouse gas emissions, which, surprisingly is about 2/3 of the level of residents' private emissions. Barbican residents can ask the City, as freeholder, working with residents, to institute a zero-based budget analysis of the common parts electricity consumption and use this to implement changes that reduce emissions.

8.2 Local Authority

Barbican residents can ask the City to review its policy on the maintenance of the public realm in the area around the Barbican. We should ask the City, in addition to determining cost benefit of its many schemes, to determine the embodied emission equivalent in each project. For example, the embodied carbon in the proposed re-paving of the Barbican Podium is likely to be in excess of 2 $ktCO_2e$. This single apparently modest project is equivalent to 5% of the City's total scope 1 and 2 emissions.

8.3 Property owner

Just as in its role as a local authority, the City needs to audit the level of carbon embodied in its projects. The City should be encouraged, when planning development of its property portfolio, to compare the embodied carbon in new build projects with alternative refurbishment options as part of the evaluation process.

9 Next steps

Common Councillor Mark Bostock has assembled a small team of residents who are already working on these challenges. The team is anxious to engage with the City on opportunities to reduce emissions. Following this engagement the next steps should be;

- Work with the City's consultants with experience in building design, building management and heating and ventilating to evaluate the cost effectiveness of the initiatives outlined in Section 4 and Appendix 1.
- Prioritise these initiatives based on cost effectiveness.
- Identify possible grants and soft loans to support investment in these areas.
- Engage with residents to determine their receptiveness to the implementation of these initiatives.
- Seek legal advice on how navigate through the Barbican Residential Lease while implementing these initiatives. The lease that governs the way in which changes can be made to the BRE buildings and how the heating is managed is complex and was written in the 1960s; an environment different from today's.
- Challenge the City as our freeholder, working with residents, to undertake a zero-based budget analysis of the energy consumption of the common parts of the BRE, with the aim of driving down emissions.

Appendix 1 Additional mechanisms for reducing emissions

A1.1 Estate-wide initiatives

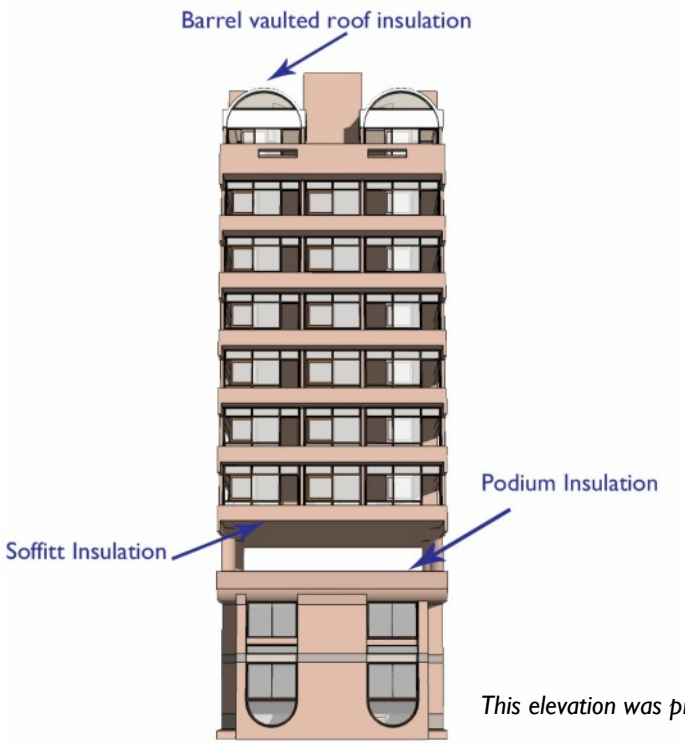
- Individual control of apartment temperatures, which will include transferring cost responsibility for marginal use to the flat occupant.
- Using weather forecasts to adjust overnight loads. This could be implemented with the current control system with minimal cost.
- A complete review of ventilation and air management.

A1.2 Initiatives for individual flats

In these instances, adaptations will be the responsibility of individual flat owners, but the City should provide approved designs and bulk procurement systems, and advice about soft loans and green finance.

- Installation of double or triple glazing.
- Use of high-emissivity window coatings for glass for heat retention.
- Internal insulation of walls with exterior facing facades.

Appendix 2 Illustration of low rise insulation



This elevation was provided by barbicanliving.co.uk