Investment Grade Proposal: LBH-002

LONDON BOROUGH OF HILLINGDON

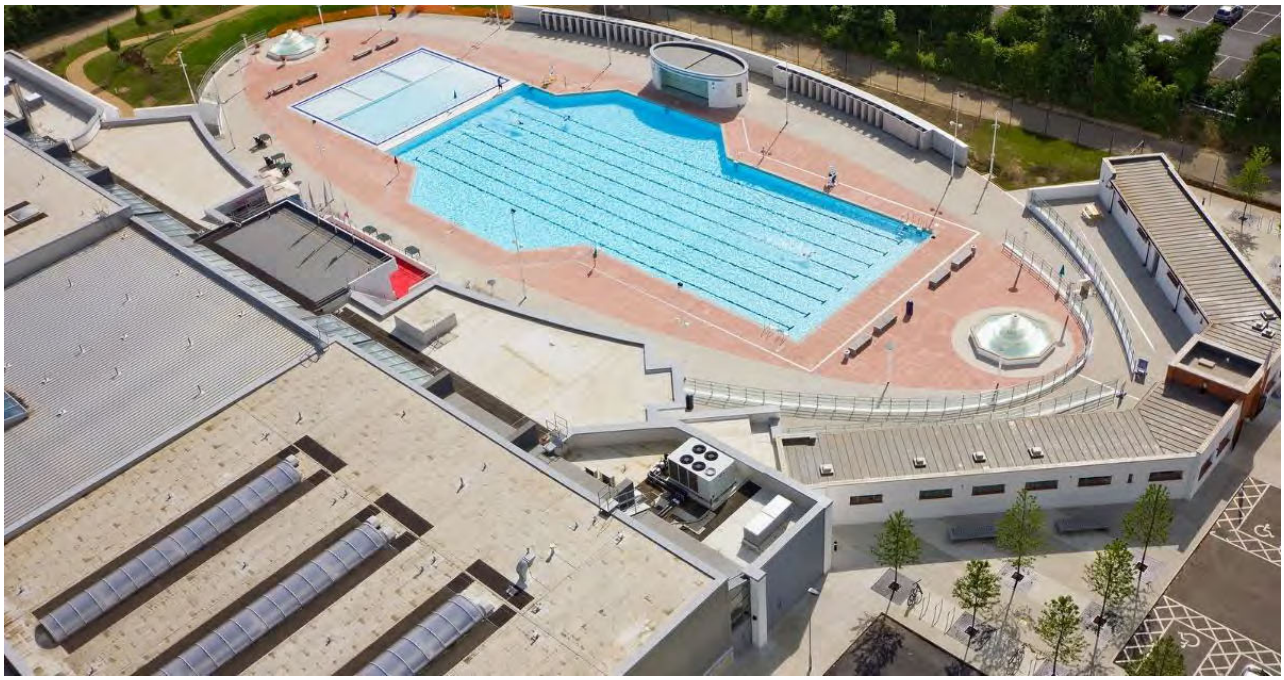
Prepared for:

HILLINGDON
LONDON

Submission Date: 19th April 2023

Hillingdon Sport & Leisure Complex

Gatting Way, Uxbridge UB8 1ES



Building Overview

Hillingdon Sport & Leisure Complex is based around a 1935-built Art Deco style sports complex formally Uxbridge Lido.

The new sports complex was completed in 2010 and includes an Olympic-sized pool and the renovation of the existing grandstand, cascades, entrance building and the lido pool.

The main features of the complex include 50 meter eight lane swimming pool; leisure waters with spectator seating; café leading to a four court badminton sports hall; wet and dry changing accommodation; a crèche; staff facilities and dedicated health and fitness block with sauna and steam rooms. The sports complex is also incorporated with a range of leisure opportunities for the use of residents and visitors.

The pool, which is grade II listed, is the only remaining example of a 12-sided star swimming pool in the UK.

The listed entrance to the building that houses GLL offices and a crèche is single storey with the new centre occupying up to 3 storeys.

The original 1930's building is constructed of solid brick with a new render and 6mm metal framed critical style double glazing. Similar style windows are seen as part of the fabric of the original viewing gallery, currently houses a spin bike studio, of which the 2010 extension has been built around in keeping with the original style.

Figure 31. Original single glazed units and brick work

The new extension building fabrics are assumed to be aligned with the building codes and regulations for its heritage with well insulated cavity walls, insulated flat roof and 16mm+ double glazing which is seen throughout.

Figure 32. Hillingdon Lido before and after 2010 extension

The main building sits on a footprint of approx. 4,670m^2 with a gross internal area of 6,074m^2.

The site is supported by 1no. electrical meter located in the electrical cupboard with cableway metering to main plant and distribution boards throughout the site. There is also 1no. gas meter which serves; the main boiler plant, a 30kW gas boiler within the crèche building utilised for radiator heating & DHW and the athletics track building. The main leisure centre also includes gas kitchen equipment (gas hob and gas fired chip pan).

The athletics track building comprises of 1no. 120kW Remeha Gas 210 Eco boiler and 2no. 80kW direct fired gas calorifiers. The building operates with 1no. CT circuit feeding the building 1no. AHU heating coil and 1no. VT circuit which provides heat to the radiators throughout the building. During site surveys the building was not in use.

The main building site heating is provided by 2no. Hoval Cosmo 1750kWth heat output boilers (which include relatively new burners for each) and 1no. Centric E150 CHP capable of 235kWth heat output and 151kWe electrical generation which is run at max load non-modulating. The CHP supplies the majority of the heating the gas boilers acting as a top-up by receiving the CHP LTHW output feeding in to the main return manifold back the gas boilers.

During site visits, Ameresco noted the flow temperature to be 62°C with outdoor air temperature at 12°C.

The site utilises 2no. Constant Temperature (CT) and 1no. Variable Temperature (VT) circuits:

- *CT, Supply to 4no. pool plate heat exchangers via 2no. Grundfos MGE132, 5.5kW pumps (running and standby).*
- *CT, Supply to FCUs, AHUs and DHW circuit via 2no. Grundfos MGE100, 3.0kW pumps (running and standby).*
    - The heating circuit indirectly heats the DHW circuit via plate heat exchangers and 2no. cylinders approx. 1200L each maintained at 60°C.
- *VT, Supply to radiators and underfloor heating for the reception area via 2no. MGE71A, 0.37kW pumps (running and standby).*

Equipment is controlled throughout the facility via Trend IQ3 controllers and I/O with remote monitoring as part of GLL's system 'The Bureau' to allow for live visibility of main equipment.

Space heating throughout the site is delivered via AHUs, FCUs and indoor cassette units. It is noted the gym hall area has decommissioned gas fired radiant tubes (gas supply has been capped off).

There are 4 AHUs located across the leisure centre:

- *AHU1, Pool room supply and extract which includes direct mixing heat recovery.*
- *AHU2, Kitchen room supply and extract, no heat recovery.*
- *AHU3, Wet & Dry change areas, heat recovery via thermal wheel.*
- *AHU4, Sports hall, heat recovery via thermal wheel.*

FCUs across the site are capable of cooling and heating, cooling is supplied via a 119.6kW Carrier chiller utilising R407c refrigerant. Notably some FCUs have been either replaced for A/C cassettes or removed from service i.e. lower gym floor and others that are in situ were not running at time of visit due to poor performance and an effort to save energy by switching the roof chiller off.

The site makes use of split heat pump units to supply heating and cooling via indoor cassette units to the spin class studio (multipurpose room) and Café area.

Pumps throughout the facility were all direct drive motors with VSDs throughout driven by time scheduled speed setpoints as managed through the Omron MCC panel. The site manager has invested significant time through trial and error to managing the speed setpoints including night time reductions.

Figure 33.Existing Boilers, CHP, VSDs and VSD time schedules

Plant operating schedules for the site and associated utilities were considered to be appropriate and well managed based on daily operating hours per area e.g. Pool AHU run hours aligned with pool opening times, Gym Hall AHU run hours aligned with Gym Hall opening times.

Premises Energy Consumption Baselines and Profiles

Electricity & Gas Consumption Profile

No HH data was available for this site so it was not possible to develop or analyse the consumption profiles for this site. It was therefore not possible to identify demand outside of operational hours. Monthly gas and electricity consumption data was used to develop the site baselines.

Summary of Site Baselines

The table below shows the site annual energy baselines for gas and electricity consumptions based on 2021/2022 data. These are obtained from the client.

Energy Type	*Consumption (kWh/Yr)*	*Energy Cost (£/Yr)*	*CO2 Emission (tonnes/Yr)*
Electricity	857,357	£367,519	166
Gas	3,915,059	£507,666	715
Total	**4,772,416**	**£875,185**	**880**

Table 17. Hillingdon Leisure Centre energy baselines

Overview of Proposed ECMs, Cost and Savings

Following our investigation of all ECMs, we have prioritised ECMs based on their maximum value to the site, including capital cost and energy savings. The proposed ECMs are shown in the following table.

ECMs	LED (new fitting)	Solar PV	Double Glazing	Secondary glazing	Cavity wall insulation (CWI)	Loft insulation	BMS (remotely managed)	Air source heat pump (ASHP)	Draught lobby (internal)	Fans - high efficiency	Ventilation - distribution	Pool Cover	Floor Insulation	External wall insulation (EWI)
Hillingdon Leisure		✓						✓						

Table 18. Proposed ECMs – Hillingdon Leisure Centre

The table below summarises the savings and capital cost for all the proposed ECMs at this site.

ECM Description	kWh Savings (kWh/Yr)	Cost Savings (£/Yr)	CO2 Savings (te/Yr) (PSDS)	Lifetime CO2 savings (PSDS)
Solar PV	127,159	£ 54,508	-	-
Air source heat pump (ASHP	2,651,248	-£ 32,915	714	14,279
DNO upgrade works	-	£ -	-	
Design costs	-	£ -	-	
Extra costs (M&V, financing)				
TOTAL	**2,778,407**	**£ 21,593**	**714**	**14,279**

Table 19. Summary Hillingdon Leisure Centre ECM and savings table

Proposed ECMs

ECM: Solar Photovoltaic

To support the decarbonisation project and the increased electrical demand placed on the site in lieu of removing gas heating dependence, Ameresco are proposing the following self-generation electrical solution.

Equipment Specifications

Full Equipment specifications can be found in Appendix C.

The proposed design will utilise QCells MLG10 series panels rated at 410W. Datasheet and information regarding declarations, production compliance and codes of conduct are appended.

The panels will be integrated with fixed voltage inverters from SolarEdge SE90K / SE66.6K range, details of which are found in Appendix C.

Design Capacity

LBH submitted electrical import data for each site in which only the Civic Centre has Half Hourly (HH) metering. Ameresco solar team have reviewed monthly consumption data for this site and designed an array to maximise electrical self-consumption in order to support the decarbonisation project (new demand from ASHPs).

It should be noted Ameresco are guaranteeing project performance in the form of electrical production of the system, not electricity self-consumption.

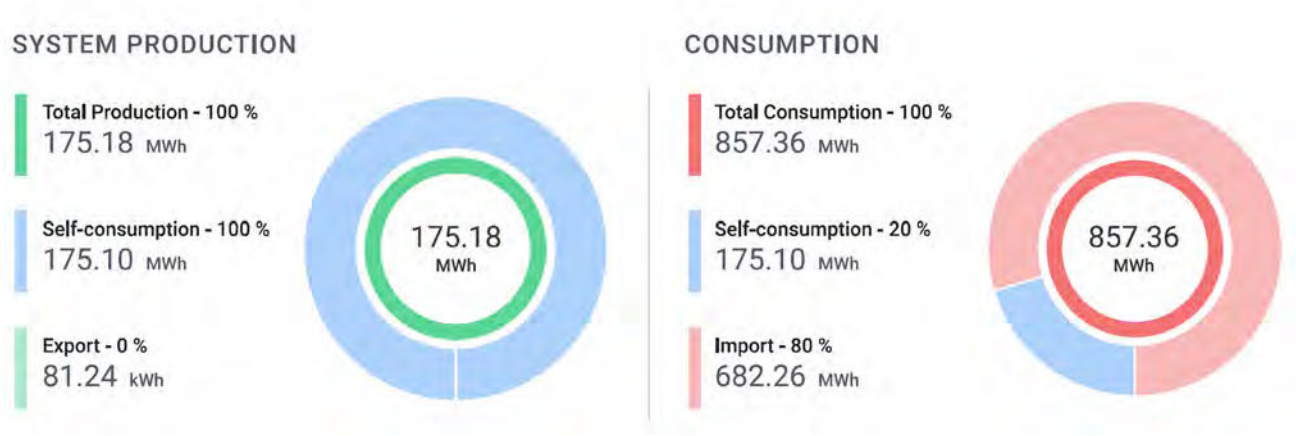


Figure 34. Hillingdon S & LC, PV production vs. site consumption

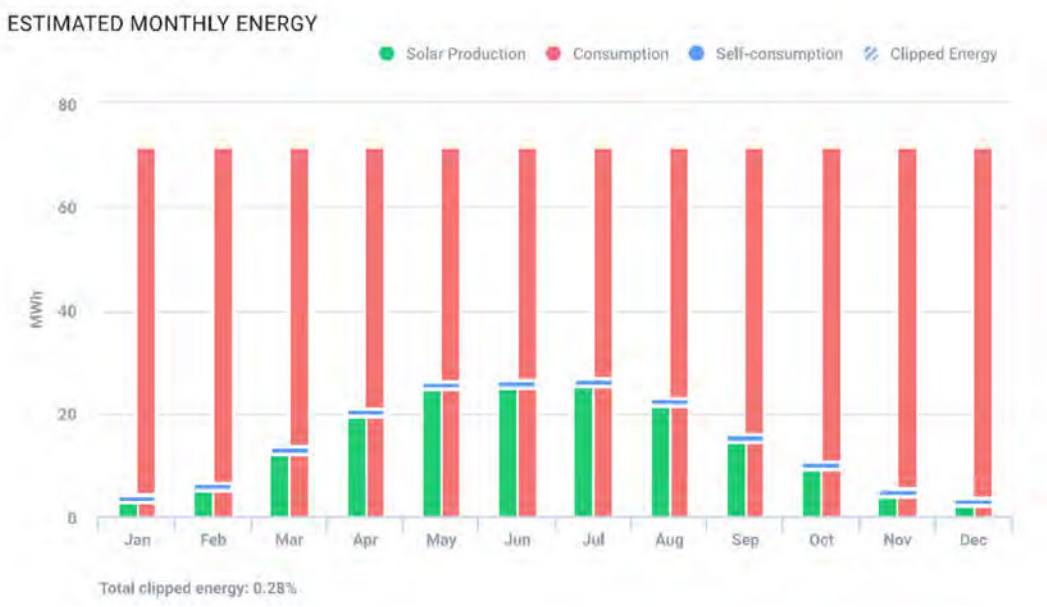


Figure 35. Hillingdon Leisure, monthly elec. consumption (2021-22), PV production & est. self-consumption

*clipped energy loss % refers to the lost energy caused in a solar photovoltaic (PV) system due to the inverter derating its output to meet either its maximum power rating or the maximum allowable power at the grid connection.

Preliminary Design

Ameresco propose to install 202.54kWp of PV system mounted to the roof with an annual yield up to 175,180kWh/yr.

The array peak capacity is sized to maximise electrical self-consumption to support the site's decarbonisation programme. The panel layout is designed to optimise all the feasible roof space and to avoid any walking path, plant equipment, edge of the roof, safety guard rails and shading based on initial site inspection.

This design will utilise 494 modules assorted into 16 strings with each module fitted with an optimiser to ensure maximum generation per string. The inverter will be installed in the electrical incomer cupboard at the South side of the centre under the same roof where the PV is to be installed.

Ameresco have included in the design to include for LPS bonding.

Figure 36. Indicative Solar PV Layout - Hillingdon Leisure Centre

Scope of Supply

The detail scope of supply is outlined below.

Detailed mounting and electrical design	Included
Structural Assessment	Included
494 x Solar PV QCell	Included
Solar Edge 90K solar inverter	Included
Solar Edge 66.6K solar inverter	Included
Appropriate mounting kits required to fix the panels	Included
All accessories required for connecting the system to the Network	Included
DC cabling between panels and inverters, and AC cabling between inverters and switch boards	Included
New protection switch, to be installed in spare way of boards	Included
Total Generation kWh meter with remote monitoring capability	Included
Labour and standard materials required for the complete installation of the system	Included
Main AC and DC Cables	Included
Access and Lifting Equipment	Included
Scaffolding and Edge protection as required	Included
Solar Edge Monitoring System	Included

Table 20. Solar PV Detailed Scope of Supply - Hillingdon Leisure Centre

The solar PV system will be designed as a single unit and is proposed to be delivered in a single installation phase to minimise disruption and contractor time on site. It will be installed in compliance with all relevant health and safety regulations and designed to be in complete agreement with the latest editions of:

- ***MIS3002:*** *Requirements for Contractors Undertaking the Design, Supply, Installation, Set to Work Commissioning and Handover of Solar Photovoltaic Microgeneration Systems - published by MCS.*
- ***Photovoltaics in Buildings****: Guide to the installation of PV systems. 2nd Ed. 2006: published by DTI.*
- ***BS EN 62548:*** *Installation and Safety Requirements for Photovoltaic (PV) Generators Guide to the Installation of Photovoltaic Systems as published by the MCS.*
- ***BS 7671:2015:*** *Requirements for Electrical Installations: IET Wiring Regulations.*
- ***BS EN 62446:2009:*** *Grid connected photovoltaic systems -Minimum requirements for system documentation, commissioning tests and inspection.*

Anticipated Savings and Other Benefits

The table below summarises the overall performance of this ECM.

Solar PV	Energy Savings			
	kWh/Yr	£/Yr		CO2 (te/Yr)
				PSDS
Electricity	127,159	£	54,508	-
Gas	-	£	-	-
Total	**127,159**	**£**	**54,508**	**-**

Table 21. LED Lighting Performance Summary – Hillingdon Leisure

All savings will be separately measured and/or verified as detailed in the M&V plan.

[redacted]

Assumptions and Exclusions

The proposed project has the following assumptions and exclusions. If any of these are required, they will be added at an additional cost. A full risk register can be found in Appendix H.

- No allowance made for DNO reinforcement related improvements.
- No allowance for export limitation device.
- No allowance for a new LPS system installations - we will carry out LPS bonding to existing LPS.
- No allowance made for external Surge Protection Device (SPD) installation, only built-in Type 2 SPDs inside the inverters.
- Given the age of this site it is assume there is no asbestos present and as such no provision has been made for asbestos at the installation areas (i.e. roof, cable routes, inverter location, etc.)
- If during the construction phase asbestos is discovered, it is at the responsibility of LBH to safely remove and dispose of before work can continue.
- No allowance made for fire alarm integration.
- Assumed electrical infrastructure is good and spare ways at the existing sub DBs can be utilised.
- Assumed working only during standard weekday working hours.
- No allowance has been made for out of hours working or outdoor lighting.
- Assume we will have full and unrestrained access to site to complete works.
- Assume we will have access to welfare facilities. There is no provision for separate welfare units.
- Assumed we will have access to the site Wi-Fi. If this is not possible, the client will need to arrange and provide a SIM card and router.
- Assumed roofs do not have any ongoing warranty.
- Make/model of panels subject to client's approval with Ameresco providing forced labour declaration.

ECM: Air Source Heat Pump (ASHP)

Heat Loss Analysis

Ameresco attended site to carry out laser measurements of all windows and doors and selected internal rooms to cross reference against general arrangement floor plans throughout all sections of the building. Note was taken of building materials and glazing, as well as estimates of air change factors given the building's expected configuration and use.

An external temperature of - 3°C which was considered appropriate for the Hillingdon area was used for peak load analysis. Internal design temperatures and ventilation rates were used following BS EN12831.

A room-by-room simulation was derived for the original 1930s office/crèche building to assess building fabric heat loss and appropriateness of current heat emitters. Given the building's listed status external wall upgrades are not recommended (internal wall insulation possible but the current capacity is already small) and the building already includes for double glazing, albeit small air gap it is not economical to upgrade.

A similar approach was used for the Athletics track building to estimate building heat loss and heat emittance capability from existing radiators. Given the heritage of this building, fabric upgrades will not be required and the building thermal envelope is already optimised.

A whole building approach for the main leisure centre had been used to account for heat loss in areas not served by heat pumps and to exclude areas which are not heated. Given the heritage of the main building, fabric upgrades will not be required and the building thermal envelope is already optimised.

Building heat losses:

- *Créche / office 1930's building, 24kW.*
- *Main leisure centre, 1490kW (including indoor and outdoor pool heating* and DHW).*
- *Athletics sport track, 37kW (excl. DHW).*

The heat loss modelling and heat pump designed has been based on the outdoor Lido operating from May to October as the current program is aligned to. Discrepancy from these hours of operation will need to be taken under variation and revised model / design.

Detailed heat loss analysis can be found in Appendix F.

System Sizing and Building Limitations

The building electrical supply is rated at 415kVA and the max demand occurring in the past 12 months is 346kVA, 83.5% utilisation. Under the usual running of the site, this would elicit a much lower import due to the site CHP contributing up to 150kW electrical generation. Ameresco are assuming the CHP will be turned off and decommissioned as part of this decarbonisation project and as such are accounting for this in the site new maximum demand.

Ameresco has contacted SSEN to obtain a budgetary cost for increasing the site supply by 465kVA to account for site current maximum demand and the additional load placed upon it by ASHP installation. LBH will be subjected to a Connection Offer Expense (COE) to cover SSEN Design fees to carry out a full assessment and final fixed pricing for this work – this cost is included in the Detailed Design proposal.

SSEN have indicated a budgetary cost of £190k which allows for the installation of equipment within the site boundary as on-site works only. The current substation supplying Hillingdon S & LC also supplies two other sites, SSEN have indicated they would need to install a new 1500kVA substation to account for the new load to Hillingdon S & LC. Ameresco are continuing conversations with the DNO to e

This price does not include any possible 2nd-comer reinforcement charges that may apply, and does not confirm that there is available capacity on the network to meet the required demand – this would be an

outcome of the detailed assessment being carried out by SSEN which is currently in progress.

Substantial upgrades are needed to the electrical network to integrate the new HP system. These will be confirmed pending a response from the DNO.

Scope of ECM Work Proposed

Ameresco has undertaken a diligent review the site, including site surveys to establish space availability inside plantrooms, as well as outside areas for the outdoor evaporator units. Areas identified for the location of the external units have not been agreed with LBH at this time. Ameresco has allowed costs for preparation of planning permission / listed building consent for the site, which are required for the evaporator units and heat pump unit installations placed externally. Ameresco would seek approval from the LBH to proceed with the works concurrently to the planning submission to limit any impact to the project timeline.

The general scope of works is to provide a solution including supply, installation, testing and commissioning of 2no. commercial sized air source heat pump packages and 1no. domestic sized air source heat pump for the Hillingdon Sport & Leisure Complex including the crèche building and Athletics track building.

Detailed design includes for all electrical, mechanical, controls and civils work.

- *DNO connection and Planning applications.*
- *Civil works.*
- *Foundations for external units.*
- *Trenching, excavation works, where applicable.*
- *Inclusion/modification to existing concrete plinths to accommodate equipment, where applicable.*
- *Fencing around the external units, where applicable.*
- *Mechanical works.*
- *Wiring and heat transfer pipework between indoor and outdoor units.*
- *Buffer tanks and interconnection and integration pipework connections.*
- *Insulation to pipework, valves etc. that we installed in plantrooms.*
- *Electrical works.*
- *Connection of heat pumps to site electrical supply.*
- *Integration of the new heat pump systems to newly proposed BMS.*
- *Supply and installation of heat pump units to be located in external area.*
- *Thermal and hydraulic integration of the heat pump into the existing heating system which includes correct pump and pipe sizing.*
- *Hydraulic separation of new installed heat pump and associated equipment from existing distribution system.*
- *Site training and handover.*
- *Removal of 2no. existing indirectly heated calorifiers in main plant room.*
- *Removal of 2no. existing gas boilers in the main plant room*
- *Removal of 2no. direct fired gas calorifiers in athletics track.*
- *Removal of 1no. existing indirectly heated calorifier in crèche building.*

Equipment Positioning and Detailed ECM Schedule

It is appreciated that the Lido pool area and the surrounding buildings are Grade II listed. The majority of the building shown on the right hand side of Figure 32 is newer and not listed.

This site will require 3 ASHP packages:

- *1no. for the Lido office / crèche.*
- *1no. for the main plant room that serves 2no. pool heating and space heating for the main centre.*
- *1no. for the athletics track building North of the main centre.*

The scoped location details per package are outlined below, these have not been approved by LBH or planning (including heritage planning) at this stage.

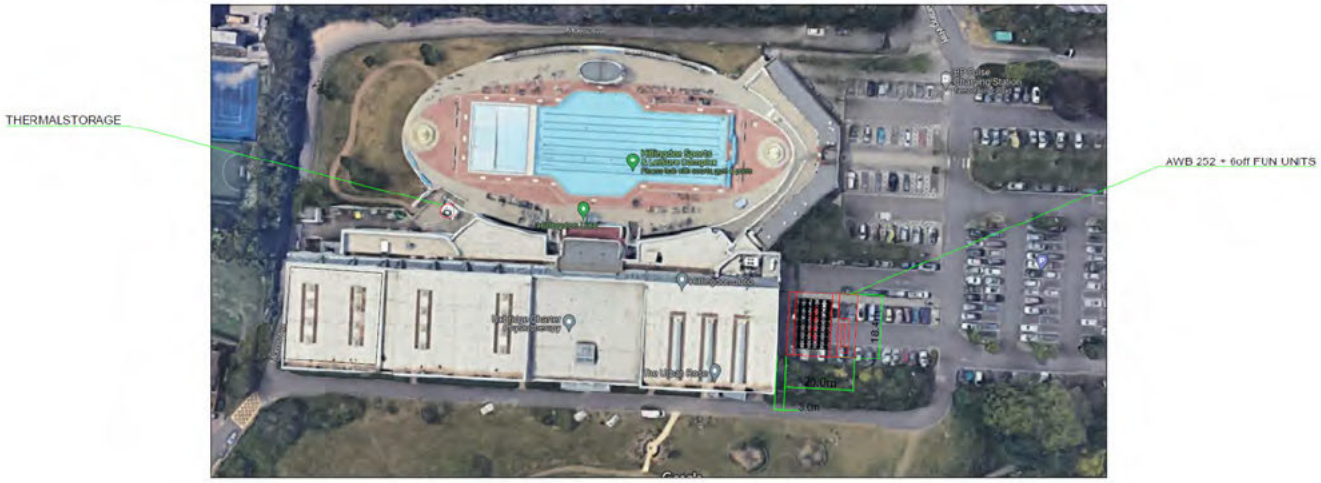


Figure 37. Hillingdon S & LC, Large ASHP location

Figure 37 shows the location for a large ASHP package to ensure ample space for airflow and space to fit the units with a thermal store based outside and opposite the existing boiler plantroom. Ameresco propose to install a Solid Energy AWB252 heat pump package that will serve the main building heating, DHW, main pool heating, learner pool heating and outdoor lido pool heating. This package is capable of providing high flow temperatures, however, Ameresco propose to run this package at a lower flow temperature (yet maintaining DHW at 60°C in storage) in order to achieve higher efficiencies and lower electrical consumption. This will necessitate the upgrading of existing heat emitters including AHU heating coils which is included in the pricing. The ASHP package will include an enclosure to dampen acoustic noise from the fans and ensure there is a suitable exclusion zone around the package to allow for maintenance when required.

As part of this solution, the existing 2no. Hoval Cosmo 1750kW boilers will be removed from site to ensure a full decarbonised solution.

Figure 38. Hillingdon S & LC Athletic track

Figure 38 shows the Hillingdon S & LC athletic track building (in white) which has considerable space and options for ASHP location. For this building Ameresco propose a ThermoNova NOVA110 ASHP in close proximity to the existing plant room by placing the package within the carpark. This ASHP will replace the existing gas boiler and 2no. direct fired gas calorifiers by replacing with a thermal store and 2no. indirectly heated calorifiers. This package is capable of providing flow temperatures up to 68°C and will not necessitate the upgrading of existing heat emitters including AHU heating coils.

Figure 39. Hillingdon S & LC, Crèche domestic ASHP location

Figure 39 shows the lower tier roof from the main building that currently houses the chiller and a pair of small a/c condensers. This roof area is not considered listed (allowance for current utility equipment located on the roof) and as such Ameresco will propose to located a small ASHP on this roof top. If it is the case that during detailed design that this location is discovered to be not appropriate, Ameresco will propose the ASHP is located on the higher tier roof to the right in the image above. This small domestic sized unit will replace a 30kW gas boiler which indirectly heats a calorifier supplying the building radiators and domestics hot water users.

In either case, Ameresco propose to run pipework within the ceiling void of the listed building to supply a replacement indirectly heated calorifier with appropriately sized coil. This calorifier will replace the existing which is located within a cupboard on the crèche side of the archway (left side of archway in image above).

This domestic unit will operate with a flow temperature up to 55°C and as such the building will require upgrades to existing emitters (radiators). This is included within this project scope and Ameresco will propose protected radiator designs within the crèche side of the building to align with suitability for the current room use. DHW will be maintained at 60°C in storage via immersion heater top up.

System Design and Schematics

To be produced as part of the detailed design.

Equipment Selection (Preliminary)

Ameresco propose at this site ThermoNova and Solid Energy ASHPs.

Benefits of ThermoNova units considered:

- High flow temperatures available to cover DHW requirements.
- Flexible return temperature solution.
- Very Low Global Warming Potential Refrigerant – R290 GWP of 3.0.
- Small compact size vs thermal output – monobloc approach means evaporators combined with compressors.
- Excellent coefficient of performance (COP).
- Simple hydraulic connection.
- Modular frame based design to enable expansion and quick installation.
- Strong remote monitoring capabilities.
- Great for integrating into existing buildings.
- Reliable construction techniques.

The nature of the monobloc units having combined compressors means we are able to allow for great redundancy across each installation i.e. NOVA 440 will have 4 compressors which are able to continue operating should a compressor fail. The expectation would be a drop in efficiency from a cascade unit due to a failed compressor and a balance would be struck between flow temperature and rate of heat delivery if the unit was at maximum load.

A NOVA 110 unit is considered a singular modular unit which can be incorporated up to a NOVA 880. For each package up to 4 units, a control panel will be included e.g. a NOVA 660 would include 2no. control panels for that associated package.

Figure 40. ThermoNova, NOVA 110 ASHP

Figure 41. ThermoNova, NOVA 440 AHSP

Benefits of Solid Energy units considered:

- A solution that is economically attractive for high heat load with considerable space such as specific to the Hillingdon S & LC carpark.
- This units are capable of producing flow temperatures up to 90°C but will yield great increases in efficiency (electrical savings) operated at lower temperatures as required.
- The AWB252 unit proposed includes for a 2-step compressor set-up (one step is a pair of compressors). Should one step be inoperable for unforeseen circumstances, the opposite step will still deliver flow temperatures up to 65°C offering a backup solution.

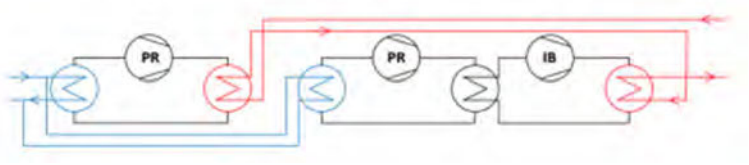


Figure 42. Solid Energy 2-step compressor as utilised in AWB252 units.

- There are options to consider a modular approach for increased redundancy (and essentially 2 units operating side-by-side) if desired by LBH. This approach comes at an increased cost which has not been included in this project pricing.
- AWB252 compressors are semi-hermetic screw compressors with a design life of 100,000 hours. They are sealed units, maintenance free and they have an excellent track record in current supplier installations.
- The compressors turn down to 50% without loss of efficiency.

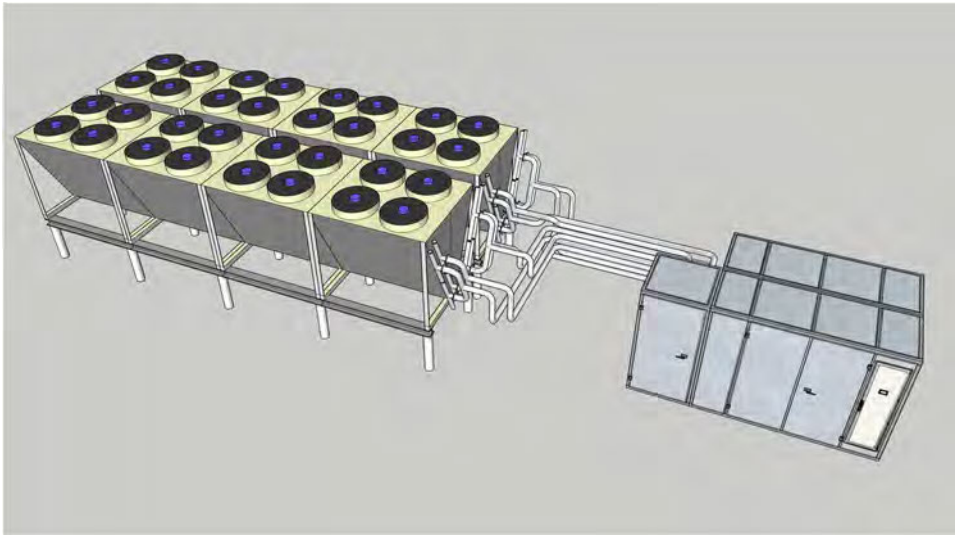


Figure 43. Illustration of a Solid Energy AWB252 heat pump (evaporators left & compressor right)

This is a preliminary selection of equipment for this measure as decided upon surveying the site. As an outcome of the detailed design the type and number of units will be confirmed which may vary from the preliminary selection.

Building Management System

The current BMS controllers and IO throughout Hillingdon S & LC are Trend IQ3 which are considered obsolete.

Ameresco propose to replace this system with the Trend IQ4 Building Energy Management System. The Control Panel we propose to install will provide control/monitoring of the newly installed ASHP that serves the main centre only. The small ASHP packages will run with local control for the crèche and integrate to the existing BMS within the athletics track building.

As part of these works we will also be carrying out the replacement of the obsolete IQ3 controllers and obsolete IQ3 IO modules within MCC3. We will also be carrying out various enhancements to the control of existing plant. For example, the existing boilers control loop is configured with P+I (proportional and integral control), where lead/lag on/off controlled plant such as boilers and chillers should be configured P only. Additionally it was notices the IQ3 controller within the panel has an 8 analogue output module fitted that is not configured in the controllers SET strategy.

Primary user interface will be by the replacement IQView 8 display to be fitted in place of the obsolete IQView display. Additionally we have allowed to update and create additional graphics for the remote GLL IQVision Supervisor PC.

Ameresco recognise the existing Omron panel which manages pool temperatures and pump VSD setpoints is suitable to remain in-situ and as a brand has excellent spare parts support with minimal obsolescence risk.

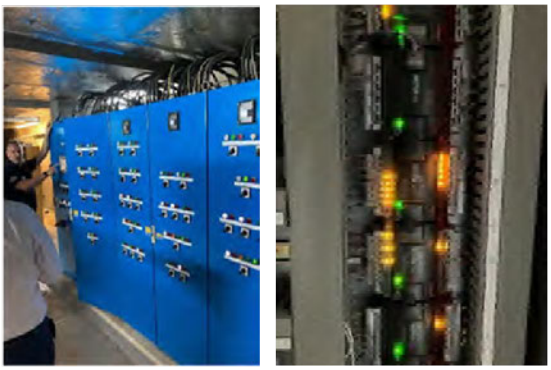


Figure 44. Hillingdon S & LC, Omron control panel and existing Trend IQ3 controller and IO

The main focus of this project is to replace the gas boilers with low carbon technology, a new BMS system with remote monitoring will ensure the best integration with new major equipment installed and allow for Ameresco to remote monitor performance to ensure the best delivery. This is dependent on LBH providing a suitable network connection, where necessary, in order to allow 2-way access to the new control units.

Existing CHP

The existing CHP unit has been in situ since 2009 but with significant downtime prior to a site management change in 2019 as reflected in the running hours in the image below. It was observed to be delivering a flow temperature of 60°C at the time of visit but is capable of temperatures up to 80°C.

Figure 45. Existing CHP within Hillingdon S & LC

As part of the effort to fully decarbonise the site, Ameresco recommends shutting down the existing CHP and migrating the heat generation requirement to low carbon technologies (heat pumps) with the option of a PV array to increase on site electrical generation and offset the generation lost from the CHP. Although there is currently no definitive end point for the use of gas (for heating and/or electricity generation) the government has proposed to end all new boiler installations by 2035 and indeed LBH has plans to be Net Zero Carbon by 2030. Whilst running the CHP for the next 7years will provide some financial savings in the short term it is likely that grants and funding for the installation of low carbon heat pumps will have ceased when the unit needs replacing.

If LBH wish to continue to run the CHP, flow distribution changes will need to be considered during detailed design stage to isolate the CHP from parts of the site to comply with Salix funding. For the purposes of this project it is assumed the CHP will not run, is isolated from the site distribution and as such is not within project scope.

Assessment of Existing Heat Distribution System

As part of the installation of the domestic heat pump package to the crèche / listed building, Ameresco will include for the upgrade to existing heat emitters (radiators) within the building. The two larger ASHP packages that will serve the main leisure centre and the athletics track will be capable of higher flow temperatures but in order to maximise efficiency will run at lower flow temperature (yet maintaining DHW at 60°C in storage)

and as such will necessitate the upgrades to heat emitters including AHU coils.

Heat pump integration to the Hillingdon S & LC centre will include for a hydraulic break via 1no. plate heat exchanger to protect newly installed equipment which will connect with the existing pipework distribution. It is not standard engineering practice to install a standby plate heat exchanger due to the additional cost and space requirements involved and their low failure rate. Significant redundancy is already built into the proposed solution through the use of modular compressors and heat pump units.

Ameresco strongly recommend the existing distribution system is flushed and inspected to ensure adequate delivery of low temperature hot water from heating plant.

Electrical Requirements and DNO Application

Ameresco have applied for DNO approval and are currently awaiting final and fixed connection / upgrade costs. As previously mentioned, SSEN has stated a new substation is likely required and provided a budgetary cost of approx. £190k. Ameresco has allocated a provisional sum of £210k on this basis. Full DNO connection costs have not been included within this proposal and will be quoted as part of the DNO full assessment, the cost of which is included in the Ameresco Detailed Design proposal. Should the DNO come back stating a differing cost from the budgetary indication beyond the allocated amount, then LBH will be responsible for these upgrade costs. In our experience it is rare for a full assessment to identify a cost in excess of the budgetary figure initially offered.

As part of this project, and included within the project costings for this ECM, Ameresco has allocated a cost for connecting the new heating equipment, including the heat pumps themselves and any ancillary equipment, to an identified distribution board or isolator that is unused. Ameresco has assumed all existing on-site electrical systems comply with current regulations and any upgrade to bring up to standard are out of our scope.

Noise Assessment

Ameresco will appoint an acoustic consultant to carry out noise surveys and assess the noise impact to the neighbouring buildings once confirming heat pump locations subject to heritage planning approval. Ameresco will share the information with the council following completion of the survey and its noise assessment report.

Planning

Ameresco recognises that the Lido, archway and grandstand form part of a Grade II listed site and, as such, external installations such as heat pumps will be subject to standard and heritage planning consent. In order to keep with the required funding timelines, long lead items such as heat pumps will need to be ordered quickly, potentially prior to receiving planning approval. LBH will be responsible for the cost of any equipment ordered, with agreement, prior to planning and heritage planning approval.

Anticipated Savings and Other Benefits

The table below summarises the overall performance of this ECM.

Air source heat pump (ASHP)	Energy Savings		
	kWh/Yr	£/Yr	CO2 (te/Yr)
			PSDS
Electricity	- 1,259,896	-£ 540,073	-
Gas	3,911,144	£ 507,158	713.94
Total	**2,651,248**	**-£ 32,915**	**713.94**

Table 23. ASHP Performance Summary – Hillingdon Leisure

All savings will be separately measured and/or verified as detailed in the M&V plan.

Assumptions and Exclusions

The existing boilers and associated plant will be removed from site and not remain as a backup redundancy as aligned with PSDS funding requirement. As we do not envision at this stage the need for space of these boilers it will mitigate the need for an external boiler as part of equipment changeover process. This is subject to the detailed design and may change if it is determined the boilers need to be removed as an outcome of this work.

Ameresco assumed the existing CHP will be switched off and isolated from the existing heating distribution.

We have not priced in asbestos removal, Ameresco require LBH to conduct retrofit & demolition asbestos surveys in all areas to be affected by work prior to Ameresco starting work. Although given the heritage of the buildings on this site we do not expect the discovery of asbestos, in the case of asbestos discovery during construction phase previously not known or recorded, LBH will take full responsibility in the safe removal and disposal before work can continue. Work areas to be affected include but are not limited to ASHP equipment installation and enabling works, connection to existing site distribution, power connection and related enabling works, any associated civils works.

We have not priced for removing the gas pipes or gas meters from site due to their requirement for kitchen gas supply. Kitchen equipment that currently operates on gas can be replaced with electric alternatives but this is not currently included in this IGP. Completely removing the use of gas from site will allow have a significant positive financial impact as it would remove the need to pay the daily gas standing charge.

Although we will process the DNO upgrade application, costs for the upgrade are outside of Ameresco scope and not considered as part of this project and therefore within LBH scope.

We have not priced in upgrades to existing distribution system including pipework, pumps, valves and existing metering.