IT IS PREDICTED THE SYSTEM WILL HALVE CO_2 EMISSIONS

By Barrie Evans. Photography by Kilian O'Sullivan

Burgess Park Community Sports Centre, designed by Studio E Architects, has a low-energy design and is a building making extensive use of renewables. Its heating and hot-water comes mainly from a ground-source heat-pump system. A photovoltaic array that forms part of the southerly facade provides some electricity to the building. But, as with any good energy story, it begins with the built form rather than the energy technologies.

Burgess Park is an extensive, informal park in south-east London. Towards its east end is an all-weather pitch and a set of eight turf pitches, and between these is the new sports centre, accommodating changing spaces for 128 players plus officials, toilets, reception, and café, the latter open to anyone using the park. This has to be a tough building, particularly as the park is unlocked at night. Southwark is ready to risk some vandalism for the openness of the building.

The building deliberately nestles discreetly into the parkland when seen from most directions. Its west side merges into a long existing masonry wall that once bounded an industrial site, now part of the perimeter of the all-weather pitch. To the north and east the building is sheltered, using earth from the site and within the park. To the south it is open to the sun. The wall of the changing-room block has a low masonry plinth, then timber-framed laminated glass inclined at 60°, with an integral horizontal band of photovoltaics.

The building's other facilities, fronted by a canopied terrace that extends the café area, are against the western wall. But it is the block of changing rooms, and particularly its section, that most clearly expresses the energy agenda.

This block is reminiscent of Studio E's 1998 Solar Office at Doxford International Business Park. Here, the inclined wall fronts a buffer space, thermally cut off from the changing spaces by an insulated wall. This solar-warmed but otherwise unheated corridor gives access to the changing rooms. There are high-level windows in the inclined wall to vent it to avoid summer overheating. Fixed lights in the rear wall provide some illumination of the changing rooms beyond. (There were to be pavement lights in the changing-room roofs too, but these were cost-cut, so the designers were resigned to more use of artificial lighting than intended.) Changing rooms (and WCs) are mechanically ventilated, with air prewarmed in the corridor entering adjacent to the showers and drawn out at a high level. Both changing-room ventilation and lighting are controlled by presence detectors.

Showers create the largest heat load, followed by the underfloor heating. Heat is provided by a two-compartment $10m^3$ thermal store charged by a ground-source heat-pump system. This runs on off-peak electricity, from 11pm to 7am. There is an immersion heater back-up for rare peak water use.

Eight 100m-deep boreholes were sunk beneath the site of the earth mounding to the north, the first few metres of the bores lined with mesh, and beyond that in the hard strata the bore walls unsupported. Each is 150mm in diameter, with water circulating in a tube-within-tube closed loop.

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1. Canopied entrance to café to left, with changing-room block beyond
2. South aspect across park

Heat pumps are run at a near optimum COP (Coefficient of Performance – the ratio of the energy extracted by the heat-pump to the energy used to run it) of four-to-five. To achieve this efficiency involves using an output water temperature of about 45°C – a higher output temperature would lower COP. The water is warm enough for both underfloor heating and for the showers, for which it is first lightly dosed with chlorine dioxide to mitigate the risk of legionella. (Normally water would be stored at 65°C to cut this risk.)

Predictions are that using the ground-source system compared with a conventional gas boiler will about halve CO_2 emissions and quarter energy-use for heating and hot water.

The other renewable energy system, the 4.8kWp of photovoltaics, is predicted to supply 25 per cent of the building's electricity demands, in part powering the ground-source heat-pumps and lighting. Connection to the grid allows export of surplus at times and saves the cost of on-site storage.

This is a normally functioning building but also to some extent experimental. Thus, for example, both the ground-source system and a conventional system had to be designed for tendering. There was a 50 per cent grant for the ground-source system of £49,000, and a grant of £25,000 largely covered the cost of the photovoltaics. (Overall project cost was about £930,000.) Grant funding came from the DTI/BRE Clear Skies programme, now superseded by DTI's Low Carbon Buildings Programme (www.lowcarbonbuildings.org.uk). This approach is new to the Football Foundation, but it is ready to consider a ground-source system for future projects.

All these services may sound elaborate because they are unfamiliar. But the plan shows that the floor space given over to the plant room is actually not particularly large.

Earth-sheltering makes sense in terms of the discreet siting of the building but may at first seem strange for an intermittently occupied building, where the rapid thermal response of the fabric could be more appropriate. However, when it is in use, occupancy is dense, like a theatre or a community hall, and the concern can quickly turn to overheating. A building with significant mass strikes a balance. (Overall envelope U-value is $0.2W/m^2K$ for a building designed in 2002.)

The building is now open. Metering is being put in for a programme of monitoring that will run over the next year or so, tracking the when and how-much of energy use for the ground-source system, overall building performance and the photovoltaics. This will confirm whether the designers have met their ultimate target of producing less than 50 per cent of the CO_2 emissions of an equivalent good practice building.

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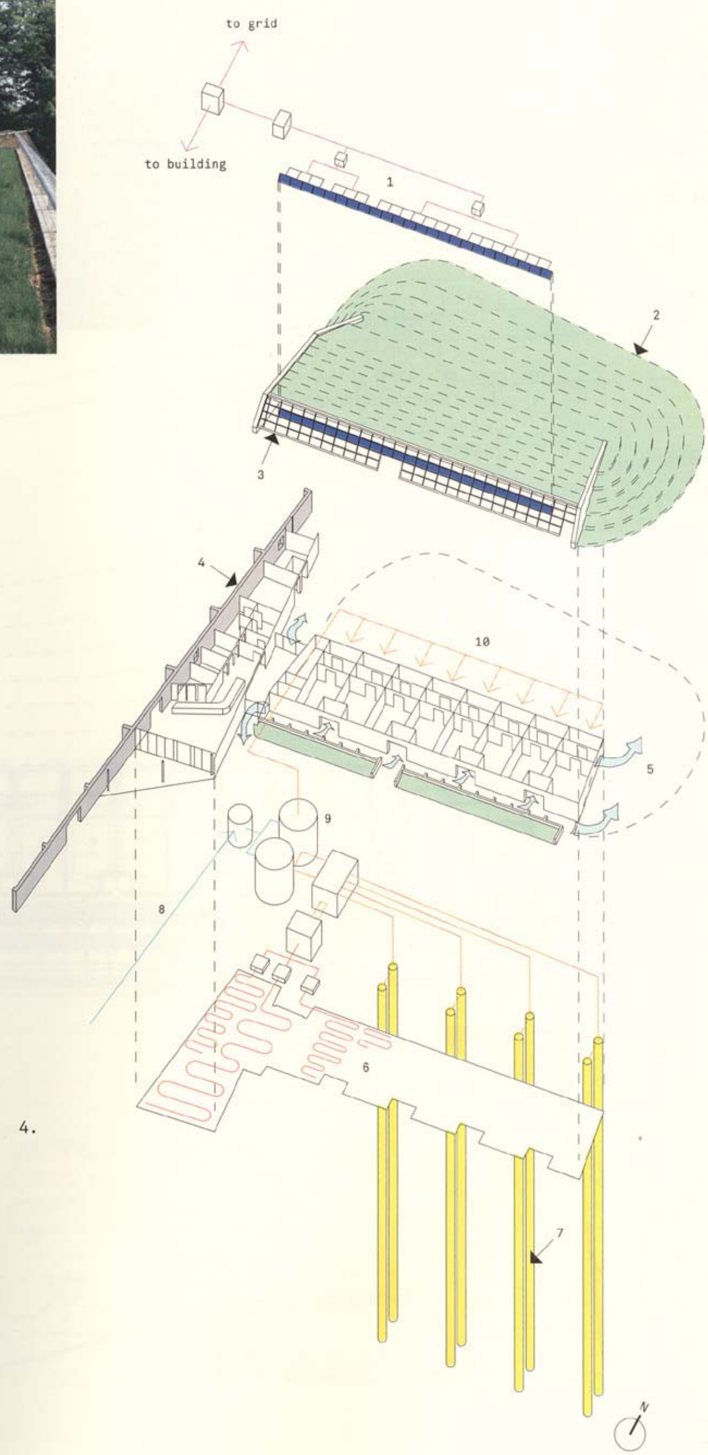
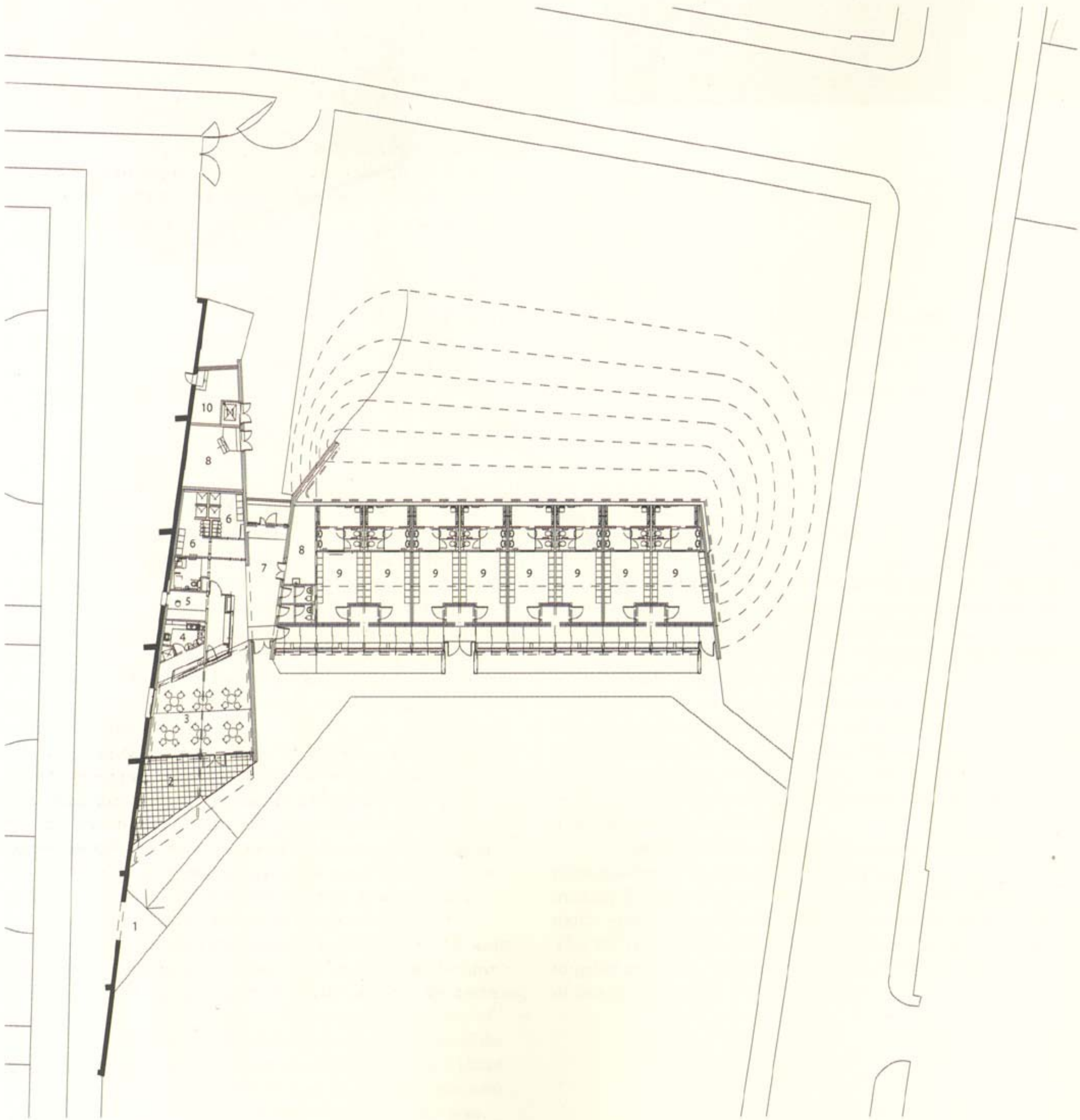


4.

3. Earth mounding, with railings above south facade to right
4. Ground-source system feeding underfloor heating and hot water

KEY
1 PHOTOVOLTAIC ARRAY
2 PLANTED EARTH BANK AND ROOF
3 GLAZED 'GREENHOUSE' FACADE
4 EXISTING FACTORY WALL REUSED
5 MECHANICAL AIR EXTRACTION
6 MULTIZONE UNDERFLOOR HEATING
7 EIGHT 100M-DEEP CLOSED CIRCUIT WELLS
8 MAINS WATER AND CHLORINE DIOXIDE TREATMENT
9 GROUND-PUMPED HEATING SYSTEM
10 HOT WATER TO CHANGING ROOMS

KEY
1 PITCH ACCESS
2 TERRACE
3 CAFÉ
4 KITCHEN
5 OFFICE
6 OFFICIAL'S CHANGING
7 RECEPTION
8 PLANT
9 CHANGING ROOM
10 PITCH STORE
11 BIN STORE



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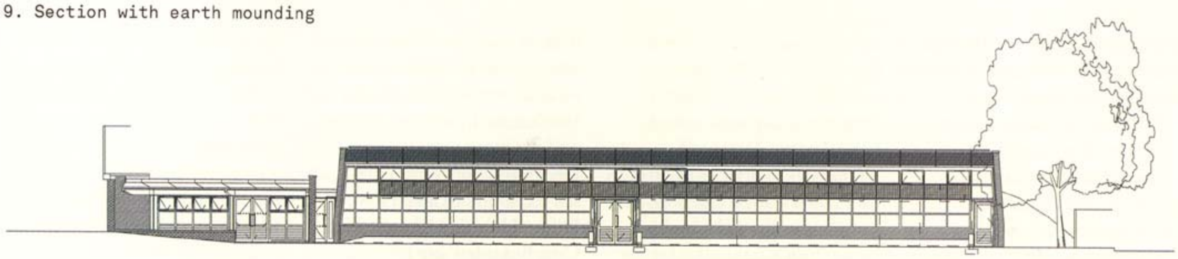
Credits

Client
London Borough of Southwark
Client representative
Groundwork Southwark
Funding
Football Foundation, Southwark Council, Clear Skies, London Development Agency, European Regional Development Fund, Aylesbury New Deal for Communities
Architect
Studio E Architects
Building services engineer
Downie Consulting Engineers
Structural engineer
Price and Myers
Quantity surveyor
MPA
Landscape and project management
Shape
Main contractor
Claremont Refurbishment

5. Plan with earth-mounding contours. All-weather pitch to left
6. Southerly corridor/buffer space
7. Integrated photovoltaics
8. South elevation
9. Section with earth mounding



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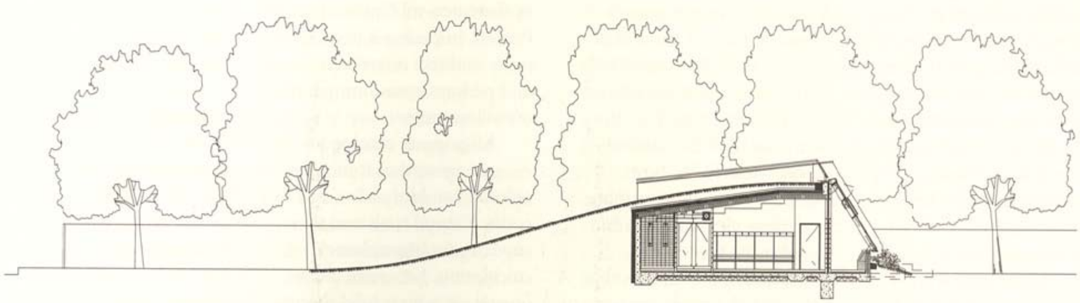

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