

Harrington and Coppins quickly realised that what could work nearby at More London could also work at Embankment Place. “It has been very useful having More London as we have brought all the good things from that scheme into this building,” says Harrington. A key plank in the BREEAM “outstanding” strategy at More London was a biofuel powered tri-generation unit that provides heat, cooling and power. According to Coppins, installing this at Embankment Place would bump the building up from an EPC “B” to an “A” and contributed a healthy 15 BREEAM points. The More London tri-gen plant is powered by biodiesel made from waste vegetable oil sourced within the M25 to keep transport emissions down. Although a laudable aspiration, the downside is a limited choice of suppliers. According to Coppins, the fuel supplied to More London suffers from variable quality which impacts on the efficiency of the sensitive tri-gen plant.

The More London tri-gen plant features absorption chillers which uses the heat from the CHP diesel engine to produce chilled water. The variable quality fuel impacts on the stability of the heat



A tri-gen plant running on bio-diesel bumped the BREEAM rating up by 15 points and was key to achieving the highest ‘outstanding’ rating to date

output from the diesel engine. The efficiency of absorption chillers drops off dramatically if the supplied heat drifts outside the narrow operating parameters. Adsorption chillers have been used at Embankment Place in an attempt to solve this problem. These may vary by only one consonant in spelling but work using a totally different technology from absorption chillers and are much more

tolerant of variable input temperatures. Adsorption chillers cost twice as much as absorption chillers but last 20 years rather than seven or eight years. Adsorption chillers have another advantage over absorption chillers as they use silica gel and water as a refrigerant rather than ammonia, which is caustic.

The Embankment Place tri-gen provides 1,040kW of electricity, 800kW of cooling, equivalent to the building base load and up to 20% of the building's heat requirement. A bigger unit made sense but couldn't be shoehorned into the existing brick barrel-vaulted plant rooms under Charing Cross station. Another issue was noise - the council required the unit to operate 10dB quieter than the ambient noise level in the street.

The building was carefully modelled for comfort, which won the team BREEAM points and will help keep staff happy. A combination of chilled beams and trench heating was used at More London but as modern chilled beams can provide heat too, they have been used throughout the building at Embankment Place. Variable air volume fan coil units have been used in areas adjacent to the south-facing facade to maintain comfort levels.



The boardroom is at the top of the building under the barrel vaulted roof and offers stunning views over London

LED lighting saves energy in the primary circulation areas, breakout spaces and meeting rooms but hasn't been specified for the open-plan office area. "LED isn't quite right yet for big working areas, and the return on investment isn't there yet," says Harrington.

Why didn't the leaky facade blow a hole in the building's energy performance? According to Coppins, this didn't make much difference. "As the predominant load is cooling and most of the year it is cooler outside, we get a small benefit," he explains. This means energy is lost when the building heating is on."Overall we are slightly down [compared with an airtight building] but nowhere as much as we thought we would be."

Five credits were gained from installing waterless urinals, which weren't used at More London. The water supply to sinks is controlled locally in tandem with movement detectors for lighting to reduce water use. Eight land use and ecology credits were gained despite there being no external space other than roof terraces, which were planted with green walls and herb beds. A credit was gained from specifying paints, varnishes and carpet with low volatile organic compound content. Coppins describes this as an "epic" task, which was tackled by a dedicated person who changed suppliers where necessary to ensure the credit was gained. "Often this is a credit that falls away at the end of the project," says Coppins.

A key part of achieving a BREEAM "outstanding" rating are the so-called innovation credits, which can only be awarded once. This forces teams to come up with original ideas to gain the innovation credits. The team won eight out of a maximum of 10 credits. A lot of work went into working with the biofuel supplier to improve fuel quality to European standards needed to maintain the warranty on the tri-gen engine. "I am disappointed to say we didn't receive the credit considering all the work we did on this," says Coppins. "BRE felt it was inconclusive and the engine could be converted to run on diesel. The drive was to achieve the final certificate rather than spending six months arguing over the credit." Which is very

impressive as initially the team thought a BREEAM “outstanding” couldn’t be achieved, instead (according to the BRE) Embankment Place is the most sustainable building ever - for now.

A DIFFICULT REBIRTH



The stairs in the south atrium make it easy for office workers to access other floors

Refurbishing Embankment Place was challenging as there is virtually no room to move in this part of London. Charing Cross station is sandwiched by Embankment Place with access to the building under the station and the office floors above. Thirty seven million people pass through the station each year and tiny Villiers Street, immediately to the east of the building, is London’s busiest street. There is a hotel to the north and a residential block to the west. To cap it all the building had to be refurbished while in occupation.

The refurbishment was tackled in two halves with floors 5-9 done first. Access was extremely limited - the only way of getting materials in and out of the building was via a hoist located in tiny Hungerford Lane on the west side of the building. Difficult ground conditions and complex negotiations with Network Rail over the impact the hoist would have on the station meant installing it was a protracted process. Nearby flats meant that once operational, it could only be used in office hours.

Like the existing floor plates, the scenic lifts in the north atrium are suspended from the roof. This required Network Rail approval, and

new trusses at roof level to distribute the loads.

All the services in the building have been replaced. This process had to be carefully managed to ensure office workers and the retail units under the station weren't affected. "A lot of time, energy, effort and discussion in workshops was needed," says Rebecca Boorman, ChapmanBDSP's principal mechanical engineer. Four air-cooled chillers were installed externally to maintain cooling while the main chillers were replaced. These have been retained to provide cooling to IT spaces. Boorman says the building's complexity made routing new services difficult and a lot of thought went into ensuring even lighting and air distribution in the odd-shaped rooms on the ninth floor.

Physically getting the tri-gen plant in was a challenge as there was just 100mm clearance between the units and the building. Office workers couldn't be disturbed, which meant noisy work was carried out at night. "There was a theatre next door so we couldn't start [noisy] work until after 11pm," says Simon Brown, M&E specialist Michael J Lonsdale's project manager.

Brown says the firm worked 24 hours a day, seven days a week for 42 weeks to get the job done.

WHAT IS THE REFURBISHED BUILDING LIKE?



The building entrance is below Charing Cross station, with the main building over the station

Embankment Place was designed by Terry Farrell and completed in the early nineties and over time became increasingly cluttered inside. Cellular offices ringed the two atriums inside the building,

blocking out natural light to the office floors. The atriums were used as a space for smokers and vertical circulation was difficult as the stairs were hidden away, putting pressure on the lifts.

“Hardly anyone knew the stairs were there - the carpets were so pristine we considered reusing them,” says Harrington. The entrance, below the station, was dark and stank of the chlorine in the entrance fountain.

Architect TP Bennett is responsible for transforming this tired, awkward and unloved building into a modern office space. The fountain in the entrance has gone and the space is now light and bright with a huge information screen at one end. Workers have their own lifts and client lifts service the first and ninth floors where there are dedicated client reception areas.

The cellular offices have been swept away, leaving large, uncluttered floorplates open to the atriums, allowing natural light to flood in. Although largely open plan, there are plenty of