



Case Study: Dextra Court, Basingstoke

The Challenge

Dextra Court is social housing block of 56 flat units in Basingstoke, managed by a Housing Association, Vivid. It was a 2015 commercial conversion to residential an all-electric energy source, but with history of tenant complaints for high energy bills. Vivid asked Neutral Home to propose how a zero carbon transformational retrofit scheme could be creatively funded to meet future legislative requirements.

Measuring the Baseline

Our start point was to monitor the energy consumption on site to provide a firm baseline for the business case but also insight into where improvement could come. It revealed it great deal and many of the reasons for the tenants' complaints;

- 28% of the site power was being consumed in the communal areas outside of the flat dwellings with poorly controlled lighting, heating and ventilation.
- Tenant's flat bills had risen by almost 40% year on year as a result of poorly matching and renegotiated central electricity contract.
- There was a wide variation in monthly bills across tenants, but some were over £ 250 per month and becoming unaffordable and risking rent arrears.
- Although the units were EPC rated C and D, 25% of the units were performing either a level or two below this.
- 85% of the flat unit's consumption came from space and water heating.
- Tenants were not aware or not able to benefit from a much cheaper night rate tariff that was in operation.

The energy data insights led us to thermal image the building and the results were shocking revealing during the 2015 refit, no insulation in the internal walls with the outer surface being blanked off window glass, see below:



It was confirmed that the building conversion had been done on a shoe-string budget and this insulation had been omitted. This development decision had not been widely communicated resulting in an EPC rating that was incorrect and undersized panel heaters installed in the flats. The tenants were cold and had sky high energy bills highlighting the need to understand the impact of design decisions on the life cycle running cost.

Economic Modelling

From the energy monitoring, we built an economic model to inform the macro design decisions. The capital cost of retrofit was going to be high to fix the infrastructure issues and this would require some very significant energy savings to make this pay. This drove us to an “all in” solution where we needed to pursue every energy saving and do so in a very orchestrated and optimal way.

The Solution Proposed

The solution had four elements;

1. A communal area energy management automated solution to control lighting, heating and ventilation.
2. An integrated and replicable “in-flat” heating solution combined with cavity wall insulation.
3. A building level micro-grid to generate 95 mWh p.a. of solar power and 300 kWh battery to store and distribute it on a daily basis.
4. A communal integrated Electric Vehicle charging station that could be used to generate revenue from the wider public due its ideal proximity to the train station and town centre.

To extend the benefits, this would be coupled with an optimally matching energy variable time of use tariff from a genuine renewable energy source. Overall this would save 76% of the site’s energy bill and deliver net zero emissions.



Neutral Home Pilot HA Project: Solution framework

Four solution elements combined with an optimal Time Of Use (TOU) tariff will deliver a 76% energy cost saving

Baseline Consumption	Solution Elements	Energy Saving	Optimal TOU Tariff	Cost Saving
144,000 kWhs (£ 22,500) p.a.	1: Landlord Supply Solution	→ 56% Energy Saving →	New Energy Deal Base on TOU Tariffs Octopus Business Triband Day : £ 0.117/kWh Night: £ 0.099/kWh Peak: £ 0.313/kWh	→ £ 14,000 p.a. (saving 64%)
378,150 kWhs (£ 59,000) p.a.	2: In Flat Solution	→ 33% Energy Saving →		→ £ 29,000 p.a. (saving 50%)
335,000 kWhs (£ 81,500) p.a.	3: Building Micro-Grid	→ 35% Energy Saving →		→ £ 16,000 p.a. (saving 66%)
Additional Power to Charge EVs 47,000 kWhs (£5,300) p.a.* * Average over ten years	4: EV Charging Platform	→ 10% Energy increase →		→ £ 2,750 p.a. (Net Revenue)
Total	570,000 kWhs (£ 86,800 p.a.)	253,000 kWh (55% Energy Reduction)		£ 61,750 (Cost Saving 76%)

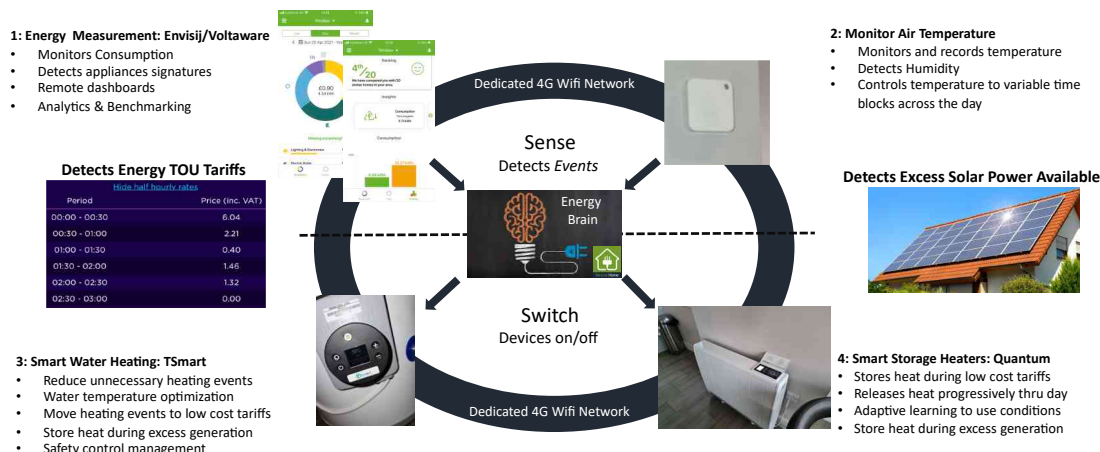
The Need to Test the In Flat Solution

We modelled the key saving risks and realized that the “In Flat” solution element had the biggest savings and the highest exposure to technology risk and variable human behaviour !

We decided to test this conceptual solution in a monitored test flat environment. We built a technology prototype made up of five elements as shown below:

Neutral Home Integrated Heating Technology: Controlled by the energy brain

An automated solution to control 85% of the flat’s energy cost



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This in flat solution focused on the space and water heating and integrated five IOT technologies:

1. A more accessible energy monitor that helps tenants understand their consumption and how they are saving money.
2. A remote temperature sensor that is used to manage the flat’s internal temperature.
3. A smart thermostat for the water immersion tank to optimize how and when water is heated
4. Smart storage heaters that store power at cheap times and release it progressively through the day.
5. Controlled by a smart central home brain that detects events such as high/low tariff periods, high/low temperatures and available excess solar power and switches on/off storage devices in the home.

The results have been encouraging so far demonstrating up to 40% savings on the space heating as shown below matched with the right tariff.



By “moving” the heating event to early morning would save between 25-40%, depending on the tariff



Tariff Type	Before		After	
	Cost/Day	%	Cost/Day	%
Flat Rate	£ 5.71	100%	£ 5.71	100%
Day/Night	£ 5.52	97%	£ 4.27	75%
Tri Band	£ 5.68	99%	£ 3.89	68%
Agile	£ 4.77	84%	£ 3.36	59%

The Funding Mechanism

The origins of Dextra Court’s issues were the lack of available budgets and the issue how the landlord recovers the money from the tenants who will benefit from lower energy bills. A funding mechanism was established with the following features;

- Aggregating demand and gaining volume discounts on the retrofit equipment to lower the total capital cost.
- Optimised installation costs, through using common "super" installers across technologies.
- Vivid lends the tenants' homes (not the tenants) the retrofit cost over a ten- year period which is repaid on a monthly basis from the energy savings.
- Neutral Home on behalf of Vivid sources an aggregated energy contract on behalf of all the tenants with an optimal tariff structure to monetise the energy savings.
- The tenants benefit from a net 15-20% reduction overall on their monthly bills.
- Vivid benefits from improving the EPC rating to B, increases revenue through greater tenant retention and lower rent arrears.
- Neutral Home monitors the energy performance that underpins the financial formula.