CITY AIRPORT DEVELOPMENT PROGRAMME
(CADP1) S73 APPLICATION

REVISED ENERGY AND LOW CARBON STRATEGY

DECEMBER 2022

CITY AIRPORT DEVELOPMENT PROGRAMME (S73)

Section 73: REVISED ENERGY AND LOW-CARBON STRATEGY

Notice

This document has been prepared to support London City Airport's planning application which seeks various amendments to the CADP planning permission.

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1. Executive Summary

1.1. This document is an update to the Energy and Low Carbon Strategy produced in 2013 and submitted to the London Borough of Newham (LBN) in connection with the City Airport Development Programme (CADP1) planning application (13/01228/FUL) which was granted permission in 2016 and the subsequent Energy Assessment that was submitted under Condition 61 of the CADP1 Permission and approved by LBN in December 2019 (LBN Ref. 18/00994/AOD).

1.2. This Revised Strategy has been prepared to accompany a Section 73 Application to vary conditions attached to the CADP1 Permission (proposed amendments) and to deliver significantly reduced energy consumption and carbon emissions (where achievable) and deliver improvements against the previously approved Energy Assessment given the passage of time and more contemporary guidance.

1.3. The CADP1 infrastructure, buildings and integrated systems have been fully designed, with construction commencing in 2017. Construction was paused in 2020 due to the impacts of the Covid-19 pandemic with the airfield infrastructure, energy centre shell and foundations having already been constructed. When construction restarts, it is expected that the remaining terminal buildings will be built out to the existing design which was granted approval. This document has been prepared based on a detailed review of the approved design and identifies where it could be enhanced to align with contemporary guidance as well as to better aligning to the airport's Net Zero ambitions. it then outlines the steps to enhance the steps to enhance the performance of the approved design which are being progressed as part of the proposed amendments.

1.4. This document demonstrates that the CADP1 development, with the proposed amendments, still achieves compliance with the previous Part L2A 2010 & 2013 regulations as well as the more onerous and recently published Part L2A 2021 regulations and the London Plan 2021 (against 2013 targets) with an overall reduction of 46% against set targets using the London Plan 2013 methodology. This results in savings of 344 tonnes of CO2 a year, a further saving of 291 tonnes per year over the previously approved strategy which only achieved savings of 7% using the same methodology.

1.5. The Revised Strategy therefore significantly reduces the CO2 emissions of the CADP1 development compared to the previously approved energy strategy.

1.6. The London Plan sets two targets for energy reduction and, in both cases, the CADP1 development, with the improvements outlined below secured by way of the proposed amendments, is expected to meet and exceed these:

1. A minimum 15% CO_2 reduction target must be achieved through energy demand reduction alone.
   Target 15% → Projected 25% reduction
2. A minimum overall 35% CO_2 reduction target must be achieved across the development.
   Target 35% → Projected 46% reduction

1.7. The projected targets above are based on carbon emission reductions compared to Building Regulations 2013 targets, as converted using the prescribed figures for carbon intensity associated with the latest Standard Assessment Procedure (SAP10) which reflects the rapid trajectory of decarbonisation that is happening on the electricity grid compared to previous calculation methods.

1.8. An energy model was also simulated against the new Part L2 2021 regulations and achieves a projected overall saving of 15% over the Target and Notional Building Emissions Rate. The Target and Notional rates are used as the benchmarks for calculating savings.

1.9. To improve the overall performance of the CADP1 development compared to the previously approved documents and achieve the above projected reductions, the following enhancements have been included:

1. **Further efficiencies to the previously approved terminal design**, including:
   (a) Reduction in air leakage through the building(s) envelope.
   (b) Improving the efficiency of air handling units, heat recovery and air-cooled chillers.
   (c) Providing luminaire efficacy of 110 lumens / circuit Watt, compared to 85 lumens / circuit Watt, with more effective lighting control.
   (d) Installing kitchen extract heat recovery systems for commercial application.
   (e) Replacing high air volume/energy systems with local systems, reducing auxiliary power demand.
2. **Replacing the previously approved gas fired CHP system** with a more sustainable onsite heat network, including:
   (a) A combination of Air Source and Water Source Heat Pumps to deliver low temperature hot water (LTHW) at a Coefficient of Performance (COP) of 2.8 to serve both space heating and domestic hot water, in lieu of gas fired systems.
   (b) Allowance for valved and capped connections and space for heat exchangers to allow future connectivity to a district heating scheme should a commercially and technically viable solution come forward.
3. **Delivering almost 1,200m^2 of Photovoltaic** (PV) panels on the roof of the CADP1 terminal buildings and piers.

1.10. The improvements proposed as part of the proposed amendments are likely to cost in the region of £11-16 million above the costs of the previously approved strategy.

1.11. Beyond the above improvements to the 2013 Energy and Low Carbon Strategy that are summarised above, the airport has also published its plans to become London's first net zero emissions airport (Scope 1 & 2 emissions) by 2030. The airport's 'Sustainability Roadmap' includes a range of measures to deliver its objective to become net zero for the emissions that it is directly responsible for and this is likely to include a further significant investment in solar technology to supplement the approved CADP1 development. The future investment, which would be subject to detailed feasibility and securing the necessary consents, could be accommodated through a combination of roof mounted PV on other onsite buildings, surface car parks and/or on floating pontoons in KGV Dock.

1.12. Other measures will also be implemented to reduce Scope 1 and 2 emissions to net zero, such as (but not limited to) energy efficiency improvements to existing buildings, green electricity tariffs, electrification of airside vehicles and plant, replacement of gas-fired energy plant, and replacement of CFC refrigerant plant. However, these elements are not subject to this Energy Strategy which related to the CADP1 build out only and will be delivered in accordance with the ambitions set out in its Sustainability Roadmap.

2. Background

2.1 This document accompanies a Section 73 application to the London Borough of Newham (LBN) to vary conditions attached to the City Airport Development Programme (CADP1) Permission which was granted in 2016. The application seeks minor-material amendments to allow the following:

> *"Section 73 Application to vary conditions 2 (approved drawings and documents), 8 (aircraft maintenance), 10 (restrictions on development – Plan P4),12 (aircraft stand location – Plan P4), 17 (aircraft take-off and land times), 23, 25, 26 (Daily limits), 35 (temporary facilities), 42 (terminal opening hours), 43 (passengers) and 50 (ground running) attached to planning permission 13/01228/FUL dated 26 July 2016 (as varied) to allow up to 9 million passengers per annum (currently limited to 6.5 million), arrivals and departures on Saturdays until 18.30 with up to 12 arrivals for a further hour during British Summer Time (currently allowed until 12.30), modifications to daily, weekend and other limits on flights and minor design changes, including to the forecourt and airfield layout".*

2.2 Full details of the proposed amendments to the CADP1 conditions can be found in the accompanying Planning Statement prepared by QUOD.

2.3 This document is an update to the approved Energy and Low Carbon Strategy 13/01228/FUL, submitted to the LBN in connection with the CADP1 Permission and the subsequent Energy Assessment that was submitted under Condition 61 of the CADP1 Permission and approved by LBN in December 2019 (LBN Ref. 19/02559/AOD). Following the granting of the CADP1 Permission, works commenced in 2017, in full accordance with the approved design and Energy Strategy. Between 2017 and 2020, the following works had been completed:

- 8 new aircraft stands and a parallel taxiway
- The Eastern Energy Centre (EEC) (shell and core only)
- Infrastructure services from the EEC to the proposed new East Terminal Extension (ETE)
- Foundations for ETE and New East Pier (NEP).

2.4 The build was put on hold in 2020 due to a significant downturn in aviation traffic during the Covid-19 pandemic.

2.5 Following the pause of construction in 2020, London City published their Sustainability Roadmap which outlines the ambition to become London's first net zero emission airport.

2.6 As part of the pre-application discussions ahead of the submission of this Section 73 application, the airport held a number of meetings with the Greater London Authority (GLA) to brief officers on LCY's net zero ambitions and to understand the potential requirements for any updated Energy Strategy.

2.7 Following feedback from GLA officers, the previously approved energy strategy was reviewed against Building Regulations Part L2A 2013 and the more contemporary 2021 Building Regulations and GLA guidance both of which were published since the CADP1 build started.

2.8 This Revised Energy and Low Carbon Strategy has been prepared following a review of CADP1 and an assessment of the potential improvements which could be made, notwithstanding the constraints associated with the constructed elements of the scheme.

2.9 2.9 It also seeks to address further comments following discussions with GLA officers as set out in the 'Pre-app two advice note', dated 26th September 2022 (provided in Appendix A) following a clarification/scoping meeting held on Tuesday 13th September 2022. Some relevant extracts from discussions have been highlighted below:

- GLA stated within their Advice Note that *"It is noted that the proposed application is a section 73 and that the site history may provide some constraints to performance. The applicant should seek to meet current policy as far as possible"*. This statement outlines what enhancements are considered reasonable and practicable as part of the proposed amendments, given the existing constraints of a build programme that has already significantly progressed (albeit currently on pause).
- This Energy and Low Carbon Strategy submission follows the London Plan 2021 and continues to use 2020 guidance as stated on the London.gov.uk website.
- Whilst noting the Part L 2021 regulations took effect in June 2022, we have adhered to guidance posted on the London Plan Website which states *"planning applicants should continue to use the 2020 guidance, spreadsheet and the Part L 2013 methodology"*
- The scheme already benefits from U-values bettering the Part L 2021 regulations, in line with GLA recommendations.
- Energy consumption and overheating risks have been considered in line with the GLA recommendations.

2.10 Subject to the proposed amendments being approved, it is intended that the details in this Revised Strategy will be incorporated into the CADP1 build and that an updated Energy Assessment will be submitted for approval under CADP1 condition 61.

2.11 Significantly enhanced solutions and design changes have been identified within the sections below which the airport propose to secure through the proposed amendments and through its previously published ambitions to become Net Zero.

2.12 In order to develop a workable and holistic solution for the proposed development, the following options were considered:

1. Review architectural and M&E options to improve efficiencies within the design.
2. Assess realistic energy demand reduction options to achieve at least 15% carbon reduction in-line with the GLA Hierarchical 'Be Lean' stage.
3. Investigate a possibility to connect the development to existing or proposed heat generating facilities or decentralise energy networks.
4. Consider appropriate on-site heat generation options in lieu of natural gas CHP to maximise carbon savings; and
5. Consider maximising use of renewable technologies and the provision of PV on site to achieve at least 35% carbon reduction in-line with the GLA Hierarchical 'Be Green' stage.

3. Energy Efficiency Standards

National Planning Policy Framework (2021)

3.1 The National Planning Policy Framework (NPPF) sets out the Government's planning policies for England and how these are expected to be applied, including how plans and new development should meet the challenge of climate change by increasing the use of renewable and low carbon energy and heat, among other considerations.

The London Plan (2021)

Policy SI 2 Minimising greenhouse gas emissions

3.2 Major development should be net zero-carbon. This means reducing greenhouse gas emissions in operation and minimising both annual and peak energy demand in accordance with the following energy hierarchy:

- Be lean: use less energy and manage demand
  '*Achieve 15% CO_2 reduction through energy efficiency measures*'
- Be clean: exploit local energy resources and supply energy efficiently and cleanly
- Be green: maximise opportunities for renewable energy on-site
  'A minimum on-site CO_2 reduction of at least 35% beyond Building Regulations'

Policy SI 3 Energy infrastructure

3.3 Major development proposals within Heat Network Priority Areas should have a communal low temperature heating system. The heat source for the communal heating system should be selected in accordance with the following heating hierarchy:

a) connect to local existing or planned heat networks

b) use zero-emission or local secondary heat sources (in conjunction with heat pump, if required)

c) use low-emission combined heat and power (CHP) (only where there is a case for CHP to enable the delivery of an area-wide heat network, meet the development's electricity demand and provide demand response to the local electricity network)

d) use ultra-low NOx gas boilers

Newham Local Planning Policies

3.4 The Local Plan (2018) sets out a vision and framework for development in the borough and these are generally aligned with the Building Regulations and London Plan.

Part L Building Regulations

3.5 The previous version of the Energy and Low Carbon Strategy and subsequent energy assessments were prepared on the basis of the Part L2A 2010 Regulations.

3.6 Approved Document Part L2A 2013 (amended 2016) incorporates a number of changes and additions compared to Part L2A 2010 and is the basis for the GLA's targets as set out in the London Plan 2020. Part L2A 2013 requires new non-domestic buildings to reduce their carbon emissions by a further 9% across the build mix, compared to Part L2A 2010.

3.7 The most recent revisions to the Part L regulations were released in June 2021 (taking effect June 2022) and incorporate several changes in comparison to the Part L2A 2013 regulations, including all new non-domestic buildings will be required to have a carbon emission reduction of 27% compared to what was acceptable.

4. Summary of CO_2 Emissions

Revised Energy Strategy

4.1. The tables below quantify the total carbon dioxide (CO_2) emissions, converted using SAP10 at each stage of the GLA Energy Hierarchy (Table 4.1) and the regulated CO_2 savings from each stage of the Energy Hierarchy (Table 4.2). Revised energy solutions are explained within Section 5, 6 and 7.

4.2. Appendix B includes Building Regulations UK Part L (BRUKL) compliance reports produced for each stage of the energy hierarchy.

4.3. The unregulated energy demands presented in Table 4.1 have been obtained from the BRUKL reports (as agreed with the GLA). These cover the electrical demands of the proposed development that are not included in the Part L assessment and include small power, lifts, escalators, baggage conveyers and moving walkways.

4.4. Measures being considered to reduce unregulated energy usage, which are not accounted for in Table 4.1, include high efficiency external facade lighting and controls, energy efficient lifts, escalators and baggage conveyors and energy saving controls.

Table 4.1: Carbon Dioxide Emissions following each stage of the GLA Energy Hierarchy

Energy Hierarchy Stage	CO_2 Emissions (Tonnes CO_2 per annum)		
	Regulated	Unregulated	Total
Building Regulations Target Emissions Rating Part L Base Case	745.7	519.3	1,336.0
After Energy Demand Reduction (Be Lean)	559.8	519.3	1,151.1
After renewable energy applied (Be Green)	401.7	519.3	993.0
Be Clean: Future connectivity to Heating Network	386.8	519.3	978.1

4.5. The above projected emissions rates are compared to Building Regulations Part L2A 2013 (amended 2016) converted using the prescribed figures for carbon intensity associated with the SAP10 assessment.

Table 4.2: Regulated carbon dioxide savings from each stage of the Energy Hierarchy, using SAP10 Carbon Intensity factors

	Regulated Carbon Dioxide Savings	
	Tonnes CO_2 (Per annum)	**%**
Be Lean: Savings from Energy Demand Reduction	185.9	25%
Be Green: Savings from renewable Energy	158.1	21%
Total Cumulative Savings	344.0	46%
Be Clean: Future connectivity to Heating Network (additional saving)	14.9	2%
Total Target Savings 35%	186.4	35%
Additional Saving currently Achieved	157.6	

Note: for the purposes of the London Plan 2021, all CO_2 emissions have been converted using SAP10.0 carbon intensity factors.

Hotel: CADP2 outline planning application:

4.6. Outline planning permission was granted for the development of a hotel at the Airport (CADP2). The permission has not yet been implemented and with the full design details, Hotel operator, proposed facilities and servicing requirements not yet being known, energy modelling has yet to be undertaken. Although the hotel (CADP2) does not form part of energy profile within any of the strategies, it will be designed to meet and exceed the Building Regulations Part L 2021 and the London Plan 35% reduction in carbon emission targets. The energy systems associated with CADP1 have the ability to be extended to serve the Hotel as necessary.

4.7. The following graph (Figure 3.1) illustrates that the Building Regulations Part L2A 2013 (amended 2016) carbon targets will be met by the improved energy efficiency measures alone (set out in Sections 5, 6 & 7) for all the buildings (part constructed and unbuilt) forming part of CADP1 (excluding CADP2).

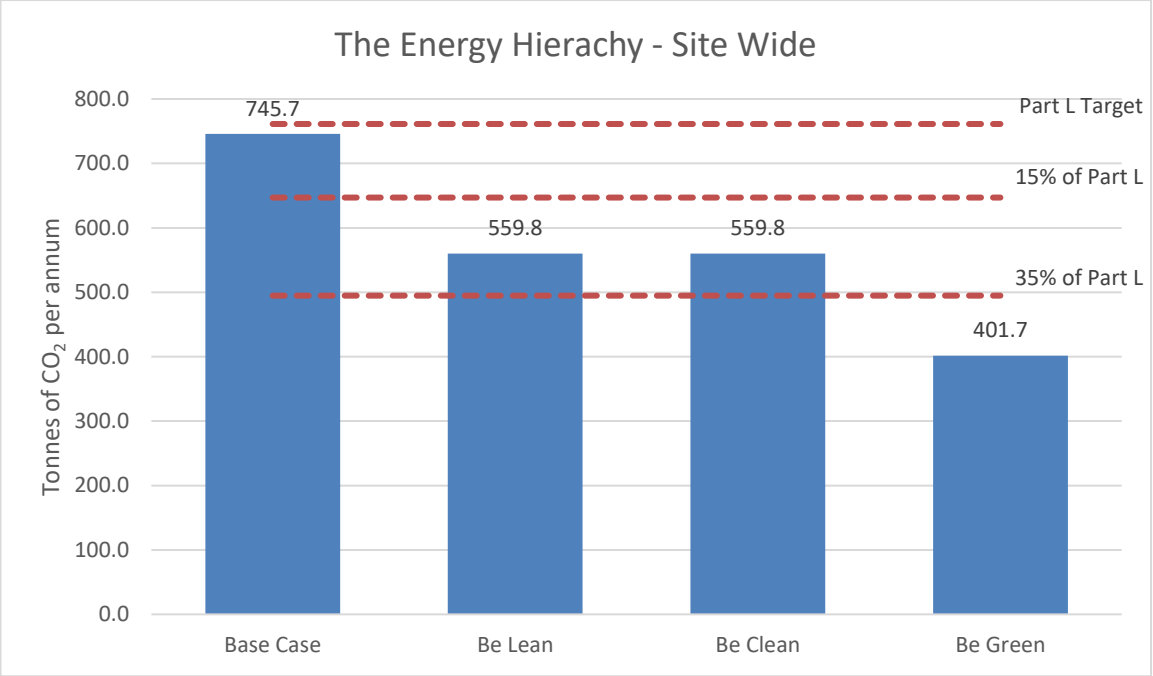


Figure 3.1: CADP1 Development hierarchy, for all the buildings (part constructed and unbuilt).

5. Be Lean

Fabric Specification

5.1 The Energy and Low Carbon Strategy for all CADP1 buildings (part constructed and unbuilt) has achieved a reduction of energy demand associated with energy efficiency savings by using a "fabric first" approach. The proposed building fabric specification for individual building elements is presented in Table 5.1 below. It should be noted that there are no proposed changes to the specifications and they would be as currently approved.

Table 5.1 - Fabric specification

Element	U-values (W/m^2K)		
	Part L2A 2013 min. fabric requirements	**Part L2A 2021 min. fabric requirements**	**Proposed specification (no change from approved)**
External walls	0.30	0.26	0.20
Roof	0.20	0.16 / 0.18	0.15
Insulated Ground Floor Slab	0.25	0.18	0.18
Exposed Floor - Upper Soffit	0.25	0.18	0.18
External Windows (Typical)	2.00	1.6	1.20
Glazed External Doors	2.00	1.6	1.20

Energy Efficiency

5.2 Energy efficiency measures have been incorporated into this Revised Strategy to reduce the carbon emissions in line with the London Plan 2021 Energy Hierarchy and are summarised below.

5.3 The energy efficiency measures for heating, ventilation and cooling (HVAC) systems include:

- Air handling units (AHUs) specific fan power (SFP) reduced to 1.45 W/l/s, heat recovery increased to 85% and free cooling facility to reduce energy demand in the summer.
- High efficiency air cooled chillers with a seasonal efficiency (SEER) of 5.27.
- The energy efficiency measures for lighting systems include:
  - An average installed luminaire efficacy of 110 lumens per circuit Watt achieved across the buildings.
  - Provision, in zones with access to daylight, for photoelectric controls by which the output of the lighting system will be regulated in response to the daylight level to reduce both the lighting and cooling loads.
  - Provision for occupancy sensing, where appropriate to the use of the space.
- Fan coil unit terminal units SFPs reduced from 0.3 W/l/s to 0.2 W/l/s.
- Installing Kitchen extract heat recovery systems for commercial application, recovered heat to the kitchen area supply air.
- Replacing centralized VAV conditioned air distribution systems (high volume/energy requirement) with tempered fresh air only plus local fan coil units (FCUs), as seen in other areas of the building.

5.4 It has been calculated by use of dynamic thermal modelling that the above efficiency measures can achieve over the minimum 15% energy reduction set out within the 'Be Lean' requirement of the London Plan 2021 Energy Hierarchy.

6. Be Clean

Combined Heat and Power (CHP)

4.1. A heating strategy was included in the previously approved Energy and Low Carbon Strategy and Energy Assessment (LBN Ref. 13/01228/FUL) that incorporated energy efficient CHP and gas boiler systems. The CHP unit strategy included 1no. CHP unit with a 357kW thermal and a 229kW electrical output for the terminal building, and 1no. CHP unit with a 357kW thermal and a 229kW electrical output for the future Hotel.

4.2. As set out above, the EEC and services infrastructure were constructed between 2017 and 2020, during which period the CHP equipment was purchased ready for installation.

4.3. Since then, updated London Plan Policy SI3 'Energy Infrastructure' provides new policy on the use of low-emission CHP (part c) and the use of ultra-low NOx gas boilers (part d). CHP plant and gas fired boilers have not been considered in this Strategy due to the associated 'high' carbon emissions intensity of natural gas compared to the decarbonising electricity grid.

4.4. CHP technologies largely rely on natural gas fired systems to drive the electrical generation output. As the electricity grid continues to decarbonise, any ongoing savings in carbon to be derived from gas-fired CHP have reduced significantly and therefore it is appropriate to utilise plant fuelled by electricity to deliver ongoing and significant carbon reduction.

4.5. The gas fired boiler plant and gas fired CHP would have a negative effect on carbon emissions compared to alternative systems and are therefore no longer appropriate for CADP1and incompatible with LCY's aspiration of reaching 'net zero carbon' by 2030, as highlighted in their Sustainability Roadmap.

4.6. The 'Be Clean' option therefore focusses solely on the potential future feasibility to connect to a District Heating Network and/or utilise Air Source Heat Pumps, as highlighted in Section 7 (Be Green).

District Heating

4.7. There is no immediate availability for a decentralised heat network supply in the proximity of the site.

4.8. The EEC safeguards for a connection to a future district heating system should one come forward in the future that is reliable, commercially viable and technically feasible. The measures installed in the EEC include an allowance for future heat exchangers and valved and capped off pipework connections.

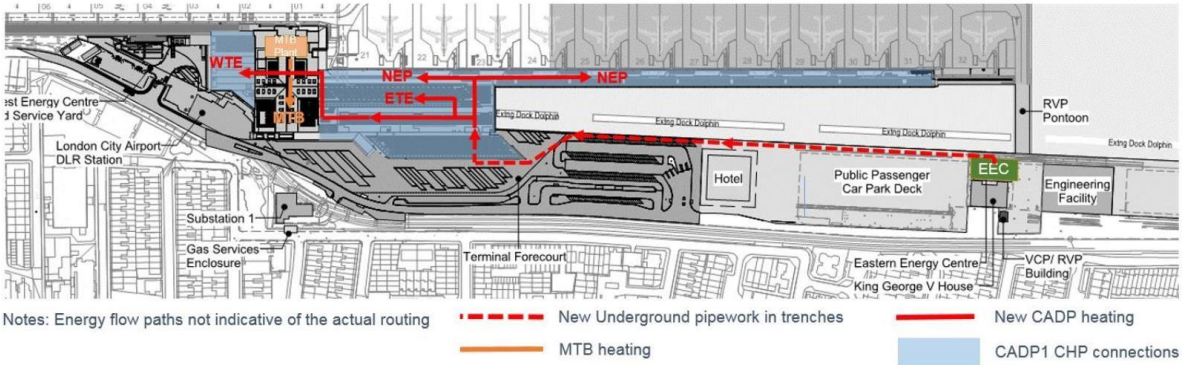
4.9. In 2012, LBN commissioned an energy infrastructure report for the Royal Docks and Canning Town, as highlighted in the previous 2013 Strategy. The report noted the potential for district heating schemes to be created but there was uncertainty around the long-term future of the major heat production opportunities identified (as experienced with the delay of the London Thames Gateway Heat Network). Since CADP1 was approved in 2016, no new schemes have come online in the vicinity of the site.

4.10. As part of the preparation of this Revised Energy and Low Carbon Strategy, investigation into the current feasibility of a 'District Heating' connection has taken place through discussions held with the GLA, GLA Royal Docks Team, E.ON and Equans.

4.11. Discussions have taken place with E.ON regarding its proposed Ectogrid scheme at Silvertown and these will be progressed to establish future feasibility and viability for a connection at a future date.

4.12. The approved 2013 Energy and Low Carbon Strategy (LBN Ref. 13/01228/FUL) includes an onsite decentralised heat supply system connected to the EEC only. This ensures the required resilience and remains a fundamental part of CADP1(while also safeguarding for future connections to district heating).

Figure 6.1 Connections of buildings to the site wide heat network



4.13. The CADP1 heat network will be phased as the CADP1 buildings are delivered and will contribute to meeting the demand for heating and domestic hot water in the new CADP1 terminal buildings (Figure 6.1).

7. Be Green

Heat Pump Technologies

7.1. As discussed in section 6.1, gas fired plant (inc. gas fired CHP) has been discounted as a feasible technology to reduce carbon emissions especially considering the airport's ambitions set out in its Sustainability Roadmap to 2030.

7.2. For the majority of new heating systems, heat pump technologies have replaced 'traditional' gas fired plant (inc. CHP) as the main source of heat generation.

7.3. Air Source Heat Pumps (ASHPs) are now proposed as the primary solution for low temperature hot water generation.

7.4. With the installation of ASHPs, a further reduction of 21% on top of the energy efficacy measures identified under 'Be Lean' can be realised as indicated in Table 4.2. Once the carbon emissions saving using ASHPs are combined with the energy efficiency measures, a total of 46% overall reduction can be accommodated.

7.5. The ASHP system will be installed to raise water temperature to 45˚C which will be combined with High Temperature (HT) Water Source Heat Pumps (WSHPs) fed from the ASHP's that will then raise the maximum low temperature hot water (LTHW) temperature from 45˚C to circa 78˚C. The system would have a combined Coefficient of Performance (COP) of approximately 2.8 or more and would serve both space heating and Domestic Hot Water (DHW), which offers significant carbon emissions savings compared to the replaced gas fired systems, which would operate at 95% efficiency (effectively a COP of 0.95).

7.6. The Part L2 Regulations 2021 however only permits a maximum LTHW temperature of 55 ˚C but as stated in the same Regulations, "*It does not apply to work subject to a building notice, full plans application or initial notice submitted before that date, provided the work is started before 15 June 2023"*.

7.7. The requirement to retain a 78˚C LTHW as part of the CADP1 development, instead of the recommended maximum 55˚C set out in the Part L2 Regulations 2021 is primarily driven by the following factors:

- The terminal buildings have been subject to a detailed and protracted design process with onsite development having commenced in 2017 and the building substructures already in place. Adapting the approved design would have a significant cost and could undermine the future delivery of CADP1.
- The need to utilise the already installed pipework and infrastructure, between the EEC and the terminal building substructures. A move to lower temperatures would require the replacement of this infrastructure with larger pipework.
- The higher temperature will maintain the potential for the new terminal buildings to connect to a future district heating scheme which would require a higher temperature LTHW similar to 78˚C to maintain appropriate heating levels.

7.8. Despite the significant constraints, in order to improve the overall performance and upgrade, as far possible, to the requirements of contemporary policy, namely the London Plan 2021 and the Part L Regulations 2021, a number of changes to the detailed design have been progressed to ensure that ASHPs can be delivered instead of gas fired boilers and CHP. These changes primarily relate to the internal configuration of the existing EEC which can be progressed either with or without the presence of the CADP2 Hotel and final load and configuration will depend on whether the Hotel is in situ or not. The design changes are not expected to materially change the external design of the terminal buildings or EEC, although some additional plant and an electrical capacity increase may be required. Any plant would be subject to approval under the Condition 38 (Plant Screening) of the CADP1 planning permission.

Photovoltaics (PV)

7.9. An estimated area of roof to be covered by PV cells has been calculated as 1,165m² of active PV area throughout the site to maximise renewable technologies. The area coverage is split across the roofs of the CADP1 terminal buildings and NEP and remains unchanged from the Condition 64 Report (PV Panels) 19_02559_AOD.

7.10. The estimated annual energy output required from PV panels is 139.00 MWh per annum as per the Condition 64 Report - PV Panels (19_02559_AOD). The available roof area for PV installations is indicated on the architectural layouts included in Appendix C.

7.11. Because there are no high-rise buildings adjacent to the new buildings and they would have unobstructed exposure to the sun, the PV system should operate at its full potential. The PVs will also be installed 1.5m clear from all building edges to avoid any shading from the building parapet.

8. Cooling and overheating assessment

8.1. The design approach aims to reduce the demand for cooling, mitigate the risk of overheating and reduce fuel consumption via energy efficient systems. The energy efficiency measures deployed for reduction of cooling energy of the building are summarised below. Additionally, a synthetic indicator that allows comparison between the cooling demand of the notional building and the building as designed is included.

Cooling Demand

8.2. The design of the buildings incorporates several measures to reduce the demand for cooling.

8.3. Excessive solar gains have been mitigated through enhanced performance of the glazing and external shading elements in the form of perforated mesh screens and perforated mesh fins. At all stages of the mechanical design, energy efficient systems have been used to minimise any additional heat gains from equipment operation. AHUs will have facility to provide free cooling to reduce energy demand in summer.

8.4. Energy efficient lighting with photoelectric controls and occupancy sensors reduce gains from electrical lighting.

Active Cooling

8.5. The potential for the use of outside air for free cooling in the form of natural ventilation is discounted due to the high occupancy density and the requirement for a sealed building (mainly due to the adverse aircraft noise). As such, comfort cooling is proposed to be provided to the extension buildings where required.

8.6. The HVAC Systems Performance table given in the Part L compliance BRUKL report details the cooling demand of the actual and notional buildings as part of the Simplified Building Energy Model (SBEM) analysis. The data is summarised in Table 8.1. The buildings as-designed have a lower cooling demand than the notional building, which are much reduced compared to the previously approved energy strategy (LBN Ref. 13/01228/FUL).

Table 8.1 Cooling Demand from “Be Green” BRUKL Report

Average building cooling demand (kWh/m^2)	
Actual	2.96
Notional	10.92

9. Future Aspirations to achieve Net Zero

9.1. Separate to this Revised Energy Strategy, LCY has published its Sustainability Roadmap that sets out its ambitions to become London's first net zero emissions airport (Scope 1 and 2) by 2030. While not part of the CADP1 development, these ambitions are likely to be delivered over a similar timescale. This Revised Energy Strategy is consistent with LCY's ambitions and through the replacement of gas fired boilers with ASHPs this will help to minimise carbon emissions and reduce on site energy consumption.

9.2. To achieve the ambitions set out in the Sustainability Strategy, the airport is likely to make a further significant investment in solar technology to supplement the approved CADP1 development. The future investment, which would be subject to detailed feasibility and securing the necessary consents and could be accommodated through a combination of roof mounted PV on other onsite buildings, surface car parks and/or on floating pontoons in KGV Dock. It is estimated that the area of additional PV required could be in the region of 8,000 - 10,000m 2 with a mix of traditional PV Panels producing electricity and Solar PV-T panels, or solar photovoltaic-thermal panels to convert solar energy into both electricity and hot water. The potential locations of the future PV associated with achieving net zero are shown indicatively in Section 3 of the Design Development Report that accompanies the S7 Application.

9.3. Any future PV provision would be additional to the 1,165m^2 delivered as part of the approved CADP1 development and would vastly exceed the requirements of policy and guidance subject to this Revised Energy Strategy.

10. Summary

10.1. As part of the proposed amendments the airport will significantly enhance its Energy Strategy and further reduce the carbon footprint of the CADP1 development through additional improvements to the efficiency of the approved design and use of more sustainable systems where practicable and feasible given the constraints of the approved design. The improvements proposed are likely to cost in the region of £11-16million additional to the CADP1 development.

10.2. This Revised Energy and Low Carbon Strategy exceeds the previous requirements of Part L2A 2010 & 2013 regulations, as well as the more contemporary requirements of Part L2A 2021 regulations and the London Plan 2021 (against Part L2A 2013 targets) with an overall reduction of 46% against set targets using the London Plan 2013 methodology and saving 344 tonnes of CO_2 a year; a further saving of 291 tonnes per year over the approved strategy (LBN Ref. 13/01228/FUL) which could only offer a saving of 7% using the same methodology.

10.3. The Revised Strategy therefore significantly reduces the CO2 emissions of the CADP1 development compared to the approved Energy and Low Carbon Strategy (LBN Ref. 13/01228/FUL).

‘Be Lean’ Summary

10.4. The energy efficiency measures adopted to meet the required carbon emission targets for the building elements include:

1. Passive reduction of space heating and cooling via a highly insulated, low air leakage envelope.
2. Optimised glazing and shading combination to facilitate access to daylight whilst reducing the impact of solar gains.
3. AHUs specific fan power (SFP) reduced to 1.45 W/l/s, heat recovery increased to 85% and free cooling facility to reduce energy demand in the summer.
4. High efficiency air cooled chillers with a seasonal efficiency (SEER) of 5.27.
5. An average installed luminaire efficacy of 110 lumens per circuit Watt with more effective lighting control.
6. Fan coil unit terminal units SFPs reduced from 0.3 W/l/s to 0.2 W/l/s.
7. Installing kitchen extract heat recovery systems for commercial application; and
8. Replacing centralised VAV conditioned air distribution systems (high volume/energy requirement) with tempered fresh air only plus local fan coil units (FCUs), reducing auxiliary power demand.

Target 15% → Estimated 25% reduction

‘Be Clean’ Summary

10.5. The proposed design includes:

- An airport wide heat network supplied by ASHPs to deliver LTHW at a COP of 2.8 as detailed below; and
- Allowance for valved and capped connections and space for heat exchangers to allow future connectivity to district heating.

‘Be Green’ Summary

10.6. It is proposed to install an ASHP system to raise water temperature to 45˚C, this would be combined with HT WSHPs that would then raise the temperature from 45˚C to circa 78˚C. The system would have a combined COP of approximately 2.8 and would serve both space heating and DHW, which offers significant carbon emissions savings compared to the replaced gas fired systems. Once the carbon emissions saving using heat pumps are combined with the energy efficiency measures, a total of 46% overall reduction can be accommodated.

10.7. A total area of PV modules of circa 1165 m^2 is proposed and would contributes to the 46% reduction in Energy.

Target 35% → Estimated 46% reduction