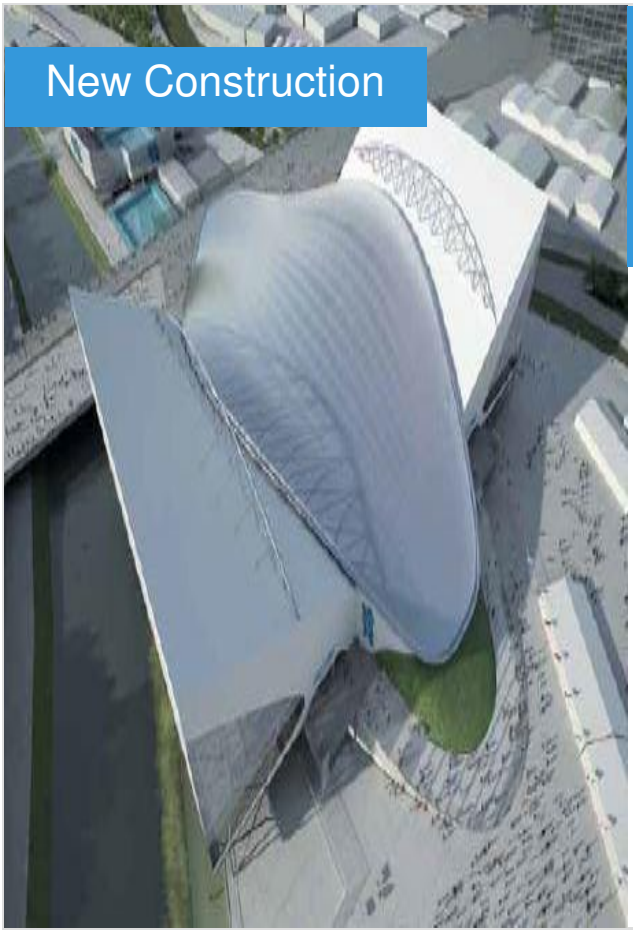
London Aquatic Center

by Pauline RIVOIRARD / 2018-06-04 10:40:49 / International / 14142 / EN

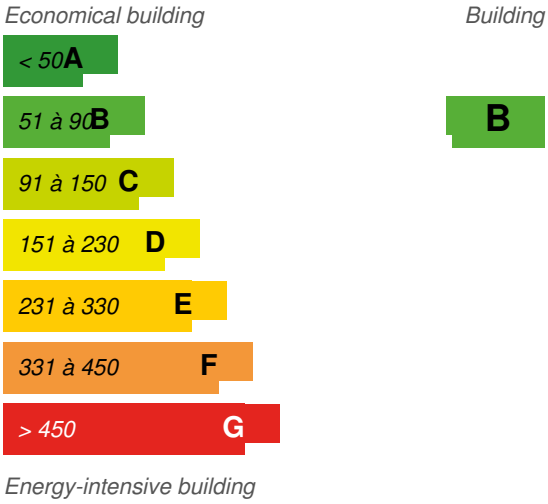


Primary energy need :

794 kWhpe/m^2.year

(Calculation method : Other)

ENERGY CONSUMPTION



Building Type : Swimming pool
Construction Year : 2012
Delivery year : 2012
Address 1 - street : Olympic Park E20 2ZQ LONDON, United Kingdom
Climate zone : [Cfb] Marine Mild Winter, warm summer, no dry season.

Net Floor Area : 42 866 m^2
Construction/refurbishment cost : 331 000 000 €

Cost/m2 : 7721.74 €/m^2

Certifications :

Proposed by :

General information

Abstract ‘Legacy’ is the concept that underlies the sustainability agenda of the London 2012 Olympic and Paralympic Games, embracing temporary infrastructure and venues to leave behind a vibrant, productive community with world-class, affordable sporting facilities. The Aquatics Centre, developed as an architectural icon, was the most complex venue constructed on the Olympic Park. This case study explores the integration of sustainability into the Aquatics Centre, providing a balanced view of the venue’s sustainability credentials and considering its contribution to the sustainability agenda beyond the boundaries of the Park. The Aquatics Centre London’s bid to host the 2012 Olympic and Paralympic Games presented a comprehensive vision for the first sustainable Games. In 2007, the Olympic Delivery Authority (ODA) embodied this commitment in its sustainable Development Strategy. The Aquatics Centre’s design featured in the bid, with an iconic wave-like roof defining the gateway to the Park for the majority of visitors. Temporary seating structures provide a 17,500-seat Games-time capacity for the venue. After the Games these are replaced by a 14-metre-high cantilevered glazed curtain wall, reducing capacity to a legacyappropriate 2,500 and flooding the interior with natural daylight.

See more details about this project

http://www.zaha-hadid.com/architecture/london-aquatics-centre/

Stakeholders

Contractor

Name : Olympic Delivery Authority

Construction Manager

Name : Zaha Hadid Architects
Contact : http://www.zaha-hadid.com/#contact-us
http://www.zaha-hadid.com/

Stakeholders

Function : Construction Manager

Glenn Morley et Sara Klomps

Function : Manufacturer

Architen Landrell Associates (ALA)

Address: Station Road, Chepstow NP16 5PF. Contact: 01291 638200. Email: mail@architen.com

http://www.architen.com/

Function : Designer

Tensys (Design office)

http://www.tensys.com/contact/

http://www.tensys.com/

Function : Manufacturer

Serge ferrari

ZI BP 54 38352 LA TOUR DU PIN CEDEX Tél : 04 74 83 59 59 Fax : 04 74 83 59 44

https://www.sergeferrari.com/

Energy

Energy consumption

Primary energy need : 794,00 kWhpe/m^2.year
Primary energy need for standard building : 3 249,00 kWhpe/m^2.year
Calculation method : Other

Breakdown for energy consumption : Annual energy usage on the Part "L" energy model of the Aquatic Center :
50% Equipment
42% Heating
5% Lighting
2% Fans, pumps, controls
1% Colling

Envelope performance

Users' control system opinion : RIBA Stage L2 and Stage L3 for the Olympic Mode was undertaken in 2011 and 2012 respectively. Very positive feedback was received from ODA, LOCOG, the IOC and users such as athletes, press and spectators. RIBA Stage 2 for the Legacy Mode was completed in December 2013 and L3 has been on-going since then with the pool to be open to the public from March 2014.

Real final energy consumption

Year of the real energy consumption : 2 017

Renewables & systems

Systems

Heating system :

- Urban network
- Heat pump
- Combined Heat and Power
- Others

Hot water system :

- Heat pump
- Other hot water system

Cooling system :

- Reversible heat pump
- Others
- VAV Syst. (Variable Air Volume system)
- Others

Ventilation system :

- compensated Air Handling Unit

Renewable systems :

- Biomass boiler
- Other, specify

District heating and power supply for Queen Elizabeth Olympic Park from a combination of biomass boilers and CCHP facilities for a 30% reduction in carbon emissions.

Solutions enhancing nature free gains :
optimisation of the main roof geometry to balance the benefit of passive solar heating and the risk of summer overheating

Smart Building

BMS :
The main pool hall is naturally lit, the pool tanks are insulated, and an adaptable environmental control system allows ventilation to be customised within specific areas of the large volume space. This gives the building's operators the option of avoiding excessive use of mechanical ventilation in areas where it isn't needed.

Environment

Urban environment

Site Context

The London Aquatics Centre is located at the south eastern edge of Queen Elizabeth Olympic Park on the new Stratford City Bridge giving pedestrian access to the park from the new Stratford City development and public transportation.

Layout

The Aquatics Centre is planned on an orthogonal axis perpendicular to the Stratford City Bridge. Along this axis are laid out the three pools. The training pool is located under the bridge whilst the competition and diving pools are within a large volumetric pool hall. The overall strategy is to frame the base of the pool hall as a podium by surrounding it and connecting it into the bridge.

Land plot area : 21 897,00 m^2

Built-up area : 75,00 %

Products

Product

Precontraint 1202 S2 Black out NPP Roof

Serge Ferrari

ZI BP 54 38352 LA TOUR DU PIN CEDEX
Tél : 04 74 83 59 59 Fax : 04 74 83 59 44

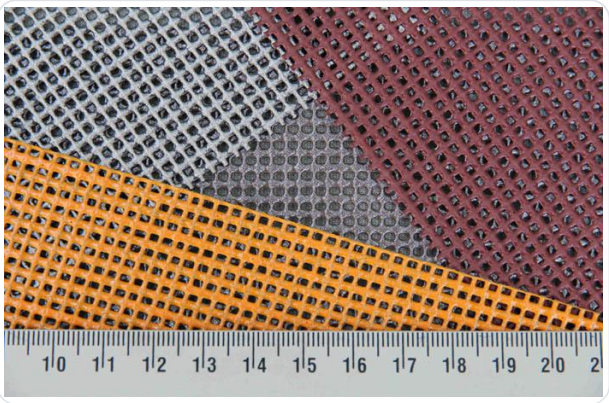
https://www.sergeferrari.com

Product category : Second œuvre / Cloisons, isolation

Totale surface : 18,000m²

Light construction system
The fully demountable wings are covered with 18,000 m² of opaque Precontraint 1002 S2. A lightweight construction solution, this composite membrane seals the roof and contributes to the building's luminous and thermal ambience. Paradox of the structure, the composite membrane that is usually suitable for curves is used here in flat interlining, in spans of 7 meters. It slides in aluminum profiles fixed on the steel frame. The Serge Ferrari composite is NPP * and guarantees the required level of resistance, aesthetics (whiteness and brilliance) and the imposed fire classification rating Euroclass B-s2, d0. Serge Ferrari is the only manufacturer of the sector to have risen to the challenge.

Stamisol FT 381 NPP



Serge Ferrari

ZI BP 54 38352 LA TOUR DU PIN CEDEX
Tél : 04 74 83 59 59 Fax : 04 74 83 59 44

https://www.sergeferrari.com

Product category : Gros œuvre / Structure, maçonnerie, façade

Totale surface : 7,000m²

Exterior security cladding for stands
7,000 m² of white Stamisol FT 381 openwork composite material envelops and secures the temporary stands. Its intrinsic characteristics and its recyclability have been decisive in the choice of material: Stamisol FT 381 reduces heat transmission and promotes air circulation with a porosity of 28%, thus helping to regulate the hygrometry of the interior space. Designed for large ventilated facades, Stamisol FT is of unparalleled strength. It is rated B-s2, d0 and is 100% recyclable.

Costs

Construction and exploitation costs

Total cost of the building : 331 000 000 €

Health and comfort

Life Cycle Analysis

Based on EVEA's Life Cycle Analyzes, roof and wall recycling via Texyloop® has reduced environmental impacts by 50%, producing 23 tonnes of 2nd generation raw materials.
EVEA
Material impact on GHG emissions :
50

Eco-design material : We substantially reduced the carbon footprint of the London Aquatics Centre by primarily using secondary aggregates and cement replacement material – in essence, recycled rather than 'new' concrete. We were the first team designing 2012 Olympic venues to push beyond the standard supplier offering of 50% coarse aggregate substitution. In the end, more than 75% secondary aggregates were used in some concrete mixes to offset limestone aggregates used for the pool tank. We exceeded targets set by the ODA, with concrete contributing just 3% to the building's carbon footprint. We were awarded a BREEAM Innovation Credit for our use of concrete mixes.

Over 150,000 tonnes of concrete was used in the Aquatics Centre and the integrated pedestrian bridge. The dedication of the team in maximising the sustainability of the concrete achieved over 4,000 tonnes of embodied CO2 savings and substitution of over 29,000 tonnes of primary aggregate, equivalent to 28 per cent of the total.

In total, over 80 per cent of the 235,000 tonnes of loose aggregates used were from a recycled source, a significantly higher percentage than any other venue on the Park.
Temporary stands enclosed with phthalate-free PVC.
The majority of recycled aggregate was construction and demolition waste from elsewhere in the London area. A further 23,000 tonnes was obtained from the site-wide soil hospital which created blended engineering materials from the soil-washing remediation process.

Water management

Consumption from water network : 40 000,00 m^3

Consumption of grey water : 2 700,00 m^3

Water Self Sufficiency Index : 0.06

Water Consumption/m2 : 0.93

Water Consumption/Shower/day : 2.29

To reduce the building's potable water demand by more than 40% (against standard designs), we developed a system that uses backwash water from the swimming pool filtration plant to flush urinals and toilets. Further savings were achieved via low-flow sanitary fittings. With greatest demand for potable water coming from showering, incorporating low-flow showers and basins delivered 35% potable water saving. Rainwater harvesting was also incorporated into the design, with harvested water used to irrigate the green wall at the southern end of the building.

Indoor Air quality

We made extensive use of measures to maximise energy efficiency, including high levels of insulation and envelope air tightness, low velocity ventilation systems with high efficiency heat recovery, and water based heating systems with variable speed pumps. An Ammonia chiller plant provides space cooling and-uses rejected heat for pool water heating.

Carbon

GHG emissions

GHG in use : 53,60 $KgCO_2/m^2$/year

Methodology used :

IES VE 6.1.1 PartL 2008 NCM /!\ Total emission without GHG before use

Building lifetime : 25,00 year(s)

GHG Cradle to Grave : 1 340,00 $KgCO_2$ /m^2

Calculations of carbon emissions use the following conversion factors: Natural Gas 0.198 kgCO2/kWh Grid Electricity 0.517 kgCO2/kWh (Divide by seasonal COP for Heat Pumps) Fuel Oil 0.297 kgCO2/kWh Biomass 0.013 kgCO2/kWh Biogas 0.018 kgCO2/kWh

Contest

Reasons for participating in the competition(s)

The London Aquatic Center symbolizes the environmental approach of the organizer: build permanent structures if they can be used after the event or temporary, where appropriate. Thus, only the central part (2,500 places) is preserved as Olympic legacy. The wings, which offeredadditional capacity of 15 000 seats, are today dismounted. Composite materials used for the roof and outer walls have been removed, packaged and shipped at Texyloop, to generate raw materials of second low environmental impact generation. [non final version]

Building candidate in the category

Low Carbon

Users' Choice

Date Export : 20230328155255