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COMBINING HOSPITAL MANAGEMENT & HOSPITAL BULLETIN MAGAZINES

DECEMBER 2017



## Introducing the IHEEM award-winners' innovative sustainable energy scheme



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# Introducing the IHEEM award-winners' innovative sustainable energy scheme

**D**escribing the first month's performance of the IHEEM Sustainable Achievement Award-winning scheme at Oxford University Hospitals NHS Foundation Trust, Claire Hennessy, head of operational estates and facilities management, tells *Hospital Times*: "The figures are amazing. It's exceeded our expectations and then a bit more."

The trust is already seeing a significant reduction in its fuel bills. In October 2016 the energy bill for the retained estate across the two sites - John Radcliffe Hospital and Churchill Hospital - was £484,177. In October 2017 the same bill was £252,832.27, a saving of £231,343.03. That's a saving of £7,462 a day in the first month of operation of the combined heat and power (CHP) system. However, these are early days. The data will be carefully monitored over the coming months to get a truer picture.

The innovative £14.8m project, which includes a 2.2km energy link between the two hospitals, has been delivered by the trust's commercial partner Vital Energi under the Carbon Energy Fund (CEF) framework.

Hennessy explains: "This is a new era of sustainable energy provision for the trust. For the first time in decades, we are going into the winter with reliable heat and power, while cutting our CO2 emissions and saving on our energy bills and backlog maintenance."

Previously, the John Radcliffe site had four high temperature hot water boilers from the 1970s. These were subject to continuous issues with their performance and that of the hot water pipework. It was a continual fight.



Mark Bristow, lead project manager for the hospital energy project, by the 2.2km energy link between John Radcliffe and Churchill Hospitals



Claire Hennessy, head of operational estates and facilities management, Oxford University Hospitals NHS Foundation Trust

The Churchill site had heavy oil boilers from the 1960s - Hennessy's "worst nightmare". The oil went to gel when it was cold, it was very difficult to move. It also caused pollution issues in the neighbourhood. The generator was one left behind by the Americans after the Second World War. The trust's team were subjected to delays for any parts as they had to be handmade.

There were problems on a huge scale, at two acute hospitals - too big to undertake as a capital scheme. All the services were becoming critical.

"Mervyn Phipps, my predecessor, spoke to CEF and kickstarted the energy scheme with Mark Trumper, the director of estates at the time," says Hennessy. "They went through the tender process and Vital Energi was selected as the preferred bidder in 2013. The basic tender was for replacing the existing plant. Vital came up with the idea of the energy link and the guaranteed savings of £460,000."

"In 2014, Mark asked myself and Edel Wyse, the financial accountant for estates, to prepare the business case. Once we received the trust board and Technical Design Authority approval, it was full steam ahead. That was March 2015."

The team began working with Vital to organise a schedule of work and with CEF to start pulling together the scheduling and the contract. Vital started on site in September 2015, with a view to completing by December 2016."

Early concerns were raised on the digging of the energy link through residential Headington. It became apparent by December 2015 that the trust needed to work closely with the wider community to

achieve a solution that worked for the trust and the community.

Jo Lennon, community and stakeholder liaison, explains: "The scheme was approved by the County Council's Highways Committee, but there were objections from residents. The City Council became involved. Vital had to put in a planning application, the first in the UK. There was a nine-month hiatus for the planning application. No-one could move it any quicker. From the trust's point of view, the delay did not cause any issues in terms of patient care or the final delivery of the scheme."

## Engaging with residents

"During the process we engaged with residents to explain the project and reassure them that the area outside their homes would be properly managed and phased. This went down to individual cases, such as people with mobility issues and sight problems."

Some residents did not understand the project, they thought the entire 2.2km of the energy link was being closed for the nine months. Once they realised the work was being done in sections and that they would be directly affected for three weeks, it became much easier. Temporary car parks were made available at the John Radcliffe and Churchill which only the residents could access while the work outside their homes was completed.

When Vital's engineers started work, it all went very smoothly. The phasing was tight and it all worked perfectly. The trench was built in 30m sections by two dig teams. Each section taking three weeks. So, as promised, the disruption per household was three weeks.

There were concerns that the scheme would cause traffic problems, but the traffic management was very well managed and kept to a minimum. Vital's district heating team were exceptional, very accommodating. They worked over Easter weekend and from 7am to 7pm at London Road, a particularly busy junction.

As a sign of the quality of the Vital engineers' work there have been no remedial road works required since the link was completed.

Hennessy adds: "The care they took with residents was superb, really impressive. They're a very dedicated team.

"The energy link is 2.2km. Amazingly there's only a three-degree heat loss in the water in the pipe. The trench is 1.2m wide with ducts for return heat pipe, HV cables and communications. There are spares for HV and communications if needed.

Describing the energy scheme in more detail, Mark Bristow, lead project manager for the hospital energy project, explains: "The first part of the scheme was the fitting of 7,000 lumens. This gave us savings from the start. The light output is tremendously improved. Staff comment on how much better it is. It enhances the work environment.



Vital Energi's district heating scheme installing the energy link

"The project scope is the replacement of primary plant, heating hot water, that plant then interfacing with our secondary plant in the form of plate heat exchangers. The establishment of the energy link then allows us to transfer energy between the two sites."

The CHP is a 4.5MWe engine providing power to Churchill and John Radcliffe - these sites then only needing topping-up by the National Grid during peak hours.

Having this engine has allowed the trust to replace the high voltage switchgear at Churchill with modern switchgear. The HV at Churchill was funded by operational estate capital allocation.



Cutting the tape at the opening ceremony, Anneliese Dodds, East Oxford MP and Shadow Treasury Minister

Also, at John Radcliffe a combination boiler and upgrade to two steam boilers. At Churchill we've installed two new boilers with space for a third, or potential CHP if we wish, and a packaged steam unit.

On both sites there is new pipework from the respective energy centres to various plant rooms, where there are plate heat exchangers. The scheme has also seen the installation and replacement of some gas boilers in outlying areas.

The trust has optimised our BMS. That, combined with Vital Energi's Scada system, is supplying lots of data, enabling the team to see energy usage. This makes it easier to budget and forecast, and aids sustainability management.

The scheme has been an opportunity for the trust to save energy and increase capacity, while reducing emissions by 10,000 tonnes a year. It has also reduced backlog maintenance by £11m over three years.

## Replacing two wet cooling towers

Bristow adds: "As a variation to the contract, we have commissioned Vital to replace two wet cooling towers at John Radcliffe with seven adiabatic cooling towers. Replacing

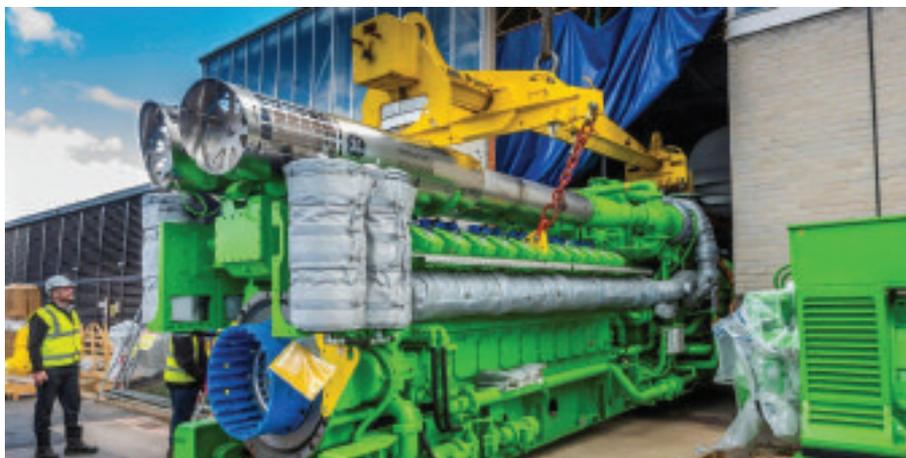
one of the chillers was always part of the programme. It's a £2.5 million variation which the trust has capital funded.

"We had three old absorption chillers. The new chillers comprise one LTHW, one electric and one HTHW, so we'll have resilience built into the system."

John Radcliffe is quite unusual in that the heat load and the electrical load are the same at 4.5MWe, so we can benefit by a 4.5MWe CHP. At night we can take the full load of John Radcliffe and Churchill. Also, during the night, John Radcliffe has a high electrical load. Churchill does not import any electricity.

Acknowledging the role played by her team, Hennessy explains: "For an operational estates team to deliver this has been a huge undertaking and I'm immensely proud. It was a big decision by the trust to allow the team to do this rather than a capital team or a contractor. It was a key part in formulating the close working relationship with Vital and maintaining the services. Our team took ownership of the project.

"From my perspective, by enabling me to free-up the team from this work, we're able to focus on other areas within the trust. We can start to become more proactive, rather than reactive."



Delivering the 4.5MWe CHP engine



The award-winners at IHEEM's Healthcare Estates conference. Mark Neal, second left, Claire Hennessy and Mark Bristow, with Julian Amey, IHEEM chief executive, left, and snooker ace and guest speaker, Steve Davis, right

There was a very good working relationship with Vital Energi from the outset - which is why it was so important that operational estates were in the driving seat. Together they could plan the shutdown and replacing of equipment and make sure that they went smoothly and dovetailed into other work that was being undertaken to keep the old boilers going.

Hennessy says: "It was never a tedious task getting it together. We've all viewed it as a 25-year partnership to provide an effective energy service for effective patient care."

Steve Black, a director of Vital Energi, says: "This has been a very innovative scheme. The first of its type in the NHS in England. I would like to thank Oxford University Hospitals for their support and their passion.

"The trust has a centralised energy generation plant that can provide low carbon and resilient energy supplies to both hospitals - saving money which can be re-invested into clinical services."

The scheme is an example of what can be achieved when the public and private sectors work together as a fully engaged team. Linking the two hospitals delivered the most effective returns compared to two separate schemes. It has saved more money and more carbon, with the trust seeing savings higher than those envisaged.

This is a trigeneration scheme. A combined heat and power and cooling

system, using heat generated by the CHP unit to generate chilled water for use in the hospital cooling system.

Rob Hilliard, principal development manager at Vital Energi, says: "This is the most complex but interesting project I have ever worked on. It's already won one award, but it won't be the last. It's a unique scheme. Many hospitals could learn from this."

Ashley Malin, project development director at Vital Energi, adds: "In addition to the significant financial savings, this project delivers significant benefits to the local community in lower CO2 emissions.

"Vital Energi would like to thank the many residents and councillors who gave us such support at our monthly liaison meetings. Their involvement and local knowledge were very valuable. They were enormously helpful."

Local resident, Nicholas Rollin, says: "In the beginning there was a tremendous information deficit. The residents initially didn't want it going on. When consultations took place, everything was ironed out. Once the impact on homes and access was taken on board, everything went very well. The actual execution of the scheme was very efficient. We're all happy."

## Delivering innovative ways in saving energy

Performing the opening ceremony, Anneliese Dodds, East Oxford MP and Shadow Treasury Minister, says: "The scheme has already delivered ways in saving energy. People have learned a lot.

"This is an innovative hospital, with innovative ways in saving energy. We need to have more of these innovative energy projects across the country and we hope that other NHS organisations follow the lead."

Peter Fairclough, a director of the Carbon and Energy Fund, says: "This is the first district heating scheme procured under the CEF in England and externally funded.

"It's a very exciting scheme with innovative technology. It gives full operational risk

transfer and backlog reduction. Using CEF framework external funding and the CEF contract, it guarantees operation and financial savings to the trust for 25-years.

"We're pleased and proud of such a prestigious scheme," explains Fairclough. "As with any project there have been problems to overcome but the excellent working relationship between the trust team, CEF and Vital Energi, facilitated through the framework, has secured an extremely successful outcome for all parties

"This excellent scheme adds a significant contribution to the CEF portfolio of financial and carbon savings to the NHS."

Mark Neal, the trust's director of estates and facilities, explains: "We're master-planning and getting successful infrastructure schemes like this gives us a springboard to move forward with the redevelopment of our aging estate. We've been able to address several issues, not least energy efficiency and reduce emissions to give cleaner air. We've also been able to demonstrate that we can reduce our backlog and increase our resilience.

"The fact that this was very much an engineering project meant that we needed to have close liaison. Managing the project by operational estates enabled us to maintain the engineering focus."

The Oxford University Hospitals project demonstrates that it is possible, in the current economic climate, to undertake significant infrastructure projects. The project-finance funded initiative enables the hospital capital to be used on other priorities whilst still demonstrating reduced energy costs. "CEF have been instrumental in this and we appreciate their guidance and assistance," says Neal. "Vital Energi has also been accommodating and a good partner."

Hennessy adds: "We've replaced energy facilities at two hospitals over a two-year period without any disruption to patient services. We have the capacity to extend the system in the future. It's part of our sustainable resilience of the infrastructure."

For further information, call Vital Energi on 01254 487 045, e-mail [sales@vitalenergi.co.uk](mailto:sales@vitalenergi.co.uk) or visit [www.vitalenergi.co.uk](http://www.vitalenergi.co.uk)



Mark Neal, director of estates and facilities Oxford University Hospitals NHS Foundation Trust



Ashley Malin, project development director at Vital Energi, left, and Peter Fairclough, director of the Carbon and Energy Fund