Dulverton, Porlock and Brompton Regis

Energy Report

T. Furness

DARE

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1 Summary

This document is compiled from information in the Dulverton, Porlock and Brompton Regis Community Energy Plans and the Dulverton, Porlock and Brompton Regis Settlement Energy Plans. Please refer to individual documents for detailed information.

As part of the Exmoor LEAF project, domestic household energy surveys were distributed throughout the three communities of Dulverton, Porlock and Brompton Regis. These surveys asked the property owners/occupiers a range of questions to determine a variety of information. This data covered all aspects of domestic properties energy use, efficiency, thermal performance, heat delivery and use of renewable technologies.

The information detailing domestic scale renewable energy potential was provided as a result of site visits, remote GIS mapping and the use of specialist software and modelling to provide detailed technical data on household heat and power generating potential.

In Porlock, the questionnaire was distributed to all of the domestic properties, approximately 723 dwellings. 44 surveys were returned completed, showing a response of 6.1%. In Dulverton, the questionnaire was distributed to all of the domestic properties, approximately 754 dwellings. 24 surveys were returned completed, showing a response of 3.18%. In Brompton Regis, the questionnaire solicited a response of 10.7% of the homes in the parish. The following results give an overview of the domestic dwellings within Dulverton, Porlock and Brompton Regis, however, as they only represent a small percentage of the housing portfolio they cannot be viewed as truly representative of the population and any extrapolation of this data should be reviewed with caution.

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1.1 Overall energy consumption

Settlement	Overall Energy Consumption	Heat Energy	Electricity
Porlock	25,824 MWh/y	17,005 MWh/y	8,819 MWh/y
Dulverton	31,888 MWh/y	16,902 MWh/y	14,986 MWh/y
Brompton Regis	7,863 MWh/y	5,447 MWh/y	2,416 MWh/y

1.2 Porlock

The overall energy consumption in Porlock Vale as estimated in the original Porlock Vale Sustainable Energy Plan is 25,824 MWh/y, of which 17,005 MWh is heat energy and 8,819 MWh is electricity.

1.3 Dulverton

The overall energy consumption in Dulverton as estimated in the original Dulverton Sustainable Energy Plan is 31,888 MWh/y, of which 16,902 MWh is heat energy and 14,986 MWh is electricity.

1.4 Brompton Regis

The overall energy consumption in Brompton Regis is difficult to calculate exactly, however, a recent study[1] looked at energy consumption in Dulverton and concluded that 22,416 kWh per household of heat energy and 9,945kWh of electrical energy are consumed in Dulverton every year. Dulverton has largely comparable buildings, aspect and location (5 miles away) so it is therefore safe to assume that the energy consumption figures are likely to be similar. It is estimated that Brompton Regis uses 7863 MWh/y, of which 5447MWh is heat energy and 2416 MWh is electricity.

Figures of this kind are notoriously difficult to estimate with any useful degree of accuracy, so in spite of the fact that the method of estimating overall electrical use (and the division between Domestic and Commercial electrical use; 2909 MWh/y and 12,077MWh/y respectively), is not clear and whether

[1] Agenda 21 Dulverton Settlement Energy Plan

the 16,902 MWh of heat energy is a figure for overall total area consumption , or just domestic demand (as is subsequently assumed), there would be little to gain from proposing an alternative set of assumptions.

2 Energy saving

2.1 Energy Efficiency Improvement Potential for Domestic Housing in Porlock

Solid Wall Insulation - The surveys in Porlock showed that 48% of properties had solid brick or stone walls, which seems to be a relatively high percentage, perhaps reflecting vernacular building styles and ages. These could be improved thermally through solid wall insulation, using either internal or external methods. 80% of these homes who responded to the questionnaire had no insulation, while 20% didn’t know if they had any wall insulation in place. On average solid wall insulation could save approximately 9,900kWh per year in heating requirement. If the survey data was extrapolated out for the whole community, this would mean 578 houses could benefit from solid wall insulation making a **potential saving of 5,722MWh per year** from this measure.

Cavity Wall Insulation - The surveys in Porlock showed that 42% of properties were of cavity wall construction, with 89% of those properties having cavity wall insulation installed. 7% of occupiers didn’t know if they had any insulation in place. There are 11% of properties with cavity wall construction who could potentially benefit from cavity wall insulation. If the survey data was extrapolated out for the whole community this would mean 33 houses could benefit from cavity wall insulation (saving 3000kWh per year) and therefore a **potential saving of 99MWh per year** from this thermal improvement.

Loft Insulation – Survey results showed that there are 67% of properties that could potentially benefit from loft insulation in order to bring them up to a minimum of 270mm of mineral wool. If a property has no loft insulation and the owners/occupiers increased it to 270mm, they could save approximately 3,800kWh per annum. If, however, they top-up their loft insulation from an existing level of 100mm to 270mm they will save on average 550kWh each year. Therefore, if we assume the lower saving figure for the 67% of properties who could potentially benefit from loft insulation in Porlock and extrapolate this data to the whole domestic sector,(this would be across 484 properties), this would make a **total saving of 266MWh**.

Glazing - Replacing all single-glazed windows with B-rated double glazing could save a domestic property 3,600kWh per year on their energy bills. If we assume that the 43% of domestic properties in Porlock with less than 100% double glazing averaged half the savings of a complete conversion, then the 311 homes would produce **a cumulative saving of 560MWh/y.**

Total savings from all of these energy efficiency measures would equate to 6,647 MWh per year. Using the carbon conversion factor of mains electricity at 0.521kg of CO_2/kWh, this would equate to a CO_2 saving of 3,463 tonnes per year.

2.2 Fuel Use in Porlock

In terms of tariff type, 73% of those who responded to the survey were on a standard tariff, 25% used Economy 7 and 2% Economy 10, which would suggest electrical heating through night storage radiators. Also, the same 25% of homes have an economy 7 emersion heater to heat water.

45% of the surveyed properties used oil as their main heating fuel, 25% Economy 7, 9% LPG, 12% Woodfuel, 5% use a mix of electricity and coal, 2% use coal and 2% use Economy 10.

2.3 Renewable Energy Potential for Domestic Properties in Porlock

Solar Photovoltaic –The most efficient are systems orientated S, SE & SW. Looking at just these potential installations would see an annual generation of 488,438kWh (488.4MWh). This equates to an average annual generation of 1,313kWh per household.

Wind Power – Outside the main settlement, 10 x 15 kW turbines have been assumed to be installed in line with the original Sustainable Energy Plan for Porlock. These could produce 394 MWh/y of electricity.

Hydro Power – There are potential hydro sites at old mills which could be developed by local private property owners. Assuming that a total of 10 such sites were developed at an average installed capacity of 10 kW, the potential energy generation would be 350 MWh/y.

So potential from domestic properties in terms of electricity production in Porlock including solar PV, wind and hydro power is **1,232 MWh per year**. Using the carbon conversion factor of mains electricity at 0.521kg of CO_2/kWh this would equate **to a CO_2 saving of 642 tonnes per year**.

2.4 Renewable Heat Potential for Domestic Properties in Porlock

Solar Thermal – Using the same methodology as potential PV system identification, solar thermal has a potential yield of 502 MWh th per year in Porlock, however, it would reduce the roof space available to solar PV reducing it's potential yield by 161 MWh per year. Due to electricity being a tertiary fuel source, consideration should be given to the relative merits of reducing roof space available to solar PV.

Biomass - Through remote mapping and area assessment, the number of domestic properties that could utilise biomass has been assumed by examining the availability of outside space where a boiler house and fuel store could potentially be located. This has been through the identification of gardens in excess of 50m2. Therefore, there is the potential within Porlock for 144 biomass boilers. If we assume that this provides the average heat requirement of those properties, the total annual heat energy generation from Biomass would be 2415 MWh th /y. In the case of domestic properties this would normally be through pellets or logs.

Heat Pumps – Taking into account properties that have a high level of cavity, loft and glazing insulation, we have calculated that 94 homes would be able to effectively accommodate either an Air Source or Ground Source Heat Pump. With each heat-pump generating 10,000kWh per annum, this is a total generation of 940MWh th per year potentially from a heat pump technology.

So, potential from domestic properties in terms of heat production in Porlock including solar thermal, heat pumps and biomass is **3857 MWh th** per year. Using the carbon conversion factor of mains electricity at 0.521kg of CO_2/kWh, for 25% of this would equate to a CO_2 saving of 502 tonnes per year. While associating the remaining 75% of offsetting traditional heating through renewables with the carbon factor of 0.246 kg of CO_2/kWh for oil heating equates to a CO_2 saving of 712 tonnes per year. This creates a **total carbon dioxide saving of 1214 tonnes each year**.

2.5 Dulverton

2.5.1 Energy Efficiency Improvement Potential for Domestic Housing in Dulverton

Solid Wall Insulation - The surveys in Dulverton showed that 17% of properties had solid brick or stone walls, although in reality it is likely to be a higher percentage than this. These could be improved thermally through solid wall insulation, using either internal or external methods. 75% of these homes who responded to the questionnaire had no insulation, while 25% didn't know if they had any wall insulation in place. On average, solid wall insulation could save approximately 9,900kWh per year in heating requirement. If the survey data was extrapolated out for the whole community this would mean 128 houses could benefit from solid wall insulation and therefore a potential saving of **1,267MWh** per year from thermal efficiency improvements.

Cavity Wall Insulation - The surveys in Dulverton showed that 83% of properties were of cavity wall construction, with 68% of those properties having cavity wall insulation installed, there were 16% without cavity wall insulation and 16% of occupiers who didn't know if they had any insulation in place. Therefore, there are 32% of properties, of cavity wall construction, who could potentially benefit from cavity wall insulation. If the survey data was extrapolated out for the whole community this would mean 241 houses could benefit from cavity wall insulation and therefore a potential saving of **723MW**h per year from thermal efficiency improvements.

Loft Insulation – Survey results showed that there are 79% of properties who could potentially benefit from loft insulation in order to bring them up to a minimum of 270mm of mineral wool. If a property has no loft insulation and the owners/occupiers increased it to 270mm, they could save approximately 3,800kWh per annum. If, however, they top-up their loft insulation from an existing level of 100mm to 270mm they will save on average 550kWh each year. Therefore, if we assume the lower saving figure for the 79% of properties who could potentially benefit from loft insulation in Dulverton and extrapolate this data to the whole domestic sector (this would be across 595 properties), this would make a total saving of **327MWh.**

Glazing – The survey results showed that 42% of properties have an opportunity to install double, triple or secondary glazing in order to improve thermal efficiency. Replacing all single-glazed windows with B-rated double glazing could save a domestic property 3,600kWh per year on their energy bills. 42% of the domestic properties in Dulverton is a total of 316 homes and a total saving of **1,137MWh.**

Total savings from all of these energy efficiency measures would equate **to 3,454 MWh per year.** Using the carbon conversion factor of mains electricity at 0.521 kg of CO_2/kWh, this would equate to a CO_2 saving of 1,799 tonnes per year.

2.5.2 Fuel Use in Dulverton

In terms of tariff type, 58% of those who responded to the survey were on a standard tariff and 21% used Economy 7, which would suggest electrical heating through night storage heaters. 21% didn't know what tariff they were on.

The questionnaire found that 4% of homes used standard electric in combination with oil to heat their homes, while 21% used Economy 7 through night storage heaters. Also, the same 21% of homes have an Economy 7 emersion heater to heat water. 55% of the surveyed properties used oil as their main heating fuel, 4% LPG, 4% Woodfuel and 8% a combination of wood and oil.

2.5.3 Renewable Energy Potential for Domestic Properties in Dulverton

Solar Photovoltaic – A total annual generation of 510,048 kWh/y (510MWh) could be achieved across all the roofs in Dulverton, facing from East through to West. The most efficient are systems orientated S, SE & SW. Looking at just these potential installations would see an annual generation of 325,779.5kWh (325.8MWh). If you then divide this by the 155 homes with good orientation, this equates to an average annual generation of 2,832.87kWh per household.

Wind Power – Due to the low wind speeds within the settlement, wind-power for domestic properties has been discounted in this study. However, the potential for community scale electricity generation through windpower has been discussed in the Dulverton Community Energy Report.

Hydro Power – There are two potential hydro sites within the settlement which could benefit local private property owners. One is already being progressed and received planning permission in March to revitalise an existing hydropower plant in Dulverton which has been disused since the 1950's.
The second site at Dulverton leat could potentially amalgamate three smaller sites to power one larger 60kW turbine. This would generate over 200,000kWh per annum for the owners of the sites if they joined together for the purposes of power production.

So, the potential from domestic properties in terms of electricity production in Dulverton including solar PV and hydro power is **710 MWh** per year. Using the carbon conversion factor of mains electricity at 0.521kg of CO_2/kWh, this would equate to a CO_2 saving of 369 tonnes per year.

2.5.4 Renewable Heat Potential for Domestic Properties in Dulverton

Solar Thermal – Using the same methodology as identifying potential PV systems, solar thermal has a potential yield of **347 MWh** per year in Dulverton, however, it would reduce the roof space available to solar PV therefore reducing its potential yield by 113 MWh per year. Due to electricity being a tertiary fuel source, consideration should be given to the relative merits of reducing roof space available to solar PV.

Biomass - Through remote mapping and an area assessment, the number of domestic properties that could utilise a biomass system has been assumed by examining the availability of outside space where a boiler house and fuel store could potentially be located. This has been through the identification of gardens in excess of 50m2. Therefore, there is the potential within Dulverton for 122 biomass boilers. If we assume a 15kW average per domestic property of installed capacity, this equates to a total of 1,830kW (1.83MW). With an assumed heat demand of 22,416kWh per annum, this would mean a total output of **2734 MWh** from biomass fuel. In the case of domestic properties this would normally be through pellets or logs.

Heat Pumps - By examining the data collected through the LEAF survey, 30% of the properties were of cavity wall construction, which was filled with insulation and also had 200mm or more of loft insulation. This group also had either 75% or 100% of their glazing up to double or triple standards and either 2 or 3 external doors. This 30% represents the best insulated homes within the sample and therefore, theoretically, the most thermal efficient. This data was matched with garden sizes and current heating systems. A total of 226 properties are potential sites for heat pump installations in Dulverton based on this data. This would equate to 98 properties having air source heat pumps and 128 properties with ground source heat pumps, either slinky or bore hole. With each heat-pump generating 10,000kWh per annum, this is a total generation of **2260MWh** per year, potentially from heat pump technology.

So, potential from domestic properties in terms of heat production in Dulverton including solar thermal, heat pumps and biomass is **5341 MWh** per year. Using the carbon conversion factor of mains electricity at 0.521kg of CO_2/kWh, for 25% of this it would equate to a CO_2 saving of 696 tonnes per year. While associating the remaining 75% of offsetting traditional heating through renewables with the carbon factor of 0.246 kg of CO_2/kWh for oil heating, this would equate to a CO_2 saving of 985 tonnes per year. This creates a total carbon dioxide saving of 1681 tonnes each year.

2.6 Brompton Regis

2.6.1 Energy Saving

Solid Wall Insulation - The surveys in Brompton Regis showed that 58% of properties had solid brick or stone walls. These could be improved thermally through solid wall insulation, using either internal or external methods. 96% of these homes who responded to the questionnaire had no insulation, while 4% didn't know if they had any wall insulation in place. If the survey data was extrapolated out for the whole community, this would mean 141 houses could benefit from solid wall insulation and therefore produce a potential saving of **1,396MWh** per year from this thermal efficiency improvement.

Cavity Wall Insulation - The surveys in Brompton Regis showed that 46% of properties were of cavity wall construction, with 100% of those properties having cavity wall insulation installed. Therefore, there are no properties of cavity wall construction that could potentially benefit from cavity wall insulation.

Loft Insulation – Survey results showed that there are 85% of properties who could potentially benefit from loft insulation in order to bring them up to a minimum of 270mm of mineral wool. If a property has no loft insulation and the owners/occupiers increased it to 270mm, they could save approximately 3,800kWh per annum. If, however, they top-up their loft insulation from an existing level of 100mm to 270mm, they will save on average 550kWh each year. Therefore, if we assume the lower saving figure for the 85% of properties who could potentially benefit from loft insulation in Brompton Regis and extrapolate this data to the whole domestic sector (this would be across 207 properties), this would make a total saving of **114MWh.**

Glazing – The survey results showed that 11% of properties have no double, triple or secondary glazing. In order to improve thermal efficiency it is suggested that replacing all single-glazed windows with B-rated double glazing could save a domestic property 3,600kWh per year on energy bills. 11% of the domestic properties in Brompton Regis is 27 homes and gives a total saving of **97.2MWh.**

Total savings from all of these energy efficiency measures would equate to **1,607** MWh per year. Using the carbon conversion factor of mains electricity at 0.521kg of CO_2/kWh this would equate to a CO_2 saving of 837 tonnes per year.

2.6.2 Fuel Use in Brompton Regis

In terms of tariff type, 53% of those who responded to the survey were on a standard tariff and 39% used Economy 7 or Economy 10, which would suggest electrical heating through night storage heaters. 8% didn't know what tariff they were on.

The questionnaire found that 15% used only oil to heat their homes, 12% used a combination of wood and oil, while 15% used electricity and 8% used a combination of coal and electricity.

2.6.3 Energy Generation

Solar Photovoltaic – A total annual generation of **83679** kWh/y (84MWh/y) could be achieved across all roofs in Brompton Regis facing from East through to West. This equates to an average annual generation of 1968kWh per installation.

Wind - From the wind speed map it is clear that Brompton Regis does indeed have a lower annual wind speed than the surrounding areas. It is commonly considered that an annual average wind speed of 6 m/s is required to get a good payback on a wind turbine.

Through a mapping exercise it was identified that the best wind speeds are well outside the settlement area, although within the parish, therefore this report does not see the development of domestic scale wind turbines as a feasible opportunity in terms of financial return on investment or planning requirements.

Hydropower – Aside from the Wimbleball reservoir which already has some generation and the river Pullman that has several features noted from the GIS surveys that are of interest, the main areas of note are redundant mill sites which are in private ownership where the owners are interested in the possibility of harnessing the hydro potential of the site.

In addition, during a community consultation a senior member of the community alluded to an old farm leat "ditch" that used to flow through the parish driving several waterwheels along its route. It is not totally clear where this site was from GIS mapping, and it would be complex to reinstate with current day permissions, however the prospect of several sites benefiting from the same water is very appealing.

Hydro Power – a total annual generation for current and new potential sites is in the region of 1839 MWh/y.

So, potential from domestic properties in terms of electricity production in Brompton Regis comes from Solar PV & Hydropower at **1923 MWh** per year. Using the carbon conversion factor of mains electricity at 0.521kg of CO_2/kWh, this would equate to a CO_2 saving of 1001 tonnes per year.

2.6.4 Renewable Heat Potential for Domestic Properties in Brompton Regis

Solar Thermal - The potential yield is **67.5 MWh** per year, however, it would reduce the roof space available to solar PV reducing it's potential yield by 23 MWh per year. Due to electricity being a tertiary fuel source, consideration should be given as to the relative merits of reducing roof space available to solar PV.

Biomass - Through remote mapping and area assessment, the number of domestic properties who could utilise a biomass system has been assumed by examining the availability of outside space where a boiler house and fuel store could potentially be located. There is the potential within Brompton Regis for 46 biomass boilers. If we assume a 15kW average per domestic property of installed capacity, this equates to a total 690kW. With an assumed heat demand of 22,416kWh per annum this would mean a total output of **1031 MWh** from biomass fuel, and in the case of domestic properties this would normally be through pellets or logs.

Heatpumps - By examining the data collected through the LEAF survey, 27% of the properties were of cavity wall construction, which was filled with insulation and had 200mm or more of loft insulation. This group also had 100% of their glazing double or triple glazed. This 27% represents the best insulated homes within the sample and therefore, theoretically, the most thermal efficient.

If we extrapolate this information and say that in terms of thermal performance, 27% of Brompton Regis's housing would be suitable for a heat pump, we can then look at availability of ground space for a ground source heat pump. Only 8% of this group identified their garden as "large" and 8% as "medium". Therefore, 8% could be suitable for air source heat pumps and 8% ground source heat pumps in Brompton Regis. This would equate to 19 properties having air source heat pumps and 19 properties with ground source heat pumps, either slinky or bore hole. A total of 38 properties are potential sites for heat pump installations in Brompton Regis based on this data.

A total of 38 properties are potential sites for heat pump installations in Brompton Regis based on this data. With each heat-pump generating 10,000kWh per annum, this is a total generation of **380 MWh** per year potentially from heat pump technology.

So, potential from domestic properties in terms of heat production in Brompton Regis including solar thermal, heat pumps and biomass is **1479 MWh** per year. Using the carbon conversion factor of mains electricity at 0.521kg of CO_2/kWh, for 25% of this it would equate to a CO_2 saving of 193tonnes per year. While associating the remaining 75% of offsetting traditional heating through renewables with the carbon factor of 0.246 kg of CO_2/kWh for oil heating, this would equate to a CO_2 saving of 273 tonnes per year. This creates a total carbon dioxide saving of 466 tonnes each year.

Energy Saving

Settlement	Solid Wall Insulation	Cavity Wall Insulation	Loft Insulation	Glazing	Total Savings
Porlock	578 homes 5,722 MWh/y	33 homes 99 MWh/y	484 homes 266 MWh/y	311 homes 560 MWh/y	6647 MWh 3463 tonnes CO^2
Dulverton	128 homes 1,267 MWh/y	241 homes 723 MWh/y	595 homes 327 MWh/y	316 homes 1,137 MWh/y	3,454 MWh 1,799 tonnes CO^2
Brompton Regis	141 homes 1,396 MWh/y	0	207 homes 114 MWh/y	27 homes 97.2 MWh/y	1,607 MWh 837 tonnes CO^2

Fuel Use

Settlement	Tariff Type	Heating Fuel
Porlock	73% Standard 25% Economy 7 2% Economy 10	45% Oil 25% Economy 7 9% LPG 12% Woodfuel 5% Electric & Coal 2% Coal 2 % Economy 10
Dulverton	58% Standard 21% Economy 7 21% Didn't know	4% Standard Electric & Oil 21% Economy 7 55% Oil 4% LPG

		4% Woodfuel 8% Wood & Oil
Brompton Regis	53% Standard 39% Economy 7 or 10 8% didn't know	15% Oil 12 % Wood & Oil 15% Electric 8% Coal & Electric

Renewable Electricity

Settlement	Solar PV	Wind Power	Hydropower	Total Capacity & CO_2 saving
Porlock	488 MWh/y	394 MWh/y	350 MWh/y	1,232 MWh/y 642 tonnes CO^2/y
Dulverton	510 MWh/y	0	200 MWh/y	710 MWh/y 369 tonnes CO^2/y
Brompton Regis	84 MWh/y	0	1839 MWh/y	1923 MWh/y 1001 tonnes CO^2/y

Renewable Heat

Settlement	Solar Thermal	Biomass	Heat Pumps	Total Capacity & CO_2 saving
Porlock	502 MWh/y	144 boilers 2415 MWh/y	94 homes 940 MWh/y	3,857 MWh/y 1214 tonnes CO^2/y
Dulverton	347 MWh/y	122 boilers 2734 MWh/y	226 homes 2260 MWh/y	5341 MWh/y 1681 tonnes CO^2/y

Brompton Regis	67.5 MWh/y	46 boilers	38 homes	1479 MWh/y
		1031 MWh/y	380 MWh/y	466 tonnes

3 Resources wood fuel

A common theme when talking about energy with the public, communities and stake holders on Exmoor is the natural resources available; the two most commonly mentioned are hydro electric power and wood fuel. At meetings the community groups expressed the desire to increase the availability and quality of dry firewood sourced locally and to bring some of the unmanaged woodland back into useful production.

The hedges on Exmoor are an ideal biomass resource. The tradition has been to grow mainly Beech tree hedge rows and allow them to grow up to provide a windbreak and shelter livestock in poor weather. They are very effective at providing timber and shelter, which is probably why Exmoor has retained much of it's traditional Beech hedgerows, whereas in other parts of the surrounding area, annual flail trimming has become the norm. The timber is then harvested on a 15 year cycle and according to some estimates [2] this management technique can supply 15kWh of timber per linear meter of hedgerow per year. A typical small field of one hectare (2.47 acres) would therefore yield 6000 kWh of timber per year.

In prehistoric times, much of Exmoor was covered in forests which were cleared by prehistoric settlers, forming early farming communities. However, there is still a significant covering of forest, currently around 12% of the moor, most of which is in private ownership with around 4% of the total land area of the National Park owned by the Forestry Commission. Approximately half is ancient broadleaved woodland, historically used for coppice, and the remainder, more recent conifer plantations.

Currently, around 40 % of the woodland on Exmoor is not managed. Exmoor National Park are keen to increase this portion. There seems to be a potential synergy with Devon County Council's Ward Foresters project. The Ward Foresters project was set up to encourage the management of woodland by allowing woodland owners to defer management of their woodland to an expert known as a Ward Forester who could join clusters of woodland under different ownership together to increase the economies of scale, making the good management of the woodland financially viable and bringing unmanaged woodland back into useful production. Therefore, the areas under their management are likely to grow over time.

It is the aim of the Ward Forester project to bring more of these woodlands into useful production of wood. However, not all of this timber would be intended for wood fuel in common with other well managed woodlands, the aim would be to supply timber for the construction industry as that is the highest value market for timber currently. This would leave mainly thinnings, storm damaged and

[2] The yield and cost of energy from woodlands in SW England and the likely impact on biodiversity from management for woodfuel. Robert Wolton 2012

diseased trees for the wood fuel market, around 50% of the annual yield. If the wood fuel market was the highest value market for the timber, then all the timber would potentially be available to the wood fuel market.

Good management of the woodland should increase the annual production of timber suitable for woodfuel. Anecdotal evidence suggests that there are a number of sites around the Exmoor area that could be brought back into useful production of timber, often in smaller plots that farmers and landowners don't know what to do with. There might be an opportunity for the community to manage a tree planting scheme for these areas to bring them back into useful production.

It is intended that the North Hill Woods near Minehead which are owned by Exmoor National Park, are used as a pilot; it is proposed that they will be managed for the community by the community. It is hoped that the management will be taken on by a properly constituted community group.

Scope for Bioheat - Porlock

Taking half the sustainable yield of timber from the woodland surrounding Porlock (5km radius), would provide a sustainable yield of timber suitable for woodfuel. This equates to 2500 tonnes of mixed hard and soft wood, giving a crude value of 13.5 million kWh of energy.

If this energy were to be consumed in an equal mixture of energy efficient appliances such as wood chip boilers and log batch boilers as well as less efficient wood burners with and without back boilers, a rough combustion efficiency of 70% can be assumed[3].

Assuming a perfect heat distribution system and an average heating load of 15,000kWh/y[4] (and that all the timber is used), approximately 628 households could be heated by the sustainable yield of biomass from the woods surrounding Porlock.

If domestic properties in Porlock used an average of 16.771 MWh of heat energy each year, the woodfuel energy would be sufficient for 805 local homes. But since only 144 Porlock properties have space to install a woodfuel boiler, there would appear to be a significant excess of potential supply over probable demand.

Scope for Bioheat - Dulverton

Taking half the sustainable yield of timber from the woodland surrounding Dulverton (5km radius), would provide a sustainable yield of timber suitable for woodfuel. This equates to 2000 tonnes of mixed hard and soft wood, giving a crude value of 10.6 million kWh of energy.

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[3] Please note: it is assumed that woefully inefficient stone age technology like open fires are not included in this estimate.

[4] Figure assumes well insulated terraced property on Exmoor.

If this energy were to be consumed in an equal mixture of energy efficient appliances such as wood chip boilers and log batch boilers as well as less efficient wood burners with and without back boilers, a rough combustion efficiency of 70% can be assumed[5].

Assuming a perfect heat distribution system and an average heating load of 15000kWh/y[6] (and that all the timber is used), approximately 507 households could be heated by the sustainable yield of biomass from the woods surrounding Dulverton.

If domestic properties in Dulverton used an average of 22.416 MWh of heat energy each year, the woodfuel energy would be sufficient for 473 local homes. Dulverton apparently boasts 754 households, so local woodfuel could potentially provide 63% of all domestic heating. However, only 122 biomass boilers for Dulverton domestic properties have been noted with space to install a woodfuel boiler, and although other forms of woodfuel could be used as a domestic retrofit, there would appear to be a significant excess of supply over probable demand.

Scope for Bioheat - Brompton Regis

Taking a third of the sustainable yield of timber from the woodland surrounding Brompton Regis (5km radius), would provide a sustainable yield of timber suitable for woodfuel. This equates to 2000 tonnes of mixed hard and soft wood, giving a crude value of 10.6 million kWh of energy.

If this energy were to be consumed in an equal mixture of energy efficient appliances such as wood chip boilers and log batch boilers as well as less efficient wood burners with and without back boilers, a rough combustion efficiency of 70% can be assumed[7].

If domestic properties in Brompton Regis used an average of 22.4 MWh of heat energy each year, the woodfuel energy would be sufficient for 473 local homes. Brompton Regis apparently boasts 243 households, so local woodfuel could potentially provide 194% of all domestic heating. However, only 34 Brompton Regis properties have been noted with space to install a woodfuel boiler, and although other forms of woodfuel could be used as a domestic retrofit, there would appear to be a significant excess of supply over probable demand.

[5] Please note: it is assumed that woefully inefficient stone age technology like open fires are not included in this estimate.

[6] Figure assumes well insulated terraced property on Exmoor.

[7] Please note: it is assumed that woefully inefficient stone age technology like open fires are not included in this estimate.

4 Possible Biomass/District Heating/CHP

4.1.1 Example of District Heating in Porlock

Figure 1 Porlock potential CHP / District heating area

This is an example of a potential district heating scheme based around existing properties and community buildings. A 600 kW boiler may be required for a scheme of this size, providing perhaps 1,000,000 kWh/y of heat. It would be much easier to find a location for a boiler and fuel store within a general area like this rather than find space for individual woodfuel boilers for each property separately. With the RHI we are beginning to see major biomass boiler installers offering deals on new boiler installations and hence providing the opportunity for a local group to manage such a scheme and gain revenue from it without having to raise impossibly large capital finance. The economic benefit to the management group could be particularly attractive if they were also able to supply the fuel.

An example of a possible new development incorporating a district heating scheme could be the proposed new development to the north of the village next to the sheltered housing area. It is understood that this might include a swimming pool.

4.2 Biomass Dulverton / District heating

Although this potential woodfuel resource could be considered optimistic due to likely support from woodland owners and timber abstraction difficulties, it could be enhanced with wood from hedge trimming, clean construction timber etc.

If domestic properties in Dulverton used an average of 22.416 MWh of heat energy each year, the woodfuel energy would be sufficient for 473 local homes. Dulverton boasts 754 households, so local woodfuel could potentially provide 63% of all domestic heating. However, only 122 of Dulverton domestic properties have been noted with space to install a woodfuel boiler, and although other forms of woodfuel could be used as a domestic retrofit, there would appear to be a significant excess of supply over probable demand.

(For more discussion on the domestic use of woodfuels see the Settlement Energy Plan for Dulverton)

Woodfuel is one of the most important renewable sources in and around Dulverton. It is essential that use of the resource is maximized, and it seems very unlikely that this will happen through reliance on domestic uptake.

Apparently, some members of the community have had to buy wood from outside the area, and certainly surveys of Dulverton households have indicated that there is some existing use of wood in various forms already for heating.

Outside of the domestic sector, which will need its own support and promotion to ensure an increase in use of wood for heating, other opportunities will need to be explored if the resource is to be fully utilized.

Opportunities that ought to be investigated include :-

- Replacement for oil boilers in higher demand commercial properties.
- Potential use of wood fuelled district heating in areas of Dulverton where clusters of dwellings may make replacement heating provision of this kind an attractive economic proposition (see below).
- Working with the Local Planning Authority to ensure that any new housing developments are built with woodfuel district heating in mind, and provide confidence that local woodfuel supplies are secure.
- Opportunities for community buildings, churches and schools to utilize woodfuel for heating.

All of these points will require local initiative and drive to accomplish and this points to the need to establish a community biomass group to develop these actions. The development of an organization in support of these aims and opportunities should be strongly encouraged and will indeed be essential if the woodfuel resource in Dulverton is to be fully used and developed. It is an initiative that would stand as a pilot exemplar for potential duplication in other communities and could play a major role in enabling Exmoor National Park to make serious progress towards achieving some of its aims for carbon reduction.

If all the woodfuel resource noted above were used to replace oil as a heating fuel, the CO_2 saving would be approximately 2,607 tonnes each year.

4.2.1 Example of District Heating in Dulverton

Figure 2 Dulverton potential district heating area

The Barns Close and Amory Road Estate has over 200 houses, the estate is close to the Dulverton Middle School and swimming pool. Currently, over 106 houses are located within 200m of Dulverton Middle School. While 235 homes in Dulverton are situated within 375 m of the school.

This is an example of a potential district heating scheme based around existing properties and community buildings. If the closest 106 homes were part of a district heating system with a heat load of 22,416kWh per year (as indicated in the Dulverton SEP), this is a total requirement of 2,376 MWh from the domestic properties. To this we need to add heat loads for the school and swimming pool, a very approximate heat load of 170,000kWh for the school can be factored in and 90,000 kWh per annum for the swimming pool. This would be a total heating requirement of 2,636MWh per year in very approximate terms, actual heat use for both the school and swimming pool would need to be determined as well as a sample of housing throughout the prospective district heating scheme to establish a more accurate heat load. A 1500 kW boiler may be required for a scheme of this size, providing perhaps 2,500 MWh/y of heat. It would be much easier to find a location for a boiler and fuel store within a general area like this rather than find space for individual woodfuel boilers for each property separately. With the RHI we are beginning to see major biomass boiler installers offering deals on new boiler installations and hence providing the opportunity for a local group to manage such a scheme and gain revenue from it without having to raise impossibly large capital finance. The economic benefit to the management group could be particularly attractive if they were also able to supply the fuel.

If a district heating scheme to supply the school, swimming pool and the nearest 106 houses was to be considered as a potential scheme for the community of Dulverton, they may like to look to an existing example of such a scheme as in North Devon. The High Bickington Community Property Trust has developed a former Devon County Council owned farm into a housing development which is now completed. Workshop units and a community building are due to be completed in July 2012. The whole site is serviced by a wood-chip boiler using locally sourced biomass fuel and the whole system is managed by the "not for profit" Community Property Trust. However, this district heating system was installed at the time of the properties being built and was not retro-fitted as would be the suggestion in Dulverton. However, for more information please visit

http://www.highbickington.org/hbcpt

In terms of the Renewable Heat Incentive, if this scheme was run as a community enterprise it would be eligible for the Renewable Heat tariff for businesses and communities. Please find below a basic calculation based on the estimated heat requirements for the 106 houses, school and swimming pool.

Actual Peak load hours = 30% x 8760 hrs per year = 2628 hours		
Peak load hours	**Boiler Output (kW)**	**Total annual kWh of Heat**
2628	1500	2500000
Teir 1 kWh	**Boiler Output**	**Total Teir 1 kWhs**
1314	1500	1971000
Teir 1 Rate	**Teir 1 annual RHI Cash £**	
0.01	19710	
Teir 2 kWhs	**Teir 2 Rate**	**Teir 2 annual RHI cash £**
529000	0.01	5290
Total RHI payment per annum		**Total RHI Payment over 20 years RHI period**
25000		500000
Capital Cost of boiler		**Payback period in years**
500,000		20

The RHI calculator is to be used as a guide only and does not include the costs of the district heating network itself or individual heat meters within the properties. It also does not include an annual management fee or maintenance contracts. It is included here as an aspirational project to provide an example of what could be done in Dulverton. There would be massive cost savings for residents of the properties and the school who would be offsetting the cost of electrical (14.39p pkWh) or oil heating (6p pkWh) and replacing it with wood-chip which costs approximately 2p pkWh. Looking at the assumed heat loads we see the following:

Property	**kWh per annum**	**Cost (electricity) pa**	**Cost (oil) pa**	**Cost (chip) pa**
Domestic	22,416 kWh	£3,226	£1,345	£448
School	170,000kWh	£24,463	£10,200	£3,400
Pool	90,000kWh	£12,951	£5,400	£1,800

The district heating scheme would be a huge under-taking and would require much more research. However, Dulverton may be interested in trialing such a technology on a smaller scheme, perhaps linking the school and the nearest dozen houses to initiate such a scheme. Perhaps Dulverton Middle School may like to progress its ECO Schools credentials with a biomass boiler scheme to link with its existing photovoltaic array?

4.3 Brompton Regis

Unfortunately, there is not much scope for district heating schemes in Brompton Regis due to the size of the community. However, 12 semi-detached properties with large gardens were noted and these could potentially share a biomass system between the attached properties. This would improve the economics, however, it would require a degree of cooperation to ensure the boiler is maintained plus heat metering would be required to proportion costs. Alternatively, an ESCo could be used to supply the heat.

5 Solar

All buildings in the community were considered using a combination of assessment measures including, site surveys and remote GIS mapping. Any roof between east and west was considered (+/-10 degrees) as a location for three potential system sizes between two and three kilowatt peak. It was assumed that all roof's were at a 35 degree angle. Solar irradiance data and yield figures are based on industry standard JRC software.

The total potential production was then reduced by 15% to allow roofs that might appear suitable on the outside but are not structurally sound and roofs that are unsuitable due to unforeseen shading issues.

5.1 Porlock

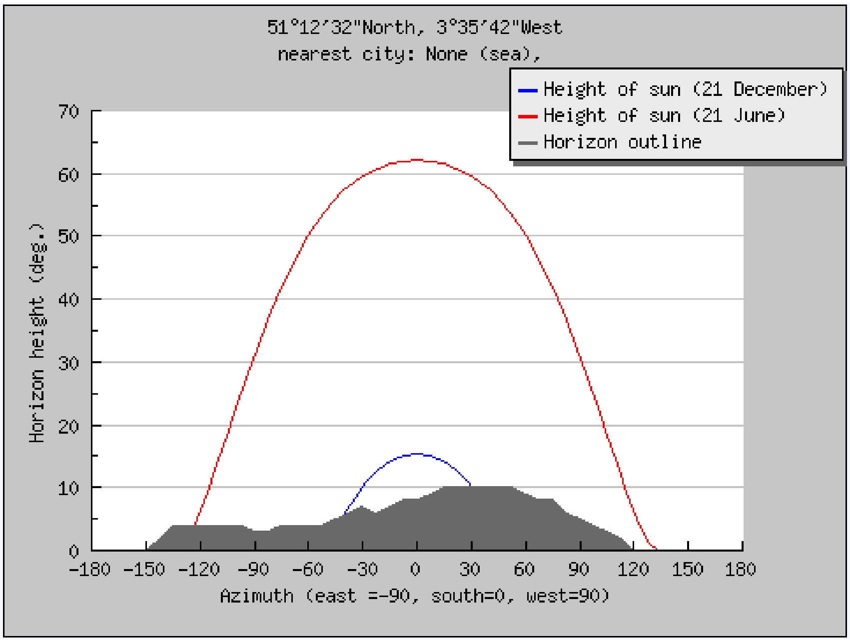

Figure 3 Solar Horizon from the centre of Porlock

Table 1 -Yield from solar PV on roofs in Porlock

Aspect	Annual yield from 1kWp	Size of array kWp	Number of buildings	Total
S	869	2	98	170324
SSE/SSW	820	2	61	100040
E/W	714	2	213	304164
			kWh per year	574528
			Less 15%	488348

Average yield per building 1544 kWh, per roof, per year.

5.2 Dulverton

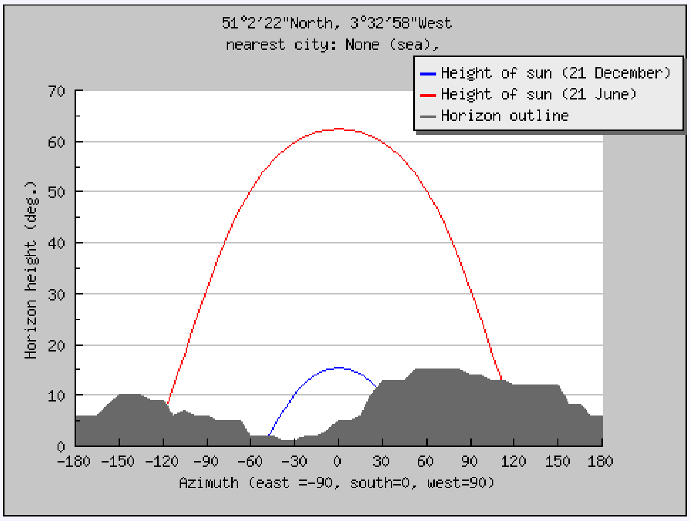

Figure 4 Solar Horizon Dulverton

Table 2 - Potential yield from all Dulverton roofs.

Aspect	Annual yield from 1kWp	Size of array kWp	Number of buildings	Total
S	874	3	44	115368
S	874	2.5	71	155135
E/W	705	2.5	107	188587.5
SE/SW	826	2.5	15	30975
E/W	705	2	20	28200
SSW	852	2	48	81792
			kWh per year	600057
			Less 15%	510048

Average yield per building 1967 kWh per roof per year.

Table 3 Potential yield from Barns Close and Amory Road Estate next to school

Aspect	Annual yield from 1kWp	Size of array kWp	Number of buildings	Total
S	874	2.5	71	155135
E/W	705	2.5	107	188587
			kWh per year	343722
			Less 15%	292164

Average yield per building 1931 kWh per roof per year.

5.3 Brompton Regis

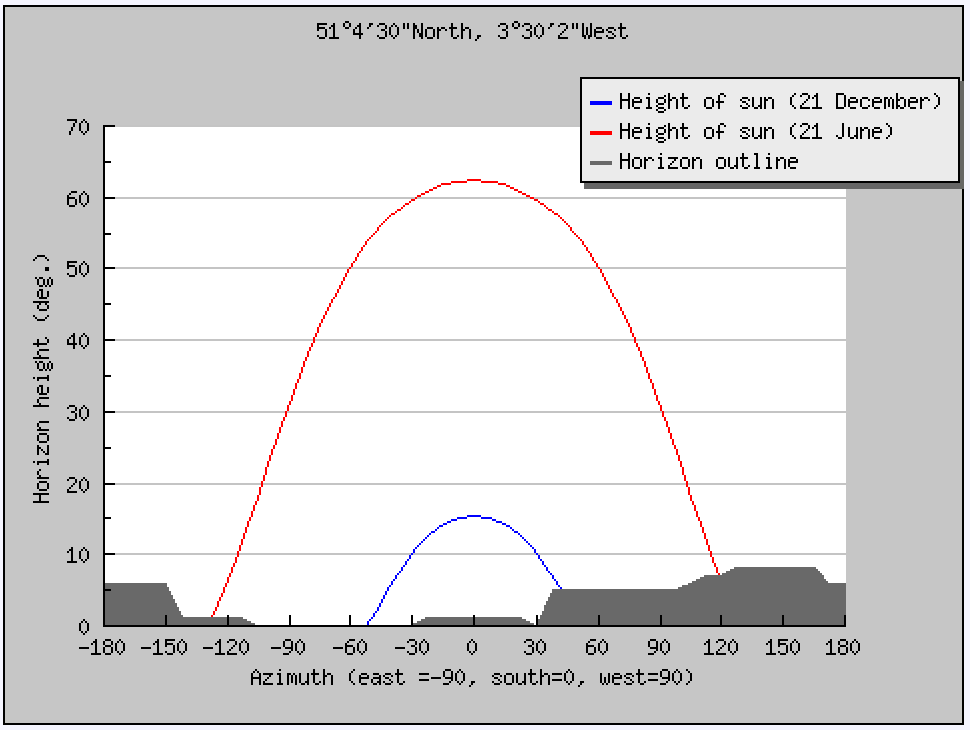

Figure 5 Brompton Regis Horizon

Table 4 - PV yield from Brompton Regis

Aspect	Annual yield from 1kWp	Size of array kWp	Number of buildings	Total
S	895	2	15	26850
SSE	884	2	13	22984
E/W	736	2	6	8832
SSE	884	2.5	6	13260
SSE	884	3	10	26520
			kWh per year	98446
			Less 15%	83679.1

Average yield per building 1968 kWh per roof per year.

6 Solar PV farm requirement to meet 20% by 2020

In the Settlement Energy Plans, the opportunities for solar photovoltaics were identified for domestic properties with good orientation which was determined through GIS mapping and a cursory site visit to the settlement.

However, for community generation the potential for solar photovoltaics would be for individual community buildings, which could be determined through on-site auditing or large scale energy generation through a solar farm.

Land availability for a solar farm would have to be decided through community engagement and may be reliant on the enthusiasm or financial return provided for private landowners, through leasing or purchase.

It is worth considering the implications of a community solar PV farm to provide 26% of the settlement's electricity, as this is the Governmental target for electricity to contribute to its EU commitment of 15% of all energy coming from renewables by 2020.

The advantages of a solar farm is that you can orientate and angle the solar panels for optimum performance, providing the available land is not sloping unduly in an adverse direction.

Solar Parks require a substantial amount of clear land (approx. 3 ha. Per MW). In this area it is likely to be sited on agricultural land. However, necessary change should be accommodated without sacrificing local character (PPG7. The Countryside Environment Quality and Economic and Social Development [England]/1997).

6.1 Porlock Solar Farm

kWh per 1kW	Installed Capacity	MWh per annum	No. of panels	Area in hectares	Capital Cost (approx)*
934	2,455kW	2,293 MWh	13,270	7-8 hectares	£4.5m

*This cost does not include any enhancements to the grid infrastructure which may be required, sub-stations, security or maintenance contracts.

FiT Income per annum	Export Income (pa)	Total Income	CO^2 Savings per year	Payback (years)
£204,074	£73,370	£277,444	1195 tonnes pa	16 years

After the capital investment had been repaid (excluding any interest), there would be a further nine years of Feed in Tariff and Export Tariff Income which would provide a community fund of £2.5m in total, ignoring price indexing etc.

6.2 Dulverton Solar Farm

kWh per 1kW	Installed Capacity	kWh per annum	No. of panels	Area in hectares	Capital Cost (approx)*
934	3209kW	2997 MWh	17,346	9 hectares 22 acres	£5,776,200

*This cost does not include any enhancements to the grid infrastructure which may be required, sub-stations, security or maintenance contracts.

FiT Income per annum	Export Income pa	Total Income	CO^2 Savings per year	Payback (years)
£266,751	£95,904	£362,655	1562 tonnes pa	16 years

After the capital investment had been repaid there would be a further nine years of Feed in Tariff and Export Tariff Income which would provide a community fund of £3,263,895.

6.3 Brompton Regis Solar Farm

kWh per 1kW	Installed Capacity	MWh per annum	No. of panels	Area in hectares	Capital Cost (approx)*
934	517kWp	483.2	2156	1.5 hectares 3.7 Acres	£750,000

*This cost does not include any enhancements to the grid infrastructure which may be required, sub-stations, security or maintenance contracts.

FiT Income per annum	Export Income (if 100% was exported) pa	Total Income	CO^2 Savings per year	Payback (years)
£41,013	£15,465	£58,477	252 tonnes pa	13 years

After the capital investment had been repaid there would be a further twelve years of Feed in Tariff and Export Tariff Income which would provide a community fund with £701,724.

7 Solar Thermal

The potential for solar hot water was based on the same methodology as that used for solar PV. The calculations are based on a collector area of three square metres and a reduction in space available to solar PV of four square metres to allow for pipe connections and to allow service access.

7.1 Porlock

Aspect	Number of buildings	SHW annual yield kWh	Reduction in PV output kWh
S	98	132300	47691
SSE/SSW	61	82350	28011
E/W	213	287550	85166
		502200	**160868**

The potential yield is 502 MWh per year, however, it would reduce the roof space available to solar PV reducing it's potential yield by 161 MWh per year. Due to electricity being a tertiary fuel source, consideration should be given to the relative merits of reducing roof space available to solar PV.

7.2 Dulverton

Aspect	Number of buildings	SHW annual yield	Reduction in PV output
S	44	59400	21535
S	71	95850	34750
E/W	107	144450	42244
SE/SW	15	20250	6938
E/W	20	27000	7896
SSW	48	64800	22902
		346950	**113364**

The potential yield is 347 MWh per year, however, it would reduce the roof space available to solar PV reducing it's potential yield by 113 MWh per year. Due to electricity being a tertiary fuel source, consideration should be given to the relative merits of reducing roof space available to solar PV.

7.3 Dulverton Barns Close and Amory Road Estate

Aspect	Number of buildings	SHW annual yield kWh	Reduction in PV output kWh
S	71	95850	34750
E/W	107	144450	42244
		240300	**76994**

The potential yield is 240 MWh per year, however, it would reduce the roof space available to solar PV reducing it's potential yield by 77 MWh per year. Due to electricity being a tertiary fuel source, consideration should be given to the relative merits of reducing roof space available to solar PV.

7.4 Brompton Regis

Aspect	Number of buildings	SHW annual yield kWh	Reduction in PV output kWh
S	15	20250	7518
SSE	13	17550	6436
E/W	6	8100	2473
SSE	6	8100	2970
SSE	10	13500	4950
		67500	**24347**

The potential yield is 67.5 MWh per year, however, it would reduce the roof space available to solar PV reducing it's potential yield by 23 MWh per year. Due to electricity being a tertiary fuel source, consideration should be given as to the relative merits of reducing roof space available to solar PV.

8 Wind

Community owned wind turbines are common in Denmark where tax incentives make it attractive for families to own a share in a community wind turbine. As a result, 85% of the wind turbines in Denmark are community owned and the country is a world leader in wind power. The community ownership of the wind turbines lead to a high degree of acceptance.

It is hypothesised that the original settlements on Exmoor were located to take advantage of the natural shelter of the surrounding hills. Exmoor famously can experience severe weather conditions and early settlers most likely did what they could to shelter from the worst of the weather. So when compared to the rest of Exmoor, it is perhaps unsurprising that the average annual wind speeds in these settlements are lower than many other places on the moor.

The NOABL wind speed database provides an average annual wind speed for any given one kilometre grid square. The maps (Figure 7, Figure 8 & Figure 6), show the average annual wind speed in meters per second for each grid square surrounding each settlement at 10 metres above ground level. It is important to remember that the figure stated is an average for each grid square so a valley and a hill within the same square would most likely have very different annual average wind speeds.

Average annual wind speeds increase with elevation above sea level, however, in this instance as the site is within the Exmoor National Park, it is likely that a taller, more visible turbine would face strong opposition. The Exmoor National Park Authority themselves are in favour of sustainable development but have only normally allowed the development of domestic wind turbines where the applicant is distanced from mains electricity grid infrastructure. It is felt that the community could be split over the issue of wind turbines on the moor and therefore it is not worth the risk of harming community relations by putting a wind turbine proposal forward.

8.1 Porlock

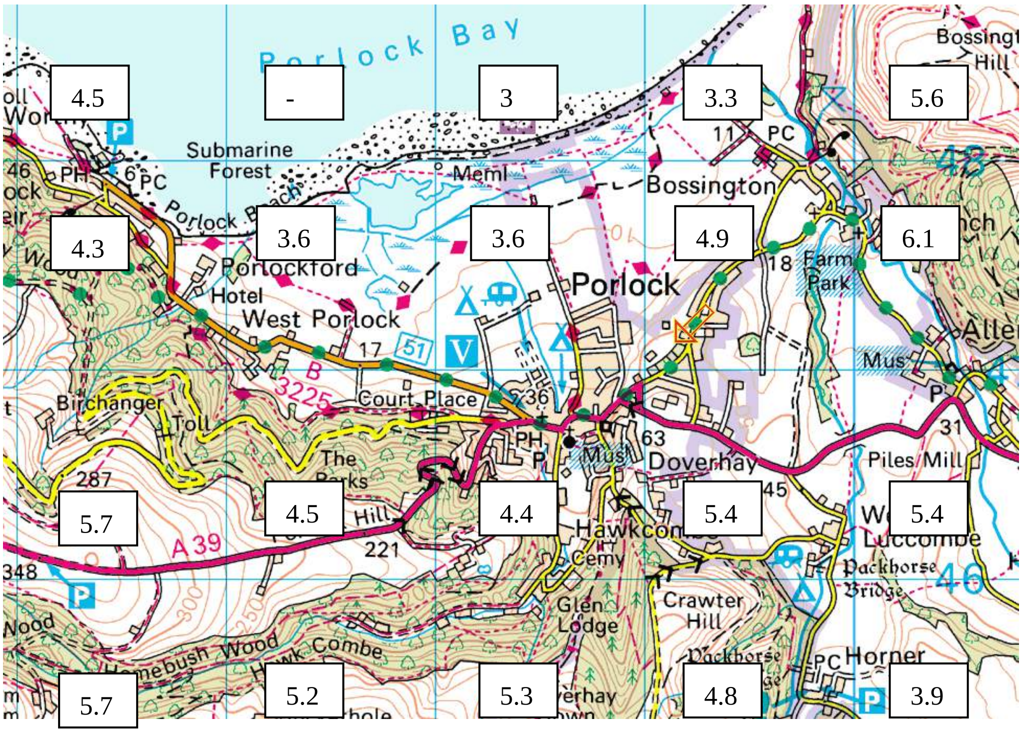

Figure 6 Wind Map of Porlock

There are two good wind sites near Porlock, but both are some distance from the village. The closest is East north East of Porlock to the East of Allerford. The wind speed there according to NOABL is 6.1 m/s at 10m, 6.6 m/s at 25m and 7m/s at 45m. Slightly further away from the village south of the top of Porlock hill near Bromham Wood the wind speed there according to NOABL is 7.1 m/s at 10m 7.8m/s at 25m and 8m/s at 45m. This is a very good wind speed that would be of interest to commercial developers.

Assuming that there was local interest in the community of Porlock of owning and developing a wind turbine, a 55 kW turbine might cost in the region of £200,000 to have installed (excluding preliminary costs to gain planning permission). It would be around 25m high to the hub, and under the Feed-in-Tariff would produce an income of perhaps £36,000 p.a., a very good return on investment and a payback period of around 6 years. Electrical generation should be around 144,000 kWh/y on a good site, producing a CO_2 saving of 75 tonnes each year.

8.1 Brompton Regis

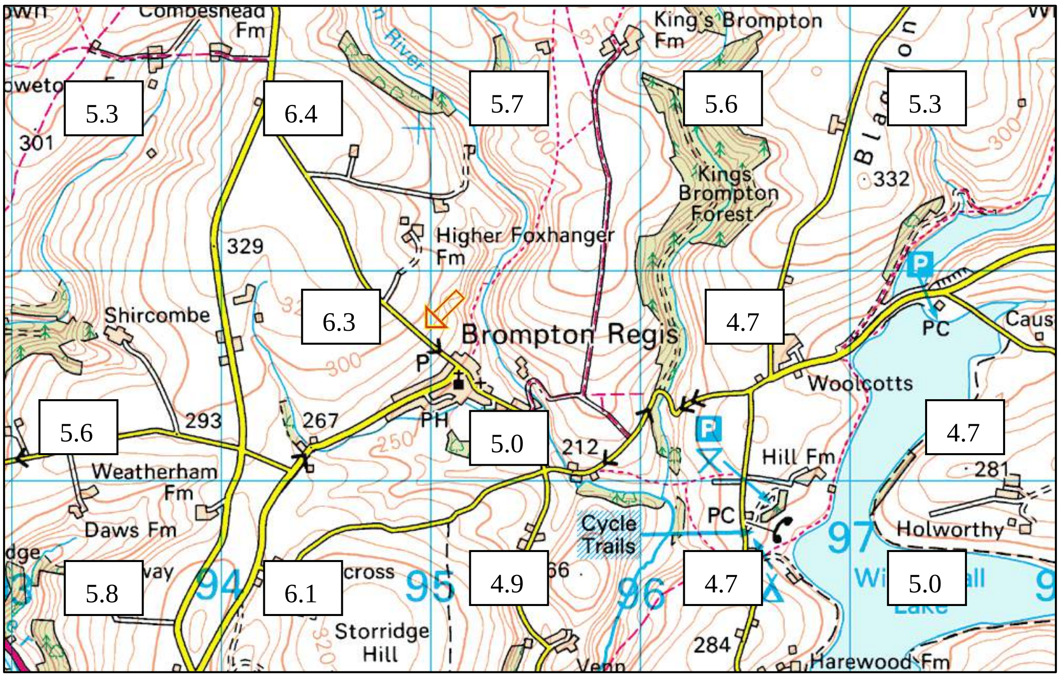

Figure 7 Wind Map of Brompton Regis

The best wind site for Bormpton Regis is the hill to the east of Higher Fox Hanger Farm. North West of Brompton Regis. The wind speed there according to NOABL is 6.4 m/s at 10m, 7 m/s at 25m and 7.5m/s at 45m.

Assuming that there was local interest in the community of Brompton Regis of owning and developing a wind turbine, a 55 kW turbine might cost in the region of £200,000 to have installed (excluding preliminary costs to gain planning permission). It would be around 25 m high to the hub, and under the Feed-in-Tariff would produce an income of perhaps £36,000 p.a., a very good return on investment and a payback period of around 6 years. Electrical generation should be around 144,000 kWh/y on a good site, producing a CO_2 saving of 75 tonnes each year.

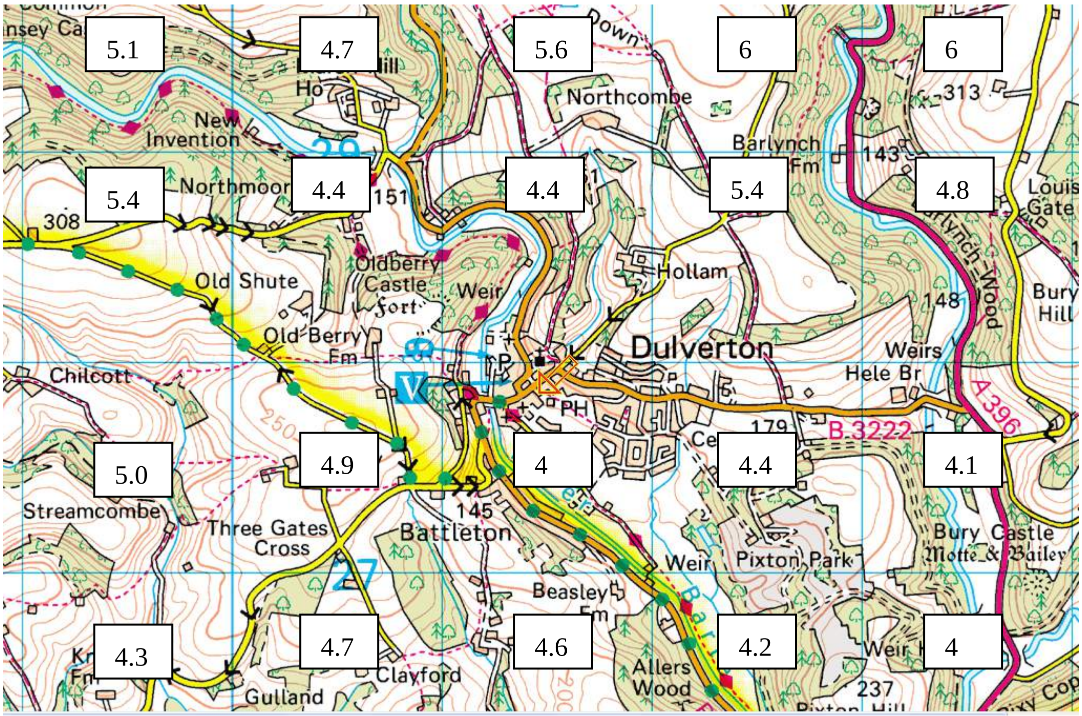

Figure 8 Wind Map of Dulverton

The best wind site for Dulverton is to the east of Northcombe this is North, North East of Dulverton. The wind speed there according to NOABL is 6 m/s at 10m 6.6 m/s at 25m and 7m/s at 45m.

From the wind speed map it is clear that Dulverton does indeed have a lower annual wind speed than the surrounding areas. It is commonly considered that an annual average wind speed of 6m/s is required to get a good payback on a wind turbine.

Assuming that there was local interest in the community of Dulverton of owning and developing a wind turbine, a 55 kW turbine might cost in the region of £200,000 to have installed (excluding preliminary costs to gain planning permission). It would be around 25 m high to the hub, and under the Feed-in-Tariff it would produce an income of perhaps £36,000 p.a., a very good return on investment and a payback period of around 6 years. Electrical generation should be around 144,000 kWh/y on a good site, producing a CO^2 saving of 75 tonnes each year.

9 Hydro

Assessment of the potential for generating electricity from rivers and streams faces a similar problem to that of assessing windpower potential, in that the theoretical potential bears little relationship to what is reasonable, practical, economic and likely to gain permission.

There has been previous research conducted into the possibilities of hydroelectric power on Exmoor.

Exmoor National Park has previously established a constituted water power group known as Exmoor Renewable Energy Group (EREG).

9.1 Porlock

Overall, there was not a significant community hydro potential that could be positively identified, although the private-ownership possibilities are a little better due to the fact most sites are in private ownership and private owners and enthusiasts are more willing to invest in the longer term.

9.1 Dulverton

Beasley Weir

The river Barle flows through Dulverton where the Beasley weir provided water for the former Beasley hydro power station site which had two 50kW turbines but closed in the 1950's. This site has recently been granted an abstraction licence to generate power once again for local businessman Bernard Dru.

Dulverton Leat

There are three old mill sites on the leat that flow through Dulverton town centre. These sites are currently owned by three different people, however, if they were in agreement then the available head could be combined in a single pipe to a single turbine. It is considered that this arrangement would produce around 60kW, producing approximately 200,000kWh per annum and generating an income of £39,200 through the Feed in Tariff, it would also save 104 tonnes of CO_2 per year. However, such a system would cost in excess of £300,000 to install as well as £5,000 per year for maintenance and repairs.

9.2 Brompton Regis

From a community ownership perspective, two possible opportunities that have been noted are :-

- The river Pulman has several features of interest on GIS mapping that should be investigated further.
- The second, more interesting idea is the old farm leat "ditch" that used to flow through the parish driving several waterwheels along it's route.

The only other non-public opportunity which we have become aware of is the utilisation of the spillway on Wimbleball reservoir.

Overall, there was not a significant community hydro potential that could be positively identified, although the private-ownership possibilities are a little better.

Renewable Heat for Community Energy Plans

Settlement	Domestic Solar Thermal	Woodfuel Resource	District Heat Potential	Total Capacity & CO2 saving
Porlock	502 MWh/y	628 homes 13.5 million kWh/y	600 kW boiler 1000 MWh/y	15,002 MWh/y 4722 tonnes CO^2/y
Dulverton	347 MWh/y	507 homes 10.6 million kWh/y	1,500 kW boiler 2,636 MWh/y	13,583 MWh/y 4275 tonnes CO^2/y
Brompton Regis	67.5 MWh/y	473 homes 10.6 million kWh/y	Little Opportunity	10,668 MWh/y 3357 tonnes

Settlement	Solar Farm	Community Wind Power	Community Hydropower	Total Capacity & CO2 saving
Porlock	2,455kW 2,293 Mwh / y	55kW 144,000kWh / y	Little Opportunity	2437 MWh/y 1270 tonnes CO^2/y
Dulverton	3,209 kW 2,997 MWh / y	55kW 144,000kWh / y	60kW 200,000kWh	3341 MWh/y 1741 tonnes CO^2/y
Brompton Regis	517 kW 483 Mwh / y	55kW 144,000kWh / y	Little Opportunity	627 MWh/y 327 tonnes CO^2/y

Conclusion

This summary report illustrates the opportunities for energy efficiency measures to reduce substantially the consumption of heat in all three Exmoor communities of Porlock, Dulverton and Brompton Regis’ domestic homes. These rural communities are reliant on predominantly carbon intensive and expensive heating fuel sources of oil and electricity and a focus to reduce this consumption will help alleviate fuel poverty and retain valuable financial assets within local economies.

There are prospects for both domestic and community scale renewable energy technologies inclusive of electricity generating and renewable heat installations. There are greater advantages for particular technologies in some areas due to geographical location, building type and density, surrounding resources such as woodland and water courses and available land for development.

It is hoped that the recommendations within this and supporting reports for Dulverton, Porlock and Brompton Regis will be investigated and expanded upon. These Exmoor communities have opportunities to improve their housing stock, reduce fuel consumption and utilise local natural resources to provide community benefit and enhance the sustainability of their communities economically, socially and environmentally.