Digital assessment of hospital environments

Andrew Rolf
Associate Director,
Heatlhcare Design Lead

The challenge of the decade is bringing an aging NHS health care estate to a condition where all Healthcare specific standards can be met whilst meeting Net Zero Carbon targets and overcoming the back log maintenance hurdles. Modern digital and data backed technologies and methodologies will be essential in achieving these key goals.

The surveying, assessment and monitoring of existing hospital buildings is always a challenge, balancing the need to gather on site information with the limitation of disruption to the clinical operations.

The NHS estate is vast, and wholesale replacement is not viable whilst striving towards reducing carbon in construction and striving towards the Net-Zero NHS aspiration.

'Building Nothing' is the foremost way of limiting embodied carbon. However, it requires the detailed understanding of our built assets, both healthcare and non-healthcare to determine the potential for reuse and adaption. In addition to dealing with immediate demands to understand our built assets for reuse, there are challenges due to inherent problems such as RAAC (reinforced aerated autoclaved concrete) panels and poor energy efficiency.

In use, the energy performance of the existing health care estate is highly variable, and the recording accuracy challenging. This is exemplified through the ERIC returns.

So, we need better data, both on physical condition and operational energy.

Arup's Net Zero Carbon Healthcare guide

For the physical estate, digital surveying and monitoring techniques have a significant part to play in both the maintenance, assessment and appraisal for adaption of existing structures.

For initial data collection, the use of 3D scanning and digital recording can have a significant part to play when forming the baseline appraisal of the existing asset. These techniques can quickly capture a digital representation of the existing estate, as well as providing imagery for future understanding. This limits the time spent gathering data, which can be highly disruptive to clinical operations.

Real-time monitoring of physical assets is not unusual.

Vibration, movement, stress / strain monitoring is often used during construction – providing informed construction methodology choices within the healthcare environment. This form of survey can be used as part of active stakeholder engagement during design and construction.

For existing construction containing RAAC - active monitoring may be installed to review movement data in real-time, tied to climatic or loading changes. Wide scale data collection of this form being useful to inform remediation decisions.
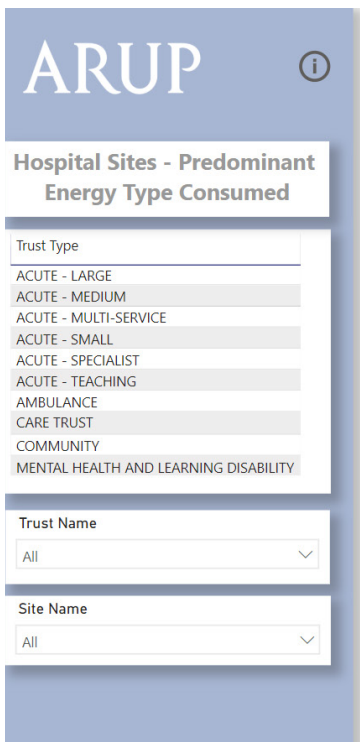
Fabric performance of the existing estate can be reviewed using thermal imaging to target interventions to improve fabric performance. Fabric performance improvements being critical as we look towards reducing operational carbon

in existing healthcare facilities – aligning the performance to proposed lower-carbon targets.
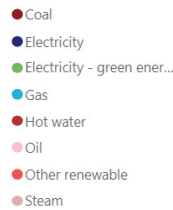
By linking physical and operational performance surveys, we can develop holistic Building Performance Optimisation models that review, appraise and evaluate constructed assets.

Sensors can be added to existing BMS systems to create a greater array of real-time data points to harvest system performance data. This data can be used to optimise performance, fault-find and complete validation of estimated energy saving predictions.
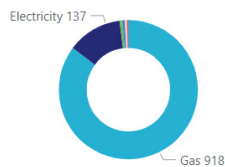
Connecting all such data points, both physical and operational, can lead to a holistic estate appraisal that – in the ideal – would automatically report to the central digital system; automating ERIC returns.
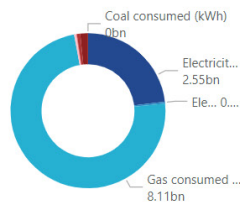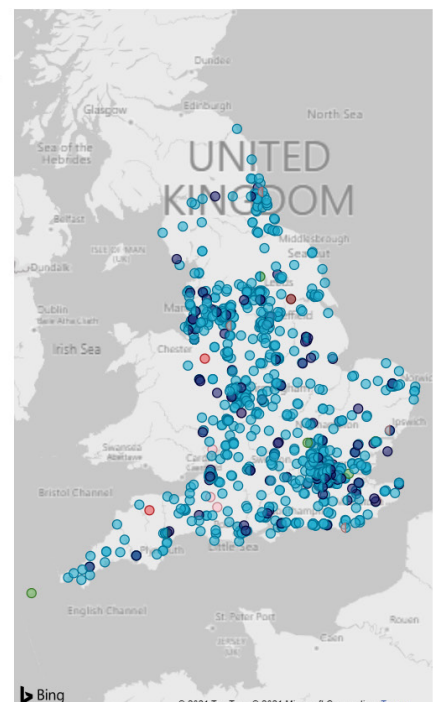

Arup ERIC return dashboard