

A life off-grid with no energy bills is closer than you think. Here's what the future has in store for sustainable homes

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Melissa York

I edit our weekly residential section Hot Property, and I deputy edit Living mag [...] [Show more](#)

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A computer impression of life atop The Beacon in Hemel Hempstead, completing in 2018



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"Right," says eco-developer Sam Budhdeo, rubbing his hands together. "We think we have the solution to climate change." As openers go, it's a bold one, but not quite as outlandish as it sounds. The housebuilder who successfully cracks the code to building sustainably – and affordably – would be solving a large part of the planet-warming puzzle.

As things currently stand, energy from fossil fuels consumed in the construction and operation of buildings accounts for about half of the UK's carbon dioxide emissions; housing alone generates 29 per cent of UK emissions, according to figures from 'Sustainability: Simple steps to better homes', a report published last month by global real estate advisors CBRE Residential.

As terrible as this sounds, it used to be worse. Since we swapped hot water tanks for efficient boilers, rattley windows for double glazed ones, and draughty breeze blocks for cavity wall insulation, energy consumption has steadily declined per [capita](#) in the UK since the 1970s. Even though the population has increased by 16 per cent, our energy consumption has only gone up by 7.4 per cent. The figures from the last decade are even more encouraging; since 2008, our domestic energy consumption has gone down 186 per cent.

So what went right? Most analysts point to a number of factors, from manufacturers making more efficient appliances to a public that's better educated about its ecological impact. Predictably, though, the main motivating factor seems to be money. Lower energy to most people simply means cheaper bills. CBRE's report says "by some estimates, the cost of fuel bills are the motivation behind 95 per cent of people's support for lower carbon housing."



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The skyline view from The Beacon balcony

And this is why Budhdeo, the co-founder of property developer Lumiere, thinks he's cracked it. The company's first scheme, The Beacon in Hemel Hempstead, claims to be the world's most sustainable residential tower and its most seductive buyer offer is "Free Energy for Life". It does this largely by harnessing the sun's rays, captured by what it says is the highest density solar farm in the world (0.8MW on less than half an acre of land) with the help of solar photovoltaic panels embedded onto each floor. Insulation warms the building – triple glazing for all apartments, quadruple glazing for the upper ones – then air pumps extract heat from the basement and atrium to heat the water supply. As over 80 per cent of our housing emissions are produced by heating space and water, this can save residents "up to £11,000 a year in living expenses."

"We want to make sustainable homes sexy, like Tesla's making electric cars sexy," says Budhdeo. "If you say sustainability, people think they have to give something up, that they have to make a sacrifice to be carbon neutral, but we have all the usual mod-cons that you'd find in any new build development."



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Their main competition in this sector is, without a doubt, Passivhaus, which is still seen by most housebuilders as the gold standard in sustainable housing. Developed in Germany in the early 1990s, its solar tech has been used on some 30,000 homes worldwide. Like The Beacon, it promises to reduce energy bills by cutting the emissions associated with heating homes by nearly 90 per cent. But it also places a high emphasis on using natural vegetation to shade and cool areas, and to harvest rainwater. Green roofs – a fixture atop many London developments these days – absorb our ample rainfall, insulate buildings (25 per cent of heat is lost through the roof) and act as effective drainage.



Designer James Shaw assembling a Plastic Baroque product

Homes at the cutting edge of sustainable technology are also increasingly preoccupied with air quality, with many urban eco-projects opting for mechanical ventilation heat recovery systems (commonly known as MVHR) that aim to remove moisture, odours and pollutants from the air inside homes. This goes hand-in-hand with Passivhaus' 'fabric-first' philosophy, which espouses that proper eco-conscious housing should look at its building materials before installing costly filtration systems. Natural, rapidly renewable materials like timber, bamboo, cork and linoleum are favoured, then non-toxic paints and adhesives to fix it all together. Paint fumes, for instance, are thought to contain VOCs (volatile organic compounds) that continue to be released over many years, harming the quality of the air we breathe inside our homes. EggHomes, another fledgling pioneer, reused and recycled everything for Viver Green, its first housing development in Cumbria, from concrete to metals to timbers throughout the build process, in addition to using the usual heat air pumps and hefty insulation.

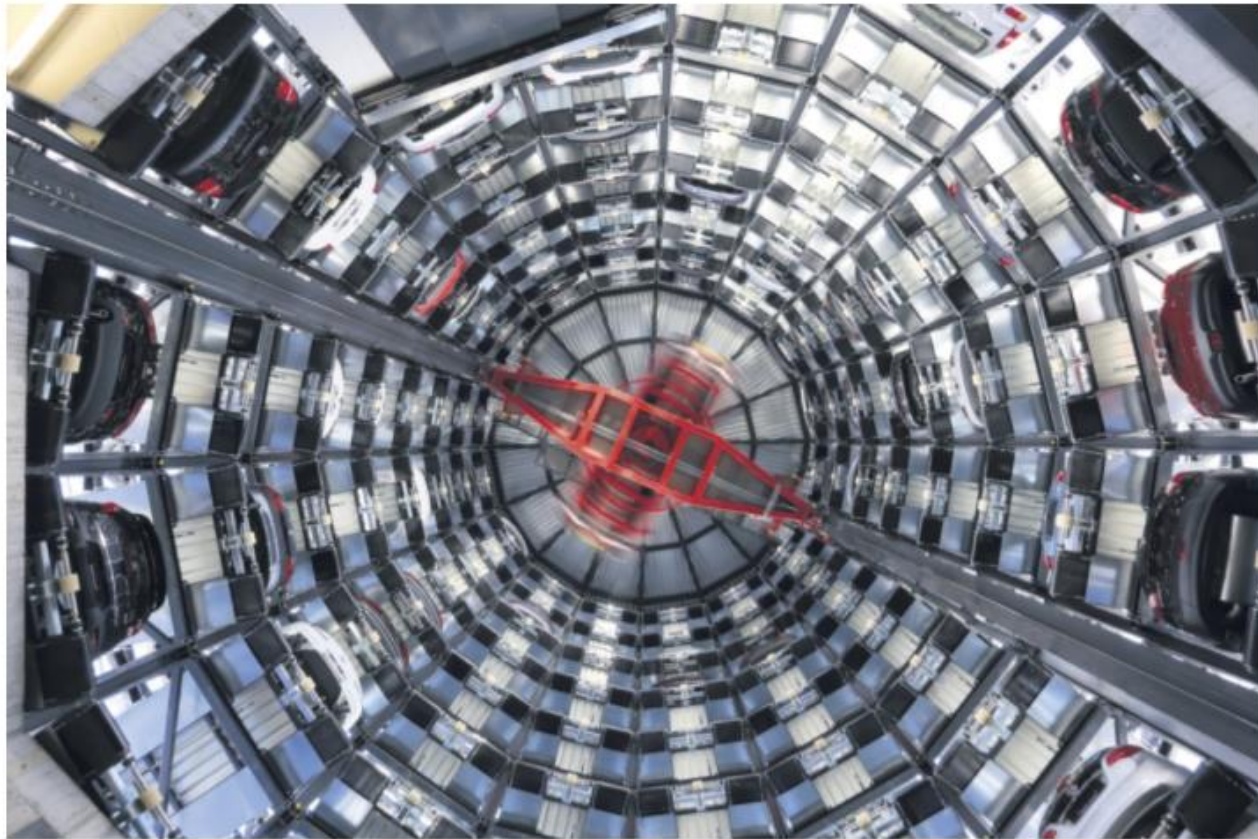
In interior design, too, young designers are finding new ways to work sustainably. In the case of London product and furniture designer James Shaw, they're even inventing new tools to do it. While studying for his final project at the Royal College of Art, Shaw built a hand-held plastic extrusion gun that melts down polymers like plastic bags and squirts them, sausage-like, out the other end, allowing him to make dextrous crafts out of recycled plastic. His series of products, Plastic Baroque, graced the foyer of the Ace Hotel in Shoreditch during this month's London Design Festival.



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“In reality, plastic is no more synthetic than some brass or bronze, and most woods, like MDF, are deeply synthetic,” Shaw says. “But people don’t feel the same about plastic, a material that lasts a very long time, but one that we tend to use for disposable things. Yet, we’re using things like woods, which break down very well, for permanent furniture – it doesn’t really make sense.”

It all comes back to money. Living in cities, as 70 per cent of the world’s population will by 2030, is expensive enough as it is. With land values on the rise, there’s some debate about whether the cost and energy of installing ventilation systems or buying up recycled crafts could ever work on a larger, affordable scale.



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The only Passivhauses currently under construction in Zone One are in Elephant & Castle at Lendlease's Elephant Park regeneration scheme. Out of 3,000 new homes, just 15 Victorian-style townhouses will be up to the gold Passivhaus standard – and they start from £1.495m. “Properties that promise a nicer lifestyle have always commanded a higher premium,” says Anita Mitchell, Lendlease's head of sustainability. “Passivhaus has just put numbers and science behind something that we've always intuitively known; human beings like an environment that gives clean air, natural daylight and has a connection to nature. So I don't think it's necessarily a new thing, but I think having this high level of accreditation allows people to differentiate when they're looking at what to buy.” The trouble is, as outlined in CBRE's Sustainability report, achieving Passivhaus certification can be a costly process in itself, so some homeowners “may have built to the standard but not had them certified as a result of high cost implications.”



An EggHomes design

A recent report by the Department for Energy and Climate Change found that green energy improvements “could increase [a home’s] value by 14 per cent on average and up to 38 per cent in some regions”; an ambitious figure considering research for the same report found that Dutch sellers received a three per cent premium on average, while Californians saw a nine per cent boost. Yet again, it seems fuel economy is the issue that spurs eco-building on. The report also notes that housing associations and the Build to Rent sector see green homes not just as environmentally responsible, but “as an effective way of ensuring residents do not fall into fuel poverty”, meaning they’ll be less likely to go into rent arrears or be financially irresponsible tenants. It points to 51 homes in Rainham, north east London, where Circle Housing has built the largest development of Passivhaus social housing in the UK, as an example of how homes can be built both affordably and sustainably.

Apart from potentially shaking the energy sector to its core, what else does the future have in store for eco-homes? “Battery technology would be top of the top for me,” says Mitchell from Lendlease. “Centralised systems, I think, are slowly dying, and battery technology has the ability to free us up from being grid-connected, leading to much more localised energy production in buildings through smart technology.”

At present, most solar technology requires some sort of grid back-up, but companies like Tesla and Daimler (Mercedes-Benz) are starting to manufacture batteries that can be mounted onto walls in homes that store energy generated from solar panels. Eventually, we’d rely less and less on the [National Grid](#) and all our energy would be generated locally and sustainably. If we achieved that for every home in the UK, that would be half of all our carbon dioxide emissions gone, overnight. That solution to climate change seems a little bit closer now, doesn’t it?

“We’ve had a hard time convincing a sceptical market that we aren’t mad scientists,” says The Beacon’s developer Budhdeo. “Now our methods are becoming accepted, but it’s trying to convince people to take on the risk. Every time a local authority chooses to go with a plan that’s less sustainable and energy-friendly to get homes built quickly, that’s costing lives.”



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