Braunton Parish Council

Rural Community Energy Fund

Stage 1 assessment

Wind Generation

This appendix assesses the viability of a community wind generation in the Braunton parish.

Headings

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Braunton Parish wind potential

Wind turbines harness the wind to generate electricity. As a general rule; the taller the wind turbine, the higher the average wind speed that can be harnessed, equally the larger the swept area of the turbine, the more energy it can generate at any given wind speed. In a nutshell, the higher and larger the turbine the better. However this needs to be balanced with potential local visual impact when considering options for community wind generation.

Wind turbines can be an excellent way of offsetting local community energy demand, when situated correctly. Full community support in the development of a turbine would be absolutely vital.

Figure 1 Braunton NOABL average wind speeds @ 10 meters height

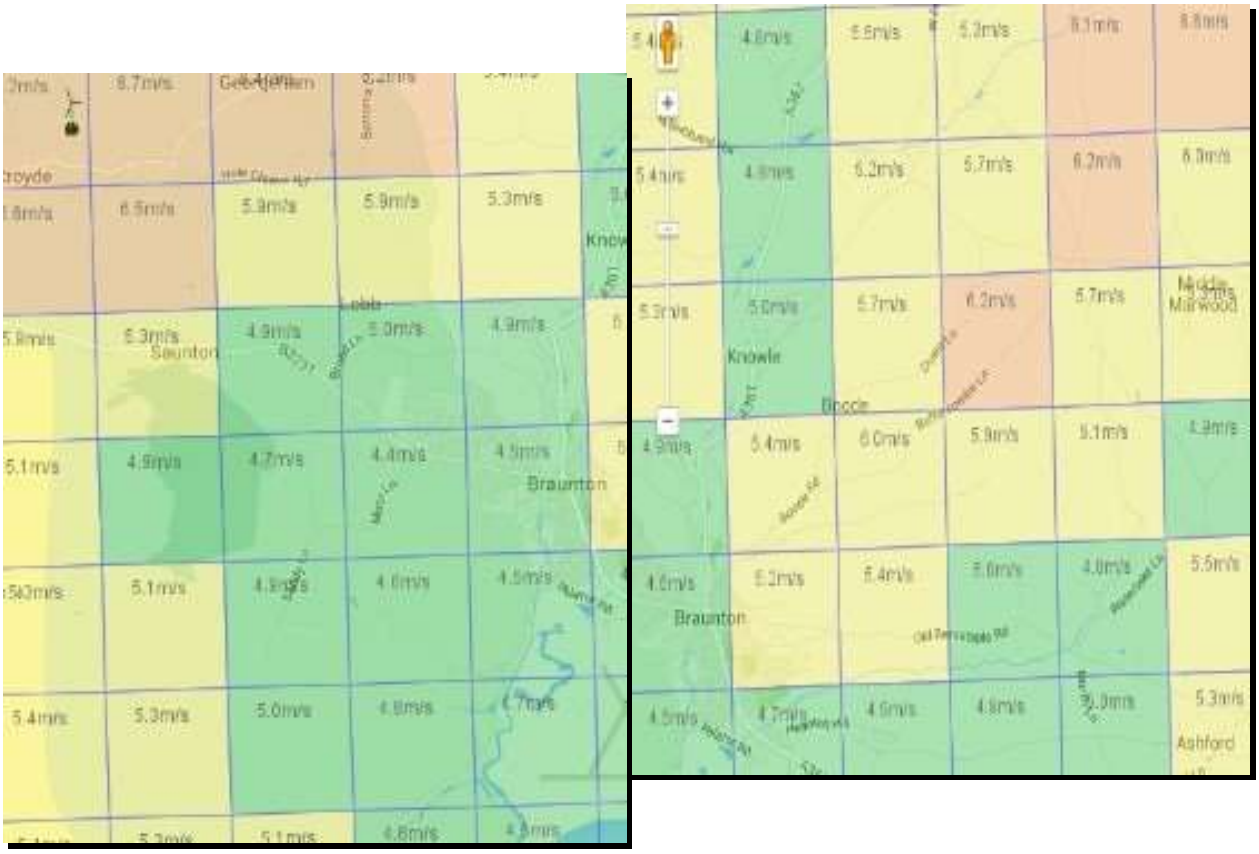

Figure 1 gives an overview of the NOABL database average wind speeds for Braunton and the surrounding area. Although only an estimation, this overlay does give a general indication of the available wind resource.
Looking at the map in Figure 1, the highest average wind speeds available are on the higher ground to the NW and NE of the village. These areas are exposed and would provide an excellent site for a community owned wind turbine, with the potential for significant generation.

The large wind turbine installations at Mullacott Cross north of Braunton, and the Fullabrook wind farm are both evidence of the areas suitability for onshore wind in this area.

The higher ground to the NW and NE would be attractive for maximising performance of a wind turbine. These areas have high average wind speeds and exposure to prevailing winds. This land is mainly agricultural land in private ownership.

These areas of higher wind speeds are shown on a satellite image in Figure 2 below.

Figure 2 Areas of high average wind speed

There are no high demand electricity consumers in these higher areas around the village. Therefore a private wire connection to offset energy demand from a site of high demand may not be possible.

An approach would have to be made to Western Power Distribution very early on in any project development to ascertain local grid capacity in these locations out of the village. A new connection into the existing grid infrastructure is highly likely to be required for a turbine in these areas due to little opportunity for private wire connections.

The land to the north of Saunton Park is a potential location and there are several grid connection points. The top of Willoway Lane, shown in Figure 3 below, has a transformer available and the nearby residential area could provide energy demand.

Figure 3 Willoway Lane transformer location

Smaller turbines could be located sensitively and be obscured from most parts of the village on these higher sites. A full visual impact assessment would be required. Full community support would be absolutely crucial to any project success.

Figure 4 Green lane pumping station - note masts to centre and left

Figure 5 Green lane pumping station view to west

Figure 6 Green lane turbine location option

Figures 4, 5 and 6 show an example of one of the possible locations for a smaller community wind turbine. The site has a high elevation, is exposed to prevailing winds, has grid connection possibilities and could also 'hide' a smaller turbine of < 50 kW from nearby housing and viewpoints.

The average wind speed at this location would be around 7 m/s at hub height and a turbine would perform very well here. The issue would be proximity to local housing, and whether this was acceptable (Figure 14). A smaller turbine could be virtually hidden at this location, due to the steepness of the valley sides up to the field. It is a good example of how a turbine can be landscaped so as not to cause undue visual impact.

There are other elevated and exposed field locations, which are further away from housing, that offer alternative installation sites. The community would have to decide what was acceptable in terms of proximity to housing and visibility.

There are other areas with high average wind speeds, such as around the estuary and out towards the coast, but these are very sensitive from a landscape point of view and planning permission is very unlikely to be considered.

An alternative approach would be to site a turbine nearer to where there is larger demand for electricity, and where the landscape is already more commercial/industrial in character. The most suitable sites for a turbine linked to high demand would be near industrial units or commercial premises. This has the benefit of linking supply to demand – WPD are more likely to be in favour of a system where the majority of the generation is utilised at site.

There is no Parish Council owned land suitable for the installation of a wind turbine.

Commercial sites

Suitable commercial sites with electrical demand are the Tesco estate, Velator Industrial estate and Perrigo. Although not as exposed as the hilltop locations these commercial locations would have the benefit of more robust grid connections, on site usage and a commercial/industrial landscape character. The issue is that these sites of high demand are also near to local housing, and the key is to find somewhere that is technically feasible and also acceptable to the local community.

Tesco – the site has high electrical demand but little land available directly around the building for a turbine. There is, however, some land to the SSW of the main Tesco site (marked by dot on satellite image). Ownership and classification is unknown. This small area of land may support the installation of a smaller turbine of < 50 kW.

There would certainly be visual impact, though much less for a turbine in the <50 kW size range. Such a turbine would still be capable of generating significant energy and carbon savings, and would complement the installation of solar PV.

Figure 7 Small turbine option Tesco

Perrigo – the site has a parcel of land available near to the building that may be suitable for a small sized turbine. There is some housing to the west of the site that would need to be considered. Nearby land is currently being developed for further commercial and residential premises.

Figure 8 Perrigo small turbine option

A possible location for a smaller turbine is shown by the blue dot. This land is not used by the site owner. The small area of land has outline planning permission – but has done so for 20 years.

The land near to the Perrigo building suitable for a small turbine can be seen in the photo below.

Figure 9 Perrigo small turbine option

This field is within easy connection distance to the main Perrigo building. The site would suit the installation of a turbine on a 15-30m tower, rather than that of a larger turbine.

There are guidelines for how near a turbine should be located to residential areas. Below are some indicative distances for smaller turbines (200m) and larger turbines (500m). These are guidelines and should form part of any Neighbourhood Plan process.

Figure 10 200m radius around Velator site

Figure 11 500m radius around Velator site

Figure 12 200m radius around Perrigo site

Figure 13 500m radius around Perrigo site

Figure 14 Turbine distances to residential areas

	Undesirably close	Turbine Size			
		< 100 kW	500 kW	2 MW	3 MW

Residential area - with Inhabitants not due to gain from installation	< 150 metres	150 to 450 metres	450 to 620 metres	620 to 820 metres	> 820 metres
Residential area - Inhabitants due to gain from the installation	< 40 metres	40 to 150 metres	150 to 210 metres	210 to 280 metres	> 280 metres
Commercial area	< 10 metres	10 to 25 metres	25 to 40 metres	> 40 metres	> 40 metres

As these figures and overlays show there is some scope for a smaller turbine at both of these commercial sites. It would depend greatly on the view of local people, and the community benefit.

The athletics track also offers some exposed ground near to sites with high electrical demand, such as Southmead primary school. This site would only be suitable for a smaller turbine (<15m tower) due to proximity to nearby housing.

Wind and the local community

A community turbine project in or around Braunton would be a major undertaking that would need full community support. The Parish Council would be required to identify appropriate areas through an adopted Neighbourhood Plan. The locations identified would determine the size of turbine used.

A common community turbine installation is the 500 kW size as it (currently) receives an attractive FiT. There are many of this size of turbine dotted around the south west. A common variant is the EWT 500 seen below.

Figure 15 EWT 500 kW turbine

This size of turbine could be mounted on a tower of 40-50 metres and would have a tip height of around 65-75 metres.

This turbine would cost in the region of £800k to £1.2m (not including planning and grid connection). Installed in the higher average wind speed areas highlighted in Figures 1 & 2, a turbine of this size could provide a very attractive return on investment (dependent on FiT levels and price of energy sales). It would generate around 1.6m kWh at an average wind speed of 6 m/s and 2m kWh at 7 m/s.

There are smaller, cheaper turbines than the 500 kW size and larger more expensive variants. The size of turbine chosen for a community development project would depend on what the community thought was acceptable in terms of visual impact. It would also depend on consultation with the MOD and NATS.

An Endurance 50 kW is an example of a smaller turbine that could still deliver energy savings and financial returns. This size of turbine is commonly installed on farm holdings and semi industrial areas. The turbine can be seen in the Figure 13 below.

The size of the turbine is mounted on a tower 24-36m high and has a blade diameter of 19.2m. It would generate approx. 175,000 kWhs at an average wind speed of 6 m/s. It may be a suitable size of turbine for

commercial sites such as Tesco and Perrigo. It may also be suitable for locating in exposed areas where the visual impact of a turbine needs to be minimised.

Figure 16 Endurance 50 kW turbine

Figure 17 below gives an indication of what the turbine hub height for a 50 and 500 kW turbine would look like side by side at the football club pavilion (for illustration purposes only – a turbine is not proposed for this location).

Figure 17 500kW vs 50kW size comparison for illustrative purposes only

Conclusion

In summary, there is good wind generation potential surrounding Braunton village. The technology is the most contentious renewable energy, and as a first community project it could be problematic. A successful development would depend on complete local support.

There is the potential to incorporate a single smaller turbine into a commercial or rural environment without causing significant visual impact. Any wind turbine discussions would need to be focused through the Neighbourhood Plan process, to identify areas the community felt suitable for wind generation.

The timeframe for wind turbine installation is longer than for solar PV due to the consents required.

Wind case study

A successful example of a community wind is South Brent Community Energy Society[1]. A 225 kW wind turbine was installed, funded via a community share issue. The turbine is on the edge of Dartmoor National Park, but did not receive any objections in the planning process.

It took a lot of hard work from a dedicated core group of volunteers. It demonstrates that wind is a viable option for community energy projects, even in areas where visual impact is a key consideration.

[1] http://www.sbces.org.uk/