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Housing and smart grids – two London based projects explore the potential for homes to balance the national grid



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Recent advances in technology offer some exciting opportunities to improve energy efficiency while improving properties, reducing emissions and cutting energy bills. In early November **RE:NEW** hosted an event to showcase practical examples of these advances including robotic under floor insulation, battery storage and virtual metering.

These developments are important as the task of improving the energy efficiency of homes is huge and once lofts, light bulbs and cavity walls are addressed, remaining energy efficiency opportunities can be both expensive and disruptive.

This blog looks at two innovative projects which tackle residents' energy bills and carbon emissions and, importantly in the current context of limited budgets and scarce grant funding, can create future revenue streams

via smart grid technology. The first, involving **virtual metering**, is at Westminster- based landlord City Homes West and the second, featuring **battery storage**, is led by Camden Council.

Both projects employ new technologies that save residents money now, but also have the future capability to respond dynamically to **smart grids** to balance grid level supply and demand peaks. Battery systems and electric storage heaters can be remotely charged and discharged (or turned off in the case of storage heaters) during periods of high and low grid demand to smooth out energy usage spikes and exploit grid price fluctuations. At scale this approach, known as grid balancing, can reduce the requirement for on-demand gas and coal fired power stations and, what's more, the service can be monetised.

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Virtual metering of storage heating

Residents of eight towers including blocks in very deprived communities of Westminster are already benefitting from technology enabled smart energy. The owner of the blocks, Westminster City Council, has used 'virtual metering' to cut energy bills by 30% and at the same time improve thermal comfort by shifting 30% of electric heating demand to daytime.

Built in the 1960s and fitted with electric storage heating in the 70s, the tower blocks' 840 homes were due a heating upgrade. The meters supplying the storage heaters were registered to Westminster City Council who provided a heat with rent service and divided electricity consumption for each block equally between dwellings.

Instead of removing and replacing old electric storage heaters, a costly and intrusive process, City West Homes, the City Council's Management Organisation, replaced grid controlled transmitters with independently controlled panels linked to external temperature sensors. A 'virtual energy meter' was registered and each flat's analogue meter was replaced by a smart meter to feed individual electricity consumption data in real time to a central server where the data is gathered.

By aggregating energy consumption across 840 flats, City West Homes was able to negotiate industrial and commercial energy tariffs with half hourly metering and reduce tariffs. The improved tariffs, combined with the new control system allowed a change to heating cycles to spread heating periods through the day and evening. This has improved comfort and reduced the need for expensive secondary heating while still reducing costs from 9.40p to 5.94p per kWh.

Battery storage

Battery storage has attracted a great deal of media attention but to date only around 1,500 residential batteries have been installed in the UK, compared to around 50,000 in Germany. Camden Council, working with Islington and Waltham Forest Councils, is one of the first UK councils to deploy a battery storage project. The consortium secured funding through National Energy Action (NEA) to install 41 batteries and funded the accompanying solar panels themselves.

Camden Council has several thousand street properties, many Victorian or Edwardian, which are

classified as 'hard to treat' and, as many are located in conservation areas, solid wall insulation and sash window replacement is tricky. Solar combined with storage fitted under permitted development was therefore an attractive option.

Camden Council is trialling three batteries: Moixa Maslow, Sonnen and Growatt. The batteries were chosen for their compactness, performance and availability.

Initially, these batteries will reduce household electricity bills by capturing solar electricity produced during the day when energy use is usually lower. Standard industry estimates suggest combining batteries with a solar system can raise on-site usage of solar electricity from 25% to 75%.

This trial will test such assumptions and compare the benefits resulting from different battery capacities, power outputs, household usage and solar system size. Performance is being closely monitored and NEA will undertake the analysis and publish the findings.

While the focus is on cutting residents' energy bills and cutting carbon emissions, grid balancing offers potential revenue generation opportunities here too. While these projects aren't yet providing a dynamic **grid balancing service**, they have the technical capability to do so and are well placed to exploit the commercial opportunities of smart grids as they develop.

Grid balancing

Grid balancing helps National Grid to cope with the peaks and troughs of energy demand and supply. For some time this has been operated through commercial arrangements with industrial sized energy users to modify their usage patterns to help balance out grid energy peaks and troughs. Now this same theory is being applied to aggregate smaller domestic systems across hundreds of sites to provide the same service.

[Project Eric](#), based in Oxford, has been testing this potential using domestic sized batteries while others are trialling electric storage heaters. Even household appliances can be programmed to be switched on or off in a fraction of a second to respond to grid capacity fluctuations.

Commercial packages which enable revenue generation from this service are already on the market

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and are set to become more widely available. Current offers include a financed upgrade to smart storage heater controls and a fixed annual payment to customers with batteries. In return, customers agree to allow automated electric balancing controls that shift non-time sensitive demand without noticeable impact on end users. This might include for example, automated drawing down from storage heaters or battery storage when electricity generation and demand is imbalanced.

David Wickersham, who led the virtual metering project for City West Homes, sees huge revenue potential in providing grid balancing from storage heated homes and has been testing these options. He is however taking a cautious approach, wary of entering contracts that may undervalue the project.

If you have electrically heated homes which need upgrading and you are interested in understanding potential grid balancing or you are interested in battery storage trials and the potential for revenue generation opportunities, please contact the **RE:NEW** Support Team for help with your options appraisal.

Jamie Abbott is an Energy consultant for the RE:NEW Team. Please contact Jamie for more information on how **RE:NEW** can help with your options appraisal.

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