

The **NEXT** generation

While 'fabric-first' is the current buzz-phrase of sustainable housebuilding, micro energy generation is still vital if homes are to maximise their green potential. ROGER HUNT reports on some of the latest technology available



Solar PV arrays under construction on Code Level 6 townhouses designed by Assael Architecture at Renaissance, a mixed-use and sustainable scheme developed through a collaboration between Lewisham Council and Barratt London



When building new homes, the emphasis has increasingly been on reducing energy demand through the adoption of a fabric-first approach coupled with the use of energy-efficient devices. This does not mean that local energy generation is not important; at the very least hot water and electricity are required, even where the highest performing fabric is employed.

Housebuilders have a range of technologies to choose from. Greenhouse in Leeds – the Energy Saving Trust’s Micro Generation Awards’ Development of the Year 2011 – is a good example of what can be achieved. Citu, the developer, has used renewable technologies to allow the development to be largely self-sufficient, with the average Greenhouse home saving one tonne of CO₂ per year.

Two rooftop wind turbines generate electricity for communal lighting and lifts. An open-loop borehole and ground source heat pump is connected to a heat distribution system providing space heating and cooling to the building. Some 212m² of solar thermal



panels are mounted on the roof to preheat the hot water system. Figures show that in two years the solar thermal technologies at Greenhouse have generated energy that equates to heating 54,000 showers.

When it came to choosing the renewable technology, Chris Thompson, founder of Citu, explains that it was not simply a case of “suck it and see”. “We spent months researching and hand-picking the best technologies, which could be easily incorporated into the design of the building and help homeowners live as energy efficient a lifestyle as possible. It’s important to remember that not all technologies will be viable for each and every development.”

Phil Hurley, managing director at renewables manufacturer NIBE, emphasises the importance of the fabric-first approach. “We always make a point of promoting insulation first, as well as airtightness, before fitting a heat pump, biomass boiler or solar thermal collectors. Taking this kind of holistic, whole-house approach to green building is vital for these systems to perform to their full potential and, by focusing on building fabric first, it will only have a positive impact on a green heating system’s performance.”

At Encraft, a consultancy specialising in energy efficiency, Kate Ashworth, head of distributed energy projects, says that if a new home cannot be connected to the gas grid, housebuilders should be looking at renewable heat. “That could be ground or air source heat pumps or it could be a biomass boiler, although that’s unusual because of the amount of maintenance. If the property is connected to the gas grid it doesn’t usually make sense to fit heat pumps



OPPOSITE PAGE

FAR LEFT TOP Solarcentury C21e solar PV roof tile

FAR LEFT MIDDLE Solarcentury C21e solar PV roof tiles being installed

FAR LEFT BOTTOM Wind turbine at Citu's Greenhouse development

MIDDLE Installer and customer with NIBE ground source heat pump

CENTRE Wind turbines and solar thermal panels at Citu's Greenhouse development

THIS PAGE

LEFT NIBE heat pumps and biomass boilers

BELOW Solarcentury C21e solar PV roof tiles at Graylingwell Park, a Linden Homes development at Chichester, West Sussex

BOTTOM NIBE air source heat pump



but you could look at orientating the property to maximise solar photovoltaic (PV) for example."

PV is one of the most common forms of micro energy generation. Installed on over half a million homes, it currently accounts for 12% of renewable electricity capacity in the UK and 2.9% of renewable electricity generation.

Jonny Williams, associate director of BRE National Solar Centre, cites two drivers for the uptake of PV. "First is the regulatory driver where housebuilders have been building to meet a particular requirement, whether that is through the Merton Rule, London Plan or Code for Sustainable Homes. For example, under the Code we saw quite a lot of PV systems that were actually very small, perhaps just two panels.

"The second driver is where housebuilders have fitted PV as standard, to meet certain regulatory drivers, but also because they see a market demand linked into better Energy Performance Certificate (EPC) ratings due to lower running costs and a recognition that certain customers want it when they are buying a new property," says Williams.

One of the advantages of solar PV is that it is relatively easy to specify and install. Jon Sturgeon, head of product development at Solarcentury, believes that building-integrated PV (BIPV) is likely to become more prevalent, particularly as housebuilders understand its advantages. Unlike conventional PV panels that sit on top of the roof, BIPV products form part of the roof itself. Incorporating solar in this way preserves the look of the roof and enables it to work in harmony with the surrounding area.

For a housebuilder, BIPV has a number of advantages, says Sturgeon. "Firstly you have a direct material cost offset so, instead of tiling a roof with

conventional roof tiles, someone could tile a roof with, for example, our C21e solar tiles and slates. As well as integrating into the building these integrate into the building process and are designed to be used by normal on-site trades. This means that a roofer can lay the BIPV tiles at the same time as they tile the roof with conventional tiles."

Well-specified renewable technology will take into account the size of the building, its heat-loss calculation and whether it has access to a suitable power supply, says Phil Hurley. "For example, an air source heat pump might work better for a smaller project with underfloor heating, whereas a biomass boiler might be best suited to a rural, off-grid home with enough space to store fuel."

Heat pumps extract heat from the ground or air. According to Graham Evans, A2W business

developer at Panasonic, heat pumps can produce up to four times the amount of energy per kW consumed in comparison to conventional heating methods. "For example, conventional electric heating systems have a COP (coefficient of performance) of one; for every 1kW of energy consumed, they produce 1kW of heat. Some air source heat pumps produce an impressive 4.74kW of energy for every 1kW of energy consumed."

Biomass – typically wood pellets or chips – is often used in combined heat and power (CHP) units. There are concerns that burning wood for energy is unsustainable and, in the context of it being burnt in power stations, wood panel producer Norbord has launched its Use Wood Wisely campaign. Certainly, for biomass to be sustainable it is essential for there to be a local supply. ►





TOP Eurobiostove's Bronpi biomass heater
 ABOVE NIBE ground source heat pump
 ABOVE RIGHT Eurobiostove's Bronpi biomass wood pellet boiler, with hopper feed



David Baines, managing director of Eurobiostove, says its Bronpi range of biomass heaters and boilers offer opportunities to builders and end users. "The two main incentives for initially installing a biomass boiler are the eco credentials over conventional heating fuel and the approximately 30% overall heating savings, which will repay the installation investment in three to four years. Installation is straightforward and more advanced models have large hopper feeds for pellets and auto crucible cleaning, meaning less intervention is needed by the homeowner."

With all microgeneration technologies, certification and warranties are essential. "Whatever the technology, housebuilders should always ensure they work with installers who are Microgeneration Certification Scheme (MCS)-accredited, and have been trained to uphold the highest possible standards at every stage of the install," warns Phil Hurley.

Jon Sturgeon points to the fact that the Feed-in-Tariff will only be available for solar systems that meet the new rigorous demands of MCS 012. "The certification means that solar systems are now tested to the same industry standards as the roofing products they are designed to work with."

The true potential of renewables cannot be unlocked until it is possible to store and manage the energy produced so that it can be used at peak times. While thermal stores can provide this function with hot water, storing electricity is harder.

Jonny Williams says that affordable storage systems are starting to enter the UK market and believes housebuilders should begin to look at these in the next two to three years. "There's a space consideration and some of the products are much better designed than others. There's a lot to be learnt from the car industry in terms of their batteries."

At Encraft, Kate Ashworth agrees that housebuilders need to think about energy storage and believes they will need to become cognitive about the advantages of smart grids that allow the building occupier to be more in control of their energy demands with smart meters. "As local planning policy becomes more aware of developments in the technology, and that it's not purely about generation but also about energy management, you might well see more mandated changes within the planning context."

Where the nearby grid is very weak and there are going to be big cost implications in terms of grid reinforcement in order to connect new homes, housebuilders may see advantages to installing a form of local smart grid with renewable generation and energy storage, explains Ashworth. "That means you don't have to build in so much resilience into the grid so you're actually off-setting some of those costs by employing these technologies. The technologies are not novel in themselves but connecting them together is a fairly new market so it's about bringing that into the mainstream." ^{sh}

CONTACTS

- BRE** www.bre.co.uk
- Encraft** www.encraft.co.uk
- Eurobiostoves** www.eurobiostoves.co.uk
- NIBE** www.nibe.co.uk
- Panasonic** www.panasonic-heating.co.uk
- Solarcentury** www.solarcentury.com
- Use Wood Wisely** www.usewoodwisely.co.uk

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