

BedZED Monitoring Summary 2003 - 2007

		2003	2003	2004	2007
			<p>Bedding ton Zero (Fossil) Energy Development Toolkit for Carbon Neutral Development - Part II, Nicole Lazurus, BioRegional Development Group. Monitoring period covers the first complete year of occupation. Summary report available as free download from www.bioregional.com. The full report costs £20 (£10 for concessions) for a hard copy or £10 for a PDF. Call 020 8404 4880 or email info@bioregional.com to purchase.</p>	<p>MSc Architecture: Advanced Environmental and Energy Studies (Thesis) The BedZED lessons, Simon Corbey, December 2005. Monitoring took place in 2004. Please contact Simon Corbey by email if you would like a copy of the thesis. simon.corbey@beri.org.uk</p>	<p>BedZED Monitoring Report 2007 Written by Jessica Hodge and Julia Haltracht</p>
	<p>BedZED aim</p>	<p>Peabody Trust monitoring of 25 BedZED homes for temperature and humidity using Hobo loggers.</p>			
<p>Electricity Consumption in the Home</p>	<p>33% reduction compared to the UK average of 4 kWh per person per day. (BRE 2002, Domestic energy consumption by final use).</p>		<p>BedZED residents use an average of 3 kWh per person per day. This represents a 25% reduction compared to the UK average of 4 kWh per person per day. Meter readings were taken from 72 homes out of 82 homes because 10 of the meters were not working correctly at that time.</p>		<p>The average electricity consumption during 2007 was:</p> <ul style="list-style-type: none"> • 3.4 kWh/ person/ day • 2579 kWh/ dwelling/ year • 34.4 kWh/ m2/ year <p>BedZED households use 2,579 kWh of electricity per year which is 45% lower than the average in Sutton. However, the average number of people per dwelling at BedZED is also slightly lower than the Sutton average.</p> <p>Owner occupiers used the most electricity and social housing tenants the least.</p>
<p>Hot Water Consumption in the Home</p>	<p>33% reduction compared to the UK average of 14.1 kWh per household per day.</p>		<p>Hot water consumption in BedZED homes is 6 kWh per household per day as compared with a UK average of 14.1 kWh (57% reduction) and 2000 Building Regulations new homes of 10.7 kWh (44% reduction)</p>	<p>The woodchip CHP and back-up gas condensing boilers were monitored for eight months in 2004 and annual consumption for 2004 was estimated based on the monitored results. Total energy used to supply hot water for heating and washing etc to all units was approximately 535.5MWh from gas boilers and 90.4MWh from the CHP, a total of 625.9MWh. The total floor area of BedZED development is 9,207 m. Site hot water consumption for heating and hot water was therefore 68kWh/ m2/ year (this includes residential and commercial units). This represents a 66% reduction compared to the UK average and a 33% reduction compared to 2002 Building regulations.</p>	
<p>Space Heating Demand in the Home</p>	<p>90% reduction compared to the UK average of 140 kWh/ m2/ year.</p>		<p>Space heating consumption (from hot water) in BedZED homes is 16.2 kWh/m2/ year compared to a UK average of 140 kWh/m2/ year (88% reduction) and 2000 Building Regulations new homes of 59 kWh/m2/ year (73% reduction)</p>		<p>The average heat consumption (for space heating and hot water) during 2007 was:</p> <ul style="list-style-type: none"> • 5.2 kWh/ person/ day • 3525.8 kWh/ dwelling/ year • 48.0 kWh/ m2/ year <p>Households use 3,526 kWh of heat (from gas) per year – 81% less than the average in Sutton.</p> <p>Social housing tenants used the most heat followed and owner occupiers the least.</p>
<p>Temperature and Humidity</p>		<p>Internal temperatures steady at 18-21 degrees c, even through heat waves and cold spells. Homes tend to perform best when their occupants understand the best time to open and close windows and curtains.</p>			
<p>Water Consumption in the Home</p>	<p>33% reduction compared to the UK average of 150 litres per person per day.</p>		<p>Mains water meters in 40 homes were monitored for one year. BedZED residents were using 76 litres of mains water per person per day, half that of the UK average mains water consumption of 150 litres. In addition the residents were using an estimated 15 litres per person per day of recycled and rain water (used to flush the toilets). Total water consumption is therefore 91 litres per person per day, a 39% reduction compared to the UK average of 150 litres, and a 46% reduction compared to the London average of 170 litres.</p>	<p>The water used at BedZED and diverted to the Green Water Treatment Plant for cleaning was monitored for the whole site for one year and the proportion used by homes was estimated. BedZED residents use 98 litres of water per person per day (this figure includes all mains, recycled and rainwater used). This represents a 35% reduction compared to the UK average of 150 litres, and a 42% reduction compared to the London average of 170 litres.</p>	<p>During 2007 residents used an average of 72 litres/ person/ day, 6% lower than the 76 litres per person per day monitored in 2003. This could be explained by the weather; 2003 was a much hotter and drier summer than 2007 and 2003 saw higher consumption on average than other recent years throughout England and Wales.</p> <p>In addition to mains water, residents used 15 litres of rainwater each day, topped up by mains water when there was insufficient rainwater collected.</p> <p>The 2007 BedZED average of 72 litres per person compares to the local average for metered properties of 143 litres (50% reduction) and the local average for all properties of 171 litres (58% reduction). BedZED residents also use an estimated 15 litres of rainwater, bringing the total water consumed to 87 litres per person.</p> <p>The Green Water Treatment Plant was not in use during 2007 as it had proved to be financially unviable.</p>

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<p>Biomass Combined Heat and Power</p>	<p>To supply enough electricity and hot water for the whole site.</p>			<p>Exus CHP commissioning targets were agreed with Peabody of 120 kW of electricity (kWe) and 250 kW of heat. In 2004 the CHP generated up to 50 kWe. The CHP had achieved better results in 2003, with EXUS regularly operating the CHP at 80-90kWe, only 30% from target. (We have not used the CHP since late 2005 and are now using gas condensing boilers to heat water for the whole site, and electricity from the grid and from PV.)</p>	<p>The biomass CHP was not in use during 2007 and hot water was provided through the communal heating system from gas boilers in the CHP building. The Peabody Trust continued to look into options for replacing it.</p>
<p>Photovoltaic Panels</p>	<p>To generate enough electricity to power up to 40 electric vehicles for 10,000 miles a year (88,000 kWh).</p>			<p>BedZED has 777m² of photovoltaic panels which in 2004 provided 31.2 MWh, or 10.5% total site electricity demand. This reading was taken from the PV output display board but the accuracy of this has been questioned. It is also significantly lower than BP Solar's estimation of 88 MWh annually. (The PV electricity is not needed for cars as there is only one electric vehicle on site).</p>	<p>For six months in 2006 metering company Pilot Systems monitored import and export electricity for BedZED. From this data we estimate that PV array provides 20% of the whole site electrical load. However, more monitoring is needed.</p>
<p>Private Car Mileage</p>	<p>To reduce private fossil fuel car mileage to 50% of what would have been expected on a 'conventional' build on the same site. The local average is 6,000 miles per person per year.</p>		<p>BedZED residents 0.61 cars per household. Surrey average is 1.2 cars per household and London 0.9 cars per household. So we have achieved a 32% reduction compared to London and 50% to Surrey. Bedzed mileage is 2061 per person per year so 65% reduction compared to Sutton average of 6,000 miles per person per year.</p>	<p>1.2 cars per household which is the same as the Surrey average. 3,665 miles per vehicle per year so not directly comparable to 2003 monitoring or to the aims of the development which was measured in mileage per person.</p>	<p>The 2001 census shows that 71% of Sutton households own at least one car and in Hackbridge (the area around BedZED) our own research²⁹ indicates that 84% of households are car owners. At BedZED it is significantly lower at 59%.</p> <p>From the questionnaire we have estimated that on average, BedZED households travel 3,708 kilometres (2,304 miles) per year by car. Based on average national occupancy figures, this equates to an estimated 64% reduction compared to the national average.</p> <p>However, we do not know how much of this reduction can be attributed to location and tenure, and how much to resident efforts to live sustainably.</p>
<p>Waste and Recycling</p>	<p>60% recycling rate by weight of waste. (Includes composting)</p>			<p>Visual monitoring of the waste bins on site was undertaken over a four-week period in November 2004. Results show that recycling rates at BedZED were 26% by weight during this month. This compares with an average recycling rate in Sutton during 2003/4 of 25%. Sutton however has set a target of 36% to achieve by 2005/6. Average resident produces 11kg of waste per week, compared to Biffa Study in London and Bedford which showed that:</p> <ul style="list-style-type: none"> • Flats - 11.9 kg/household per week, which is comparable to arisings of 10-12 kg/household per week determined in another study • Houses - 17.3 kg/household per week, which is comparable to arisings of 15-18 kg/household per week determined in other studies. 	<p>In Sutton residents throw away 324 kg of residual waste per person per year³⁹ whereas at BedZED waste audits show 104 kg of residual waste per person, a 68% reduction. However flats do tend to produce less waste than houses and the vast majority of BedZED properties are flats.</p> <p>At BedZED our audits show that residents recycle 50% of waste whereas in Sutton the average is 21%. BedZED residents compost 10% of their waste whereas the Sutton average is 9%. However, the figure for Sutton includes garden waste collected whereas at BedZED this service isn't available and so we weighed the waste that would be composted on site.</p> <p>The waste audits could be misleading as only 10% of households took part and for a maximum of 3 weeks over the year. We assume that people tend to make a greater effort to recycle if they are being audited. Therefore our results are only indicative and not conclusive.</p>