SMART UP

# Smart Social Housing: Ideal Smart Solution vs. Real-World Compromise

FACT SHEET

Smart homes offer reduced energy demand, improved indoor air quality and comfort, whilst reducing carbon emissions. However, putting smart technologies into practice—especially in social housing—involves facing real world challenges. This factsheet highlights the compromises that had to be made when smart solutions including ventilation, renewable energy generation, energy storage and electric heating and hot water systems were applied to six single storey homes near Swansea, Wales (UK).

## 1. Mechanical Ventilation with Heat Recovery (MVHR)

**Design Requirement:** Deliver fresh air at controlled temperatures to maintain air quality and reduce energy use.

| Ideal Smart Solution | Constraints |
|---|---|
| Fully automated system with temperature control. | Building regulations, user knowledge limitations, and cost for more sophisticated systems. |

**Technical compromise:**

- Continuous ventilation to meet regulations (SRI 0).
- Heat recovery modulation based on air exhaust sensors (SRI 1).
- Central humidity-based control for prevention of mould and condensation (SRI 3).
- Manual boost via a timed switch for odour and moisture control during periods including extreme moisture generation (SRI 0).
- Manual override to enable system to be maintained for safety purposes and regulation compliance.

## 2. Electricity Generation and Storage

**Design Requirement:** Generate and store energy to reduce carbon emissions and energy bills.

| Ideal Smart Solution | Constraints |
|---|---|
| Intelligent coordination of renewable energy generation, on-site storage, and grid interaction. | Complex utility contracts, behaviour change to optimise PV and battery potential, ownership of generated energy, secure access to technology minimise risk of damage or misuse. |

**Technical compromise:**

- Renewable energy generation and storage used without grid interaction (SRI 1).
- Scheduled electricity use, no user interaction (SRI 1).
- Smart metering actual values and historical data for electricity generation (SRI 2), real-time feedback on electricity consumption (SRI 2) and providing performance evaluation including forecasting and benchmarking for electricity storage (SRI 3).

# 3. Heating and Domestic Hot Water (DHW)

**Design Requirement:** Deliver consistent indoor temperatures and DHW at a safe temperature whilst reducing fossil fuel based energy demand.

| Ideal Smart Solution | Constraints |
|---|---|
| Fully automated heating and hot water from community Ground Source Heat Pumps (GSHPs) integrated with solar PV systems and energy storage. | Regulation limits, need for user temperature control, individual GSHPs system, cost of simultaneous heating and hot water control system. |

**Technical compromise:**

- DHW has automated hot water temperature to ensure legionella prevention (SRI 1).
- DHW automated storage charging and setback thermostat to optimise charging in relation to PV generation (SRI 1).
- Room heating controlled through individual thermostatic radiator valves (SRI 2).
- Heating fluid distribution temperature pre-set during installation (SRI 0).
- Prioritization of hot water delivery other than heating when outdoor temperatures are above 3°C.

## Conclusion

The case study shows that the smart solutions implemented are bounded by building regulations as well as client decisions, budget and utility companies' constraints. Strong collaboration between stakeholders from planning through design, procurement, installation and maintenance, and operation helps to align smart home goals with practical constraints. Collaboration shows design solutions are always a compromise between ideal smart solutions and the real world as targets related to how smart decarbonisation needs to be are negotiated throughout the project life. This challenges the idea that successful energy transition depends mainly on high levels of smartness, highlighting barriers and opportunities to achieve good levels of performance should be grounded in specific context.

After the completion of this project (2021), social landlords understood the need for consistent and long-term engagement with end users and the design team to optimise building operation. The national energy market has also developed with utility companies now providing a range of flexible tariffs and energy export options.

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