



SUSTAINABLE LONDON

Addressing Climate
Change in the Capital

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English Partnerships

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Vision of a Sustainable London, Ken Shuttleworth, Make Architects

SUSTAINABLE LONDON

What is a sustainable city? There are vital social and economic aspects to this, but Sustainable London is about environmental sustainability. A city must not consume more energy, water, material and food and produce more waste and pollutants than the local and global environment can support. Most urgently, it must learn to live with the current and future reality of climate change.

All but a few diehard doubters now accept that climate change is an issue which we are going to have to address decisively if our lives are not going to be changed irrevocably by its effects. London, as with all cities, needs to change.

To succeed requires both a global sense of responsibility and the farsightedness of politicians, business and individuals. It requires strategy and action, knowledge and investment, infrastructure and application, ingenuity and creativity.

Everyone must contribute, from the large utility companies and developers through to homeowners and occupants.

Sustainable London shows the first steps London is taking to make the city more sustainable. It has particular emphasis on the built environment - the new and existing communities and buildings which have a major impact on what the city consumes and expels.

London needs to develop new businesses and a new pool of skills from planning and environmental design through to manufacture and installation of new materials and technologies. It also needs to draw on its strengths in engineering and the design and construction professions to ensure that environmental sustainability is not compromised by a lack of vision or poor urban design.

The schemes included in this exhibition represent only a small proportion of those which could claim the label 'sustainable.' There are many more which propose similar measures in whole or in part. London needs as many of these as possible.

We have tried to represent schemes that have pushed beyond the boundaries of standard practice and provide exemplars for other schemes. Different building sectors are represented, showing creative ideas and how developers are responding to the particular challenges of a city such as London.

Only a few have been completed, many still have to prove they can deliver the strategies proposed.

THE CHALLENGE

At the start of the 21st century the ecological footprint of Londoners was estimated at 49 million global hectares (gha), which was 42 times its biocapacity and 293 times its geographical area. This is twice the size of the UK, and roughly the same size as Spain.

London's current population is currently around 7.5 million and is expected to grow to over 8 million by 2016.

Much of London's building stock and infrastructure is over 100 years old.

London is producing around 9.5 million tonnes of carbon dioxide per year - the UK's highest emitter per square kilometre.

Summer temperatures in London have risen more over the last 30 years than in any other European capital city, according to a WWF report.

Climate change will increase the likelihood of more frequent and intense heatwaves, droughts and flooding.

The urban heat island effect means that temperatures in the centre of the City can be 4 degrees higher than in the suburbs.

In 2005, up to 1,000 early deaths and a similar number of hospital admissions were thought to have been related to emissions.

Rising sea levels are likely to require new flood protection systems for London.

London produces about 17 million tonnes of waste per year. Only 13 percent of household waste is recycled.

In 2003, 4.9 billion litres of water were abstracted from non-tidal surface waters and groundwaters in the Thames Environment Agency Region per day. In London 800 million litres per day are lost in leakage.

Water abstractions from surface water are already at their limit in the summer for much of England and also in the winter for parts of the South and East.

The London Energy Partnership estimates that it will require a minimum of £8 billion worth of low carbon initiatives for London to meet its 2026 carbon targets.

THE RESPONSE

The London Mayor's overarching vision is to develop the capital as an exemplary sustainable world city. Sustainability and tackling climate change is one of the central themes of the London Plan. Transport has been a major area for action and the Mayor is currently negotiating increased powers, most notably for the co-ordination of waste collection and recycling.

London has set a number targets for CO₂ reductions from 2010 to 2050 and aims to deliver these through regulatory proposals, reducing consumption and provision of new infrastructure. The Mayor's Energy Strategy calls for 10 percent of energy in new developments to be generated on site. It is proposed to increase this to 20 percent in the near future.

The Greater London Authority (GLA) now has a number of agencies looking at the sustainable future for the Capital. London has also formed its own energy services company (ESCo) to drive forward work which will provide decentralised, more efficient energy supplies for London.

Individual boroughs are also playing a significant role, most significantly the London Borough of Merton which introduced in 2004 a requirement for developers to ensure at least 10 percent of all energy production for new development came from renewable energy. Many boroughs are now actively developing environmental policies to respond to the London energy strategy.

New communities proposed by both public and private sector developers provide the opportunity to tackle climate change at the planning and infrastructure levels which offer far greater potential sustainable gains. Four pilot areas in London – Merton, Barking, New Wembley, and the Elephant & Castle / Southwark

Concerto are developing schemes which are expected to deliver carbon savings from 40 - 60 percent.

The 2012 Olympics and in particular the infrastructure legacy they will leave are an opportunity for London to show how the event can be staged sustainably: the detailed strategy was published in January 2006.

The commercial sector accounts for over 30 percent of London's energy consumption. This rapid growth in commercial sector energy consumption reflects expansion in floor space, as well as increased heating, lighting, information technology (IT) and air-conditioning loads in individual buildings. The business community from commerce to retail has rapidly woken up to the sustainable imperative; productivity, brand image and even retail sales can be enhanced by positive moves to reduce impact on climate change.

A great deal of London's building stock is over 100 years old and existing buildings account for around 30 percent of energy consumption in the Capital. We are starting to see a number of exemplary conversions of older buildings to exceed current standards and incorporate pioneering environmental features.

Domestic properties represent over 40 percent of energy consumption in the capital. A typical terrace house built before 1919 (around 30 percent of London's stock) has around three times as much heat loss as a similar property built to current regulations. There is a lack of co-ordinated guidance on what should be done and exemplars to follow. The GLA is launching The Green Homes Service specifically targeting householders in this category.

ENERGY

With such a concentration on energy generation and, in particular, renewable energy when discussing the sustainable city, measures which lead to the reduction of consumption – energy efficiency – often get overlooked. Our first priority should be to look at ways to use less energy. Often passive systems, insulation, new technologies and changing habits will be the most cost effective ways of reducing CO₂ production.

The big picture however is one of planning and infrastructure. The Greenpeace report 'Powering London into the 21st Century' proposes that only a decentralised energy pathway enables sufficient CO₂ savings to put the capital on a trajectory to meet the UK CO₂ emission reduction target of 60 percent by 2050. Their solution is to base the future energy supply for London on the Danish model of urban energy production using mainly CHP.

Combined Heat and Power (CHP) is a more efficient way of generating and distributing energy and is the central technology for many of the low carbon future scenarios for energy in the city. London aims to maximise its contribution to meeting the national target for combined heat and power by at least doubling its 2000 combined heat and power capacity by 2010.

One element of this scenario will involve selecting sites within London for a large combined cycle gas turbine (CCGT) plant and developing heat networks around that plant such as at the Barking Power Station extension.

Citigen operates a combined heat and power plant in the City of London, providing around 25 MW of electrical output to the national grid. This CHP generation process also produces up to 28 MW of heat and chilled water.



The plant lies behind a listed building frontage. At its centre lie 2 Wärtsilä Vasa 18V46GD internal combustion engines which can run on either natural gas or distillate fuel. A number of boiler plants provide back-up generation. The plant serves such buildings as Guildhall, the Barbican Arts Centre, the Museum of London and Smithfield Market and is one of only four large-scale urban CHP systems in the UK and one of only two to produce and distribute chilled water for use in air conditioning.

Other proposed Community Heating (CH) schemes include networks based in Southwark, Lambeth and Lewisham supplied by the South East London CHP (SELCHP) plant and a CH network that supplies existing estates and other major buildings in Tower Hamlets supplied by a new biomass CHP plant.

While the public and not-for-profit sector will take the lead, regulation planning and economics will push developers, particularly in the housing sector to follow.

Renewables will also have an important part to play. London is looking for up to 40,000 renewable energy schemes by 2010 to generate enough power for the equivalent of more than 100,000 homes and heat for more than 10,000 homes. London then aims to at least triple these technology capacities by 2020.

To help achieve this through **Photovoltaics**, London needs to install at least 7,000 (or 15MW peak capacity) domestic photovoltaic installations and 250 (or 12MW peak capacity) photovoltaic applications on commercial and public buildings.

Wind Power is one of the fastest growing renewable sectors. One of the most ambitious plans for supplying London's Energy needs is the London Array situated off the coast near the mouth of the Thames. This would be capable of supplying 200,000 homes with power. In addition, 40 – 80 MW of potential wind energy has been identified in London itself. The London Energy strategy for 2010 proposes six large wind turbines and 500 small wind generators associated with public or private sector buildings.

It is calculated that **Biomass** is capable of delivering 13 percent of London's future energy needs. The limiting factor is the availability of land and transportation: to produce the same amount of energy as Dungeness B power station, it would be necessary to cover the whole of Kent with biomass crops. Energy is best produced through biomass-fuelled combined heat and power plants. There is also a potential domestic market in London for modern biomass boilers whose emissions do not contravene the Clean Air Regulations.

Solar Thermal Energy is the most economic of the solar technologies. The main barrier to greater use of this technology in London is the difficulty of retrofitting in

existing domestic properties. The use of community heating storage is being proposed for a number of infrastructure schemes and may precipitate the use of larger industrial solar thermal arrays.

Ground Source and Geothermal Energy will be increasingly important contributors to combating climate change as the technologies become more widespread. Some of the heaviest energy loads in the future will be for summer cooling, particularly in the commercial sector. Thermal mass and ground source cooling through water and air cooling are already starting to provide a more sustainable alternative to air-conditioning in the city.

Hydrogen and Fuel Cells are making small inroads – through transport, mobile power and buildings – into the London energy supply scene and their potential impact is being studied closely. Many feel that the initial expectations are too high but the long term potential is great.



BP Hydrogen Fuel Cell Bus

TRANSPORT



Transport is the sector where London has most visibly improved its sustainability rating in recent years. While the Congestion Charge has had a marked impact on environmental sustainability, the development of the public transport infrastructure is still a pressing economic concern. There are also engineering challenges which will be increased by changes in the climate such as increased risk of flooding and overheating on the underground system.

The Congestion Charge in central London has reduced CO₂ emissions from road transport by 16 percent since its introduction. During the same period there has been a shift of 5 percent away from car usage, saving 500,000 car journeys per day and an estimated 210,000 tonnes of CO₂ emissions per year.

Particulate matter (PM10) emissions - those most harmful to human health - have been reduced in the charging zone by 15 percent. Plans for taxi's, lorries, coaches and vans to clean up their emissions are also well under way. The extension of the Congestion Charging zone to the west is expected to bring further environmental benefits to London.

The trial of six new **hybrid diesel-electric** buses with lower emissions and better fuel economy was launched in 2006. The new single-decker buses are currently operating on route 360 in London, from Elephant & Castle to Kensington.

Three **hydrogen fuel cell** buses have been successfully trialed on route RV1 from Covent Garden to Tower Gateway. London is also committed to taking delivery of ten additional hydrogen fuelled buses, encouraging the transport industry to deliver the necessary vehicles and refuelling technology so that these clean vehicles can be rolled out across London.

Cycling in London has grown fast, up 72 percent on Red Routes in the past six years. The development of the London cycle routes and guides has also helped increase cycling in the City.

Car hire clubs are springing up rapidly in the City providing access to car usage in the city in a far more sustainable way.



A two-year pilot started in January 2005 to create the **London Construction Consolidation Centre**. Building materials can be delivered to a one-stop centre in bulk, for local distribution to individual construction sites in the quantities needed. This has cut the number of delivery journeys needed from 1,500 to 395 in the first six months, and reduced CO₂ emissions from those vehicles by 73 percent.

There has been a resurgence of interest in using London's **canal transport network** for moving materials – particularly for the delivery of construction materials for the Olympics in 2012.



- 1 London's canal network
 - 2 London Construction Consolidation Centre
 - 3 ENV Hydrogen Fuel Cell Motorcycle
- Designers **Seymour Powell**

Air travel is now the one area where internationally, nationally and locally there is a lack of clear guidance on sustainability. How do we balance the economic driving force that London's airports provide with a sustainable lifestyle for Londoners?



WASTE

London produces about 17 million tonnes of waste every year. A high percentage of this is dumped in landfill and this is no longer a sustainable option.

A quarter of all waste is municipal waste collected by councils, mostly from households and some from businesses. On average each household in Greater London creates over a tonne of municipal waste per year. Most predictions are that this will be difficult to reduce and that the best solution will be to recycle and reuse. With new recycling collections there is a need for **new recycling sorting and processing plants**

The Mayor of London believes that the best way to deliver improvements in reduction and recycling is to replace the 16 waste disposal authorities with a single **Waste Disposal Authority** for London.

A further 6.4 million tonnes of waste is produced by businesses and industry and 6.1 million tonnes produced by construction and demolition work. In general the percentage of waste recycled is much higher than for municipal waste.

The construction industry is beginning to show a high degree of success in **recycling demolition waste**, such as concrete into secondary aggregates, and setting challenging targets for the use of recycled materials in new projects. The Olympics have set a target of 20 percent recycled materials, for example.

It is also practical to produce **energy from waste**. There are currently two major waste incineration power plants in London. These have always been a target for the environmental lobby and London is looking at new solutions for turning waste into energy.

These solutions include **anaerobic digestion**, production of **biofuels**, advanced thermal conversion techniques, including **pyrolysis and gasification** and the use of wood waste as a fuel. These 'new and emerging technologies' all generally require or are compatible with sorting of recyclable materials from the waste stream first and are well suited to smaller scale facilities.

Examples of the processes proposed include the collection of organic waste from 10,000 households in the Southwark concerto community to be treated through anaerobic digestion and distributed back to the same households through a biogas CHP community heating network.

Automated collection systems are already established in many European cities and are starting to appear in a number of future London schemes. Buildings and neighbourhoods can install underground networks to handle the collection of rubbish, reducing transportation and improving hygiene standards.



Envac automated collection system



Great Mucking landfill site

WATER

One of the main concerns for Londoners is the supply of quality drinking water to a city whose population is growing and where summer temperatures are rising, further increasing demand.

Water is a contentious issue in the city. Demand is expected to grow; but we also waste a large amount in distribution. Thames Water has a large **repair and replacement** programme for mains supply, but it is a long and expensive process to complete, causing much disruption to London's streets.

The argument between the supply and conservation lobbies continues. For example Thames Water hopes, if it gets planning permission, to open a desalination plant in Newham, East London. The Mayor of London opposes the plan, asserting instead that reducing wastage and demand is a better way of alleviating London's water supply problems.

The main target of the conservation lobby is domestic consumption. The introduction of **water metering** is seen as a means of improving awareness of water consumption as well as decreasing demand. All water supplied to homes is drinking water, but we use a large amount of this for washing and flushing and watering the garden. **Collection of rainwater and grey water recycling** is now standard practice in most new homes with a high sustainable rating. This practice is set to continue and we may see a separation of drinking water supply and 'grey water' infrastructure in the future.

For planners and developers, landscaping, flood management and **sustainable urban drainage** are important factors in reducing the impact of tidal, river and stormwater flooding as a result of more intense rainfall and sea level rises which will come with climate change. With climate change, London has an increased risk of flooding, particularly east of the Thames Barrier – London's main flood defence.

Beckton Sewage Treatment Works is the largest sewage treatment works in the UK. Sewage from 3.4 million Londoners is treated on site every day. At Beckton, the sludge powered generator actually produces enough energy to power over 7000 homes a year.



Leakage from London's water mains

ECOLOGY

Improving London's ecology helps to combat and alleviate the effects of climate change. Plants absorb CO₂, filter out pollution, reduce heat gain and provide an important amenity value to the city.

Trees are vital and have been shown to reduce the heat island effect considerably in the centre of a city. Trees provide useful seasonal shade for streets, parks and buildings. Trees can also be a valuable renewable source of energy if arboricultural operations are converted into biomass fuel. Tree roots can have a detrimental effect on the underground infrastructure, but careful choice of species and location should alleviate this.

The Tree Station in Croydon has been established primarily to use the wood produced by arboriculture within the borough. Wood is diverted away from the waste stream and used to make a variety of products. The focus is now on producing woodchip for fuel.

The London plane tree is a remarkably robust city species due to its resistance to urban heat and pollution. The urban landscape will be enhanced by less familiar tree species which have been adopted from warmer climates.

Green roofs can reduce urban heat islands by providing shade and through evapotranspiration, the release of water from plants to the surrounding air. They also reduce sewage system loads by assimilating large amounts of rainwater. They also serve as living environments that provide habitats for birds and other small animals. It is reckoned that there is already 100,000 m² of green roof in London and this figure is growing rapidly.



Green roof at Canary Wharf

The growth of the green roof could soon be matched by green façade. Other cities such as Paris are actively encouraging residents to increase planting in places such as balconies to increase the amount of green in the city. This can also be part of the architecture: the **bioclimatic approach** to design, pioneered in the Far East, provides an integrated tower block ecology.

CASE STUDIES

1 BARKING RIVERSIDE

The Barking Riverside development site is one of the largest previously developed sites along the Thames covering an area of approximately 150 ha with 2km of river frontage. The site, which is on the north bank of the Thames 3 miles east of the City of London, was previously occupied by three power stations and is, consequently, contaminated and affected by electricity pylon corridors with no public access to the river. Extensive filling operations are on-going to raise and remediate the site as part of the preparation works to enable infrastructure and housing development to commence in early 2008.

Barking Riverside Ltd., a joint venture company between English Partnerships and Bellway Homes Ltd., plan to deliver the site over the next 20 years and will create up to 10,800 homes, adding up to around 25,000 people. Facilities including a District Centre, local shops, healthcare facilities and leisure spaces, as well as three brand new schools, will be phased so that, from the beginning, new residents will find the key amenities in place. All homes at Barking Riverside will have to reach high sustainability standards. Energy efficient infrastructure will make low demands on natural resources and the timeframe allows an openness to new environmental techniques throughout the lifetime of the development.

The advantage of Barking Riverside's large open spaces is that it allows for a balance between residential, recreational and ecological areas. The open space takes up 40 percent of the entire site and will be divided between the natural landscape and public parks shaped and integrated into neighbourhood areas, whilst areas of ecological interest remain protected. Access to the riverside is a priority, opening up 2km of riverfront to walkways and cycleways.

The scheme emphasises the use of public transport. It is expected that Barking Riverside will be served by the proposed DLR extension to Dagenham and the East London Transit system. The potential of the Barking Jetty as a terminal for a future public ferry service will be considered as an integral part of the development proposals. The jetty and the surrounding area have potential as a major leisure and recreational destination focused on the river, serving Barking, East London and the wider Metropolitan area.

Client **English Partnerships, Barking Riverside Ltd**
Masterplanners **Maxwan**
Collaborators **Karres and Brands Landscape Architects**
Traffic Engineering **PBA**
Landscape and Ecology **LDA Design**
Geotechnics **Merebrook**
Ground and Soil Engineering **Hyder**
Planning **Barton Willmore Partners**
Environmental Impact Assessment **Waterman Environmental**





2 BRENT CROSS CRICKLEWOOD

Brent Cross Cricklewood is London's newest major regeneration project. The scheme will deliver new parks, schools, jobs, shops, homes, and the largest investment in transport infrastructure, community and leisure facilities in the area's history – in fact a new town centre created over the next 20 years.

The Brent Cross Cricklewood Partners, world-class companies leading the regeneration, are working with the Mayor of London's Office and Barnet Council to bring pioneering standards of environmental sustainability to a scheme that will deliver £4bn of investment and 14 million sq ft of development to a key part of North West London.

The regeneration of Brent Cross Cricklewood will make use of a wide range of initiatives and new technologies to minimise environmental impact. Key to this will be a new state-of-the-art waste handling and recycling facility to replace the current ageing facility from which most of the waste is sent to landfill sites. This will separate and sort all recyclable materials first and then pass the remaining waste through a treatment cycle which will generate a renewable fuel. This fuel will then be used in a new Combined Heat and Power Plant which will provide electrical power, district heating and cooling to buildings across the regeneration area.

By putting in place the necessary pipes, cables and other infrastructure, the use of sustainable fuels can increase over time as renewable energy technologies improve and other fuels, such as biomass and hydrogen, become more readily available and reliable. Domestic and commercial waste from the development will be delivered to the new handling facility using an automated waste collection system, consisting of a network of buried pipes along which waste is moved.

With multiple access points provided both directly from the buildings and across the regeneration area, this reduces the need for traditional refuse collection, making recycling far easier, reducing the space needed for waste storage and reducing waste transportation. Initially it is estimated that 40 percent of household and 60 percent of commercial waste will be recycled, rising to 70 percent by 2020.

This combination of automated waste collection, waste treatment and combined heat and power will be unique in the UK and lead to dramatic reductions in CO₂ emissions. A number of other measures are also being introduced, including:

- Green Roofs (planted rooftops) on at least 10 percent of the roof space
- The collection of at least 10 percent of rainwater to be used for irrigation, and drainage measures to prevent water run-off during storms and heavy rain
- Installation of low-water-use fittings
- Buildings designed and constructed to reduce carbon footprint, assessed against the Government's Code for Sustainable Homes, including the use of building materials that do not contribute to global warming (the Montreal Protocol List).

Taken together, the commitments made by the Development Partners will have a real and significant impact and ensure that 'environmental sustainability' is at the very heart of the development.

Client **Brent Cross Cricklewood Development Partners**
(**Multiplex, Hammerson and Standard Life Investments**)
Masterplanners **Allies & Morrison and BDP**
Engineers **Buro Happold**



3 ELEPHANT AND CASTLE

The Elephant and Castle redevelopment is a comprehensive project to upgrade over 30 hectares of land. It will entail a major programme of phased infrastructure works, alterations to the highways network and the development of a new mixed-use urban centre, which will include approximately 5,300 new homes and a total new build area of floor space of approximately 6 million square feet.

The redevelopment sets ambitious targets for reducing carbon emissions and minimising the use of treated water for non-potable use. To meet these targets Southwark Council are committed to establish a MUSCo (Multi-Utility Services Company) a private/public joint venture energy and environmental services company to deliver low carbon energy and environmental services and next generation data connectivity to Elephant and Castle and the wider borough. Southwark Council are currently seeking a commercial partner or partners to assist in the implementation, construction, financing and operation of the MUSCo.

The targets and aspirations established by the council, its partners and technical teams include a minimum 10 percent contribution from building-mounted/building-integrated renewable sources, a reduction in water demand of at least 20 percent and the provision of a locally sourced alternative supply of water for non-potable ('green') use within the development and across the wider area.

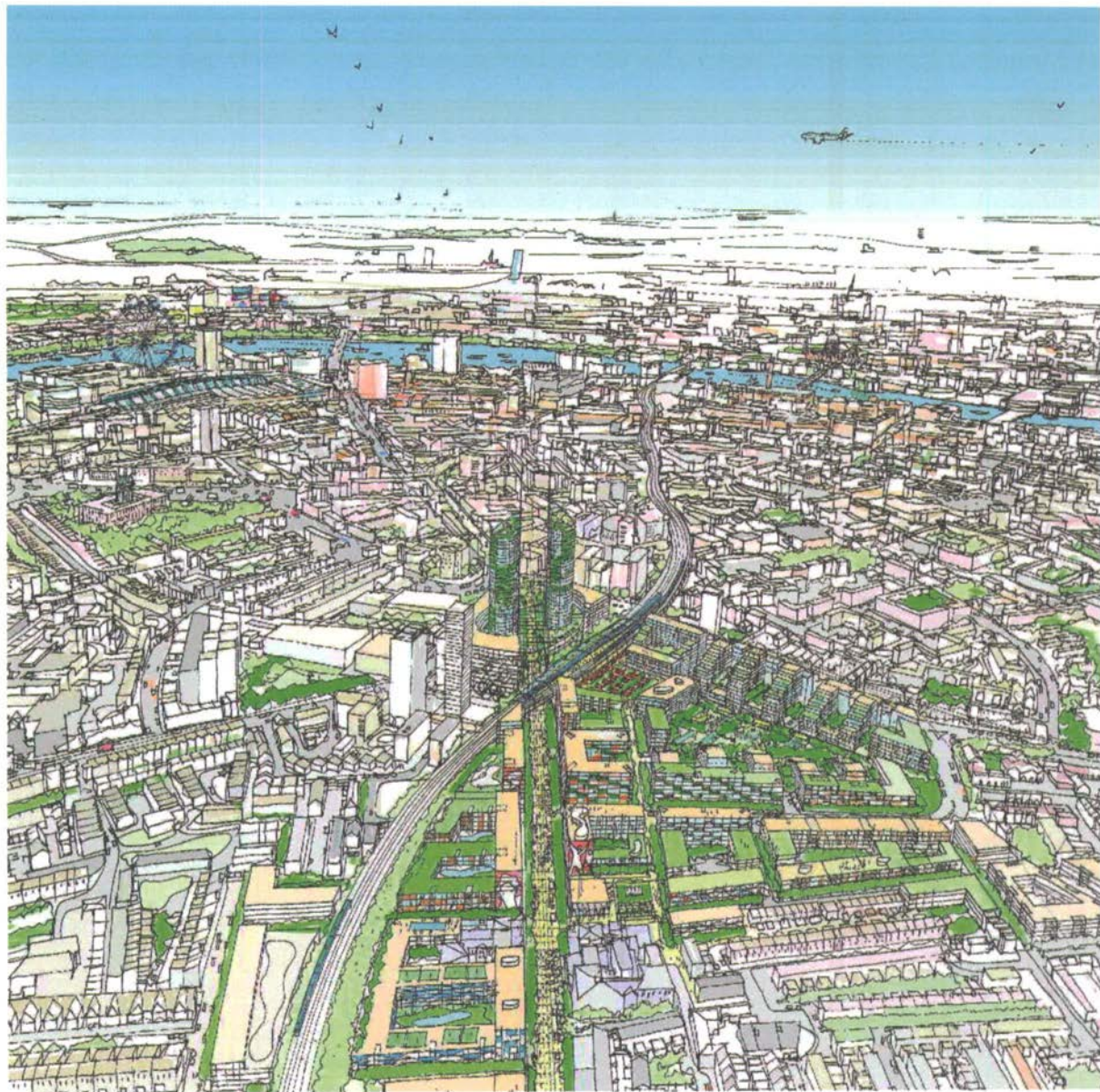
The proposed 'green' water supply system is to be based on the installation of two groundwater abstraction wells located at opposite ends of the core development area, at Stead Street and St Mary's Churchyard drawing water from the underlying chalk aquifer to provide 100 percent of the non-potable

demand of the Elephant and Castle redevelopment (30 to 40 percent of the total annual demand). Non-potable uses are envisaged to include: construction; toilet flushing; hand basins (commercial buildings only); public area cleansing; landscape establishment and street cleaning. To date, the Environment Agency consent to drill and test has been granted and tender documents have been prepared for issue to drilling contractors.

The Council has already granted planning consent for two key sites at the Elephant and Castle, New Kent Road and Castle House (see page 46) and demonstrated its commitment to the provision of MUSCo infrastructure by requiring that these buildings are 'fitted for connection' to MUSCo services. This approach will be taken for all early developments in the area, and it is the Council's intention to provide each developer with a standardised interface document containing enough technical information to safeguard service entry points and plant room space for an indirect connection to the district-heating network and for a separate supply of non-potable water.

With the introduction of London-wide carbon targets, schemes on the scale of the Elephant and Castle represent opportunities to deploy more sustainable means of generating heat, power and cooling at a local level. The project has become integrated with the working arrangements of the Greater London Authority (GLA) and the London Climate Change Agency (LCCA). The GLA has declared the Elephant and Castle an Energy Action Area and the London Climate Change Agency are providing support on technical aspects of this procurement process.

Client **Southwark Council**
Original Masterplan **Foster + Partners**



4 GALLIONS PARK

The London Energy Strategy calls for one zero carbon development in each London borough by 2010 but there is little experience of such projects in this country. After a proposal by Greenpeace, the Mayor of London Ken Livingstone asked the London Development Agency (LDA) to promote a zero carbon development to demonstrate that zero carbon can be technically and commercially viable.

The LDA has chosen Gallions Park – a brownfield site at the eastern end of the Royal Albert Dock as the location for this development. To illustrate that a zero carbon development is a viable option, Arup was commissioned to produce a feasibility study at Gallions Park. The LDA also asked Adams and Sutherland to produce a design code for the site.

The design brief was for 233 residential units built to very high standards so as to reduce energy demand by up to 40 percent compared to 2006 Building Regulations. Electricity will be generated on site by a combined heat and power plant, which also provides hot water for heating. This plant will use bio-mass, such as wood, for its fuel so that the site will produce zero net carbon emissions over the course of a year.

The LDA invited tenders for the project in autumn 2006. Five bids were submitted, all with valuable technical insights. The Mayor of London announced the Crest Nicholson, Bioregional Quintain and Southern Housing Group 'One Gallions' consortium as the preferred development partner in February.

Client **London Development Agency**
Developer **One Gallions Consortium (Crest Nicholson, Bioregional Quintain and Southern Housing Group)**
Architect **Feilden Clegg Bradley Architects**
Structure & Services Engineers **Arup Associates**
Landscape Design **EDCO Design**
Cost Consultancy **KHK Group**



Studio Toni Yli-Suanto

5 GREENWICH PENINSULA

Home to London's Millennium Dome, the Greenwich Peninsula is a highly constrained development site bearing the scars of a diverse industrial history. Covering 74 hectares with 2.5 km of river frontage, its comprehensive regeneration marks one of the largest planning applications ever submitted in London and presented significant challenges to the design team.

At its heart was the need to create an urban quarter for London embodying the concept of growth, renewal and rebirth while embracing the existing infrastructure. Farrells have proposed a network of streets, squares and parks ensuring clear lines of connection north to south and arching cross streets around the curve of the Dome.

The proposals demonstrate a comprehensive and sustainable approach to the planned development of a whole new urban district. Local planning approval was granted only 17 weeks after submission, followed swiftly by the endorsement of the Greater London Authority and Office of the Deputy Prime Minister, which signifies the strength of support from local up to national level.

Over the next 15 years, the new riverside community will provide homes for 20,000, and workplaces for 24,000, alongside places to work, eat, shop, and relax.

Reducing carbon-dioxide emissions

To improve air quality the Peninsula will be London's first Low Emission Zone. From 2009 all cars owned by residents will need to be Euro 4-compliant.

Waste Management

To reduce waste and encourage the recycling of both construction materials and domestic waste the proposal aims to achieve high levels of recycling by providing easy-to-use recycling facilities in all the homes and offices.

Water efficiency

To reduce water consumption and conserve water measures will be put in place including water efficient taps, showers and toilets in all buildings.

Energy

To create energy efficient buildings and reduce energy demand building design will include the use of solar shading solutions, natural ventilation and improved insulation standards.

Construction impacts

To minimise the impacts of noise, dust and vibration when construction is taking place development partners will operate under strict guidelines.

Client **Meridian Delta Ltd**
Masterplanners **Farrell**



6 HEART OF EAST GREENWICH

The Heart of East Greenwich initiative is set to regenerate the site of the former Greenwich District Hospital and will deliver London's first major carbon neutral development, setting a new benchmark in the creation of environmentally sustainable communities.

The scheme is being delivered under the London Wide Initiative, an English Partnerships programme aimed at bringing large sites in Greater London to the market for key worker and first time buyer homes, whilst encouraging innovation in public private partnership working. English Partnerships produced an exemplary development brief for the Greenwich Hospital site, a mixed use development including upwards of 550 homes, a new leisure centre including swimming pool, health and library facilities, retail, café and flexible workspace all set around a series of new high quality public squares and gardens. The project is being delivered in partnership with the London Borough of Greenwich.

First Base, the residential-led urban regeneration developer, established to focus on the provision of stylish, high quality, mixed tenure homes in London was awarded the site on the back of an exceptional tender that combined high quality design and exemplary sustainability standards.

The development will create a range of one, two, three and four bedroom apartments, as well as family homes in terraces and townhouses, designed and finished to a high specification. More than half of the homes will be affordable, targeted at local key workers and first time buyers, as well as social rented homes.

The new homes will all be built to a Level 5 rating under the new Code for Sustainable Homes. As London's first major carbon neutral development the new Heart will achieve net zero carbon emissions from energy use on site, on an annual basis, and be at the leading edge of environmental sustainability.

Alongside the environmental building innovations, First Base believes that it is the people who live, work and populate the community that make it truly sustainable. A holistic approach to creating sustainable lifestyles will mean residents will benefit from on site food generation and composting facilities, health and nutrition information, easy-to-access recycling facilities, and regular information on how to reduce waste and energy consumption.

Residents will be encouraged to change their travel patterns and behaviours to rely less on car travel. They will have access to real time public transport information via a local community intranet, secure on-site cycle storage facilities and an on-site car club will also be established.

The Heart of East Greenwich will transform an urban space into a great place and build a truly sustainable new community.

Client **English Partnerships**
Developer **First Base**
Architect **Make Architects**
Landscape Design **Lovejoy**
Engineer **Arup Associates**



7 KING'S CROSS MASTERPLAN

King's Cross Central is a 67 acre brownfield site situated between and to the north of King's Cross and St Pancras Stations. 11 outline planning applications were submitted in 2004 including proposals for new homes, retail, office and leisure facilities, open spaces and cultural uses and the refurbishment of historic structures and buildings. The proposals totaled some 742,275 m² of development.

The proposals are supported by an Environmental Sustainability Strategy (ESS), which sets targets for reduced carbon emissions, to be delivered through using energy efficiently, the use of renewable energy, and supply efficiency measures. All new buildings would be designed to achieve BREEAM and EcoHomes 'very good' ratings as a minimum, with an aspiration for 'excellent' (or equivalent assessment method and ratings).

It is estimated that King's Cross Central buildings would be at least 5 percent more efficient than the Building Regulations in force at this time. District Heating and Combined Heat and Power systems (incorporating at least one fuel cell) would deliver additional savings in carbon emissions. Together, these building energy efficiency and supply efficiency measures are likely to save over 5,000 tonnes of carbon per annum, a reduction of 32 percent, compared with current benchmarks.

The King's Cross development partners have made additional commitments to renewable energy, in particular photovoltaics, ground source heat pumps, solar thermal and wind turbines. These measures are calculated to save a further 71 tonnes of carbon per annum. With these measures, King's Cross Central would use less energy, use renewable energy and supply energy efficiently. Together, they are likely to

deliver annual carbon savings of some 33 percent, compared with 'current business as usual' energy benchmarks. At least 15 percent of the roof area of new buildings constructed within the development would be green/brown roofs (or equivalent systems).

The long-term aim is for King's Cross Central to achieve a 60 percent reduction in carbon emissions from 2000 levels, by 2050. Investments in district heating and Combined Heat and Power systems would 'future proof' the development and provide the means to achieve this target, of which the first step would be by using top-up boilers fired by biofuels, should market, supply chain and other conditions allow.

This Energy Assessment shows that the future implementation of biofuel technology could save a further 1,000 tonnes of carbon annually and bring the proportion of the development's energy needs generated on-site by renewable technologies up to 10 percent. The total carbon savings would then be some 39 percent, compared with 'current business as usual' energy benchmarks.

Developer **Argent (King's Cross) Limited**
Landowners **London and Continental Railways Limited**
and **Exel plc**
Masterplanners **Allies & Morrison** and **Porphyrius**
Architects



8 HALE VILLAGE TOTTENHAM

BDP was commissioned by Lee Valley Estates to provide a masterplan for the former GLS site located immediately adjacent to Tottenham Hale Station in the London Borough of Haringey in north London.

The residential-led scheme will include a mix of uses including office, education, health, a hotel and local retail. The residential element will comprise 900 private tenure units and 300 affordable units, and at a density in line the GLA recommendations for brown field sites. The site will be fully accessible and permeable, and provide amenities for existing local residents and workers in the area.

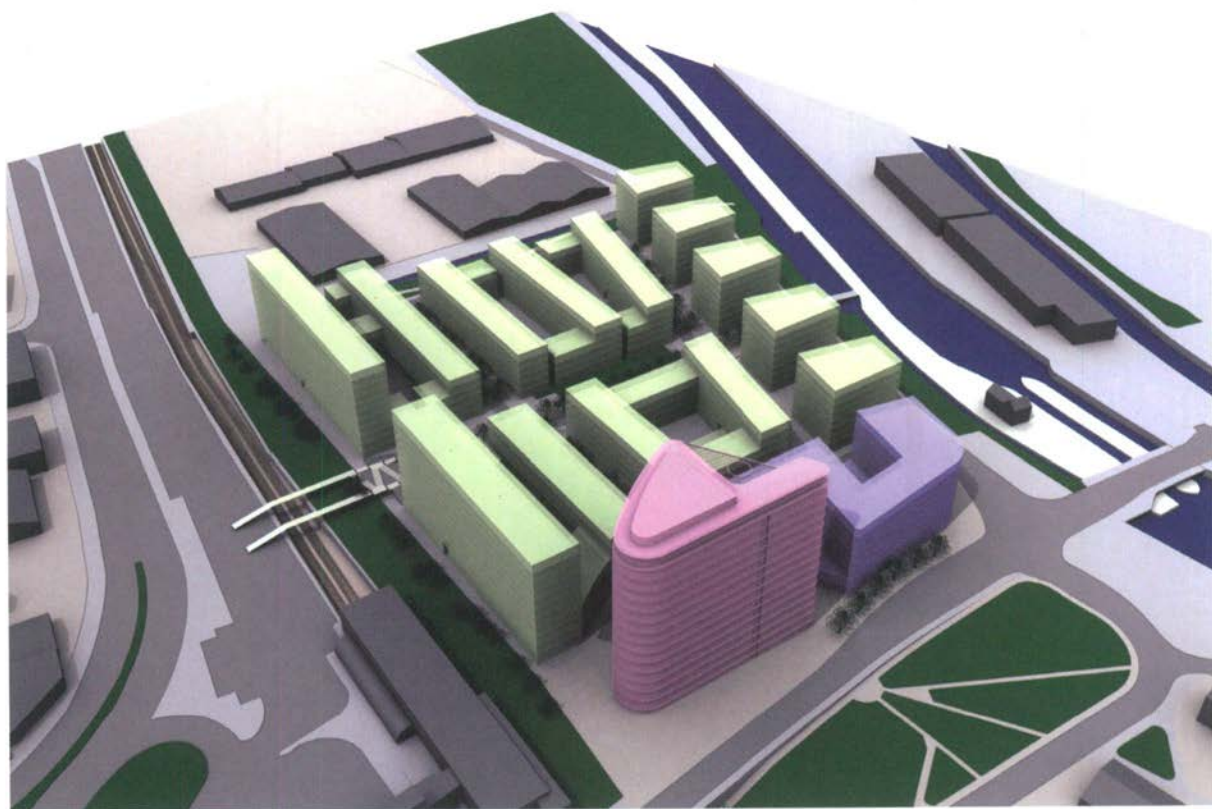
Key Sustainability features for the site include:

- CCHP (combined, cooling, heating and power generation) as part of a whole site-wide energy infrastructure scheme
- Biomass boilers that will provide a minimum of 10 percent CO₂ savings from the site through provision of thermal energy for the district heating network
- Brown Field site adjacent to major transport hub
- Rainwater harvesting
- Green Roofs

This scheme demonstrates how imaginative private sector investment can generate a mixed and sustainable development. The project will at the same time set a new and higher quality benchmark for future investment in the area and kick start the regeneration of Tottenham Hale.

Client **Lee Valley Estates**

Masterplanner, Architect and Sustainability Consultant **BDP**



9 WEMBLEY MASTERPLAN

The Wembley Masterplan area comprises a variety of existing land uses and development opportunity sites, ranging from town centre retail units to industrial estate warehouse buildings. The primary objective across the Masterplan area in relation to environment and sustainability issues will be to ensure high quality standards are met in relation to refurbishments whilst new landmark developments within the Central Development Area (CDA) encapsulate and showcase the leading advances in environmental building design and management.

Environmental and Sustainability commitments will be 'tradeable' whole-life commitments to span design, construction, operation, and eventual refurbishment or deconstruction. Site users will be encouraged to adopt more sustainable lifestyles. Delivering such objectives will require partnership working supported by legal agreements produced as part of any planning approvals by the council.

New developments will have to continually assess proposals against best practice and be able to accommodate future change. Detailed energy objectives will cover three elements. Firstly, energy conservation issues – through highly energy efficient building design criteria incorporating maximum use of passive solar energy and specifying significantly higher insulation standards than current minimum standards. Secondly, to use the maximum percentage of renewable energy production that can be accommodated. Finally to ensure energy is supplied as efficiently as possible. This may include investigating opportunities for combined heat and power for any demand that cannot be produced from renewable sources.

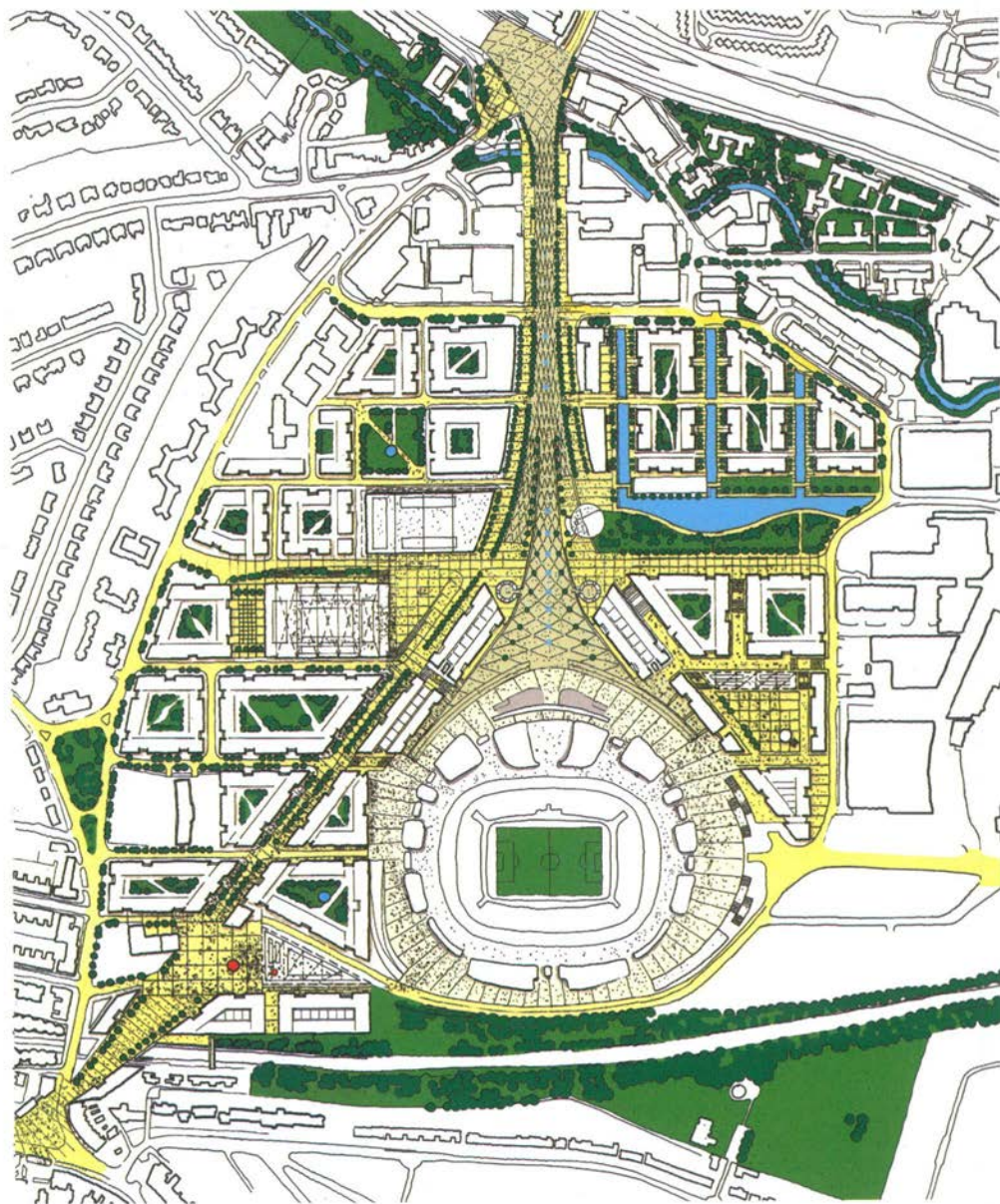
The Mayor of London and Brent Council are actively promoting the concept of zero emission developments and within Masterplan areas that are considered most suitable for this approach development proposals will identify how this objective can be delivered.

Sustainable water management both by the efficient use of water within buildings and the integration of sustainable urban drainage systems (SUDS) and rainwater and greywater reuse technologies is considered key to the development and the on-site supply of water through borehole technologies will be considered as part of the water management strategy.

The Masterplan will address the current under-provision in the area of local green space and areas for biodiversity. A new public park to the north of the Stadium has been proposed. Semi-private enclosed communal areas and green roofs will be integrated into detailed building design, and a new public square will offer further landscaped recreational space for residents, workers and visitors alike. Significant levels of new tree planting, and where appropriate vertical habitats, will create an attractive public realm and local biodiversity.

Transport planning objectives aim to maximise public transport, cycle and pedestrian access and promote car-free developments and car clubs.

Client **Quintain Estates & Development plc**
Architects **Richard Rogers Partnership**
Civil, Structural & Services Engineer **Buro Happold**
Landscape Architect **Randle Siddeley**
Planning Consultant **Gerald Eve / RPS**
Transport Engineer **Buro Happold**



10 CITY HALL



City Hall features an energy strategy enabling it to run on a quarter of the energy consumed by a typical high specification office building. This is achieved through the use of ecologically sound, passive environmental control systems and by the shape and alignment of the building.

The building's form and geometry was the result of thorough scientific analysis, aiming to reduce both solar gain and heat loss via the building's skin. Minimising the surface area results in maximum efficiency in energy terms. The building leans back towards the south, providing natural shading from direct sunlight and is naturally ventilated, with openable windows in all office spaces. Heat generated by computers and lights is recycled. The deep-plan floors allow heat to be collected at the building's core,

which is then redirected to its periphery. There is no need for chillers in the building.

Electrical consumption is reduced by avoiding refrigeration and using cold ground water to air-condition the building. The water is extracted from the water table beneath London through two bore holes and used to cool the building, for the toilets and for irrigation savings on mains water.

Client **Greater London Authority**
Architects **Foster + Partners**
Engineers **Arup Associates**

11 PALESTRA



14 micro-wind turbines are installed on the roof of the Palestra building in Blackfriars Road. These small turbines quietly convert wind into electricity and will supply the new 12 storey office building, home to the London Development Agency and the London Climate Change Agency (LCCA).

The wind turbines are located along the edge of the plant rooms on the roof of the Palestra building – out of site to anyone at ground level. Solar panels already installed on the roof of the building will combine with the wind turbines to provide 4 percent of the offices' total energy needs.

'This is the first combined photovoltaic and building-integrated wind turbine system in the UK.'
LCCA Chief Executive, Allan Jones

Client **Blackfriars Investments / Royal London Asset Management**

Architect **SMC Alsop**

Interior Designer (LDA) **Sheppard Robson**

Main Contractor **Skanska**

Structural Engineer **Buro Happold**

M&E Consultant **Aukett Europe (contract stage)**

Buro Happold (design stage)

12 WOOLWICH CIVIC CENTRE



This 20,500 m² civic office forms the initial stage of a masterplan (submitted in parallel for outline planning consent by Collado Collins Architects) to regenerate an important town centre site in Woolwich. It will consolidate the council's operations, creating a new civic quarter for Woolwich. The primary focus of the building is the delivery of public services and community facilities including a public library, local services centre, and community gallery.

The building uses mixed-mode environmental engineering to reduce carbon consumption by 50 percent relative to GLA (Econ 19) standards; supplemented by photovoltaic panels. It is also intended that the scheme will utilise a tri-generation CHP station within the masterplan area, for its costing requirement.

Greenwich Council signed an exclusivity agreement with St James' Investments/Tesco. The masterplan will provide a large mixed-use project including a retail store for Tesco, as well as approximately 900 new homes of mixed style and tenure.

Client **London Borough of Greenwich**
Architect **HLM Architects and Stanton Williams**

13 THE BEACON



The Beacon is a 40 metre high Y-shaped structure, and is designed to be 'planted' along major roads and public spaces, reaching up to the stronger breezes above London's buildings. Each Beacon supports five vertical 'triple-helix' wind turbines called quietrevolution, each five metres high and three metres diameter designed to achieve ultra-quiet operation and more efficient utilisation of urban winds.

'Most wind turbines are being planned in remote locations without any existing infrastructure. This isn't efficient as 30 percent to 50 percent of energy gets lost through transmission. We believe cities like London should take much greater responsibility for their own energy generation. London has a unique opportunity to make a difference in time for the Olympics' said David Marks and Julia Barfield, co-designers of the Beacon.

Their partner in the project, Robert Webb, CEO of XC02 and co-designer of The Beacon adds; 'Within fifty years we will be living in a world which is 90 percent powered by renewable energy, with no sacrifice to quality of life. The Beacon is a showcase and a celebration of this revolution and is designed to bring the debate on wind generation directly into the cities.'

Design Team **Marks Barfield Architects with XC02**

14 SUSTAINABLE ENERGY FACILITY



The East London Sustainable Energy Facility is to be located within the Ford Motor Company Limited site in Dagenham. The facility converts waste into a synthetic gas for use in electricity generation. It will be supplied with 13 tonnes of biomass fuel per hour (around 90,000 tonnes per year) and will be capable of generating around 10MW of sustainable energy (64 percent of which is classed as renewable).

This fuel is residual household waste, left over after recycling. The waste used during the course of this procedure will come from households in East London following its treatment at the nearby Shanks East London Bio-Materials Recovery Facility which covers the East London Waste Authority area. The Sustainable Energy facility is not an alternative to recycling, but utilises the remaining product left after recycling has

taken place. This makes for a more a sustainable and efficient solution to waste management in East London.

The project is also part of DEFRA's New Technology Demonstrator Programme, which seeks to support the development of technologies to help divert biodegradable waste away from landfill. The project was granted planning permission by the London Thames Gateway Development Corporation in September 2006 and operational commencement of the facility is anticipated 2009/10.

Client **Novera Energy**
Architect **Studio E Architects**

15 4 MASTMAKER ROAD



The proposal consists of 190 homes with community areas. The homes will be a mixture of private, intermediate (shared ownership and key workers) and social rented homes within easy walking distance of a nearby DLR station. Larger, family sized homes are placed in the lower parts of the building and enjoy a direct relationship with external spaces. One and two bedroom flats are located at higher levels and are orientated to receive sunlight and benefit from high level winter gardens. Roofs are used where possible to create gardens, amenity spaces, wildlife habitats and solar farms.

The layout of the building offers the option of connecting to a local neighbourhood CHP or to use a biomass plant, as and when supply chains become available. This plant would be supported by closed loop

heat pump systems, rainwater harvesting and solar hot water heating panels which have been incorporated onto roof areas likely to remain unaffected by overshadowing caused by future neighbouring development. This will allow the development to obtain 10 percent of its energy requirements from renewable sources. The facade of the building has been designed to minimise heat losses. The northern facade has a lower ratio of glazing to solid wall whilst it is also intended that the building fabric will surpass current building regulation standards for thermal insulation.

Client **Ballymore Properties**
Architect **Brady Mallalieu Architects**

16 ARTIST'S HOUSE, ASHBY MEWS



A project for two new houses in Ashby Mews Lewisham South London for artist clients on the site of adjoining garages. The clients, who are keen environmentalists, insisted the houses embody the best in energy-saving current practice.

M3 architects have proposed full, roof-level photovoltaic cell coverage and an underground heat exchange system to provide hot water to the houses all year round. The 2 storey, 2 bed house features a double-height living area and artist's studio space in the half basement.

Project Director Ken Hutt says: "Initial indications show that the houses will be energy self-sufficient over a full year and might even produce a slight excess of energy which can then be re-sold to the National Grid as clean energy".

Client **Private**
Design Team **M3 architects**

17 BEDZED



BedZED is a pioneering mixed use development solar urban village for The Peabody Trust built on a brownfield site in the London Borough of Sutton providing 92 dwellings in a mixture of flats, maisonettes and town houses, with over 2,500 m² of workspace, office, and community accommodation. Also on site is a nursery, community hall with changing rooms and an exhibition centre of renewable technologies.

The BedZED urban system reconciles high-density three-storey city blocks with high residential and workspace amenity. Workspace is placed in the shade zones of south facing housing terraces, with skygardens created on the workspace roofs, enabling all flats to have outdoor garden areas, with good access to sunlight, at the same time as providing

well day lit workspace without problematic summer overheating.

The combination of super-insulation, a wind driven ventilation system incorporating heat recovery, and passive solar gain stored within each flat by thermally massive floors and walls reduces the need for both electricity and heat to the point where a 100 kW wood fuelled combined heat and power plant can meet the energy requirements for a community of around 240 residents and 200 workers.

Client **The Peabody Trust**
Architect **ZED Factory**

18 THE BOTTLE STORE



The Watney Mann bottle store is an empty 1960s Brutalist structure in the centre of Stockwell. The bottle store will be redeveloped to house around 60 small to medium sized businesses over 4 floors and 19 duplex units above featuring individual solar collectors.

30 percent of the total floorspace on site will be devoted to employment generating uses, creating the potential for up to 400 new jobs. In addition to commercial spaces the development features 271 mixed-tenure residential units with over 60 percent developed as new shared ownership and social rented homes.

The scheme will exceed the Mayor of London's energy targets by providing over 10 percent of the buildings energy from renewable sources on site. Highly

insulated facades will reduce space-heating demand in dwellings by up to 70 percent. In addition 40 percent of the site's annual hot water demand will be satisfied by 550 m² solar collectors, expected to be the largest solar thermal array in the UK. The commercial space will benefit from comfort cooling with water drawn from and returned to the chalk aquifer via existing boreholes. Green and rubble planted roofs will create a variety of wildlife habitats.

Client **City and Provincial plc**
Architect **Hawkins Brown**
Structural Engineer **Price & Myers**
Service and Environmental Engineer **Max Fordham Consulting Engineers**

19 BOWZED



BowZED is a block of 4 flats, just off the Bow Road in East London. Each flat benefits from its own south-facing terrace and conservatory, which have enough photovoltaic cells incorporated into the glass to meet at least half of the occupants' annual electricity demand. The other half is planned to be met by a recently installed micro wind turbine mounted on the communal stair tower. This building will generate as much energy from renewable sources in a year as it consumes.

Finished to the high levels you would expect for a modern urban 'for sale' development, the building has also been built to ZED standards. This means the levels of insulation and thermal mass are such that no central heating system is required. The flats obtain enough heat from occupants, the solar gain from south-facing

windows, and incidental gains from cooking and appliance use. This enables a single 15 kW wood pellet boiler to supply the whole block with hot water and back-up heating. This building shows how a Zero (fossil) Energy Development (ZED) can be delivered on a tight urban site as a conventional development opportunity. The sale prices for the flats achieved by the developer show there is a healthy appetite for eco-housing in the market place.

Client **Yorklake Ltd**
Architect **ZED Factory**

20 CASTLE HOUSE



The Castle House site offers an opportunity to create a development that sets the standard for design quality for the future regeneration of the Elephant & Castle.

The client's brief challenged the design team to develop a concept that embraces energy efficiency targeting an EcoHomes assessment rating of 'excellent'. The development involves the erection of two new buildings comprising a 43 storey building rising to 147m above ground level and a 5 storey pavilion building.

The concept design explores opportunities to generate heat and electricity on site including three 9m diameter wind turbines and a combined heat and power plant. The turbines will be in cowlings designed to maximise wind velocities. The turbines will provide enough electricity to light all the apartments.

Client **Castle House Developments Limited / Multiplex / Espalier**

Architect **Hamilton Associates**

Consulting Engineers **WSP**

Cost Management **Gleeds**

21 THE LAWNS



This residential development is planned for a leafy site in East London for a Resident Social Landlord (RSL). The street front, linear block and rear block embrace a south facing courtyard that opens onto the parkland beyond. The ribbon balconies provide natural shading.

The scheme will be one of the first in London to deliver 10 percent of its energy on site and has been designed to Eco-homes 'excellent' standard. It features careful solar orientation, natural ventilation, a solar hot water system and an intensive green roof system.

The scheme falls below the generally accepted critical mass (around 150 units) both financially and managerially for more favoured technologies such as Combined Heat & Power; and is of a scale that will make up the majority of schemes referred to the Greater London Authority (GLA).

The development is currently in for planning.

Client **East Thames Group**
Architect **Barker And Coutts Architects**
Building Services and Environmental Engineer **Fulcrum Consulting**
Additional assistance **Creative Energy Networks (CEN)**
and the **Building Research Establishment (BRE)**

22 ST MATTHEW'S



St Matthew's keyworker development in Brixton is an exemplar project for Presentation Housing Association and the first scheme developed by PRP Architects and Bill Dunster Architects joint venture, PRP ZedFactor. It provides 12 spacious key worker apartments and has projected heating bills of less than £98 per annum.

All internal space heating comes from the sun and from residents' normal use of household appliances. This is made possible by the massive-built, airtight building and very high insulation which ensures superb thermal protection and energy efficiency at little extra build cost. Roof-fitted solar panels and thermal tubes provide hot water and are supplemented in the winter by a wood pellet-burning boiler using non-fossil renewable fuel. This is projected to need refuelling only once every two years.

All living rooms face south, have large windows and direct access to attractive south-facing winter gardens and balconies. Other measures include rainwater harvesting and sedum roof covering to encourage urban wildlife. The scheme is designed to be upgradeable to full ZED standards as costs of key components fall.

Client **Presentation Housing Association**
Architect **PRP ZedFactor**

23 SIXTYK ROWAN SITE



Rowan is one of the largest sites in the Design for Manufacture competition and will consist of 227 homes. The development will aim to reduce carbon emissions by 70 percent and provide 10 percent of the energy from renewable sources.

The site masterplan is driven by three key aspects; water conservation including rainwater harvesting; a 2.6 ha green space with ponds and reed bed filtration, and the built form. All the homes incorporate a passive environmental strategy with a central roof lantern allowing light deep into the plan and providing secure night ventilation. In addition the units include gas fired CHP (combined heat and power), super-efficient MVHR (mechanical ventilation with heat recovery unit), photovoltaic panels with solar panels forming the balustrades on

the balconies. Elevations maximise solar gain and minimise heat loss.

Fuel costs for a 2 bed, 4 person home, 76.5m²

- Built to 2002 building regulations
£245 per annum
- Rowan site housing, including
70 percent carbon emission reduction
£159 per annum
- Rowan site housing as above including PV
£94 per annum

Client **English Partnerships**
Developer **Crest Nicholson**
Architect **Sheppard Robson**
Engineer **Arup**

24 CREATIVE MEDIA CENTRE



The creative media and community centre at 56 Southwark Bridge Road forms part of the Elephant and Castle regeneration programme. A series of carefully crafted architectural interventions will enhance the character, capacity and environmental performance of the existing building. The aim is to get below 100kWh/m²/y total energy consumption and to cut CO₂ emissions by approximately 75 percent.

Environmental design features include:

- A very low carbon heating system using a KWB wood pellet boiler.
- A Quiet Revolution wind turbine generating 6–7000kWh/year or 14 percent of the electrical load.
- Solar thermal panels provide hot water.
- Most of the building is naturally ventilated using passive stack ventilation principles.

- Mixed-mode ventilation with heat recovery to the new workshops and the new toilet core.
- Low energy fluorescent lighting throughout.
- Full management system with energy monitoring (inc. CO₂) and remote connection to XCO2 offices for post occupancy monitoring.
- 50 percent GGBS concrete has been specified for the new concrete core and basement slab.

Client **Elephant Links / Elephant and Castle Regeneration**

Architect **Architype**

Environmental Engineer **XCO2**

Structural Engineer **Trigram**

25 FENN STREET



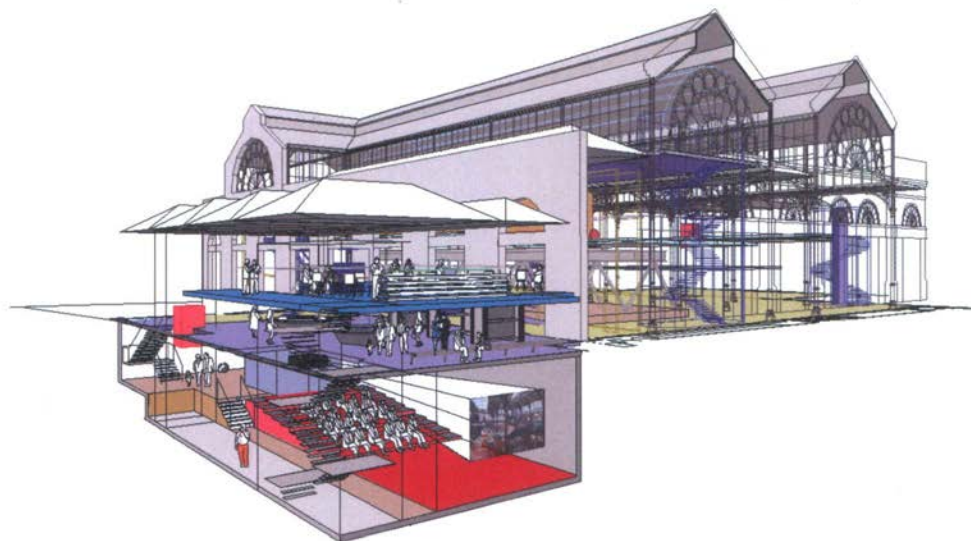
This two bedroom house on a brown-field site in Homerton, East London will be completed as an ecologically sustainable building. Constructed with a prefab structural timber system, the house will feature solar water heating panels incorporated into a roofscape that combines a green grass lawn with a retractable glass window opening onto a sunken 'Lautner' lounge-courtyard below. Tanks in the basement deal with rainwater harvesting and greywater recycling. Sensors within the house will control the internal environment through controlled passive heating and ventilating systems (opening/closing windows and blinds).

The building is developed as an assemblage of material, systems, technologies, spaces, encased in a CAD/CAM patterned and perforated timber shell. This shell itself contains and organises articulated terrazzo hybrids of Victorian mouldings and architectural elements. These are cast from CAD/CAM produced concrete formwork.

Client **Private**

Architect **WAG - Working Architecture Group**

26 LONDON TRANSPORT MUSEUM



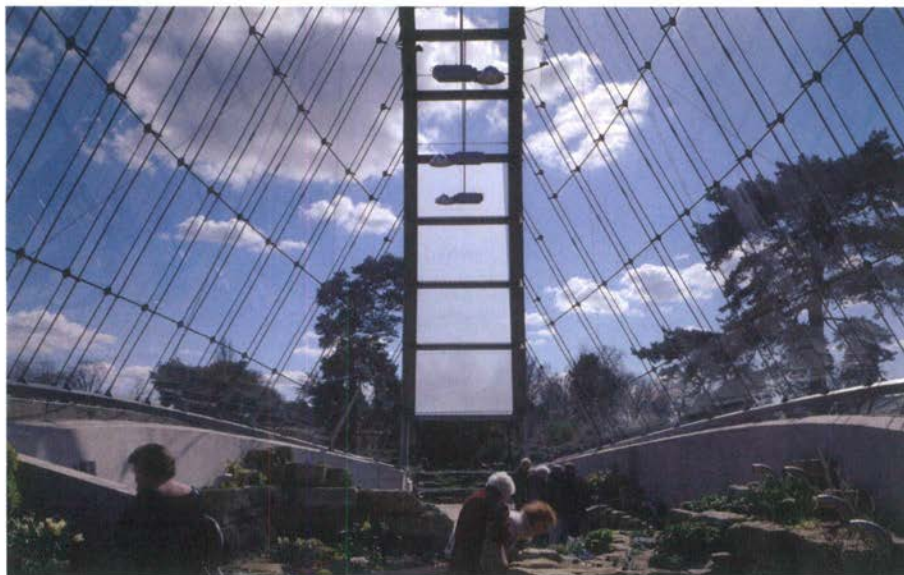
The Grade II listed market buildings of 1872 by Cubitts and William Rogers provides a fine home for the London Transport Museum. Unfortunately there is severe solar heat gain due to the large areas of single glazing in the roof which is now posing a threat to some of the older vehicles in the museum's collection. The lack of a proper ventilation system exacerbates the problem.

The renovation and extension of the building will resolve the environmental problems and undertake a complete re-display of the museum's collection. This will include new galleries and lecture facilities that will enable the museum to expand its activities. A large scale solar panel system will generate around 16 percent of the Museum's energy needs, over 2,136,000 kWh of electricity, and reduce CO₂ emissions by 1,415-2,075 tonnes over their lifetime. The initiative

has been funded by Transport for London and a grant under the DTI's Major Photovoltaic Demonstration Programme managed by the Energy Saving Trust. It is the first flagship scheme supported by the London Climate Change Agency.

Client **London Transport Museum**
Architect **Avery Associates Architects**
Contractor **Wates**
PV Installation **Sundog Energy Limited**

27 ALPINE HOUSE



The Alpine House is a small exhibition space in Kew Gardens featuring plants local to the Alpine regions which require plenty of fresh air. This project demonstrates that it is possible to keep a glazed building at a cool temperature without the need for costly and unsustainable insulation.

The skin of the Alpine House is made of low iron glass to allow for the highest possible daylight transmission. The floor slab is constructed as a 'concrete labyrinth' with a large surface area which is used to blow air through to cool the concrete down. This cooling effect is then available as a heat sink during the day. The outlets for the labyrinth are positioned within the glasshouse and are designed to direct the air over the leaves of the plant to provide the necessary air movement.

Client **Kew Gardens**
Architect **Wilkinson Eyre Architects**
Environmental Engineer **Atelier Ten**

28 JOHN PERRY CHILDREN'S CENTRE



John Perry Children's Centre & Nursery brings together children's services and a nursery alongside an existing school location. The result is a pair of 'low threshold' buildings that use sustainable materials where possible.

The building envelope is insulated to higher levels than required in the Building Regulations. The brick walls include 150 mm mineral fibre insulation (U-value between 0.22 and 0.28 W/m²C), the roof and floor contain 85 mm and 47 mm of rigid insulation respectively. Underfloor heating is used throughout the building served by a condensing boiler.

The South facing façade of the building uses high performance polycarbonate panels covering approximately 75 percent of the façade. These have

a four cell build up providing pockets to trap air and insulate the façade providing a U-value of 1.2 W/m²C.

The interior finishes consist largely of sustainable cork based products. Many of the walls are lined with cork tiling and the floor is a cork linoleum that gently transmits heat from the underfloor heating into the space.

Client **London Borough of Barking and Dagenham**
Architect **DSDHA**
Photographer **Hélène Binet**

29 LARMENIER & SACRED HEART SCHOOL



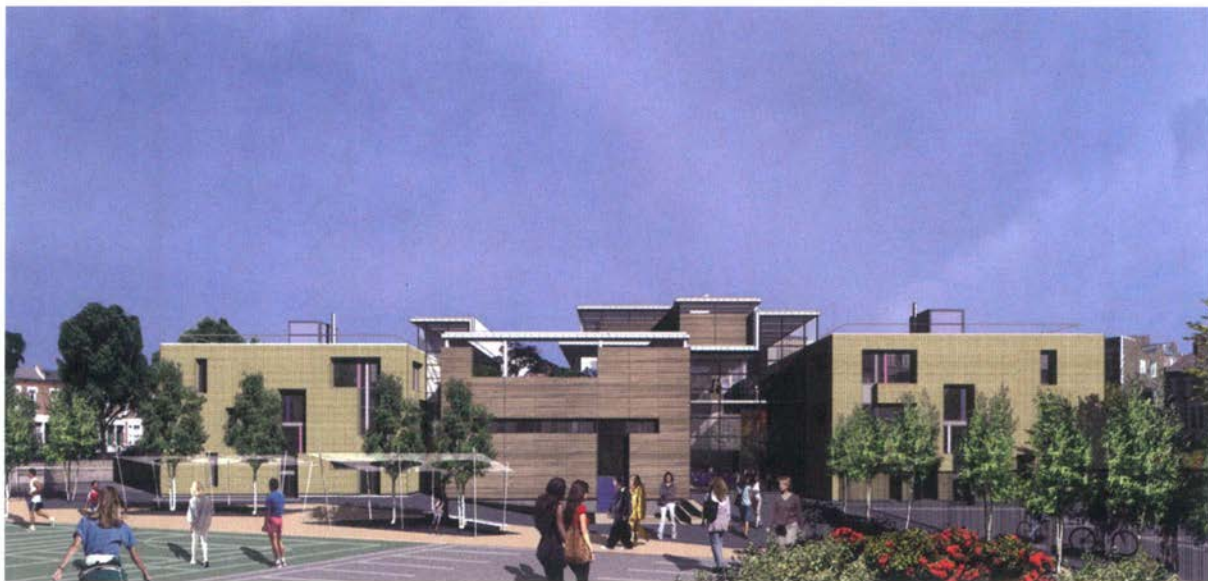
The two storey spiral building responds to its environment incorporating the Fibonacci “golden mean” as a symbol for its young community – the mathematics of nature and their building in single harmony. The architecture seeks to blur the boundaries between inside and outside; all ground floor classrooms have direct access to external learning areas.

Two 120 year old plane trees have been retained as an intrinsic part of the design, influencing the building’s shape and configuration. The building is physically embraced by soft landscape with extensive climbers on its south elevations and sedum on its north facing roof.

A natural ventilation and daylight strategy has been employed throughout with extensive use of internal light wells and rooflights, and with all classrooms facing south. Use of heavyweight materials exploits thermal mass, reducing building temperatures by 2°C on hot days. Photovoltaic panels mounted on the roof will generate 10 percent of the school’s power.

Client **Diocese of Westminster**
Architect **Studio E Architects**
Structural Engineer **Techniker**
M&E Engineer **Max Fordham Consulting Engineers**
Quantity Surveyor **Day and Johnson**
Landscape Architect **Fira**

30 PADDINGTON ACADEMY



Paddington Academy, currently on site, is a co-educational six form entry secondary school for 1,175 students sponsored by the United Learning Trust. The building is designed to maximize natural light and ventilation, whilst reducing long-term energy consumption. Internal and solar gains are minimised through careful design of glazing and shading whilst the thermal mass of the building is maximised.

The compactness of the building results in a high proportion of spaces within the building which will rely on a low pressure mechanical ventilation system. The system is integrated with an undercroft, earth-coupled, air tempering system which is pressurised by low speed fans located in below ground rooms at the perimeter of the classroom wings. Air enters the rooms via insulated ducts and exhaust air exits via

attenuators transferring via the corridors into the atrium. Peak ventilation rates per classroom will be approximately $0.45\text{m}^3/\text{s}$ in summer and winter. Recirculation air is provided via buried ducts routing between air handling units within the undercroft and the atrium, allowing higher ventilation rates in winter with better distribution and reduced energy consumption. The heat gain through the undercroft combined with the re-circulation action of the undercroft ventilation system means the school will only require morning heating during the winter months.

Client **The United Learning Trust**
Architect **Feilden Clegg Bradley Architects**
M&E and Structural Engineer **Buro Happold**
Landscape Architect **Churchman Landscape Architects**
Project Manager & QS **CM Parker Browne**

31 PARADISE PARK CHILDREN'S CENTRE



Set in an inner city park, Paradise Park Children's Centre offers high quality community facilities including a café and reception, Sure Start Creche, nursery, outdoor play areas and children's resource centre.

The project is a radical response to the challenge of how designers can create new architecture and green spaces when forced to build in ever-greater densities in Britain's cities. The building footprint is a V-shape, which is open to the park and exposed to natural south light. Sustainable principles underpin the design with natural daylighting and ventilation, rainwater recycling and flexible dual-use spaces.

A vertical hydroponic garden runs the full length of the building. The dense planting, which is sustained with recycled rain water, will provide a local amenity, improve air quality and help insulate the building. Some thirty varieties and 7,000 individual plants were planted onto rockwool slabs encased in steel mesh cages which were bolted onto the building's façade. Together with the living brown roofs it minimises the loss of green area of the park and provides wildlife habitats and enhanced biodiversity.

Client **Sure Start Hillmarton, Islington Play Association, Islington Green Space, Paradise Project**

Architects **DSDHA**

Landscape Designer **Clarke Associates**

Photography **Edmund Sumner**

32 RSPB EDUCATION CENTRE



Standing on the edge of Rainham, Wennington and Aveley Marshes is the RSPB's new Purfleet Environment and Education Centre. The site, 12 miles from central London, stands isolated with 870 acres of marshes to one side and housing on the edge of Purfleet to the other.

The building is extremely environmentally friendly. Materials were sourced locally wherever possible, there is limited use of aluminium and no plywood on the project because its source is untraceable. A ground source heat exchange pump is buried in the adjacent car park. Sheep wool insulation is used all around the main floor. A rain-harvesting tank is sunk below the car park, and photovoltaic panels sit on the roof. Grey water is used for all flushing toilets, while the urinals are waterless. Natural stack ventilation is employed,

with air drawn in through vents at ground level and around the perimeter of the first floor, and expelled through the cone shaped towers on the roof.

Client **RSPB**
Architect **van Heyningen and Haward Architects**
Structural Engineer **Price and Myers**
Services Engineer **Max Fordham Consulting Engineers**
Civil Engineer **Bettridge Turner**
Landscape Consultant **King Environmental**
QS **Trogal Griffin**
Main Contractor **Haymills**
Photography **James Brittain**

33 TANAKA BUSINESS SCHOOL



The Tanaka Business School at Imperial College houses teaching, research and office facilities. The School has been divided into two parts; the teaching elements are within a new building and the office areas within three refurbished floors of the existing Royal School of Mines.

The entire new-build element and new College entrance are cloaked in a protective envelope, creating a year round usable atrium space within. This atrium is capped with white translucent ETFE pillows measuring 20 x 4.2 m which provide better insulation than glass and admit filtered daylight into the atrium space.

Natural ventilation is provided via high and low level openings in the main atrium and automated openings in the roof. At night, these openings are used to pre-

cool the building's thermal mass. The stored cold air can then be re-emitted to reduce the demand on the cooling plant during peak times. Heating is provided by waste heat from the campus Central Heating Plant. Underfloor water pipes in the atrium can be fed with hot water in the winter and cold water for cooling. Waste air from the lecture theatres is blown out through the cladding to further temper the atrium space.

Client **Imperial College**
Architect **Foster + Partners**
Structural, Service, Civil and Geotechnical Engineers
Buro Happold
IT, AV and communication systems consultation
Buro Happold

34 TOWNLEY GRAMMAR SCHOOL



This extension to Townley Grammar School introduces wit and colour to the original 1930s Art Deco buildings. Both the sports hall and performing studio have no need for natural light, therefore no windows. Accordingly, purpose designed ventilation strategies were required.

The sports hall uses the natural buoyancy of air movement and the pressure differentials caused by wind. Air is introduced and extracted through four ventilation towers (Passivents) located along the roof. During the summer air can be introduced at low level through motorised louvers in the north facing wall. The air mixes and rises as it warms up and is extracted through the towers. This in turn pulls fresh air into the hall.

The air treatment to the performing arts studio is provided by a heating, cooling and ventilation system based on low energy passive principles. A series of sunken concrete pipes run the length of the building. External air is forced through the pipes where it takes up the chill from the surrounding ground mass. Warm air is extracted at high level. When the studio requires heating the same system is used, with the air being tempered to 18°C.

Client **Townley Grammar School for Girls**
Architect **Studio E Architects**
Contractor **R Durtnell & Sons**
Services Engineers **Downie Consulting Engineers**
Structural Engineers **Price & Myers**
Landscape Design **Jenkins & Clarke**
Quantity Surveyors **MPA**

35 ONE BLACKFRIARS ROAD



This proposal for One Blackfriars Road consists of an elegant 52 storey tower (180m A.O.D.) and a 4-5 storey low-rise building (the Rennie Street Block) grounded by a single storey podium. The buildings will be occupied by a luxury hotel, 96 residential apartments and a publicly accessible sky deck.

The tower's distinctive profile is emphasised by the dual-skinned building envelope. The curved outer facade is single glazed and incorporates glass ventilation louvers. The inner facade consists of double glazed and insulated panels. The interstitial space between the two skins will be used for accessible winter-gardens.

Renewable energy will be generated on-site by a biomass boiler, by solar water heating and photovoltaic

technology. Together with the efficient building envelope it is anticipated that carbon emissions will be reduced by 43 percent measured against current London benchmarks.

Sustainable water collection will be provided on-site to minimise the effect of storm water on the London sewer network.

Client **Beetham Landmark London Ltd**
Architect **Ian Simpson Architects**
Building Services **Roger Preston & Partners**
Structural Engineer **WSP Cantor Seinuk**



399 Edgware is a £200m mixed-use redevelopment of the existing Oriental City site implementing a mix of retail (30,000 m²) and private and affordable residential (50,000 m²) accommodation arranged around a series of linked courtyards with an integrated primary school (3,500 m²).

The arrangement of the residential blocks will create courtyards above the retail base block optimising sunlight penetration. Balconies will provide both an amenity and environmental control to afternoon sun. The roof of the school will become an accessible green roof 'play deck' with good solar aspect and minimal overshadowing. To achieve the target 10 percent of energy utilised on site via renewable sources it is currently proposed to provide geothermal ground source heating to the residential buildings. Provision

will also be allowed on the geothermal scheme to extend the ground source water to the retail units for provision of cooling.

Client **Development Securities Plc**
 Architect **Sheppard Robson**
 Services Engineers **Faber Maunsell**
 Structural Engineers **Waterman Partnership**
 Environmental Impact & Transport Consultants
WSP Environmental Limited

37 BALDWIN TERRACE



Edward Cullinan Architects are to convert a canal side 19th century foundry into their new office and to build 12 apartments on the adjacent site. Located in a conservation area both buildings will achieve 20 percent energy use from renewable sources.

The scheme will meet the highest level of the draft 'Code for Sustainable Homes'. The comprehensive renewable energy strategy includes 5 micro wind turbines and a solar panel array of 52m² (4m² per unit), calculated to provide approximately 40 percent of the buildings' annual hot water demand.

Residential energy demands are reduced by optimising day lighting with external shutters on the southern façades to prevent summertime overheating.

The offices will be naturally cross ventilated and have opening roof lights. Lighting will be low energy linear fluorescent fittings.

Modern methods of construction are to be used where possible, one example being a timber panel system that utilises industrial off-cuts minimising excess wastage.

The architects intend to explore the possibility of working with British Waterways Regeneration on transporting construction and demolition waste and construction materials during the construction phase, and commercial and household waste and recycles at post-occupation.

Architect **Edward Cullinan Architects**
Environmental Engineer **Max Fordham Consulting Engineers**

38 NEW CROSS GATE



The New Deal for Communities, New Cross Gate have appointed Feilden Clegg Bradley Architects to design a sustainable living quarter and healthy living centre. The brief includes healthcare, fitness, educational, community and creative arts facilities, residential and retail units and a new town square. The design places the community facilities on the ground and first floor with 157 residential units situated above in differing storey heights creating a dynamic skyline.

The residential elements of the building structure use sustainably-sourced, prefabricated solid timber panels while the community elements are formed from reinforced concrete to ensure flexibility of use and to maximise the use of thermal mass in controlling temperature swings. Once occupied, 10 percent of the energy required to run the development will be

generated on site from renewable sources. This will be achieved with the use of solar thermal panels to pre-heat water and groundsource cooling for the gym. Green planted walls and flowering trees will provide animal habitats and a quiet urban oasis. Wind turbines will generate electricity to irrigate the trees with stored rain water.

Client **New Deal for Communities – New Cross Gate**
Architect **Feilden Clegg Bradley**
Environmental Engineer **Max Fordham Consulting Engineers**
Structural Engineer **whitbybird**
Landscape Architects **Grant Associates**

39 REGENT'S PLACE



This mixed-use development fronting Osnaburgh Street builds on Farrells masterplan for Regent's Place and the strategic framework for Marylebone-Euston Road, adjacent to the conservation area at Regent's Park and several listed buildings, including Sir John Soane's grade 2* listed Holy Trinity Church. The proposal features 2 new office buildings with green roofs together with a residential building consisting of 151 units.

The buildings reduce energy demand and maximise efficiency through an efficient glazing and cladding system. Together with daylight control, energy efficient lighting, building services control, presence detectors and improved boiler and chiller efficiencies they demonstrate a 10 percent improvement on the building regulations (part 2A 2006).

By installing a combination of rooftop photovoltaic cells (150 m²) and rooftop solar thermal collectors (25 m²) the CO₂ emissions are reduced by 0.13 percent. NOx emissions are minimised through careful selection of plant. The buildings reduce water consumption which will be monitored by meters. Rainwater is recycled and surface water run-off is attenuated (reducing discharge to the sewer by 70 percent).

The buildings ensure future proofing for energy systems by allowing subsequent refurbishment to incorporate energy efficient measures. BREEAM and Ecohomes measurements are used as benchmarking tools in the design of the development.

Client **British Land**
Architect **Farrells**

40 VAUXHALL CROSS



Vauxhall Cross is a key public transport interchange between rail, underground and bus services. Transport for London (TfL) has pioneered the use of building integrated solar photovoltaics in the new Vauxhall Cross Bus interchange. The inclined structure generates 26 MWh of electrical energy annually, which contributes approximately 30 percent of the energy required to power the 24-hour bus station.

The Building Integrated PV (BIPV) solar design replaced stainless steel cladding, offsetting the cost of traditional building materials with energy generating, weatherproof solar technology.

TfL have specified the generation of electricity from solar PV in numerous other applications. The refurbishment of the Walworth Bus Depot became

the first bus garage in London to be solar powered with a simple roof mounted solar array. The supplier, solarcentury, have also worked with TfL to trial solar bus shelters on Waterloo Bridge and in 2004, TfL commissioned the installation of 7,500 solar powered bus stops over 5 years.

Client **Transport for London**
Architect and Engineer **Arup Associates**
Photography **Christian Richters**

41 COMMUNITY SPORTS CENTRE



The Burgess Park Community Sports Centre provides change rooms for the artificial surface and for turf playing fields, changing rooms for supervisors, toilets, reception, kitchen, bar, community room and stores. It is funded by Southwark Council, the Football Foundation and by energy grants from the DTI.

The new building is tied to the site by being attached to remaining walls of factory buildings that previously occupied the site and is set within it by being sunk into the ground and by the changing rooms being all but covered in excavated earth. The design demonstrates advanced low and renewable energy technologies. The approach has been to minimise energy consumption and, then, to use the potential of the sun and the earth to minimise reliance on fossil fuels. The energy strategy incorporates high insulation, solar protection,

a building integrated photovoltaic array, ground linked heat pump water and space heating, and rainwater recycling.

Client **Southwark Leisure**
Architect **Studio E Architects**



Exchange will be a combined bar, art gallery and website in and around two railway arches in Hackney. The scheme, currently in planning, has been described as Hackney's first eco bar.

The scheme will use recycled materials where possible in the construction and features a landscaped and planted grass roof on the rear extension, which can be occupied as a split level beer garden. The roof collects rainwater for use in the bars toilets, and there will also be some solar collectors located on the roof and south facing wall for heating and energy generation.

The front facia unifies the two arches with horizontal timber bands. Above these is a field of energy efficient LED lights. These lights are computer

programmed, and can be animated to produce textual and graphic effects.

The design for the interior fit out of the bar is an assemblage of recycled objects, from old computer monitors to car tires. This framework structure can be adjusted by the gallery and artists, changing and growing with use over time. It will also house a bookshelf, holding a free, user driven library.

Client **Cem Gul**
Architect **WAG - Working Architecture Group**

43 CHISWICK PARK



Chiswick Park is a business park located within an existing built-up area on a brownfield industrial site and is largely dependent on public transport – it is estimated that 75 percent of the tenants arrive either on foot, bicycle, bus or train.

The project offers 140,000 m² of office space spread between twelve buildings. The buildings were constructed using standardised, using off-site construction technology. The energy strategy is designed for economy and environmental responsibility – fixed external aluminium louvres and retractable external fabric blinds activated by light sensors shade 90 percent of the buildings' surfaces. This significant reduction of solar gain made possible the use of a displacement ventilation system – energy efficiency results in low running costs in the long term.

The façade performance easily passed the new Part L regulations before they came into force.

During construction waste management was used to identify the sources and types of waste, measure the quantities of waste and evaluate the causes giving immediate feedback thereby maximising the time available for finding ways of reducing site waste.

Client **Stanhope plc**
Architect **Richard Rogers Partnership**
Structural & Services Engineer **Arup Associates**
Contractor **Bovis Construction Ltd**
Facade Consultant **Josef Gartner**
Photography **Grant Smith / View**



Many new homes are planned in areas of flood risk, especially those in the Thames Gateway. Every new development exacerbates long-term problems of flood risk and water shortage.

Life (Long-term Initiatives for Flood risk Environment) provides integrated master-planning, architecture and environmental solutions to areas at risk. These solutions are based upon a principle of creating 'enduring communities' that combine genuine sustainable design with natural ecological management of flood risk, and innovative architecture, to generate areas of extraordinary character and quality.

One of the key principles of Life is to utilise flood plains through creation of assets and designation

for appropriate amenities, such as utilising lower land values to offset development costs for renewable energy, recreation and controlled development or improving water storage for operational use such as grey water and heating/cooling.

The aim is to devise and disseminate a set of principles for an approach to planning and design that can be replicated around the UK and, potentially, other parts of the world.

Architect **Barker and Coutts Architects**
Defra funded project with BRE, English Partnerships, Cyril Sweett, Fulcrum Consulting, Hr Wallingford and LDA

45 SkyZED 'FLOWER TOWER'



SkyZED is a concept for a carbon neutral, mixed-use, 'ZED tower' community, that generates its own energy on an urban plot, in this case Wandsworth Roundabout. To optimise views, daylight and privacy for all flats, the plan has four petal-shaped floor plates, arranged like a flower. To minimise façade areas, the design has evolved into two bean-shaped blocks. Each tower petal contains a mixture of two-bed flats or three-bed maisonettes. All homes have good views and high daylight levels.

The tower is designed to sit within a 200m square urban block, where buildings and amenities are positioned to maximise sunlight, creating a solar urban village. The urban village incorporates 'ZEDquarter' (high or low density, low-rise buildings) and SkyZED (high density, high-rise buildings) models. The SkyZED tower

features a water treatment system, with the capacity to recycle grey and black water for an entire urban block. Modelling demonstrates that the proposed combination of wind and photovoltaic (PV) energy is very cost-effective and will meet SkyZED's annual electricity demand. This means that on most sites, a cheap woodchip fuelled boiler to heat homes, is all that is required. On larger sites, communal heating, such as biomass-fuelled combined heat and power plant, can be used.

Architect **ZED Factory**



46 COOLING TOWER

This design was originally developed as a competition entry for the Athens Olympics which asked for 'ephemeral' structures to host urban street events. WAG proposed a mobile kevlar fabric cooling tower, erectable in 30 mins. Helium is pumped into a torus ring, inflating it to form the top of the tower, which lifts above the pollution level in Athens. Water is then pumped up small veins sown into the fabric of the tower, and weeps out of holes to run down the inside skin. This water evaporates drawing clean air down the tower, cooling it by up to 12 degrees. At night, the process naturally reverses, and warm, polluted air is drawn up the tower and dispersed.

Designer **WAG - Working Architecture Group**
 Engineer **Atelier One and Professor Brian Ford, WSP Environmental**



47 CITY ACADEMY

The City of London Academy is part of the DfES funded City Academy programme, with the City of London as prime sponsor in collaboration with London Borough of Southwark. The Academy was awarded the Prime Minister's Better Public Building Award in 2006.

The site, provided by Southwark Council, was challenging because it was very tight and split in two by a busy road. The partnered designer / contractor team has produced a compact, cohesive building with generously sized, flexible teaching spaces. At its heart daylight and natural ventilation are provided with the aid of an internal atrium roofed in ETFE.

Client **The City of London**
 Architect **Studio E Architects**
 Services Engineer **Max Fordham Consulting Engineers**
 Contractor **Willmott Dixon**



48 KALEIDOSCOPE

Kaleidoscope is a primary and social care centre that combines health, social and educational services for children and young people into one-stop care provision.

The building is almost entirely naturally ventilated and energy-saving measures, including motion-sensitive lighting and Battiso cooled ceiling panels, are used throughout. Overlooking the garden and projecting ground floor roof, the façade is fully glazed, with sun shading to the southerly aspect. Views out are dominated by the mature trees on Rushey Green.

Client **Lewisham Primary Care Trust**
 Architect **van Heyningen & Haward Architects**
 Structural Engineers **Price and Myers**
 Service Engineers **Max Fordham Consulting Engineers**
 Photography **Nick Kane**



49 ARUP HQ PHASE 2/3

The £43 million development incorporates an innovative façade design and will replace the two 1960s buildings on the site owned by LMS plc.

To achieve a reduction in energy use, the facade of the new building has been designed to work in tandem with the low energy cooling system. Using a combination of glazing – opaque, translucent and clear – two panel types have been developed, which when used in combination prevents up to 50 percent of the heat gain in the building. The energy efficient chilled beams will provide air conditioning – and this is one the first instances that a cooling system of this type has been applied in a commercial office development in the UK.

Client **Arup Associates**
 Architect **Sheppard Robson**
 Engineer **Arup**



50 ABFORD HOUSE

Abford House, Victoria comprises 10,400 m² of office accommodation and 1,780 m² of retail use.

Passive design measures incorporate the use of solar shading to both east and west elevations and the vaulted roof structure. The location of the core adjacent to the neighbouring building provides a buffer to the office spaces. The air conditioned offices are served by a water based heat pump system which is integrated with ground source water obtained from two boreholes. Renewable energies are derived from an installation of photovoltaic panels and solar thermal collectors located at high level on the south facade.

Client **Heron and AXA**

Architect **Sheppard Robson**

Structural Engineer **Arup Associates**

Services Engineer **Foreman Roberts**



51 HOUSE + STUDIO

This house and studio uses recycled materials for the majority of its construction. The brick, granite setts and pavers, brick pavers, floor boards, tiles and sanitaryware are all recycled. The majority have been collected by the client through countless trips along the Thames foreshore to select materials of the appropriate period. Every sett and brick was meticulously selected and placed to give appropriate patterns on the buildings floors and facades.

The building envelope is insulated to higher levels than required in the Building Regulations. All glazing is Low-E, double glazed and Argon filled to minimise heat loss.

Client **Private**

Architect **DSDHA**

Photography **Hélène Binet**



52 GROSVENOR WATERSIDE

The Grosvenor Waterside development meets EcoHomes very good standard and Part L requirements, providing 5 percent of energy through renewable sources. This is realised through the energy provided by CHP to all the entire blocks, PV panels to one block, green roofs and gardens providing the maximum of shared and public green spaces possible and rain water harvesting. VRV (Variant Refrigeration Volume) a form of heating and cooling spaces has been integrated into some of the private units and eco-labelled white goods will also be provided. All units are located close to public transport pedestrian access and a car pool will be in operation.

Developer **St James Group Ltd**
Architect **Sheppard Robson**



53 NOBEL HOUSE

Nobel House is DEFRA's flagship office and main interface with the public. This refurbishment project achieved an 'excellent' BREEAM rating for offices and scored, at the time, the highest ever score in the UK for an office building.

The energy supply to the building has been made more efficient with the use of a gas turbine CHP unit, solar controlled intelligent lighting system and natural ventilation with the energy consumption monitored by a comprehensive Building Management System. A 'Materials Matrix' was used to assess the full impact of all materials considered for use with a strong emphasis on reusing and recycling construction waste.

Client **Department of Environment, Food and Rural Affairs**
Architectural, Structural, M&E Services **Atkins**



54 GLENGALL BRIDGE

Glengall Bridge is a mixed use high density development on the Isle of Dogs providing a mix of social and private residential, educational, commercial and cultural uses for both established and emerging communities within the area. The development creates a new focal point for the island with the construction of a 230 m high tower and a new urban square.

The site is being developed as part of a strategy designed to encourage densification at nodal points throughout the island creating a more coherent urban strategy for regeneration over the next 20 years. The development will integrate CHP, ground water cooling and passive ventilation.

Client **Rowan Asset Management**

Architect **Sheppard Robson**

Structural and Services Engineer **Arup Associates**



55 ADELAIDE WHARF

Adelaide Wharf in Shoreditch, is the first scheme in English Partnerships' London Wide Initiative. The scheme will provide 147 residential units, 50 percent of which are affordable, and is on target for an Ecohomes "Excellent" rating. It utilises a biodiverse brown roof, a centralised heating system, and offsite construction to reduce waste on site.

The development wraps around a landscaped courtyard, glimpsed from the street through coloured double height entrance courts. The prefabricated cladding treatment gains the quality benefits of Modern Methods of Construction whilst allowing for variation within the system.

Client **English Partnerships**

Developer **First Base**

Architect **Allford Hall Monaghan Morris**

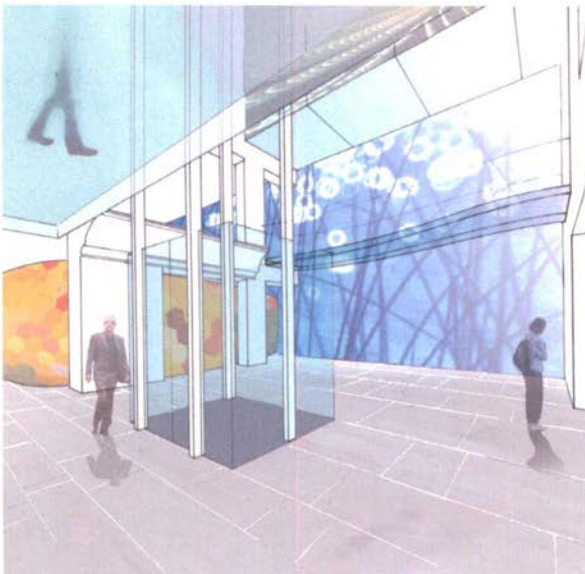


56 GREAT ORMOND STREET HOSPITAL PHASE 2

Great Ormond Street Hospital Phase 2 involves the creation of a new building on a tight 2 hectare site. The building will aim to achieve a target BREEAM score of 77 percent with total carbon emission saving of 49 percent, of which 7 percent is achieved through renewable energy sources. These will include a 1Mwe CHP plant, Ground Source Thermal Piles with Heat Pumps and an Adiabatic Cooling system. Green 'sedum' roofs (intensive and extensive) will increase thermal performance and reduce storm water runoff. The overall building envelope will achieve 5 percent better than Part L Building Regulations 2006.

Client **Great Ormond Street Hospital for Children NHS Trust**

Architect **Llewelyn Davies Yeang**



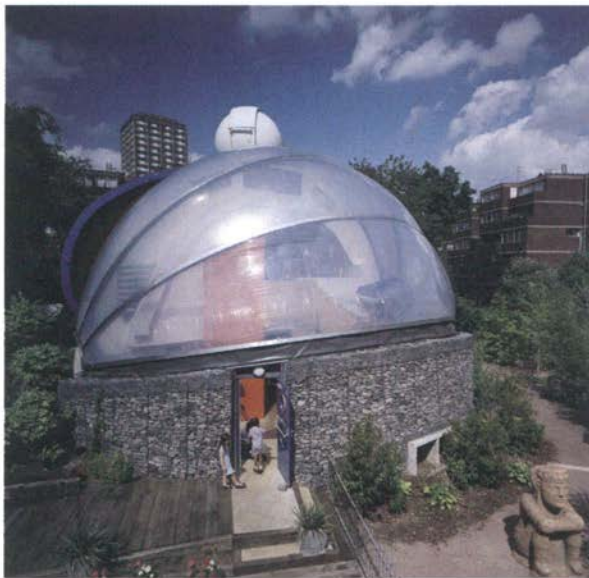
57 ROYAL INSTITUTION

The Royal Institution is currently undertaking an expansion of facilities. Farrells design proposal provides a new public route connecting two main stairs of this Grade 1 listed building. En route a new daylit atrium for the building is incorporated around new social facilities.

The atrium creates a natural ventilated stack effect by drawing in hot air at the base of the building and venting the air through louvres at the top of the lift shaft. It replaces an existing inefficient glass roof with a high specification insulated double glazed unit, which decreases the energy wastage of the building. The atrium will also reduce required levels of artificial light within the building, reducing energy costs by 5 percent.

Client **The Royal Institution of Great Britain**

Architect **Farrells with Rodney Melville and Partners**



58 CLASSROOM OF THE FUTURE

This classroom at St Francis of Assisi Primary School is one of 30 such projects funded by the DfES.

Sustainability is a key feature of the design, which includes many environmentally driven measures delivered within a tight budget. The selection of construction materials emphasised renewable sources, low embodied energy and/or recyclability. The ETFE south facing conservatory forms an environmental buffer between the classroom proper and the outside. £100,000 of additional funding has been secured from the DfES to introduce further environmental measures including thin film photovoltaic cells over the ETFE.

Client **Royal Borough of Kensington and Chelsea**
 Architect **Studio E Architects**
 Services Engineers **Max Fordham Consulting Engineers**
 Structural Engineers **Techniker**



59 HOPE HOUSE

Hope House, built in 1995, was the first experimental 'ZED'. Regular upgrades improve energy use as the latest technology advances become available.

A log-burning stove was installed in 2004, and a wood pellet boiler was fitted in 2006. Together they will replace the gas boiler for hot water. A micro wind turbine was fitted in 2005, which generates about 50 percent of electricity needs, and the existing PVs also supply around 50 percent. As Hope House is home to Bill and Sue Dunster, it allows them to experience and evaluate components first-hand.

Client and Architect **Bill & Sue Dunster**



60 PRIVATE HOUSE

A typical Victorian terrace house has been transformed into a light, airy and environmentally friendly home. The client borrowed an additional £10,000 for energy saving measures including new argon-filled double-glazed windows, additional insulation between all floors and external walls and the installation of a 92 percent efficient condensing boiler. The measures save around 2 tonnes of carbon per year and fuel bill savings are the equivalent to the sum of the additional mortgage interest. A rainwater collection system was installed and there is provision for renewable energy systems in the future. All materials are as far as possible recycled, locally sourced or from certified sources.

Client and Specification **Dan Epstein, Sophie Thomas**
 Architect **Phin Manasseh**
 Contractor **EBCO Building Company**
 Engineering Consultant **Atelier Ten**



61 RECYCLING CONSORTIUM

The scheme is for a Community Waste Recycling Company. The scheme uses a recycled façade acting as a new outer skin to the building. The building will eventually be replaced with 80 sustainable housing units which are currently under development.

Client **London Borough of Tower Hamlets**
 Architect **Mangra Yvars Architects**

TALKS, SEMINARS AND DEBATES

Morning talks

Every Wednesday during the exhibition run 8.30am

Includes talks on energy strategy, adaptation to climate change, and case study examples from around the capital.

Free of charge

Seminar - Hydrogen & Fuel Cells: New Energy Sources

Monday 12 March 3.00–7.00pm

A half-day seminar looking at the role Hydrogen and fuel cells can play in tackling climate change in transport, power and buildings.

£75 + vat

Seminar - Towards Zero Energy

Friday 16 March 8.30–10.30am

New materials and products for tackling climate change. Produced in association with the PIA.

Free of charge

Talk - Modern Earth Construction

Thursday 22 March 6.30pm

Rowland Keable, founder of InSitu.

Free of charge

Seminar - Density

Monday 26 March 3.00–7.00pm

A seminar looking at one of the key topics of debate driving the development of sustainable communities in the city. Produced in association with Design for Homes.

£75 + vat

Seminar - Keeping Cool

Thursday 29 March 3.00–7.00pm

A half-day seminar examining how buildings can adapt to higher temperatures without adding to the causes of climate change.

£75 + vat

Talk - The Beacon

Wednesday 4 April 6.30pm

A presentation on wind powers in the city by Marks Barfield Architects and XCO2.

Free of charge

Conference - CHP and Communities

Tuesday 17 April 10.00am–5.00pm

A full day seminar that looks at the CHP and heat networks. Produced in association with CHPA.

£120 + vat

Screening - An Inconvenient Truth

Thursday 19 April 6.30pm

Free of charge

Seminar - The High Performance Workplace

Monday 23 April 3.00–7.00pm

A seminar series looking at how the design of modern office spaces can create high productivity and low running costs.

£75 + vat

For full extended programme details please visit www.buildingcentretrust.org

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