Future Energy Landscapes Workshop

Broughton Parish, Wednesday 27th November 2024

This note summarises what happened and what Broughton residents said during the Future Energy Landscape workshop in November. The comment and thoughts are a result of an extended conversation with a group of local people while they were learning together. It cannot be assumed to be representative of the full range of opinions in the local community. This was a discussion about possibilities and is seen as the start of further activities for the community of Broughton.

Workshop Background

The Centre for Sustainable Energy (CSE) developed the Future Energy Landscape workshop to enable communities to have informed conversations about their understanding and feelings about renewable energy technologies. It is a community consultation process that ensures communities are being listened to and enables them to shape ambitious plans as we transition away from fossil fuels.

Energise South Downs were invited by Broughton Community Energy (BCE) and Community Energy South to run this workshop in order to understand how local people felt and thought about renewable energy technologies in their local context. This workshop hopes to inform the objectives and activities of Broughton Community Energy who provided an introduction at the workshop to share their journey so far and plans for the future, the slides for which you can find as **Appendix 1**.

The workshop draws on local data and research to explore what might be feasible and create space for an informed, balanced conversation about what communities feel is acceptable. See **Appendix 2** for details of the data, research and assumptions that have been used to build this workshop.

The workshops, follow up reports and surveys are to demonstrate that it is possible to develop a local vision for sustainable energy that is acceptable to the local community, and to use this as a springboard for project and policy development.





Why the Future Energy Landscapes workshop?

- Transforming the way that we generate and use energy is key to tackling the climate emergency.
- Generating more energy from renewable sources, so we produce less carbon is key to a transition away from fossil fuels.
- Communities need to be better informed about low carbon renewable energy technologies.
- Local people need to be consulted about the energy transition towards renewable technologies and supported to have informed discussions about the different solutions.
- Community energy should be recognised as a key part of this energy transition so communities benefit from local renewable energy generation, stable prices and energy security.

Workshop summary

Attendance: 47 people attended including representatives from the Parish Council and it was hosted by Broughton Community Energy.

Workshop purpose: To explore the question *'How might Broughton power its community using locally generated renewable energy?'*

Workshop boundary: These workshops use the civic Parish boundary (**Appendix 3**) to pinpoint the discussion around an area that is familiar and frequented by the participants. It is an arbitrary boundary, but it is useful to focus the conversation on how acceptable people would find renewable technology in their local landscape.

Broughton Parish is on of the Test Valley's 59 parishes and is made up of 1,079 people living in 485 homes n 3,790 acres made up of farmland and various designated and protected areas with Wallop Brook, a small chalk stream tributary of the River Test.

Workshop process:

1. **Connect to the landscape,** considering areas that are important.
2. **Learn together** about different types of renewable energy
3. Have an **informed discussion** about how we feel about the technologies.
4. Discuss if and **where different technologies might be acceptable** in the local landscape.
5. Use graphs and data, to understand how much electricity and heat the different combinations of technologies would **generate,** the impact on current local energy needs and related carbon emissions.

What was said?

After spending time sharing local stories about Broughton's landscape and people's connection to it, the group watched short videos about the different renewable technologies that were locally feasible. In groups each table then opened a detailed discussion about one of the following five technologies:

a) Wind Power
b) Solar Farm (12 Acres)
c) Anaerobic Digestion
c) Domestic solar
d) Domestic heat pumps

Each group discussed each technology asking:

- How do they feel about the technology overall?
- How much of the technology would they be happy to see in their landscape? (i.e. quantity of rooftops with solar or the no. of a particular sized wind turbine)
- Where might this technology be located?
- How does it impact the landscape? Who would this affect most?
- Is this a realistic suggestion and what might the barriers be to implementation?

Impact of different renewable energy technologies

Each table fed back their reflections about their specific technology, and where they felt, and on what scale, the technology might be located, if at all, in the Parish boundary.

The group's suggestions on the amount of each technology were inputted into the CESAR tool [1], which showed how much energy, or heat would be generated[2]. The data showed the impact each technology might have on Broughton's energy needs and the difference each technology has on the area's carbon emissions. The ideas of the different groups were then offered for further comment to the wider group.

You can see from the CESAR tool graphs below and Broughton Community Energy's local analysis (Appendix 1) that transport is a major contributor to carbon emissions. This is a very important topic but was not focused on during this workshop.

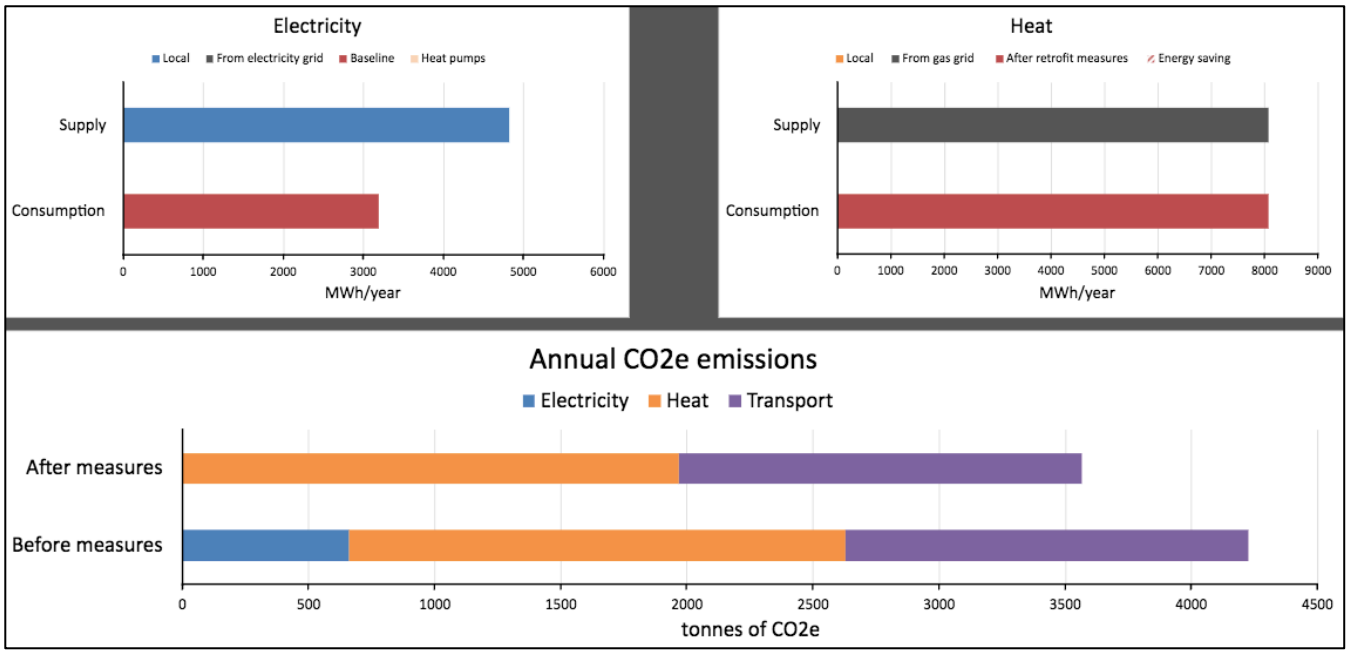
[1] The Community Energy Saving and Renewables (CESAR) tool was developed by the Centre for Sustainable Energy and is designed to help workshop participants think about how they would provide some or all their energy needs from renewable energy and to see the different amounts of heat or power generated by the different renewable technologies in their local context.

[2] **Reading the graphs:** Using the key, supply of 'electricity from the grid' is assuming that currently, electricity comes from the burning of fossil fuels to create steam, which turns a turbine, creating electricity. The supply of 'heat from gas grid' is assuming the use of oil or LPG in individual homes, as Broughton is not on the gas mains.

Solar Power

A couple of tables took on this technology but raised different concerns and ideas in their conversations so we will detail them separately.

The first group took comfort in the fact that solar was a proven and efficient technology and that it could work alongside farming as sheep could continue to be grazed. They saw solar infrastructure as part of the solution and emphasised how small 12 acres was in the context of a parish of almost 4,000 acres. The consensus from the group was that it was realistic to imagine having two 12 acre solar farms and identified areas in the north of Broughton with the dairy farms or buffalo farm and discussed areas in the south west of the parish. Comments from the room suggested that with some further study they could have gone further and had more solar.

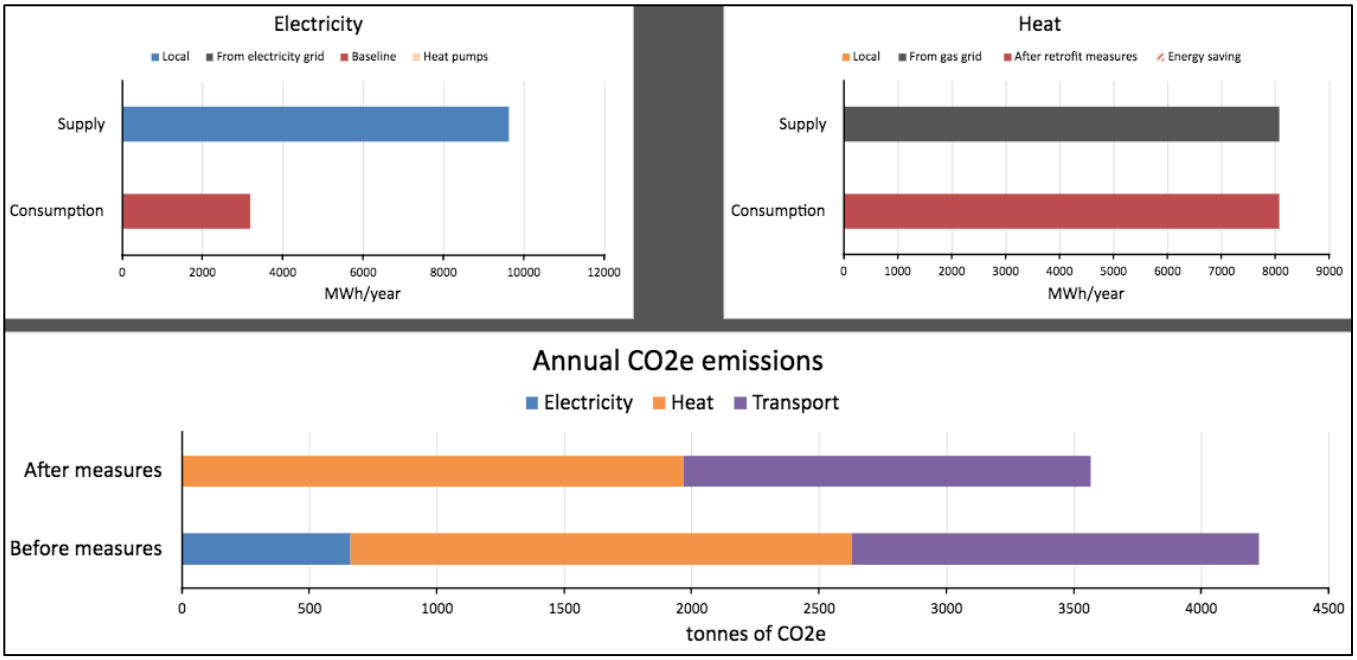


Impact of 2 x 12 acre solar farms on local demand

The graphs above show that two, 12 acre plots of solar could produce more electricity than is currently being used locally (blue bar compared to the red consumption bar in the first graph) and therefore reduces the overall carbon emissions produced by electricity from our current demands from the national grid. There was a further comment about it being difficult for a local community to feel that it is getting benefits from locally generated energy, given the current legislation, which is that it all goes into the national grid. Dan Payne of Broughton Community Energy reassured people that mechanisms exist for local communities to benefit from the power they generate through the provision of a low-cost community tariff. There are already communities in the UK benefitting from such mechanisms. He stressed that the key objective of any project progressed locally will be to reduce local energy costs.

The second group had spent time considering the visual impact of solar on people walking around and enjoying the parish as well as those outside of the area and thinking through what they might see. They had concerns about biodiversity and the ecological balance of the area as well as accepting the fact that there would be an impact on arable farmers as land would be taken up 'growing solar panels'. Stuart Mills, the facilitator, did respond by saying that only low grade agricultural land was permissible for solar and that biodiversity can be improved as the land upon which the panels sit would be likely to be replacing a single crop with a variety of plants and species. Following on from this someone asked a question about biodiversity net gain (BNG), and whether the BNG of a solar farm could be used to offset any lack of BNG from a nearby housing development. Developers can offset the loss of biodiversity by improving biodiversity in other areas but the details of how this works with developments would need to be looked into by a planning specialist.

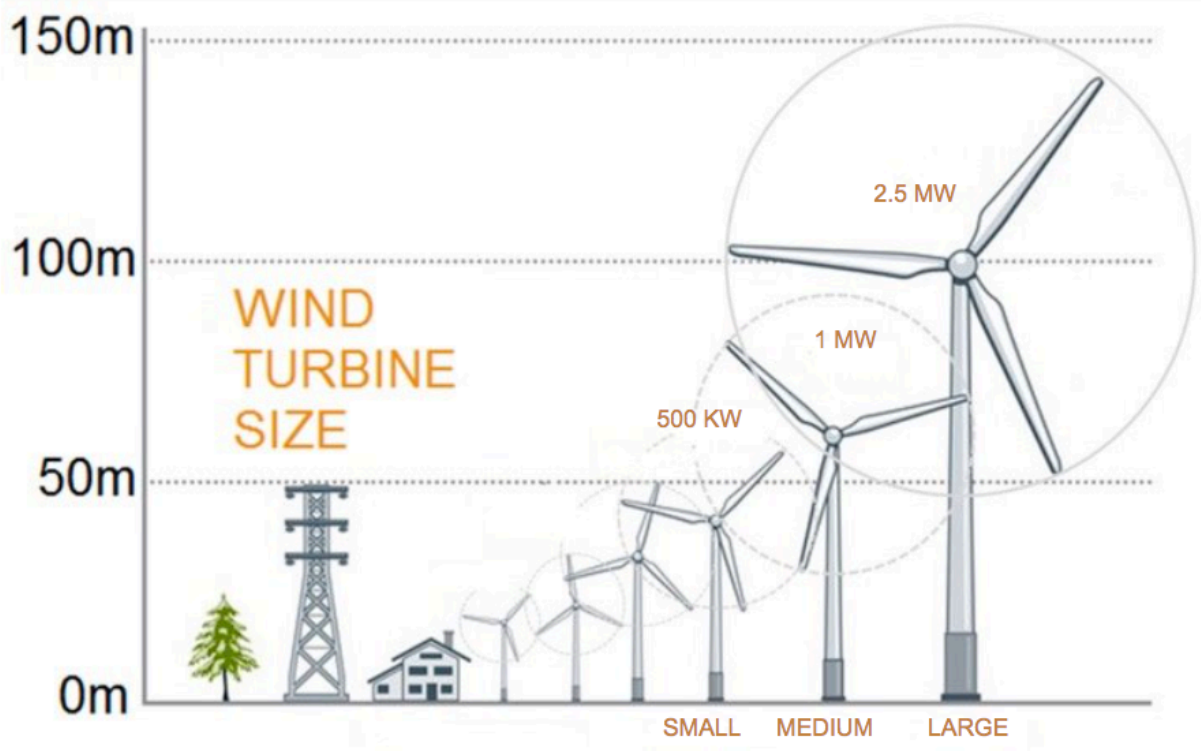
Despite concerns the group agreed that four separate 12 acre areas of solar would be acceptable, not 48 acres in one block and agreed with the first group that the only place to have them would be in the north east. They proposed having four 12 acre plots as they were keen to future proof the village and the community's electricity demand which was likely to be 2.5 times what they use now as fossil fuel powered boilers and vehicles are replaced with heat pumps and electric vehicles. You can see from the graph below that doubling the amount of solar creates three times as much electricity than the community currently needs, and removes all carbon emissions related to grid electricity.

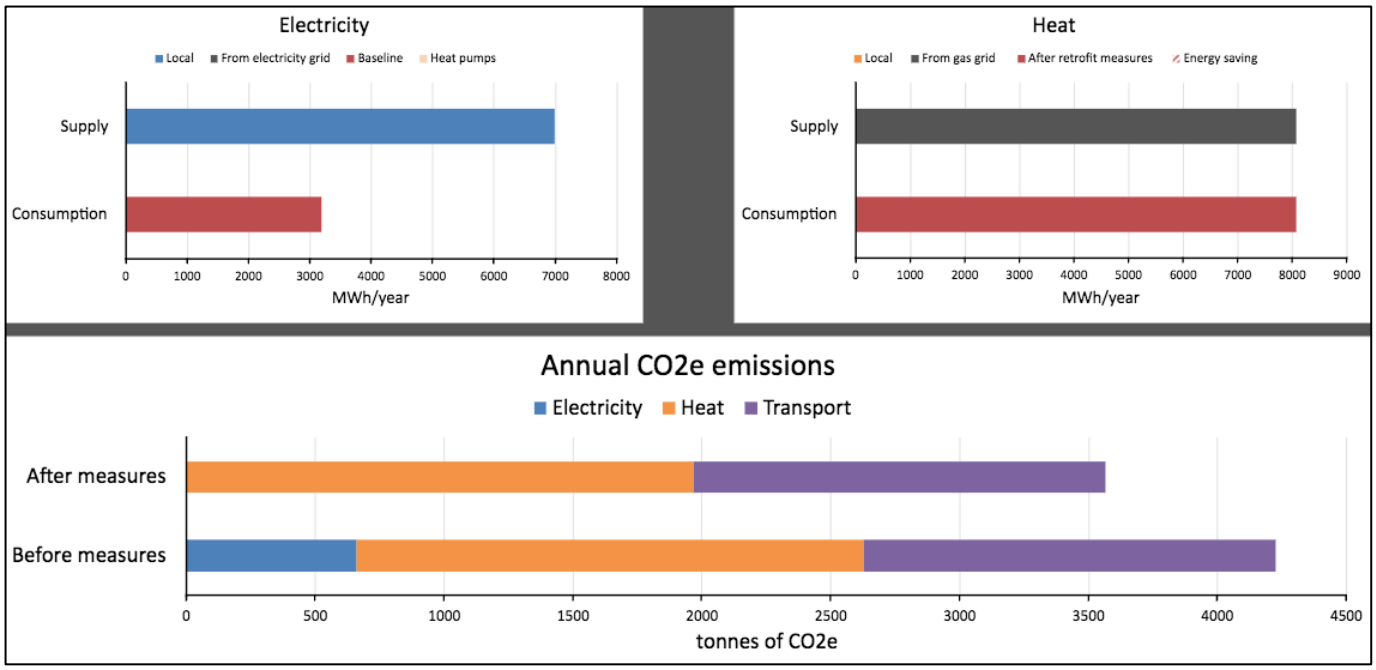


Impact of four 12 acre solar farm on local demand and emissions

Wind Power

This group were surprised by the fact that they were all generally positive about wind but acknowledged that they might not be representative of the views held by others in the village. The only places they thought wind turbines might be feasible and acceptable would be in areas on the parish boundary, on the ridge lines to the northeast and southwest that you would not see from the village. They did appreciate that neighbouring communities might have a different view and perspective and raised concerns about the destruction of bird life as well as Hampshire not being a very windy county. Stuart Mills shared anecdotally that around 400 times more birds are killed by cats than by wind turbines and that local speed maps suggested that there were certain places in the parish that were viable but that wind turbines are usually placed in high areas to guarantee consistent wide speeds. The group agreed on three medium sized wind turbines with a hub height of 70 metres.





Impact of 3 x medium wind turbines on local demand and emissions

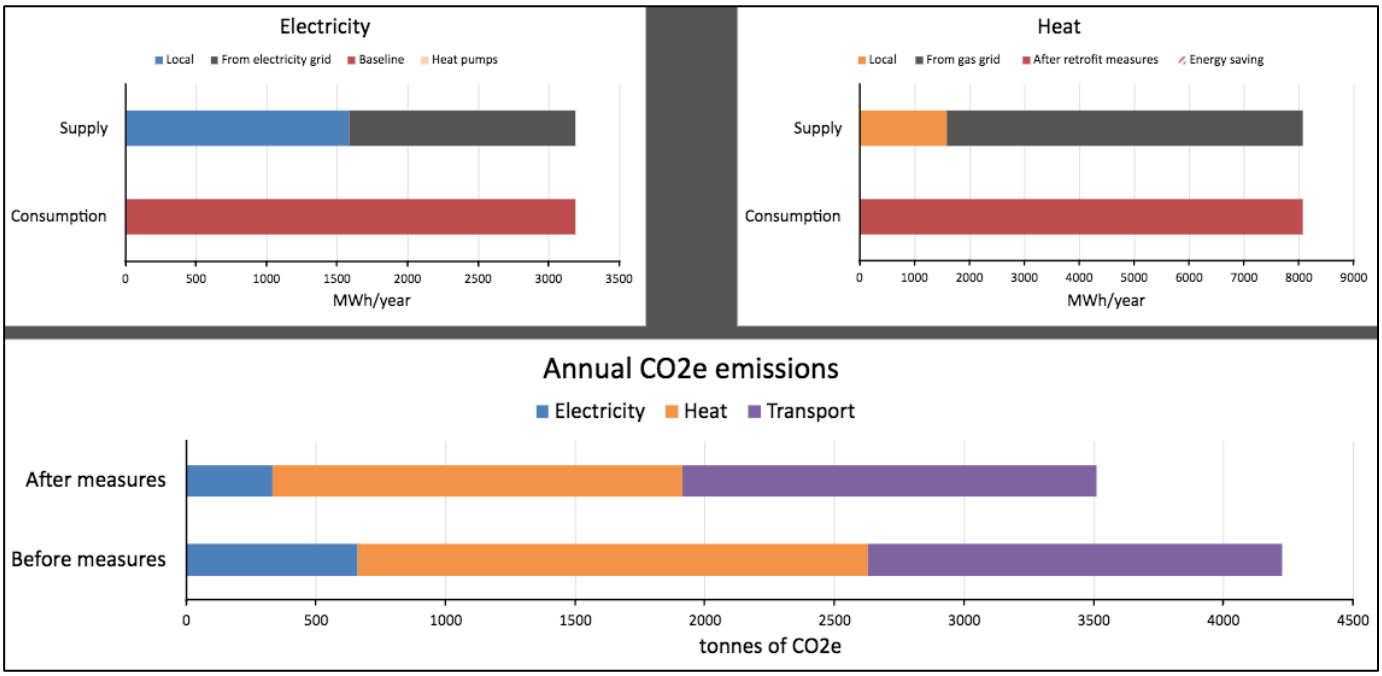
The relatively small number of wind turbines would generate twice as much electricity (blue bar) as is being used in the whole of Broughton. Turbines have high visual impact but are using less land area than solar and the generation of three medium turbines would dramatically reduce carbon emissions (blue bar in the bottom graph). The point was raised that the wind does not always blow so wind technology would have to be working in combination with storage and other technologies to consistently meet Broughton's energy needs.

Anaerobic Digestion

The final large energy infrastructure technology that was discussed was anaerobic digestion where the group imagined 125 acres of land was given over to growing a crop; a crop that was put into a digester to create methane that is then burnt to make both electricity and heat via a district heating network. The carbon produced by burning the methane would be reabsorbed by future crop growing, making it a renewable, low carbon energy source.

The table had already started a conversation about growing crops for energy before they knew that their focus was to be anaerobic digestion, and also benefited from having a local farmer in the group. They were broadly positive about the technology and in principle saw the benefit of its low visual impact and potential to support local farmers. However there was also a conversation about the burning process potentially impacting our air quality

They could imagine it being possible to have smaller areas growing crops to add up to 125 acres for the process rather than one large plot.



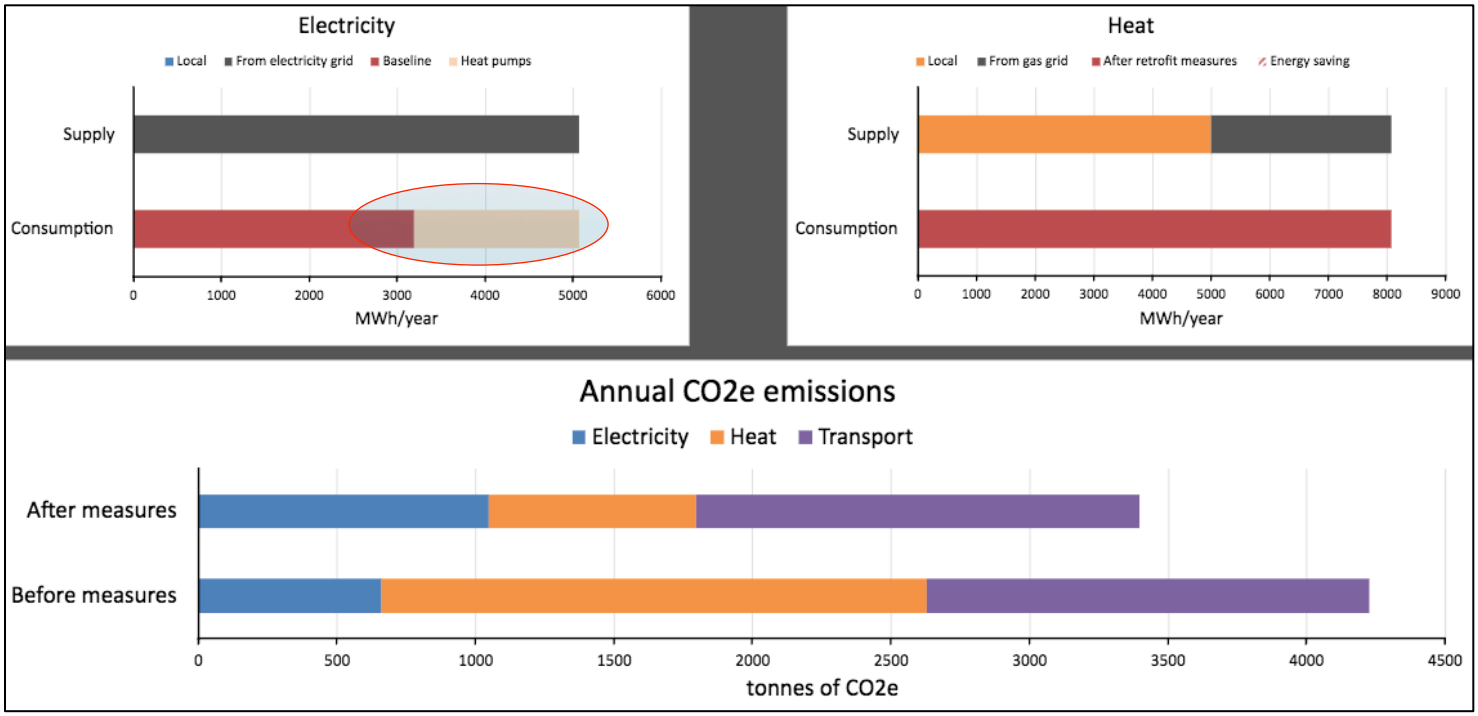
Impact of one anaerobic digestion plant requiring 125 acres of crops

From this anaerobic digestion you could meet half of the electricity needs of Broughton and also heat around 100 homes whilst reducing the net carbon emissions from the conventional high carbon emissions produced by fossil fuels currently used for heating and powering homes. This led to a discussion about how the heat would be distributed to homes, which would require new pipework and therefore disruption in the village and would also mean ensuring the AD plant was sited somewhere appropriately nearby homes - which might not be possible. There were concerns about possible methane leaks as well as the need for tractors transporting the crops to the plant. There are examples of communities that have done this but it requires significant capital funding and might only benefit a handful of homes.

Domestic heat pumps

There were two tables that discussed heat pumps and both tables saw the benefits of this domestic technology and the role it could play in decarbonising their community, with a number of people having already installed heat pumps in their homes.

The first group decided that it was reasonable to imagine 50% of homes in Broughton having an air source heat pump, recognising that there are 70-80 listed properties in Broughton who may not be able to have one due to the visual impact on historical buildings. They felt confident that 50% of the remaining homes would be suitable for an air source heat pump. Ground source heat pumps might be an option for the listed properties and other homeowners so they agreed that 15% of homes could have a ground source heat pump. They also made the point that all new developments should be fitted with renewable energy technology, avoiding the need for retrofit. They also wondered if the ex-local authority housing might have a centralised ground source shared heating scheme.



Impact of 50% of homes having an ASHP and 15% of homes having a GSHP on heat production

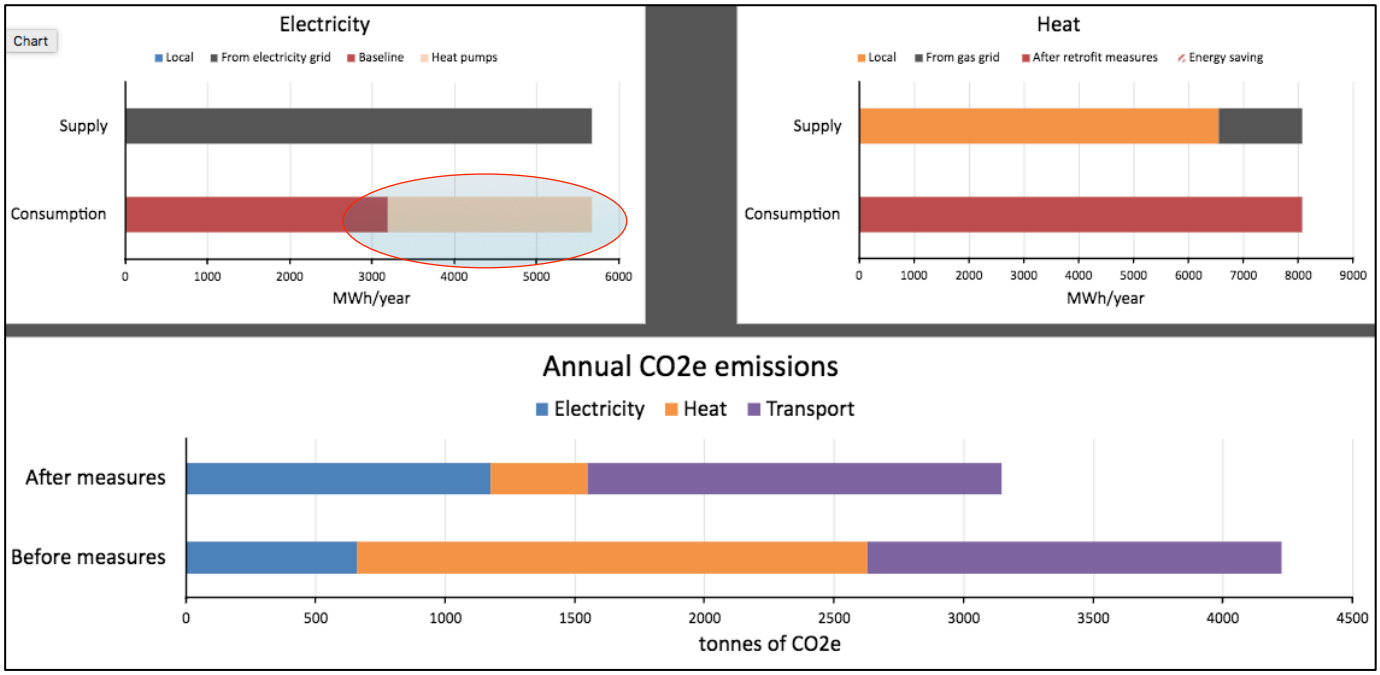
From the graph above it shows that with 50% of the non-listed homes (200 homes) plus 15% of homes (approx. 70 homes) having ground source heat pumps Broughton could meet almost two thirds of the heat demand and reduce the current carbon emissions from conventionally burning oil and gas, by over half. Heat pumps use electricity to run so the graphs also show the consumption of electricity increasing (highlighted on the graph) as well as the related carbon emissions from creating that electricity. This is to be expected but heat pumps are a very efficient way of generating heat because they produce three to

four times as much heat energy as they use in electrical energy, as they extract heat from the air or the ground.

The second table also had a positive view of heat pumps and discussed the fact that the governments Boiler Upgrade Scheme grant of £7,500 towards an air source heat pump made the replacing of an old boiler with a heat pump more affordable. With this incentive they could imagine 75% of Broughton homes having heat pumps in the next 10 years and agreed that 10% of homes could fit a ground source heat pump.

The negative side they cited was the concern about noise when dwellings are close together but someone in the group with a heat pump shared their experience of their heat pump that might reach 65 decibels when it is at maximum capacity - about the same sound level as people talking together in the garden. It was also commented that planning restrictions are being changed in recognition of the technology improving and noise no longer being the issue that it was.

A final concern was about the efficiency of heat pumps being dependent on the construction of the building and that there were costs to ensure there was appropriate insulation. Like any heating system, heat pumps use less energy in well-insulated buildings but if they are sized correctly, with large enough radiators, they should keep any building warm.



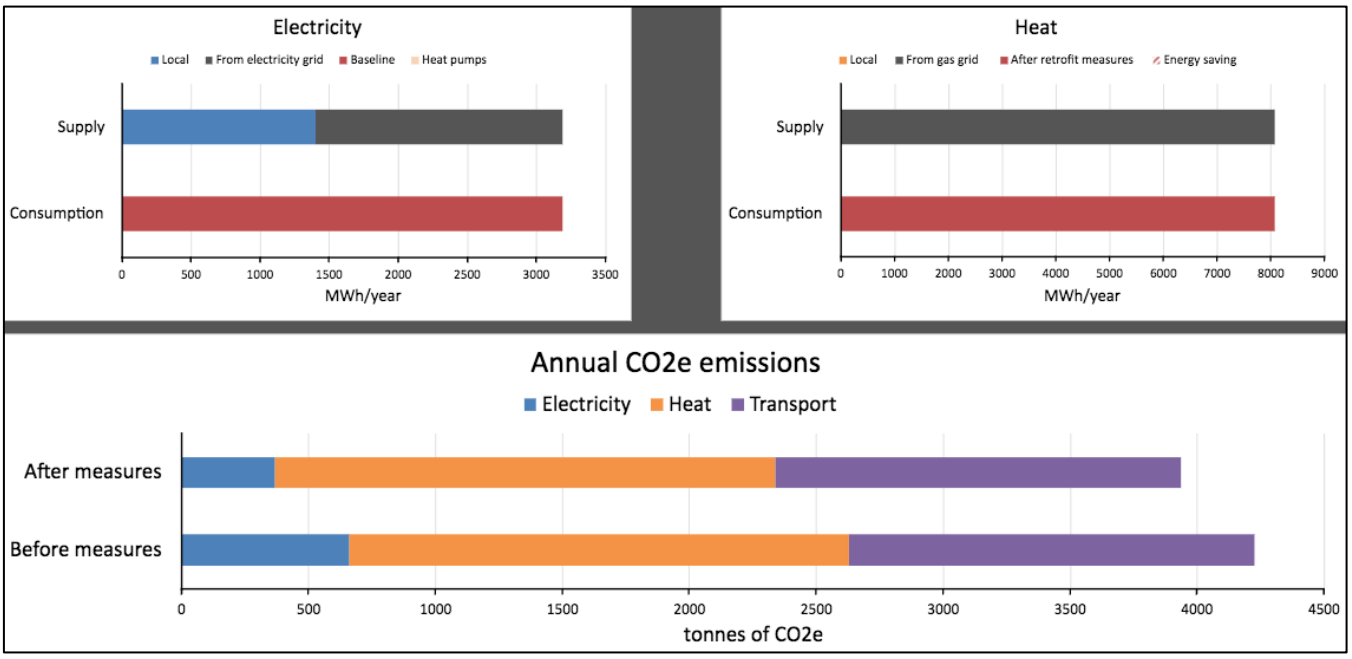
Impact of 75% of homes having an ASHP and 10% having a GSHP on heat production

So with 75% of homes with air source pumps and 10% with ground source, Broughton could meet nearly 90% of the heat demand, increasing the electricity significantly but having a huge impact on reducing the overall carbon emissions. It was noted that in both

instances the tool is assuming that the increase in electricity is being met by carbon heavy grid electricity whereas in reality the national grid is increasingly using renewable sources of generation but also in the future locally generated renewable energy can be used to supply this increased demand.

Domestic solar panels

The group who discussed the domestic use of solar panels were positive about it and were happy to see solar panels around the village with no strong objections to them. They were reminded about the planning restrictions with putting panels on listed buildings but felt they would be comfortable with 75% of homes having solar on their roofs. There was also a discussion about orientation which might impact such a large proportion of homes having solar but were reminded that south facing roofs are optimal but east or west facing also work.

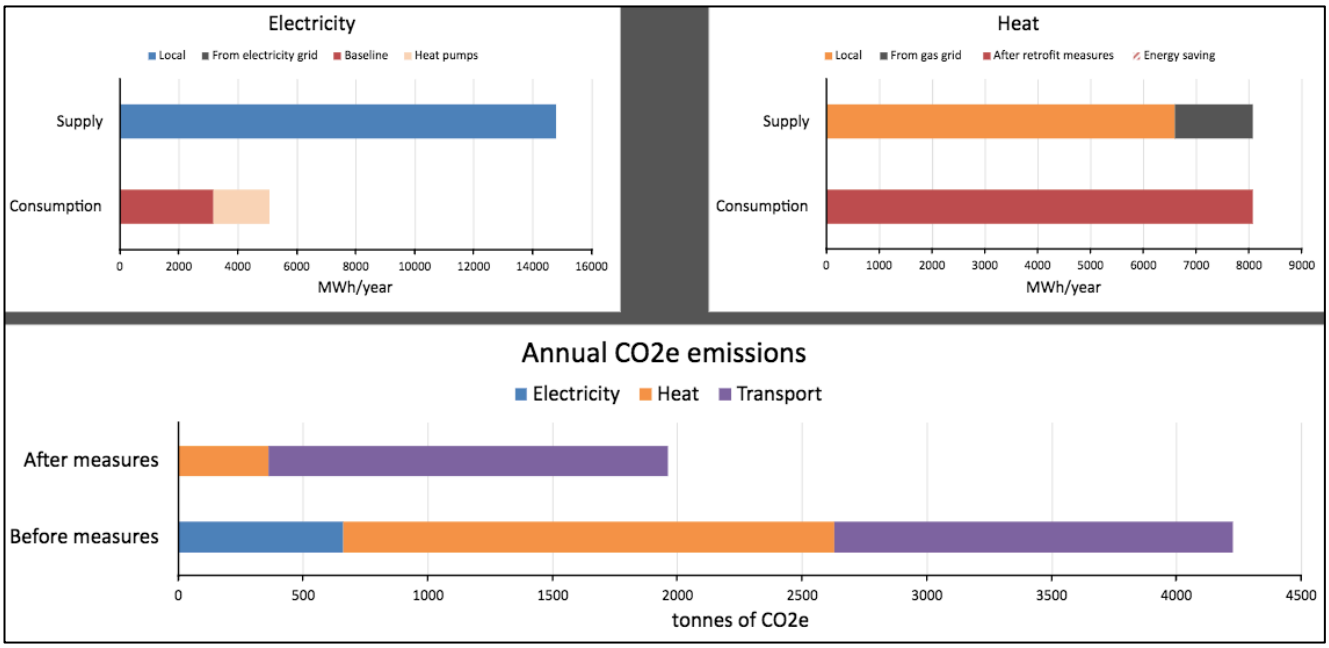


Impact of 75% of homes having solar panels on the roof

The graphs show that if 75% of homes in Broughton each had 10-12 solar panels on their roof it would produce nearly half of the electricity needs of the parish as well as halving the amount of carbon emitted from the electricity consumed from the grid. This shows a significant contribution from a relatively low visual impact, domestic technology.

Technologies in combination

As was discussed by the different groups, none of the technologies hold the complete answer so the CESAR tool was used to see what might be generated if we were to combine some of the technologies as they were discussed. We imagined a future with two 12 acre areas of solar, three medium sized wind turbines, an anaerobic digestion plant being fed by crops grown locally along with 75% of homes with solar panels and 50% of homes with air source heat pumps and 15% with ground source heat pumps.

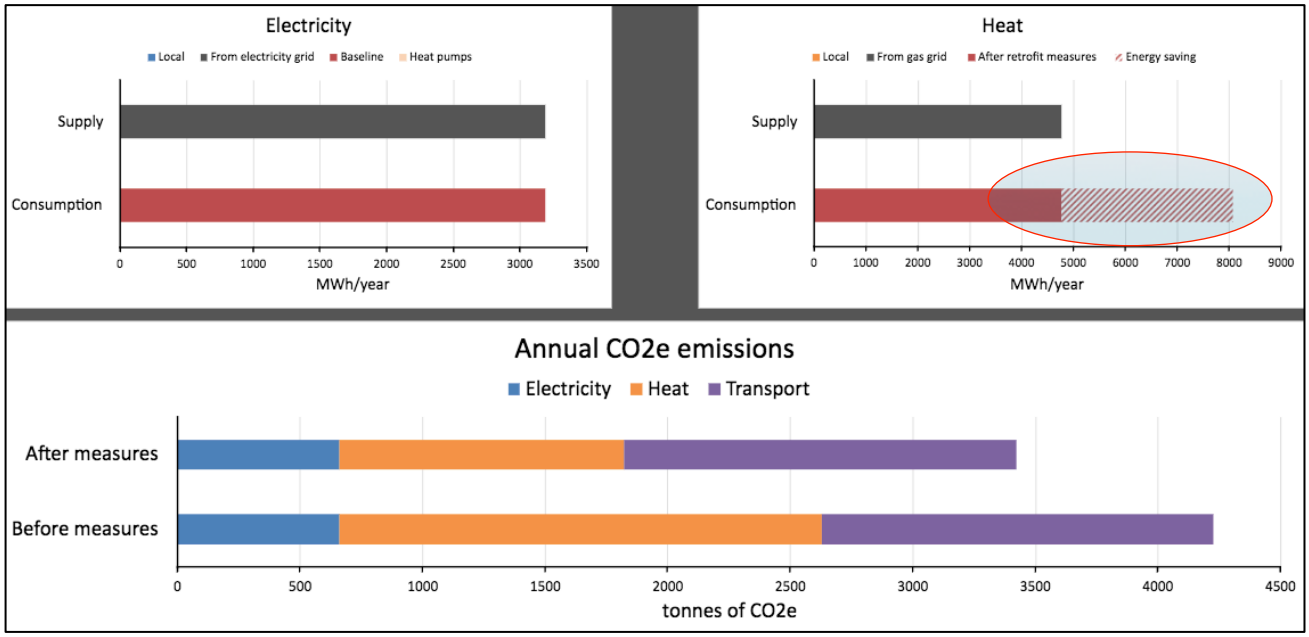


By reimagining the local energy system in this way, Broughton's carbon emissions from powering their homes would almost be entirely removed (remember the purple is transport); three times the amount of electricity needed would be generated locally and three quarters of the heat needed would be produced from low carbon sources.

Solar and wind generation work well in combination. Solar generation is most effective in the spring and summer months when there are long sunny days (and generally lighter winds). Wind generation is most effective in the autumn and winter when the days are shorter and the winds are stronger. And, of course, it's often windy at night. A combination of wind and solar provides more consistent generation throughout individual days and over a typical year compared to either technology in isolation. Storage would also have to be understood and discussed but by working with renewables in combination you can provide more consistent, local generation.

Retrofitting

As with any community discussion about energy it starts with seeing what house owners can do to reduce their energy demand. The CESAR tool allowed us to look at how making homes more thermally efficient could reduce the heat demand, and therefore the energy required by Broughton, based on some broad assumptions made about the local housing.



These graphs demonstrate that energy efficiency measures like draught proofing, insulation and double or triple glazed windows to improve the energy efficiency of the lowest performing houses could reduce the local heating demand by almost 50%. This reasonable retrofitting would reduce the amount of energy needed to heat these homes and therefor the carbon emissions from heating are almost halved. For many communities signposting local people to good home energy advice, recommended suppliers, group buying schemes and developing local home energy case studies where people can share their experience is a simple next step.

Conclusion

It was great to have such a good number of people to support this important conversation in Broughton. The workshop enabled people to raise their concerns about different renewable energy technologies and also learn from each other about how the different technologies work and what could be possible where they live. With just over a thousand people in the parish the group seemed surprised about how a relatively small amount of the larger technologies is needed to meet the local needs of the community; one or two medium wind turbines or approx. 18 acres of solar.

There was broad support for all the technologies, which participants acknowledged might not be a fair reflection of the parish as a whole, but it was a healthy and enthusiastic conversation about change. There seemed real appetite to embrace domestic low carbon technologies with an opportunity to support people in taking that step towards them and sharing experiences of those who have already got heat pumps or solar. The workshop highlighted people's comfort with small solar farm installations as well as reasonable and considered deployment of wind power recognising the importance of protecting the landscape.

The workshop participants spent two hours imagining how renewables might meet their local community's energy needs. They shared what they wanted to protect in their landscape whilst exploring what might be possible if various combinations of renewable technologies were deployed. This was a hypothetical conversation based on data and research and put to one side constraints such as planning, expense and grid capacity. The discussion format aimed to help people learn together about what the different technologies are, how they work and so open local possibilities about possible projects helping us all transition away from fossil fuels.

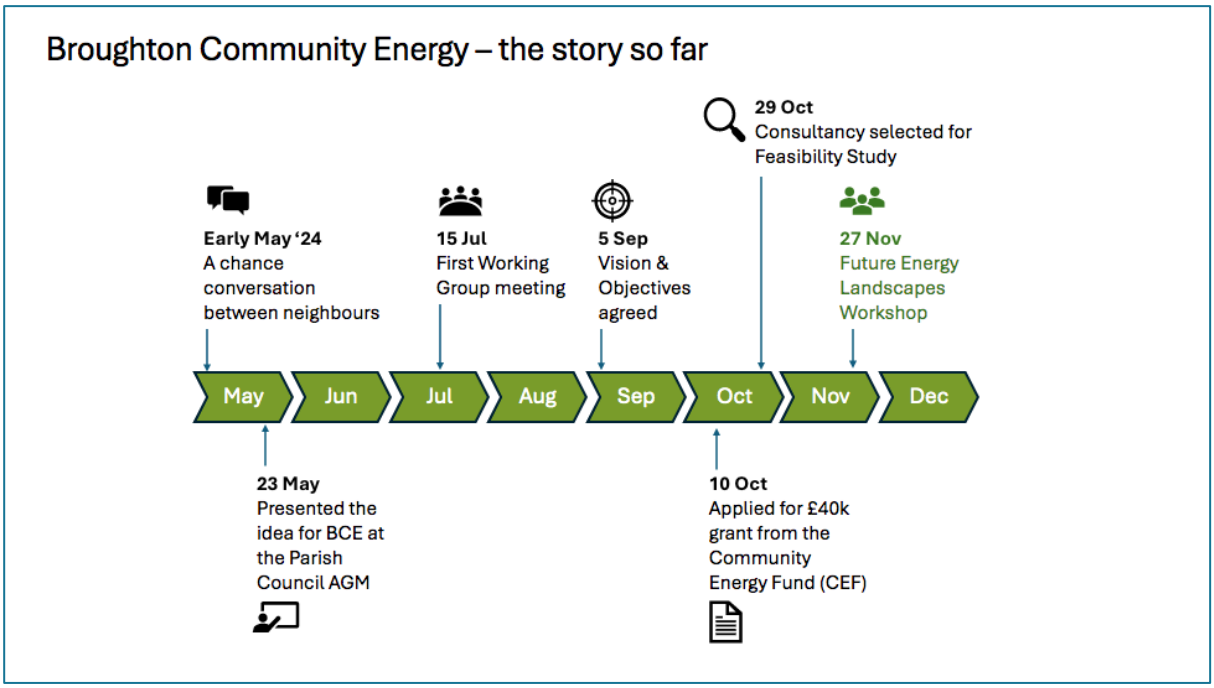
The workshop concluded with the host asking for a show of hands from everybody who is in favour of Broughton generating its own sustainable, secure, zero-carbon energy. The response was unanimously in favour. Of course, it was a self-selected audience, but the response was encouraging.





Appendix 1: Broughton Community Energy slides





Several organisations have been supporting us

COMMUNITY ENERGY SOUTH

Dragonfly POWER

ENERGISE SOUTH DOWNS

Energy Local

Hampshire County Council

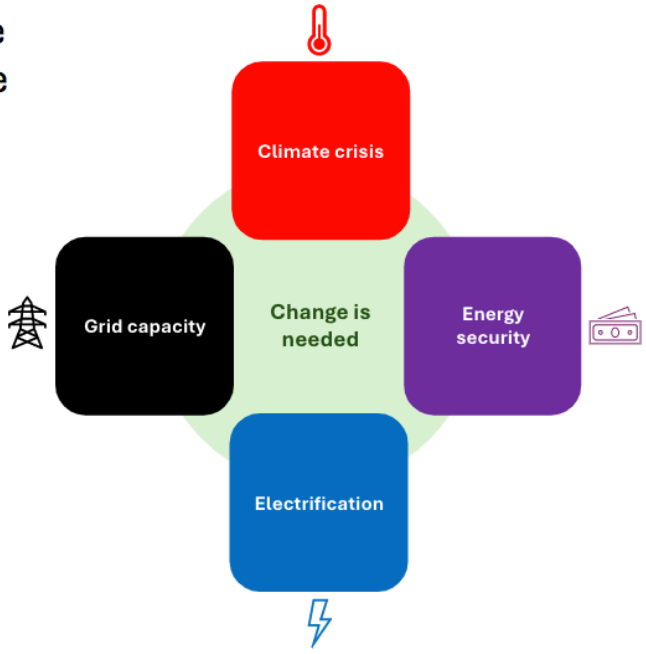
Test Valley Borough Council

Greater South East Net Zero Hub

Scottish & Southern Electricity Networks

Prospus

We must change how we generate and use energy



Our Vision

Our village is fuelled and powered entirely by sustainable, secure, zero-carbon energy, ensuring affordability and fairness for all.

Our key objectives

Environmental

- Reduce our CO_2 emissions
- Contribute to UK sustainability goals

Economic

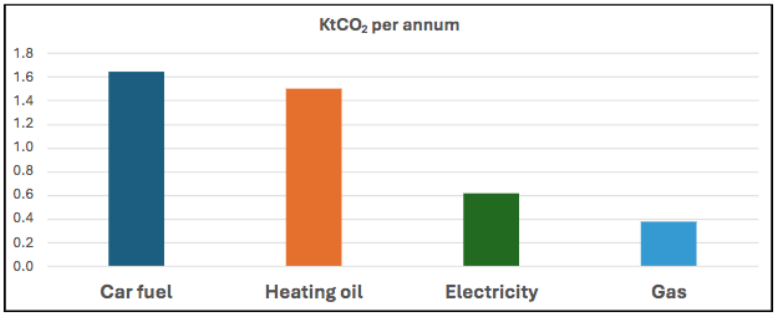
- Reduce our energy costs
- Reduce energy poverty in our community

Community

- Provide a blueprint that inspires other communities to act

We've estimated the annual energy consumption and CO_2 emissions of our village

Car fuel - 7.2 GWh ($1.6\ KtCO_2$)	Electricity – 3.0 GWh ($0.6\ KtCO_2$)
Oil – 6.1 GWh ($1.5\ KtCO_2$)	Gas – 1.6 GWh ($0.4\ KtCO_2$)



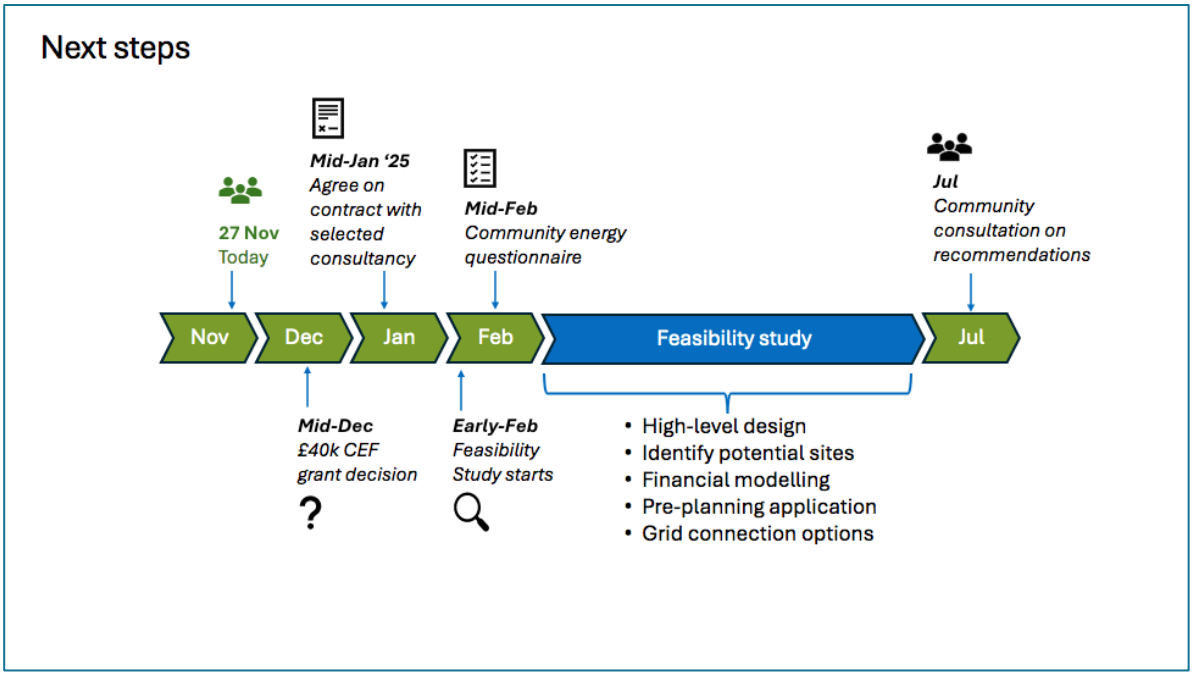
We emit **4.1 $ktCO_2$** each year, which would fill **140 million party balloons.**
We would need to plant **200,000 trees** to absorb it.

Draft only
Subject to community consultation.

The pillars of our strategy

- Generate sustainable electricity
- Low-cost community tariff
- Provide energy advice
- Improve household energy efficiency
- Replace fossil-fuel boilers
- Transition to electric vehicles

Engage and listen to the community



Appendix 2: Tools, assumptions and research

Tools

Future Energy Landscapes toolkit from Centre for Sustainable Energy: www.cse.org.uk/my-community/future-energy-landscapes/

CESAR (Community Energy Saving Renewables) workbook: Showing renewable energy generation in relation to how much energy the community uses and the impact of renewables on carbon emission reduction.

Impact Tool: An estimator of a community's carbon footprint that works for parishes, wards, district councils and unitary authorities.

Assumptions

Onshore wind and solar farms
Assessments of suitability of landscape for different technologies represent an upper bound estimate and do not take full account of the impacts associated with potentially limiting characteristics (proximity of roads, railways land type etc.) (LUC, 2018). Spacing of wind turbines is based on an allowance of five times the rotor diameter (LUC, 2018).

Rooftop PV
Suitable rooftop is defined as one on which a minimum of a 1 kW solar PV system can be installed (8 m2 rooftop area required), with an orientation east through south to west and at an angle between 15° to 70° (Palmer et al., 2018).

Analysis suggests that in the City of Southampton district 67% of rooftops had one area that satisfied the criteria (Ridett and Anderson (2023), p19), while in the wider Winchester City area 78.8% had a rooftop surface that was deemed as suitable for a rooftop PV installation of at least 1 kW (Ridett and Anderson (2023), p20).

These figures are likely to represent an upper bound estimate of solar PV potential. For the purpose of the CESAR tool, an estimated potential of 75% suitability would provide a realistic upper bound estimate.

ASHP/GSHP

Based on assumption that dwellings need to be reasonably airtight and well insulated. Significant proportion of post 1990 houses plus an allowance for others that might have had deep retrofit we assumed 50% of homes could have an ASHP. We then considered that older homes in the centre of the towns / villages would have bigger gardens so assumed 25% would have room for GSHP.

Research

Ridett, E., and Anderson, B. (2023) An updated assessment of the technical and economic potential for renewable electricity generation in the pan-Hampshire area (v2.0). Establishing a Robust Evidence for a Pan-Hampshire 2025-2050 Energy Strategy project report. Southampton: University of Southampton.

LUC (2020) Test Valley Renewable and Low Carbon Energy Study

LUC (2020) Test Valley Landscape Sensitivity Assessment of Wind and Solar Developments

Palmer D., Koumpli E., Cole I., Gottschalg R. and Betts T. (2018). A GIS-based method for identification of wide area rooftop suitability for minimum size PV systems using LiDAR data and photogrammetry. Energies, 11(12): 3506

Ridett, E., and Anderson, B. (2023) An assessment of the wider Hampshire distribution network capacity and potential constraint points for renewable generation (v1.0) Southampton: University of Southampton.

UK Government (2023) Figures for English Housing Survey headline report 2022 to 2023.

Appendix 3: Broughton Parish Boundary

