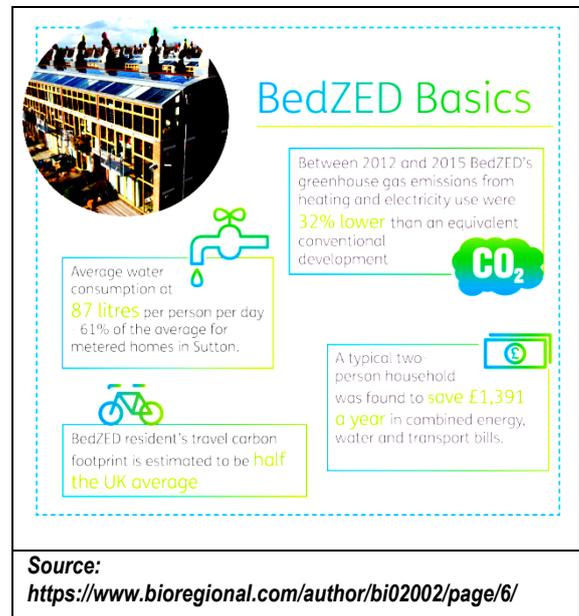


**Case Study 1 London,  
United Kingdom: Eco-District Bed-ZED**

**Problems to resolve**

Today's predominant functioning of cities relies on massive use of non renewable energy and other scarce resources. This is not sustainable and threatens the existence base of mankind. Rather sooner than later, fully sustainable and Zero Emission settlement types need to be introduced to replace the still dominant type of towns and cities which use up the globe's limited energy resources, turn them into waste and are a main cause of global warming.



**BedZED Basics**

- Between 2012 and 2015 BedZED's greenhouse gas emissions from heating and electricity use were **32% lower** than an equivalent conventional development.
- Average water consumption at **87 litres** per person per day (61% of the average for metered homes in Sutton).
- BedZED resident's travel carbon footprint is estimated to be **half** the UK average.
- A typical two-person household was found to **save £1,391 a year** in combined energy, water and transport bills.

**Source:**  
<https://www.bioregional.com/author/bi02002/page/6/>

	<p><b>Means /Secondary tools:<sup>i</sup></b></p>
	<p><b>The building envelope:</b> The building's orientation was designed to maximize the use of solar heat, thanks to the massive use of glass façades.</p>
	<p><b>Heating:</b> Biomass heaters were implemented along with solar heating. The pipes used for hot water distribution <b>pass</b> near the windows to maintain their heat even using the sun's rays</p>
	<p><b>Energy production:</b> Through <u>integrated building design</u>, the elements dedicated to energy production also perform other functions. For example, there are wind turbines on the roof that, besides producing energy are also used to promote ventilation and indoor-outdoor air exchange</p>
	<p><b>Water recovery:</b> <u>Rainwater</u> is used for irrigation and water closets. Part of the water used for irrigation is purified through phyto-treatment and fed back into the tank.</p>

**Background.**

**Beddington Zero Energy Development (Bed ZED).** The Beddington Zero Energy Development (Bed ZED) is an environmentally friendly housing development in Hackbridge, London, England. It is in the London Borough of Sutton, 2.0 miles (3 km) north-east of the town of Sutton itself. Designed to create zero carbon emissions, it was the first large scale community to do so. <sup>ii</sup> BedZED was designed to be carbon neutral, protecting the environment and supporting a more sustainable lifestyle. The project was also pioneering by being the first construction project where a local authority sold land at below market value to make sustainable economically development viable.



**Buildings.** The 82 homes, and 1,405 square meters (15,120 sq. ft.) of work space were built in 2000–2002. The apartments are finished to a high standard to attract the urban professional, and the project was shortlisted for the Stirling Prize in 2003. Through **integrated building design**, the elements dedicated to energy production also perform other functions. For example, there are wind turbines on the roof that, besides producing energy are also used to promote ventilation and indoor-outdoor air exchange. The houses face south to take advantage of solar gain, are triple glazed, and have high thermal insulation. Low-impact materials—Building materials were selected from renewable or recycled sources within 56 km of the site, to minimize the energy required for transportation.



*Eco-District Bed-ZED, London, United Kingdom<sup>iii</sup>*

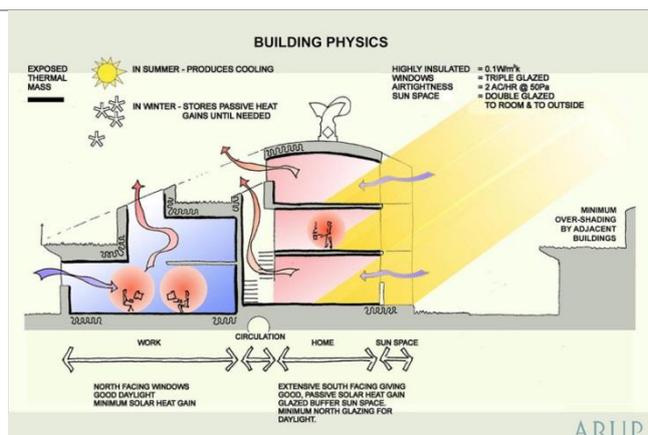


*Biomass heaters and solar heating in Bed-ZED, London<sup>iv</sup>*

**Heating.** The project is designed to use only energy from renewable sources generated on site. There are 777 sqm. of solar panels. Tree waste fuels the development's co-generation plant (downdraft gasifier) to provide district heating and electricity. The gasifier is not being used, because of technical implementation problems, though the technology has been and is being used successfully at other sites. **Biomass heaters** were implemented along with solar heating. The **pipes used for hot water distribution** pass near the windows to maintain their heat even using the sun's rays.



*Street in Bed-ZED, London<sup>v</sup>*



*Building Physics of Eco-District Bed-ZED<sup>vi</sup>*

**Water.** **Rainwater** is recovered and used for irrigation and water closets. Part of the water used for irrigation is purified through phyto-treatment and fed back into the tank. Most rain water falling on the site is collected and reused. Appliances are chosen to be water-efficient and use recycled water when possible. A "living machine" system of recycling waste water was installed, but is not operating.

**Transport.** Because of BedZED's low-energy-emission concept, cars are discouraged; the project encourages public transport, cycling, and walking, and has limited parking space. There are good rail and bus links in the immediate area. The project works in partnership with the United Kingdom's leading car-sharing operator, City Car Club. Residents are encouraged to use this environmentally friendly alternative to car ownership; an on-site selection of vehicles is available for use. Encourage eco-friendly transport—Electric and liquefied-petroleum-gas cars have priority over cars that burn petrol and diesel, and electricity is provided in parking spaces for charging electric cars.

**Performance.** Monitoring conducted in 2003 found that BedZED had achieved these reductions in comparison to UK averages: (i) space-heating requirements were 88% less; (ii) hot-water consumption was 57% less; (iii) the electrical power used, at 3 kilowatt hours per person per day, was 25% less than the UK average; 11% of this was produced by solar panels. The remainder normally would be produced by a combined-heat-and-power plant fueled by wood chips, but the installation company's financial problems have delayed use of the plant; (iv) water consumption has been reduced by 50%, or 67% compared to a power-shower household, and (v) residents' car mileage is 65% less. A review of the BedZED development in 2010 drew mainly positive conclusions. Residents and neighbours were largely happy. However, a few significant failures were highlighted, for example: (i) the biomass wood chip boiler (biomass gasifier) was no longer in operation and the back-up power source, a gas boiler, was now used. The downdraft wood chip gasifier CHP (combined heat and power) had reliability problems due to technical failures and the intermittent schedule of operation (no night time operation) imposed by the local authority; (ii) the 'Living Machine' water recycling facility had been unable to clean the water sufficiently. The cost of the facility also made it unviable; (iii) the passive heating from the sunspaces had been insufficient; and (iv) despite best efforts, residents were on average still leaving an ecological footprint of 1.7 planets, which is more than the target of 1.0 planet (but much less than the UK average of 3 planets).<sup>vii</sup>



Source: Other cities can learn from London's drive for clear air.  
[http://www.chinadaily.com.cn/business/2015-03/31/content\\_19958465.htm](http://www.chinadaily.com.cn/business/2015-03/31/content_19958465.htm)

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**Sources and Further Reading:**

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<sup>i</sup> [http://www.eurotubieuropa.it/english/NL/2014/09/nl\\_09\\_3.html](http://www.eurotubieuropa.it/english/NL/2014/09/nl_09_3.html)

<sup>ii</sup> <http://en.wikipedia.org/wiki/BedZED>

<sup>iii</sup> Source: <https://i.pinimg.com/originals/33/c9/71/33c9716f75843453f842eeede78164a0.jpg>

<sup>iv</sup> Source: [https://upload.wikimedia.org/wikipedia/commons/c/c3/BedZED\\_roofs\\_2007.jpg](https://upload.wikimedia.org/wikipedia/commons/c/c3/BedZED_roofs_2007.jpg)

<sup>v</sup> Source: [https://upload.wikimedia.org/wikipedia/commons/thumb/6/6e/Street\\_in\\_BedZED.jpg/275px-Street\\_in\\_BedZED.jpg](https://upload.wikimedia.org/wikipedia/commons/thumb/6/6e/Street_in_BedZED.jpg/275px-Street_in_BedZED.jpg)

<sup>vi</sup> Source: <http://www.eurotubieuropa.it/english/NL/2014/09/ARUP-Bedzed-Hi.jpg>

<sup>vii</sup> <http://en.wikipedia.org/wiki/BedZED>, see also: Ryser, J. Ecocities in Action: Sustainable Development in Europe –Lessons for and from China? in: European Union, Konrad Adenauer Stiftung, et al. 2014. *Eco-Cities - Sharing European and Asian Best Practices and Experiences*. EU-Asia Dialogue. Singapore. pp. 107-123 <http://www.eu-asia.eu/publications/eco-cities/>