

### Wind

The UK has about 40% of Europe's total potential wind energy. However, we only meet 0.5% of our electricity requirements from windpower.

#### Summary

- Modern wind turbines are a cost-effective way of generating electricity.
- Depending on scale, electricity generated can be for own use or sold to the grid.
- For own use and to cover for windless periods, some form of storage is required or a back-up electricity supply.
- Scotland has some of the best sites for windpower in the UK, from a production point of view.

#### Scale

Designs for wind turbines vary. They can best be described by output:

- Small-scale:
  - Turbines typically range from 1–6kW per hour;
  - Can provide all or part of domestic electricity demand;
  - Some models are suitable for rooftop mounting.
- Medium-scale:
  - Up to about 50kW per hour;
  - Suitable for community-scale projects.
- Large-scale:
  - Up to and above 1MW (per turbine) per hour;
  - Usually commercially operated by utility company.

The stated size (in kW per hour) is the power a turbine produces when the wind is blowing in ideal conditions – not too weak and not too strong. As a rule of thumb, a turbine on a good site in the UK will deliver on average about 30% of its rated capacity over a year. Turbines at commercial scale are usually grouped as a windfarm.

#### Site requirements

The amount of energy produced depends on the wind speed. Therefore, it is important to pick a development site very carefully. Wind speeds generally increase with height above sea level. The ideal siting is a clear exposure free from excessive turbulence and obstructions such as large trees, houses or other buildings.

Knowledge of local wind speeds is vital. A good source of general information is the NOABI database that can be accessed from British Wind Energy Association at [www.bwea.com](http://www.bwea.com). To assess specific local conditions, an anemometer can monitor wind speed. These are available for around £120.

## Planning requirements

Seek advice of the planners at an early stage. Planning permission is required for all but the smallest installations. At commercial scale, the planning decision may be “called-in” by the Scottish Executive for Ministerial decision rather than by the local authority. National planning guidance should be examined.

## Capital & Installation costs

Systems up to 1kW will cost around £3,000 whereas larger systems in the region of 1.5kW to 6kW would cost between £4,000 - £18,000 installed. These costs would be inclusive of the turbine, mast, inverters, battery storage (if required) and installation; however it’s important to remember that costs always vary depending on location and the size and type of system.

## Operation & Maintenance Costs

Once installed, operation and maintenance costs are very low.

## Savings

Savings potentially come from three sources:

- Reduction in electricity charges;
- Income from Renewables Obligation Certificates (ROCs);
- Margin on sale of excess electricity to the grid.

At small scale, savings on electricity charges will usually be most significant. At large scale, net income from sales will be most important, followed by income generated from ROCs.

Electricity distribution companies will pay a wholesale price for energy sold to the grid that reflects the interruptible nature of supply from windpower, i.e. lower than for fossil-fuel generated power.

Local users may be prepared to pay more but this will be offset by extra distribution costs. Likely savings and incomes are outlined below for small scale units:

Installation	Installed capacity (kW)	Cost incl. VAT @5%	SCHRI Grant (note 1)	Final Cost to Customer	Energy yield pa in kWh	Annual saving on bill	Annual income from ROCs	Payback time
400W roof mounted	0.4	£3,500	£1,050	£2,450	1051	£105.12	£42.05	17
2 x 400W roof mounted	0.8	£4,200	£1,260	£3,400	2102	£210.24	£84.10	12
2.5kW ground mounted	2.5	£15,100	£4,000	£12,600	6570	£657.00	£262.80	14
6kW ground mounted	6	£24,500	£4,000	£19,500	15768	£1,576.80	£630.72	9

## Notes

- 1 Assuming 30% grant, up to maximum of £4000
- 2 Assuming 30% capacity factor
- 3 Assuming an electricity price of 10 p/kWh
- 4 Assuming a ROC price of 4 p/kWh
- 5 Total cost / annual savings

These estimated energy yields might be too high for roof-top turbines.

## Sources of Funding

### Scottish Communities and Householder's Renewable Initiative:

The Energy Savings Trust (EST) and Highlands & Islands Community Energy Company run the Scottish Communities and Householder's Renewable Initiative (SCHRI). Householders can receive up to 30 per cent of the total cost of their project up to a limit of £4,000. Community schemes can receive a maximum grant of £10,000 for a feasibility study and a maximum grant of £100,000 for a capital project. Contact: [www.est.org.uk/schri/](http://www.est.org.uk/schri/) or call 0800 138 8858.

### Loan Action Scotland:

Loan Action Scotland is funded by the Scottish Executive through the Scottish Energy Efficiency Office in support of Action Energy. Loans may be advanced against a range of energy saving measures to enable companies to take action to reduce their energy bills. It is primarily an energy efficiency scheme, but it may be worth discussing whether biomass heating equipment would be eligible.

The scheme provides interest free loans of £5,000 to £50,000. Loans can have a repayment period of up to five years. The loans are available to companies based in Scotland, with up to 250 employees. Companies must be able to demonstrate that the actions proposed will deliver the energy efficiency benefits claimed. See: [www.energy-efficiency.org/howto/help/loan/index.html](http://www.energy-efficiency.org/howto/help/loan/index.html)

## Advice

Energy Savings Trust (EST) business advisers can help small to medium sized businesses make best use of the many energy and resource efficiency schemes provided by the Trust and other government funded organisations. They can also help access tax incentives and interest free loans to help finance improvements. EST advisers can help you access:

- Free and impartial information and advice.
- Free on-site energy, waste and water audits.
- Practical guides and best practice literature.
- Low carbon, clean fuel and renewable technologies.
- Relevant training and seminars.

Contact: 0845 458 5040                      [www.est.org.uk](http://www.est.org.uk)

Energy Efficiency Advice Centre (EEAC) 0800 138 8858.

British Wind Energy Association      [www.bwea.com](http://www.bwea.com)



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