



Immediate (Integrated Management of Margins through Evaluation, Design, Analysis, Tracking and nEgotiation)

Benefits to: NHS Hospitals, Estate Directors, Estate Managers, Estate Officers, Building Service Consultants, Building Service Designers and Providers, Energy Managers.

“if you look at the culture ... within the public sector, buildings generally I think, there is a fear of getting it wrong, which is so extensive, that the level owed to the design or overcapacity, that goes into these schemes is crippling”

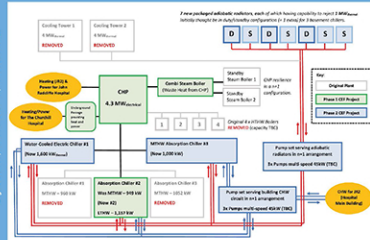
- Estate Director, NHS



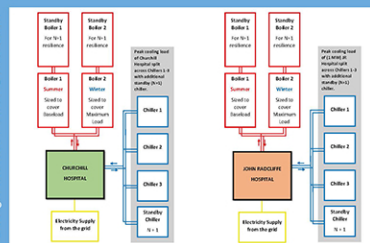
Summary

Over-engineering of systems is an often hidden source of inefficiency in building systems within building service systems. It significantly increases their design, installation and running costs, and reduces the sustainability of the system. The project carried out a case study of the CHP and the chiller installations at the Oxford John Radcliff hospital, a recent PFI project.

CHP Network Diagram - Original System, Phase 1, Phase 2



CHP Network Diagram - Alternative Design without Power Generation

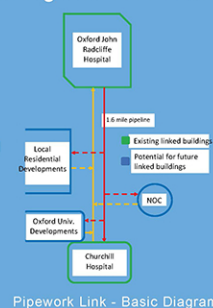


While the system studied during the project makes considerable savings compared with the antiquated boiler system it was replacing, different stakeholders realised that their system was oversized, but could not quantify the amount, or cost the overdesign. Stakeholders are not aware of the rationale behind the upgraded specification of the system, intended for much greater demand than that which transpired, and consequently the margins remain, and are not challenged. The case study illustrated how a previously rational decision can ultimately lead to an oversized system.

Impact and Value

Oversizing building services:

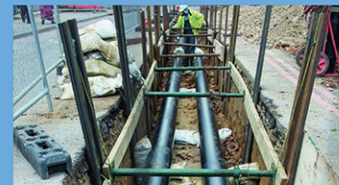
- considerably increases initial capital costs and long-term running costs
- negatively affects sustainability through excess energy use
- excess heat produced is frequently vented to the atmosphere, rather than harnessed for other purposes



Pipework Link - Basic Diagram

Key Findings

- Building service systems can be very oversized
- The size of new system often based on the capacity of existing systems, rather than on need
- The rationale for the system architecture and size is often lost
- Resilience requires some system duplication - this may be reduced by solutions from outside the system
- The language of making “savings” from a new system, against specified base lines, can obscure significant overdesign



Underground District Heating and Power Network

Next Steps

- A proposal is planned to address
 - Decision making processes in the NHS including an analysis of the risks that need to be considered for resilience
 - Modelling and visualizing margins on interconnected parameters
 - Capturing and managing data related to current and future energy, water and heating needs.
- Developing sizing guidelines for the building services in the NHS
- Predicting the future energy use of hospitals based on estimates of patient care trajectories, climate data and environmental requirements, and medical equipment use.
- Developing system architectures for flexible and upgradable building service systems

Long-term Vision

The long term vision is to contribute to adequately sized and interconnected systems of systems for providing energy, heating, cooling that,

- utilize capacity by combining different types of systems, that can be brought on-line as required, from non-critical parts of the system or from external sources;
- and which can be upgraded easily through a modular architecture.

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