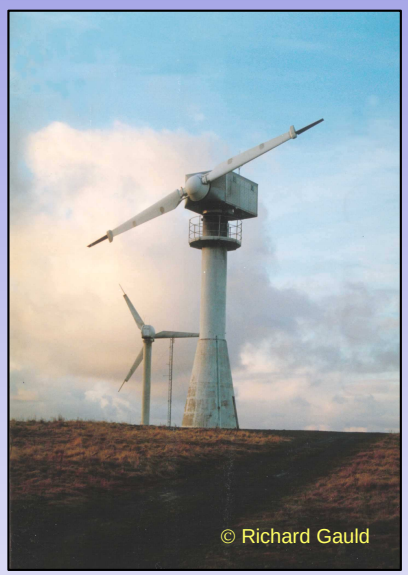
Orkney Renewable Energy Case Studies

Original Burgar Hill Research Project



The 3MW and 250kW prototype wind turbines were designed and constructed by the Wind Energy Group during the 1980s. At the same time Howden completed their research and development of their 300kW wind turbine, with all three machines tested on Burgar Hill during the late 1980s and early 1990s. Although each design of machine functioned, and the site produced over 10GWh of electricity, design failings ultimately led to the demolition of these experimental turbines.

The 3MW wind turbine demonstrated that Britain could be a world leader in renewable energy, with machines of this scale only now being produced for the commercial market. The Wind Energy Group was a joint venture of British Aerospace, GEC and Taylor Woodrow Construction, and became NEG Micon UK. Local individuals involved in the project included Richard Gauld, now of Orkney Sustainable Energy, Micky Austin of MT Austin Civil Engineers, Ian Heddle, Heddle Construction and Terry O'Hara, Andrew Wilson Electrical.

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Burgar Hill Phase II: SRO Projects

The establishment of the Scottish Renewable Order allowed the redevelopment of the Burgar Hill site, with the establishment of the NEG Micon 2MW and 1.5MW wind turbines in 2000. During the same year a joint venture between TXU Energy and Orkney Sustainable Energy lead to the erection of a 1.3MW Nordex wind turbine. The Burgar Hill site has an annual mean windspeed in excess of 10 m/s, requiring robust class 1 machines. Each of the turbines erected on Burgar Hill has had operational problems due to these very high wind conditions.

Orkney Sustainable Energy were responsible for planning all the wind turbines on Burgar Hill, with NEG Micon 2MW wind turbine replaced with the larger NM92 in 2002. With the demise of TXU, the Nordex wind turbine is now owned by London-based Hainsford Energy, http://www.hainsford.com/htmls/sigurd.html., and the NEG Micon turbines are now owned by Vestas.

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Burgar Hill Phase III: WindWorks

The Renewable Order (Scotland) created in 2003 allowed expansion of the Burgar Hill site, with consent granted for two new 2MW scale wind turbines. These wind turbines are to be deployed during 2004 once a constrained connection system has been established. Orkney Sustainable Energy were responsible for design and planning of the WindWorks project on Burgar Hill, on behalf of the landowner and Npower Renewables Ltd. The involvement of the landowner in all stages of the planning process is the first stage in providing greater control and governance of renewable energy developments.

The deployment of wind turbines on Orkney was temporarily halted in 2002 due to the need to provide better control of the grid system in the islands. A constrained connection system has been established, with Scottish and Southern Energy in a controlling position; should the local grid be seen to be unstable due to excess production of electricity, SSE will disconnect windfarms until the grid security is re-established. This novel system was seen to be necessary to allow generation to the maximum capacity of the grid system, suggesting that this model of grid control could be adopted in Scotland to enable further generation.

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Rothiesholm Project, Stronsay

The Rothiesholm headland on Stronsay was developed in 2001 as part of the Scottish Renewable Order. The original idea for development of the site came from the landowner, with the Devon-based company Farm Energy responsible for obtaining a Scottish Renewable Order contract. Orkney Sustainable Energy was engaged to complete site design and planning, with a project created based on the Enron 900kW wind turbine. Detailed design and consultation led to a project being established which fully avoided sensitive habitats and respected bird species on the island.

The demise of the American companies TXU and Enron has had an impact on the project, with three GE Wind wind turbines now in place. As the project has a small SRO contract, each wind turbine has been de-rated to 750kW. Moreover the SRO contracts remain tied to an original bid price, and although profitable, rates of return have been poor compared with the newer energy trading mechanisms. The limitations of the old SRO contract has now resulted in a proposal to expand the site.

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Burray Community Wind Energy Project

The Burray Wind Energy Project was established by the landowner as a mechanism of ensuring that the full economic benefits of renewable energy are retained within the community. Full local and community ownership has been achieved, using a single Vestas 850kW wind turbine. It was originally intended that a smaller wind turbine would be used, however the poor availability of small machines resulted in the decision to use this Vestas turbine, manufactured at the Machrihanish factory in Scotland.

The Burray project was developed by Orkney Renewable Energy Ltd, with directors including the landowner, along with Richard Gauld, Brian Rendall, Micky Austin, Ian Heddle and Alistair Macleod. This strong team has all the skills and abilities needed to develop Scotland's first true community wind energy project. The main stumbling block to establishing this project had been the need to establish a constrained grid on Orkney, now in place, and creating a suitable mechanism of community ownership has also presented difficulties. The Scottish Agricultural Organisation Society is in the process of establishing a community ownership model that will be suitable for this and other similar developments, http://www.saos.co.uk/news/Dec04/OrkneyWindFarm.html

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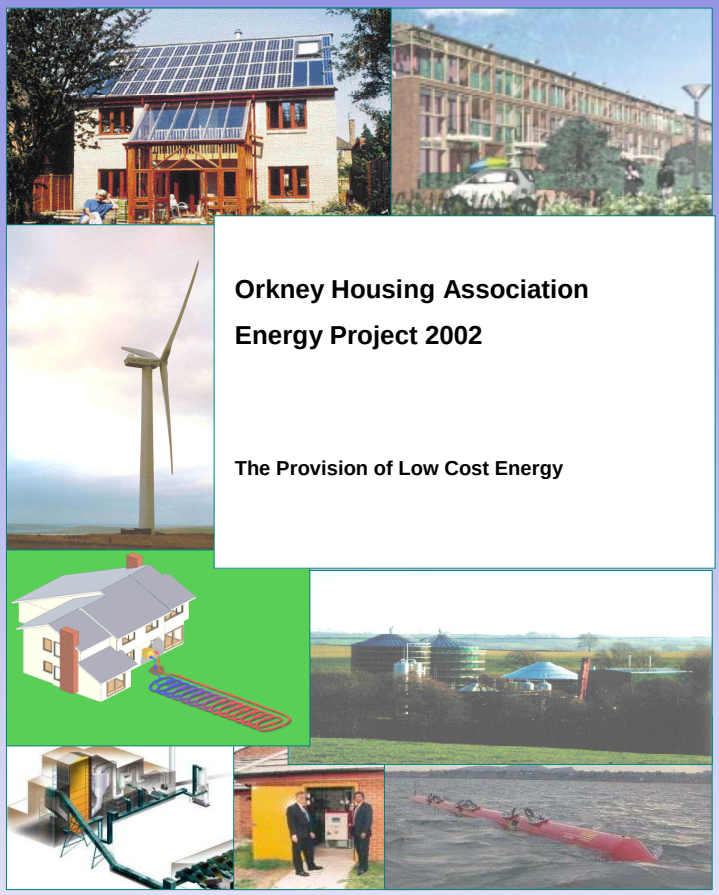
Orkney Housing Association Energy Project



In 2002 the Orkney Housing Association obtained funding to investigate mechanisms to reduce the cost of energy to their tenants, with the aim of using renewable sources where possible. Orkney Sustainable Energy were commissioned to complete a feasibility study, identifying a range of possible options, including enhanced energy efficiency, alternative energy supply and the provision of energy from renewable sources. Recommendations included establishing a combined heat and power district heating scheme, ownership of a wind turbine, change to a green electricity supplier and the incorporation of solar and ground-source heating systems into housing stock; http://www.oref.co.uk/biomass_boiler.htm

Orkney Housing Association is in the process of incorporating many of these measures into their properties, with combined heat and power systems and ground source heating being used in their new developments, http://www.oref.co.uk/SCHRI_4-OHA_Solar_Vent.htm. Ownership or involvement in a wind energy project has not yet been implemented, however a further study is underway to identify constraints to ownership.

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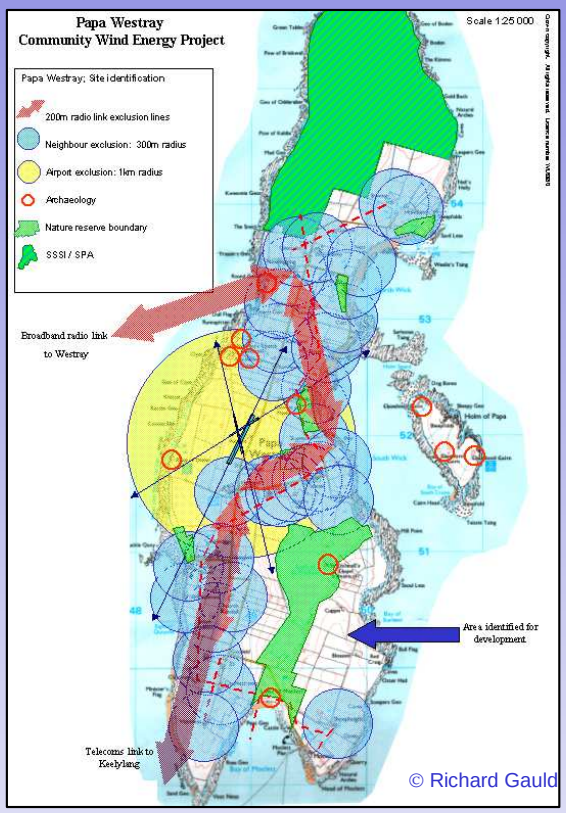
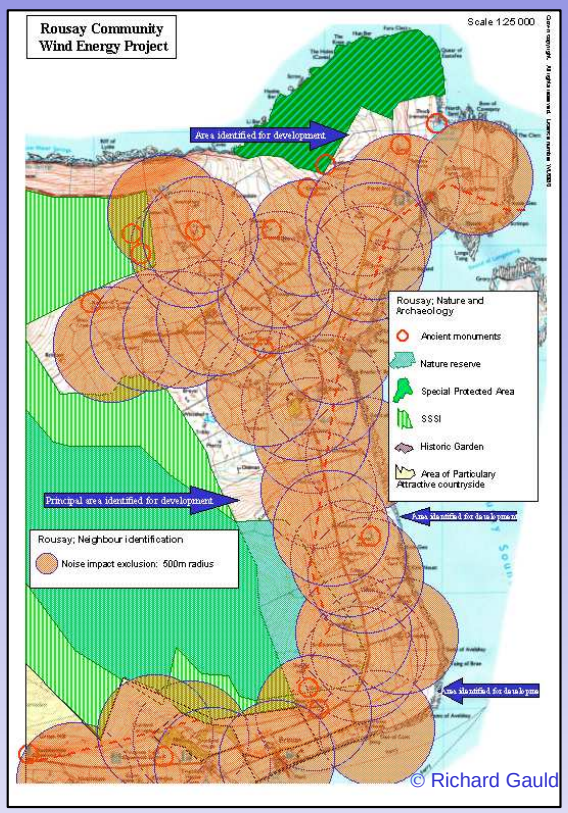
North Isles Community Project





The establishment of the Scottish Community and Householder Renewables Initiative (SCHRI) has allowed community groups the opportunity to investigate the feasibility of direct ownership of renewables energy. Orkney Sustainable Energy has been working with SCHRI on a range of projects, including a study on behalf of Pairc Community on Lewis, and a study for three of the north isles of Orkney; Westray, Papa Westray and Rousay. Focusing on wind energy, this study identified constraints to development, discussed the relevant technology and identified appropriate sites on each of the three islands.

Direct community governance of renewable energy developments is being achieved. There are constraints to development on each site being considered, however by investigating a complete island, the least contentions and most suitable location can be identified. Taking the project forward from the initial study is the responsibility of the island community, with environmental studies, planning, turbine purchase, contract negotiation and energy trading all to be undertaken; a strong and willing community is necessary to achieve full community control.

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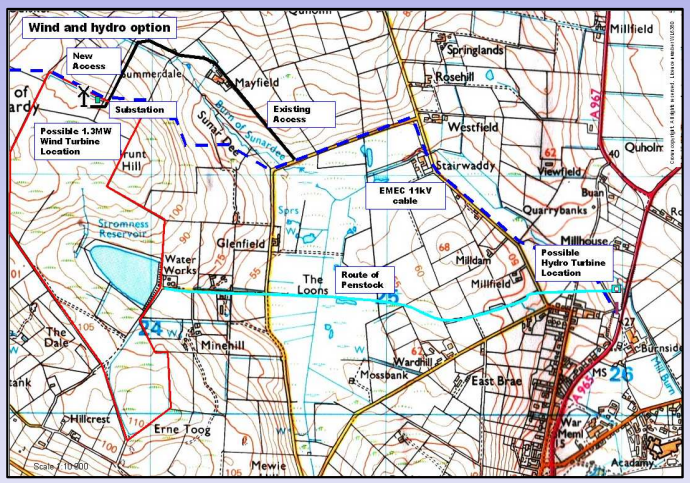
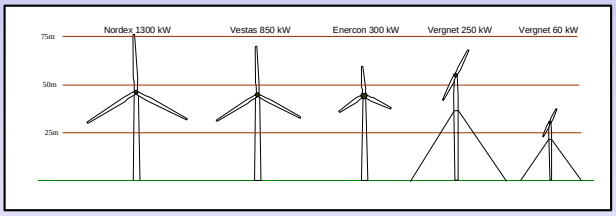
Stromness Renewable Energy Project





The Stromness Community Business Forum and Stromness Community Council has initiated a study into the potential for community ownership of renewable energy, using funding from the SCHRI. Orkney Sustainable Energy completed a full assessment into the renewable energy resources around the community and designed a preliminary wind and hydro project, located on a site next to a redundant water reservoir. The wind energy project will produce a maximum of around 2.5MW, and will be constructed from either two Nordex N60 wind turbines or three Vestas V52 machines. The hydro electric scheme is constrained by the low annual rainfall on Orkney, and although 250kW can be generated, the lack of resource limits operational hours.

Community governance of renewable energy developments is hard to achieve. For the Stromness project it is proposed that the development should be owned by businesses within the community, with a percentage of revenue distributed by the community council. One possible idea that came out of the study was to use revenue from the development to combat fuel poverty. Many households in Orkney spend more than 10% of the household income on heating, with energy dividends from wind energy one mechanism of providing a direct link between energy production and heating needs.

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Constraints to development; Gruf Hill

Wind energy projects are being proposed for all parts of Orkney. The pattern of scattered low density housing prevalent around the isles prohibits development over much of the islands, with projects having to be located on remote hill tops or ridges to avoid noise and shadow nuisance. The Gruf Hill project was initiated by two landowners as a mechanism of providing renewable energy in the Orphir community in Mainland Orkney. Orkney Sustainable Energy designed a project using three wind turbines on the hilltop next to the main island grid connection point. Because of the need to avoid impact upon neighbours the turbines have encroached upon a Special Protection Area (SPA), designated to protect bird species.

The regulations governing development on SPAs requires detailed and rigorous assessment of environmental impact, and for the Gruf Hill site, detailed assessment of birds flight paths and a collision risk model were used to quantify impact. Renewable energy development requires a balanced approach, considering impacts upon both natural resources and communities. Achieving a balance requires a project which avoids impact on sensitive species and habitats, while at the same time avoiding impact on neighbours and maximising local and community benefits.