Mechanical and electrical systems integration

Key Findings: Retrofit project team perspectives

Analysis of a selection of Retrofit for the Future projects
The Institute has partnered with the UCL Energy Institute (UCL-Energy) on an independent analysis of the UK’s leading domestic retrofit demonstrators: the Technology Strategy Board’s £17 million Retrofit for the Future (R4tF) programme. Eight projects consisting of ten houses were selected from 25 R4tF projects in London based on their social and economic diversity.

This summary is one of four based on a series of interviews with Project Teams working on R4tF projects as part of the wider analysis. This summary focuses on the critical importance of careful integration of M&E systems and renewables in the retrofit process.

**Whole-house heat recovery ventilation**

The implementation of different M&E systems can have a significant impact on the overall performance of the retrofit. This includes various aspects of the installation and implementation, such as the availability of skilled labour to implement innovative systems, the integration of various systems with one another to ensure that they work optimally, the supply chain’s ability to meet demand for innovative technologies, and occupant expectations of performance and usability.
Improving systems installation and resolving installation issues

The management of systems installation needs to be handled carefully to ensure that the site and design teams can deliver a successful project for the client. Clear communication between the site team and the consultants will help to ensure that any snags and defects are addressed quickly and appropriately. Integration of system elements and coordination can be assisted by prioritising the effectiveness of the installation work through improved site management.

Recommendations:

- The involvement of an M&E services consultant throughout projects was considered to be essential. It is suggested that this should also include the employment of an “on-site M&E coordinator” with combined expertise in both heating and ventilation systems.
- The M&E designer should be informed by the site operatives of any snags in the system’s operation as soon as possible during installation. This enables issues to be resolved as quickly as possible.
- It is important to engage with utility companies early in the retrofit process to ensure that any enabling works (e.g. installation or moving of meters) are completed on time.

Renewable energy systems and resource recycling

Renewable energy systems can be essential for achieving more challenging energy and CO₂ targets in retrofit projects. Renewable systems should be selected and sized in conjunction with fabric and M&E systems and with careful consideration of relative costs. Renewable energy systems considered to be most suitable for domestic retrofit include the following:

• Solar thermal systems

Solar thermal installed on a rooftop

Solar thermal systems were installed in all eight of the R4tF sample projects. In principle, the use of solar thermal systems has been found to be an especially successful strategy for domestic retrofit properties due to their effectiveness in meeting hot water demand. In practice, however, system performance can be compromised by poor installation practices and poor control strategies.
• PV systems

Photovoltaic (PV) systems were installed in six of the sample R4tF projects. While solar thermal installations are often prioritised in retrofits, PV systems can be installed alongside them when enough roof space is available.

While PV systems appear to be more expensive than solar thermal installations, they require simpler controls and should be considered – even for single house projects.

Low-profile PV panels which can be installed in the plane of the roof can provide an effective solution in the case of stringent planning restrictions, since they can be viewed more favourably by planning officers (Case C).
• Water harvesting and recovery systems

Combined rain and grey water harvesting systems are often used around Europe; as a result there is a large, experienced labour force on the continent. These skills are less developed in the UK market but could represent a significant business opportunity for skilled individuals given the likely future demand for these systems.

The operation of waste water recovery systems may be affected by existing low water pressure levels (Case A). These issues must be resolved before the installation of such systems to ensure efficient operation.

For one of the sample R4TF projects (Case F) a water harvesting and recovery system was initially proposed. This was changed to a rainwater harvesting system due to the cost and grading of the site, which in turn added the complications of installing an underground tank, and further costs associated with the excavation works required. This harvested water is used for toilet flushing and washing machine operation.