

## Case study summary

# Ecotricity, Gloucestershire, UK

2007 Ashden Award

Ecotricity's 2007 Ashden Award recognised the work it had done to promote local renewable electricity from large wind turbines.

There is considerable demand for renewable electricity in the UK, driven both by electricity supply companies that want to meet their statutory renewable requirements, and by customers who want to buy less environmentally damaging energy. Ecotricity is a fast-growing installer of wind turbines in the UK.

- Enercon wind turbines used, designed for relatively low wind speeds. They use electronic power conversion, which eliminates gearbox noise, improves efficiency and reduces noise from the blades.
- Under 'Merchant Wind Power' scheme, a business provides a turbine site and receives the electricity directly to businesses at below market rate.
- Wind installations typically cost £800 - £1,000 per installed kW. Ecotricity is a registered electricity supplier and funds installation of wind turbines using profits from electricity sales, supplemented by commercial loans and bonds.
- By 2006, Ecotricity had 27 MW of installed wind in 11 wind farms, delivering 46 GWh/year of renewable electricity.
- Avoids 25,000 tonnes/year CO<sub>2</sub> emissions at average UK grid replacement, or 46,000 tonnes/year if displacing coal-fired generation.
- Customers in 2007 included over 30,000 homes and 1,000 businesses.
- Merchant Wind Power programme has engaged businesses that might not otherwise have considered renewable electricity
- Ecotricity achieves high success rate with planning authorities as a result of choosing sites carefully (often industrial sites with limited scenic value) and ensuring proper local consultation has taken place.

### Update

- Significant growth experienced since 2007. Ashden Award funding used to promote Merchant Wind Power scheme with businesses. Seven wind parks operating under the scheme, and two under construction.
- By early 2011, 55 MW total capacity in operation (avoiding about 75,000 tonnes/year CO<sub>2</sub>), 29 MW under construction and 140 MW at the planning stage. Over 41,000 domestic and 4,200 business customers.

### The organisation

Ecotricity is a private company, established by Dale Vince in 1991. In 2006/7, the company had over 100 staff and a turnover of £18 million.

### UK statistics

(IMF 2009, UNFCCC 2006)

GDP: £20,500/year per person

CO<sub>2</sub> emission: 9.2 tonnes/year per person

### Location



**"Climate change is a global issue which is affecting the poorest communities all over the world. But we can all make a difference. Many solutions exist on an individual level and one is choosing Ecotricity, as we have done, to help tackle climate change."**

Oxfam, Ecotricity customer



An Ecotricity turbine being erected.

### Contact

Ecotricity  
Dale Vince  
Helen.Johnson@ecotricity.co.uk  
www.ecotricity.co.uk

## Case study

# Ecotricity, Gloucestershire, UK

### Background

There is a strong demand for renewable electricity in the UK, which exceeds current supply. Demand is driven both by electricity supply companies wanting to meet their statutory renewable requirements, and by customers who want to buy less environmentally damaging energy.

Wind turbines are a mature sustainable energy technology. They have high levels of public acceptance both at national level in the UK and around sites where they have been installed, although a minority of vocal opponents often block planning permission for wind developments. Developments with small numbers of turbines, away from areas of particular scenic beauty, are the most acceptable to the public. This is the market sector that Ecotricity has pioneered and developed.

### The organisation

Ecotricity grew out of the commitment of Dale Vince to develop the use of wind power, which he began in 1991. His initial work was in masts for wind monitoring. The income from these enabled him to finance the construction of his first wind turbine, near Stroud in Gloucestershire, in 1996. The company is still based in Stroud, and in 2007 had over 100 staff and an annual turnover of about £18 million.

### The technology

#### How does it work?

The hub of a wind turbine is rotated by the force of the wind on the blades that are attached to it, which drives an electrical generator. The hub is mounted on a tall tower in order to capture high wind speeds (since the speed of the wind increases with height above the ground) and so that the blades are clear of anything on the ground. For grid-connected machines, the electrical output from the generator goes through power conversion and safety systems.

Many of the turbines are linked directly to the national grid, usually at the transmission voltage of 11 or 33KV. Ecotricity also runs the 'Merchant Wind Power' scheme, whereby turbines are installed to supply electricity directly to the distribution network of a business. By receiving power directly, the losses and costs associated with grid transmission are avoided, and any excess can still be sold. The result is that the turbines can be economic at sites with a lower wind speed than is usually viable, and the Merchant Wind Power customers can buy electricity at a lower price than conventional mains supply.

#### How much does it cost and how do users pay?

Wind installations typically cost £800 - £1,000 per installed kW. Since 1995, Ecotricity has been a registered electricity supplier and funds the installation of new wind turbines using the profits from electricity sales, supplemented by commercial loans. Ecotricity sells customers the electricity generated by its wind farms, supplemented by conventional 'brown' electricity, which it buys from the wholesale electricity markets.

Because the percentage of renewable electricity in the Ecotricity mix exceeds the amount required under the UK Renewables Obligation, Ecotricity is able to sell the excess Renewable Obligation Certificates (ROCs) to other suppliers who are not meeting the required percentage. This is a significant component of the income stream of all new Ecotricity wind energy projects.

Merchant Wind Power customers purchase electricity at below market rate, in return for providing turbine sites. Other customers pay no more than the normal electricity price in their area, even though the electricity mix from Ecotricity has a higher contribution from renewable energy.

Profits from electricity sales are invested in new wind installations, and all turbines are owned and operated by Ecotricity.

### The technology in more detail

Ecotricity uses only Enercon wind turbines, which they have found to be the most reliable and the most efficient, in particular at relatively low wind speeds. In most wind turbines the rotor is constrained to rotate at a fixed speed, and a gearbox is used to convert this to the speed required to generate mains frequency electricity. Enercon turbines use electronic power conversion rather than gearboxes. This eliminates gearbox noise (a problem with some 1990s wind turbines), improves the overall efficiency because the rotational speed can vary, and reduces noise from the blades since on average they move more slowly. The use of power electronics gives greater flexibility to cope with voltage fluctuations on the grid, and to supply reactive power.

**"You don't really have to give anything up, you just use a different supplier. You do feel better about it when you know that it's not actually polluting the planet every time you use an electrical appliance."**

Molly Scott-Cato,  
Ecotricity domestic customer

### How is it maintained?

Ecotricity is responsible for operation and maintenance of the wind turbines. The performance of all turbines is monitored remotely, so that electricity output is known accurately. Monitoring allows the fine-tuning of turbines to deliver the maximum energy output, with any problems identified as soon as they occur. The physical lifetime of the turbines is 25 to 30 years.

### Benefits

By 2007, Ecotricity had 27 MW of turbines in operation in 11 wind farms, of which 9 MW came from the Merchant Wind Power scheme. Turbines had a rated power of between 500 kW and 2 MW. Ecotricity customers included over 30,000 homes and 1,000 businesses.

### Environmental benefits

During 2006, the wind turbines operated by Ecotricity delivered 46 GWh of electricity. The average carbon dioxide emission for UK grid electricity generation is about 0.55 kg CO<sub>2</sub> per kWh, so on this basis Ecotricity turbines prevented the emission of 25,000 tonnes/year of CO<sub>2</sub>.

However, the real carbon reduction is probably higher, because wind electricity tends to displace coal-fired generation, rather than the less carbon-intensive base load from nuclear and gas fired power stations. The Parliamentary Office of Science and Technology and the Select Committee on Environmental Audit suggest that wind energy should be regarded as replacing coal fired generation at 1.0 kg CO<sub>2</sub> per kWh. On this basis, Ecotricity turbines prevented the emission of 46,000 tonnes/year of CO<sub>2</sub>.

### Community engagement

Although opinion surveys show an overwhelming support for wind energy, both in the UK in general and in the locality of wind farms, there is a minority of vocal opponents to wind energy. Ecotricity often chooses industrial and commercial land without great scenic value as potential sites for small wind farms, sites which might not be considered viable by larger wind developers. The company consults fully with local communities before and during the planning process, and has achieved a high success rate with planning applications.

Ecotricity has helped the whole wind sector in the UK by showing many people that having a local wind turbine can be a positive experience. The Enercon turbines are generally liked because of their slow rotation and aesthetic blade design. At several sites, the first turbine proved so popular that a second has been installed. For instance, at Swaffham, Norfolk, local residents lobbied the council to get a second turbine.

The 'Merchant Wind Power' programme has engaged businesses that might not otherwise have considered renewable electricity. It has brought them financial savings and a positive image, with good feedback from employees and local media about the wind energy 'in the back garden'. The very visible use of wind turbines by some of the best-known names in UK business has added significant credibility to wind as an electricity source.

Customers – both domestic and business – like buying electricity from a supplier that invests all its profits in installing more wind capacity.



Ecotricity builds wind turbines in industrial areas: this one is on a business park next to the M4 near Reading. (above and below).



**“The installation of the wind turbines will see the Dundee site join Ecotricity as a pioneer in the ongoing promotion of alternative, cleaner energy sources for heavy industry.”**

Trevor Haynes, Michelin – Ecotricity Merchant Wind customer

**Update: what happened next?**

Ecotricity has experienced significant growth since 2007. The Ashden Award fund was used to promote the MerchantWind Power scheme with businesses, through developing a dedicated micro-website ([www.merchantwindpower.co.uk](http://www.merchantwindpower.co.uk)) and events. Seven wind parks are operating under the MerchantWind Power scheme, with another two under construction.

By early 2011, a total of 55 MW capacity had been installed in 16 wind parks, with a further 31 MW under construction and over 140 MW at the planning stage. Ecotricity wind turbines are generating about 136 GWh/year, avoiding the emission of 75,000 tonnes/year CO<sub>2</sub> at average grid replacement (or 136,000 tonnes/year if displacing coal).

In 2010, Ecotricity had over 41,000 domestic customers and 4,200 business customers, and provided 41% of the electricity it supplied from renewable sources.



Ecotricity's turbines are often in rural settings.

**Contact details**

Dale Vince  
Axiom House  
Station Rd  
Stroud  
GL5 3AP  
Telephone: +44 1453 769351  
Email: [Helen.Johnson@ecotricity.co.uk](mailto:Helen.Johnson@ecotricity.co.uk)  
Website: [www.ecotricity.co.uk](http://www.ecotricity.co.uk)

**Disclaimer**

This report is based on information provided to the Ashden Awards judges by Ecotricity, and findings from visits by members of the judging team to see its work in India.

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