

# Microgeneration

## Policy from Practice

**The UK has an exciting opportunity to embark on a micro-generation revolution, where every home, business and public building generates its own renewable energy and helps tackle climate change. Decentralisation of electricity and heat production in this way would significantly reduce greenhouse gas emissions, energy waste, pollution, and the impact of power generation on the countryside and coast.**

### The National Trust and energy

The National Trust needs energy for our everyday business of looking after the country's finest buildings and countryside. We manage over 245,000 hectares of countryside, 1,100 kilometres of coastline and 300 houses and gardens open to the public across England, Wales and Northern Ireland.

Our bill for electricity, oil and gas in 2005–06 amounted to almost £2.5 million. Most of our energy currently comes from fossil fuels.

We are committed to investing in small-scale renewables, greater energy efficiency, and using low carbon materials and products to reduce our use of fossil fuels. We want to share this experience with our 3.4 million members, our wider networks of visitors, school children and local communities, and our partners.

This leaflet highlights some of the National Trust's microgeneration projects, the barriers we have encountered, and recommendations

for policy makers to move microgeneration from a niche market to the mainstream.

### Towards a renewables revolution

The UK is rich in a wide range of renewable energy – hydro, solar, wind, tidal, wave, biomass and geothermal. However, only two of these technologies have been developed to a significant degree in the UK: hydropower from large scale dams since the 1930s; and large scale wind energy since the 1990s. The proportion of UK electricity from these sources is still only 4%.

We support the Government's strategy to increase dramatically the proportion of energy in the UK supplied from renewable sources. To date, this approach has focused on large-scale developments such as onshore wind power. We believe there is great potential in developing renewable energy, for both electricity and heat, at a more local and small scale, in households, businesses and communities - microgeneration.

Microgeneration of renewable energy provides the basis for an alternative model to the centralised, fossil-fuel based energy system in the UK today that would bring a wide range of benefits:

- reduced waste and inefficiencies
- greater reduction of greenhouse gas emissions

- improved energy security through reducing reliance on imported fuel
- low or zero energy bills, helping to tackle fuel poverty
- creation of market opportunities for UK businesses
- reduced public controversy over the impact of large-scale energy developments on communities and the environment.

Crucially, microgeneration also presents a unique and exciting opportunity to transform people's attitudes to energy and climate change; helping everyone feel part of the solution and providing an incentive for energy saving behaviour. This progressive cultural shift is as important to tackling climate change as technological, financial and policy innovations.

### Our microgeneration experience

The Trust has been using renewable energy – such as waterpower for milling and woodfuel for heating – on its properties for many years. Our first purpose-built hydro-electricity scheme was at Aberdulais Falls in 1986. Since then, we have developed over 20 sites for woodfuel heating, solar, ground heat and hydro.

From our practical experience, we believe that small-scale renewable energy has huge potential to be a cost effective and sustainable means of providing affordable heat and electricity to homes and businesses.



## Solar energy

The visitor buildings and café at Kynance Cove on the Lizard in Cornwall have recently had a green refit, showing that energy efficiency and micro-generation can be incorporated into building restoration and repair, as well as new build.

The buildings have been re-roofed with over 500 solar slates that generate electricity throughout the year to supplement the mains supply and export to the grid at times of low use. Importantly, in the sensitive landscape of the Lizard, the solar slates look like a traditional slate roof.

The solar slates have produced over 5,000Kwh of electricity in the past 12 months – enough to light a 3-bedroom house for eight years.

Wool insulation – ‘Thermafleece’ – has also been used to make the buildings energy efficient, substantially increasing the proportion of the buildings' energy that the microgeneration technology can supply.

### Installing the solar slates at Kynance Cove



The Trust has also installed solar energy systems at:

- Heelis, the Trust's new central office in Swindon (photovoltaic (PV))
- Gibson Mill, North Yorkshire (PV and thermal)
- Brancaster Millennium Activity Centre, Norfolk (PV and thermal)
- Studland Education Centre, Dorset (PV)
- Craflwyn Centre, Gwynedd (thermal)

Our next installation will be at:

- Dunster Castle, Somerset (PV)

## Wood energy

The Trust has eight heating systems that use wood rather than oil or gas as the main fuel source. These range from small log burning stoves to large, fully automatic wood-chip boilers heating an entire regional office.

Woodfuel could make a particular contribution to reliable and affordable

heat in rural areas, where a greater proportion of properties are not connected to mains gas and are especially vulnerable to increasing and unstable oil prices.

We have significant wood and other biomass resources of our own and we are considering how best to use these at a local level. It is not straightforward, as the quality and reliability of supply needs to be guaranteed for wood heating systems to operate effectively.

The Trust cannot make the most of wood energy potential alone. We need to develop local markets by working in partnership with local networks of suppliers and users such as South West Wood Fuels, but these are currently rare.

The Trust has installed wood energy schemes at:

- Sheringham Park visitor centre, Norfolk
- Westley Bottom East of England regional office, Suffolk
- Dudmaston Estate offices, Shropshire
- Craflwyn Centre, Gwynedd
- Dinas offices, Betws y Coed, Conwy
- Gibson Mill, Yorkshire [\[below\]](#)
- Bowe Barn offices, Borrowdale, Lake District

Our next installation will be at:

- Dinefwr Home Farm, Camarthenshire



## Hydro-electricity

Gibson Mill is a 200 year old cotton mill in West Yorkshire that demonstrates the potential of combined microgeneration technology. The listed building has been transformed into a visitor centre, café and community space, and is 100 per cent self-sufficient in heat and electricity, as well as water and waste treatment.

All of the Mill's energy is generated on site by two water turbines, photovoltaic panels, and biomass harvested from the surrounding woodland. The electricity from the hydro and PV is stored in a battery bank, giving us the potential to run the property for four days in the unlikely event that all of the generators failed.

Wool insulation and ultra-energy efficient devices – including the fridge and light bulbs – reduce total energy demand. This makes it possible for the microgeneration to supply all the power needed. A key factor to success is a system allowing easy monitoring of power generation and consumption.

Gibson Mill proves that microgeneration is usable and reliable, and gives us a useful model for future projects. Critically, it is designed to inspire and share solutions with the visiting public and schools.

The Trust has installed hydro-electric plants at:

- Aberdulais Falls Centre, Neath and Port Talbot
- Houghton Mill, Cambridgeshire



Our next installations will be at:

- Poltesco Mill, Cornwall
- Bransdale Estate and Malham Tarn Estate, North Yorkshire
- Llanerchaeron, Ceredigion

## Ground source energy

Brancaster Millennium Activity Centre is a 17th century listed building on the North Norfolk coast that has been renovated as a residential education centre to demonstrate more sustainable living in the coastal zone.

It is heated by a surface array ground heat recovery system with a water:water heat pump. This system has a long length of coiled pipe below the surface of the surrounding mudflats through which water flows, absorbing heat from below the ground.

A heat pump at the Centre upgrades the liquid from the buried pipes from 10–12°C to 30°C, and pumps it through pipes under the floor of the Centre to provide space heating and also to pre-heat the hot water system.

**Below:** The main hydro turbine at Gibson Mill was originally installed in the 1920s. It has been refurbished and is supported by a smaller turbine which operates when the river flows are low

**Below left:** The water-wheel at Aberdulais Falls



In addition, the hot water for washing and showering is pre-heated by a highly efficient solar panel on the roof consisting of 30 Thermomax vacuum tubes which absorb energy even on cloudy days. A small wind turbine and solar photovoltaic panels generate electricity, providing some of the power needed for lighting.

All systems are connected to computers and linked into the education programme at the Centre, to engage the children and adults on residential courses in how renewable energy is generated and used during their stay.

The Trust has also installed heat pumps at:

- Botallack Count House, Cornwall (borehole system)
- Craflwyn Centre, Gwynedd (borehole system)

Our next installation will be at:

- Aberdulais Falls Centre, Neath and Port Talbot (air:water heat pump)

## Barriers to progress

We continue to encounter a range of barriers which the Government, local authorities and industry need to address:

- upfront costs of installing micro-renewable energy systems are high compared to mass-produced goods such as conventional gas and oil boilers, and payback times can be long
- practical problems in supplying electricity to the local or regional grid, especially metering and pricing
- difficulties in finding independent and reliable advice – in several cases, poor quality advice has led us to install the wrong system.
- the engineering skills gap – there are not enough people with relevant technical expertise and experience who are fully independent of suppliers and manufacturers
- weak local networks and infrastructure, particularly for biomass, hinders both development of supply and growth in demand
- planning and consenting procedures can be overly complex
- local planning authorities often do not have the expertise to provide good guidance to councillors or the public.

## A way forward

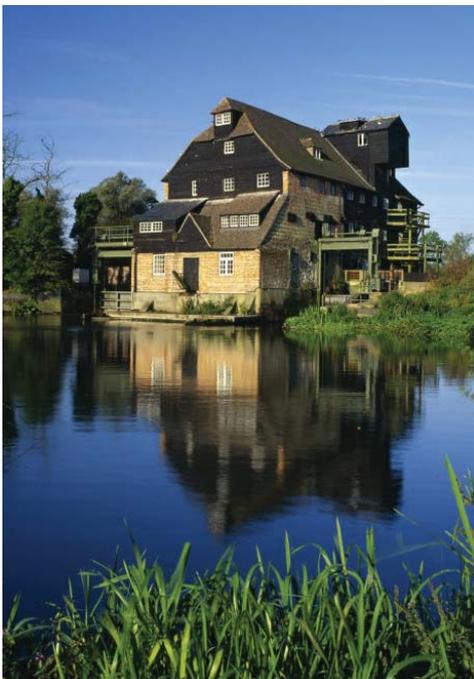
The National Trust is committed to working with partners to demonstrate the potential of microgeneration, and to help establish consumer confidence and generate demand.

The Government's Microgeneration Strategy and associated low carbon initiatives are a welcome step forward. However, we need a greater sense of urgency, priority and commitment to achieve widespread take up of microgeneration technologies. There is much we can do now to realise the potential contribution of existing low and zero carbon technologies, as well as support innovation in new technologies and services. We strongly encourage the Government, local authorities and the industry to gain momentum by:

- setting national and local **targets** for microgeneration of renewable energy
- securing a **long term framework** to provide the certainty needed to attract investment in the microgeneration sector, and move away from the current short term and insecure grant system
- requiring **public buildings** to generate a substantial proportion of their energy use through on-site microgeneration

- requiring all **new building** projects and significant refurbishments, whether domestic or commercial, to incorporate microgeneration technologies
- creating greater **financial incentives** for householders, businesses and communities to install microgeneration technologies, such as council tax and stamp duty rebates
- improving the quality and scaling up the provision of independent **information, advice and support** programmes for individuals and communities and ensuring they are widely publicised
- introducing an **accreditation** scheme for advisers, engineers, suppliers and technologies
- removing regulatory and legislative disincentives for **metering** and **connection**, and making **planning** issues much more straightforward for home and small business micro-generators
- ensuring complementary support for **energy saving** measures to optimise the share of supply from microgeneration and make low carbon buildings a reality.

**Below left:** The weatherboarded Houghton watermill on the River Ouse



Photos © p1 Rob Jarman; p2 Rob Jarman, Guy Laurie, Steve Morgan, NTPL/Andrew Butler; p4 NTPL/Rod J. Edwards.

Printed on Revive uncoated paper, made from 80% post consumer waste.

The National Trust is a registered charity, independent of Government and receives no state grant or subsidy for its general work. Charity No: 205846. © The National Trust 2006.

**Cover picture:** Aerial view of the visitor buildings and café at Kynance Cove. The solar slates generate electricity and look like a traditional slate roof

## Other topics in this series:

*Tourism*  
*Visitor Travel*

For a copy of either of these contact us – details below:

National Trust  
32 Queen Anne's Gate  
London  
SW1W 9AB

Tel: 020 7799 4541  
Fax: 020 72225097  
policy&campaigns@nationaltrust.org.uk  
www.nationaltrust.org.uk