3. Power Up

This is an extract from
Dorset 2030
Living in a zero-carbon county

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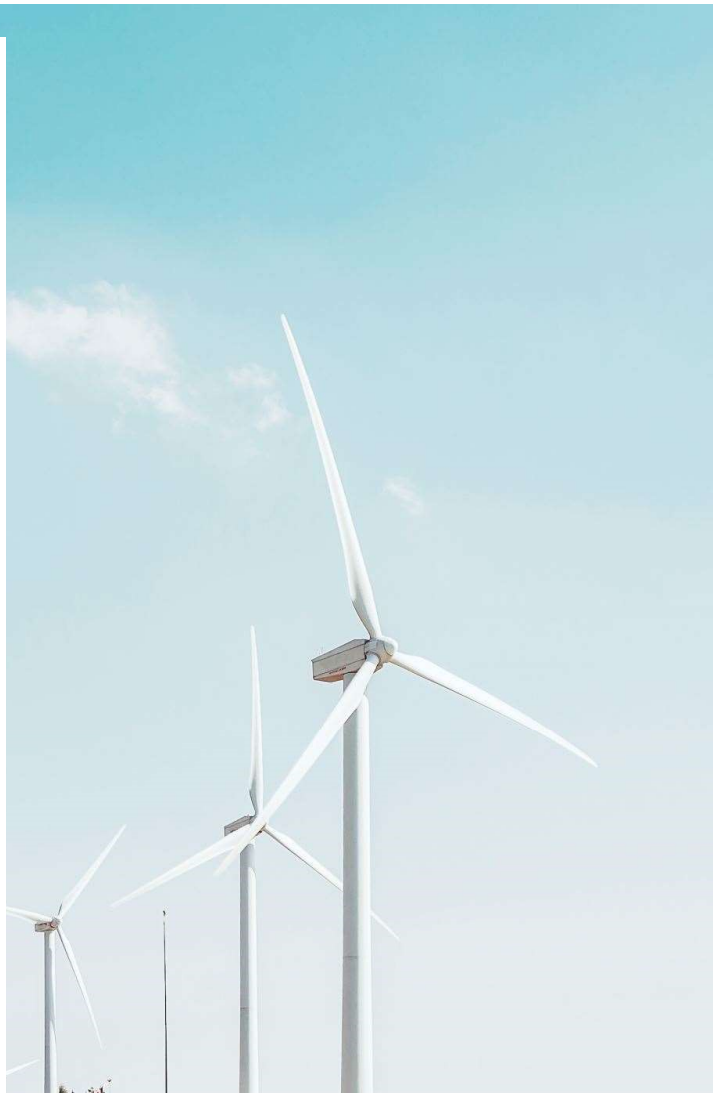

Authors: Neil Smith & Mark Chivers

3. Power Up

Defining a Vision for 2030

Globally, the biggest contributing factor to climate change is the burning of fossil fuels. In the UK energy supply sector, business and residential use account for 56% of GHG emissions while transport accounts for 28%. In total the burning of fossil fuels in the UK accounts for nearly 85% of all our GHG emissions. In this chapter, we focus primarily on grid energy supply (i.e. not transport) although it is important to note that the shift from internal combustion engines to electric vehicles will create additional demand on the grid. We will address this in part in the *Travel Better* chapter. To reach net zero as rapidly as possible, we need to electrify virtually everything (in particular heating for buildings and transport), providing this entirely from renewables.

While fossil fuel use is the principal cause of climate change, at the heart of environmental breakdown is the separation of nature from human activity. Over recent centuries our supposed 'domination' of nature, as a commodity to be tamed and exploited, has been instrumental in creating the issues we now face. In our use of energy this manifests itself in the notion of 'somewhere else' cause and effects, with both the production of energy and the subsequent damage it causes taking place out of sight, and often out of mind. As with nature itself, there is an opportunity to reconnect with where energy comes from. This chapter, therefore, as well as looking at the technical challenge and statistics, seeks to define a vision where we can actually see the source of our energy production here in Dorset, and in doing so, asks us to reconnect with how we power our lives for the first time since the birth of the industrial age.

In 2030…

All Dorset's energy needs are provided by renewable sources, all of them situated within the county's boundaries or offshore. The transition has been just, equitable and produced wider benefits to residents, including the creation of local jobs and lower bills.

Most energy production is owned by the community through various mechanisms: Council-controlled installations that return profits to residents through reduced local taxes, mutual organisations who return profits to members, direct community ownership, and homeowners themselves.

The link between energy requirements (for example how many wind turbines we need) and our energy usage is clearly understood, supporting the on-going efforts of businesses, the public sector, communities, and individuals to reduce their energy demand.

No biofuels or any other 'renewable' technologies are employed that require imported materials or are in some other way damaging to eco-systems.

Assessment Framework

How are we performing currently?

The framework below sets out the criteria against which the current status can be assessed. Aspirational objectives are then set to encourage progress towards the vision.

Category	Assessment Criteria
1	Less than 25% of energy needs are provided by local* renewable sources and, where plans exist, they are insufficient to address the issue (*local = within Dorset's boundary or immediately offshore).
2	More than 25% of energy needs are provided by local renewable sources and, while plans exist, they are not at the scale required.
3	More than 50% of energy needs are provided by local renewable sources and clear plans exist to extend this.
4	More than 75% of energy needs are provided by local renewable sources with plans to address the remaining requirements and with community schemes increasing.
5	All of Dorset's energy needs are provided by local renewable sources, most of which are community owned.

2021 Assessment

Where are we now and what else do we need to know?

The **Zero Carbon Britain** (ZCB) scenario shows how, subject to appropriate reductions in energy demand, we could provide all of our energy using only renewable sources, with no nuclear. Based on extensive analysis of historic weather patterns (wind speed, sun hours) and considering all the available technologies (including those that would be needed to meet demand during times of inadequate wind and/or sun), the split of provision shown in Figure 1 would provide this 100% coverage across the UK.

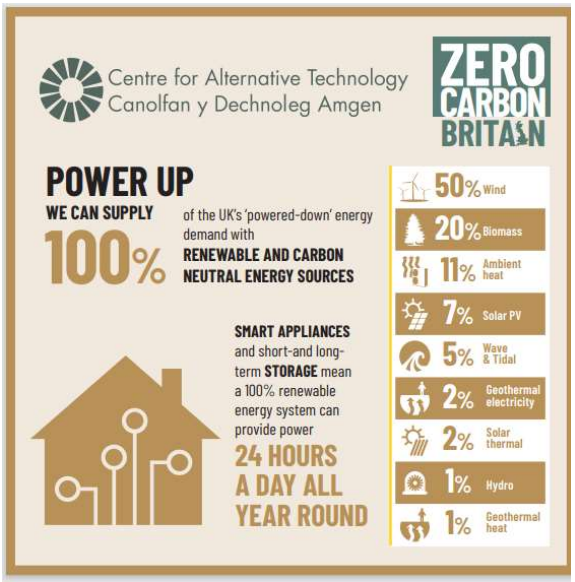

Figure 1. ZCB Power Up Scenario

In October 2021, the UK Government announced, as part of its **Net Zero Strategy**[1], that all UK electricity will come from 'clean energy sources' by 2035. This broad commitment is a welcome one. However the inclusion of nuclear and the seemingly contradictory figure of a residual 15-20% of emissions suggests the commitment to rapid decarbonisation and move to full renewable deployment is still lacking.

Nationally, targeted provision of energy to the grid previously assumed approximately half of this will come from offshore wind farms, leaving the remainder to be provided locally. For this assessment, the starting point is that, because a site has been identified within Poole Bay in which an offshore wind farm could be located, we have the potential to produce all our energy locally.

Of course, Dorset doesn't *have* to produce all of its power within the county boundaries but, as set out above, the aim here is to develop an understanding of what our energy demands look like in terms of generating power, to assess what is possible and to create that connection and awareness. As we will outline below, not only is this possible but producing all our energy locally also brings additional benefits.

Dorset's current energy needs (as shown in the table and chart below) are estimated to be around 14,000 GWh[2]; businesses and residential are the county's two largest sources of GHG emissions (after transport), contributing 60% of the total when combined. Work in the ZCB report (as outlined in the *Power Down* chapter) proposes we should reduce our energy demand by 60%. In line with this, for this chapter the targeted energy requirement is based on this reduced level of 5,600 GWh (which would also cover the electricity required for transport). Energy consumption has decreased steadily over the last decade, with total demand over 7% lower than in 2010. Total energy demand per person in Dorset is 23 MWh. Three quarters of this demand is met through fossil fuels, predominantly natural gas for heating and petroleum for vehicles.

Date	**2018**	**2030**
Electricity	3,103	1,241
Gas	4,782	1,913
Transport (Petroleum)	5,328	2,131
Other sectors	590	236
Totals (GWh)	**13,803**	**5,521**

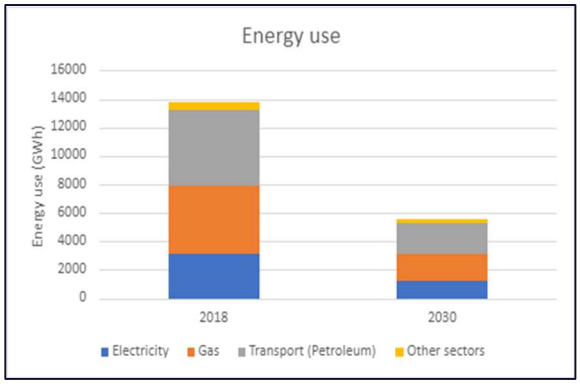

Figure 2. Dorset's energy requirements 2018 and 2030

The aim here is to determine what this would actually look like (i.e. how many solar panels, wind turbines, anaerobic digesters etc. would we actually see across the county). While there are, of course, many possible outcomes we will do this by looking at two scenarios:

1. The level of renewable energy capacity required if we achieve the recommended reductions in overall energy demand.
2. The level of renewable energy capacity required if we only continue reductions in demand at current level.

The **Dorset Local Enterprise Partnership (LEP)/Regen** report **Dorset Low Carbon Investment**

[1] https://www.gov.uk/government/publications/net-zero-strategy
[2] www.dorsetlep.co.uk/userfiles/files/Dorset%20Low%20Carbon%20Opportunities%20Evidence%20Base.pdf

Opportunities Evidence Base[3] presents a range of opportunities for decarbonising Dorset to help the region deliver on net zero, jobs and green recovery. There is broad alignment with the high-level numbers we have used and the Regen report. The main difference between ZCD and Regen is the speed at which net zero should be achieved (the LEP / Regen target being 2040). Our argument is that there is scientific consensus that we need to move much faster to zero and no *physical* reason why this deployment cannot be achieved by 2030 if appropriate funding and Government policies are in place. As we cover in the *What's Next* chapter a wartime scale mobilisation is required. To reach net zero as rapidly as possible, we need to electrify everything, and in particular heating for buildings and transport, and provide the resulting, reduced energy demand (as set out in the *Power Down* and *Travel Better* chapters) from renewables.

Figure 3, from the LEP report, outlines both existing and potential projects and areas where renewable energy could be deployed.

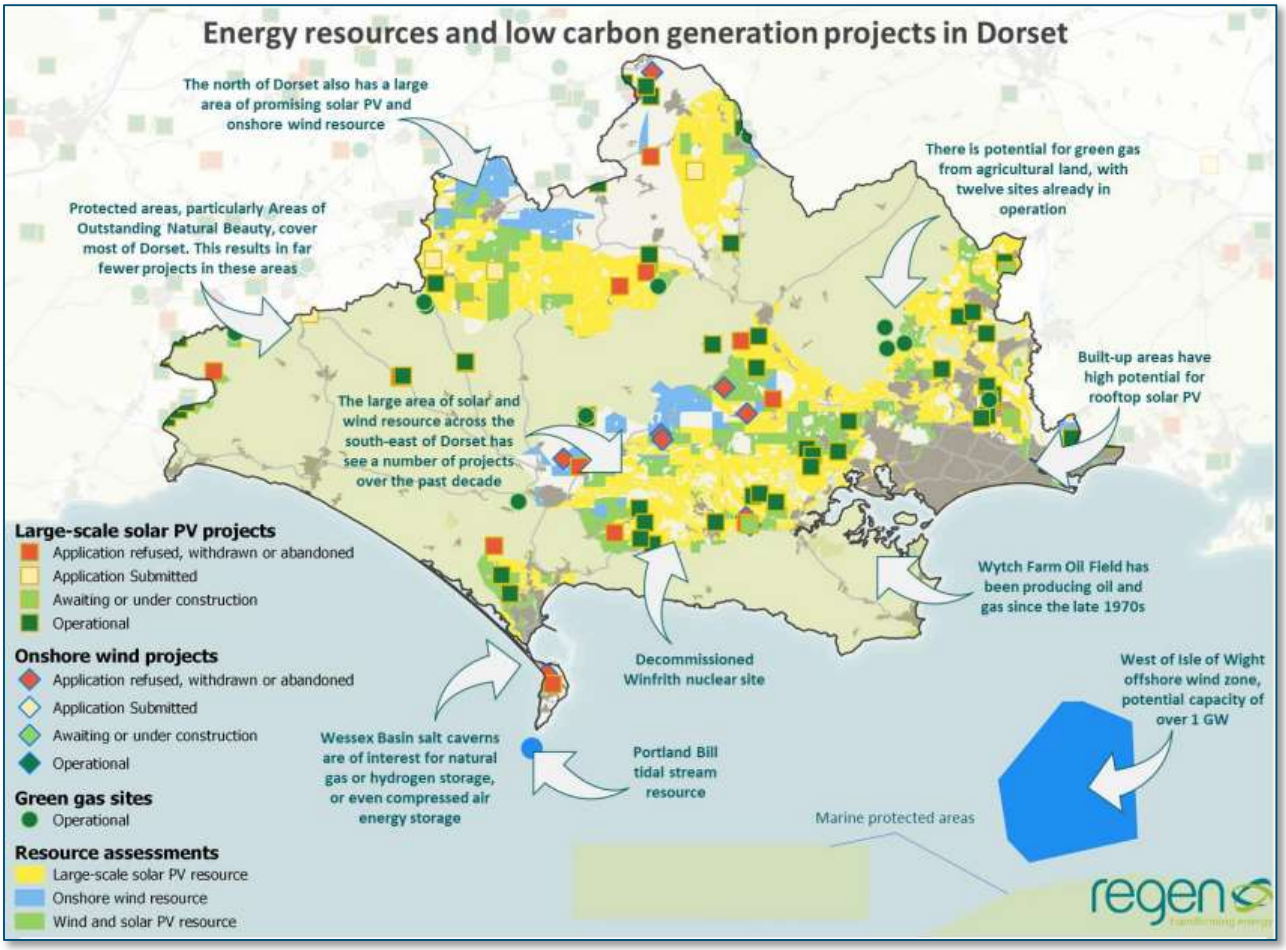

Figure 3. Existing projects and potential locations for renewable energy projects

[3] https://www.dorsetlep.co.uk/userfiles/files/Dorset%20Low%20Carbon%20Energy%20Opportunities%20Document.pdf

While Dorset benefits from extensive analysis and research in this area (in addition to the LEP report the **Bournemouth, Dorset and Poole Renewable Energy Strategy**[4] and associated analysis, produced in 2013 provide a strong foundation of data), it suffers from a disappointing lack of renewable provision to date. These reports proposed a target of renewables providing 15% of Dorset, Bournemouth and Poole's energy needs by 2020. Approximately half of this (7.5%) was assumed to be delivered by those installations considered by Government to be national resources, principally offshore wind.

Where are we now?

Current installed renewable capacity in the county is dominated by solar PV, with a total capacity of 480 MW, comprising 420 MW of ground-mounted solar and 60 MW of rooftop solar. In total this accounts for 98% of low-carbon generation capacity. In 2019 (assuming typical load factors), renewable energy generation in Dorset was 685 GWh per year (512 GWh of electricity and 173 GWh of heat). This equates to around 22% of *electricity consumption*, but **only 5% of total energy consumption**, i.e. even below the relatively low aspirational 7.5% target. A dramatic improvement is required over the coming decade.

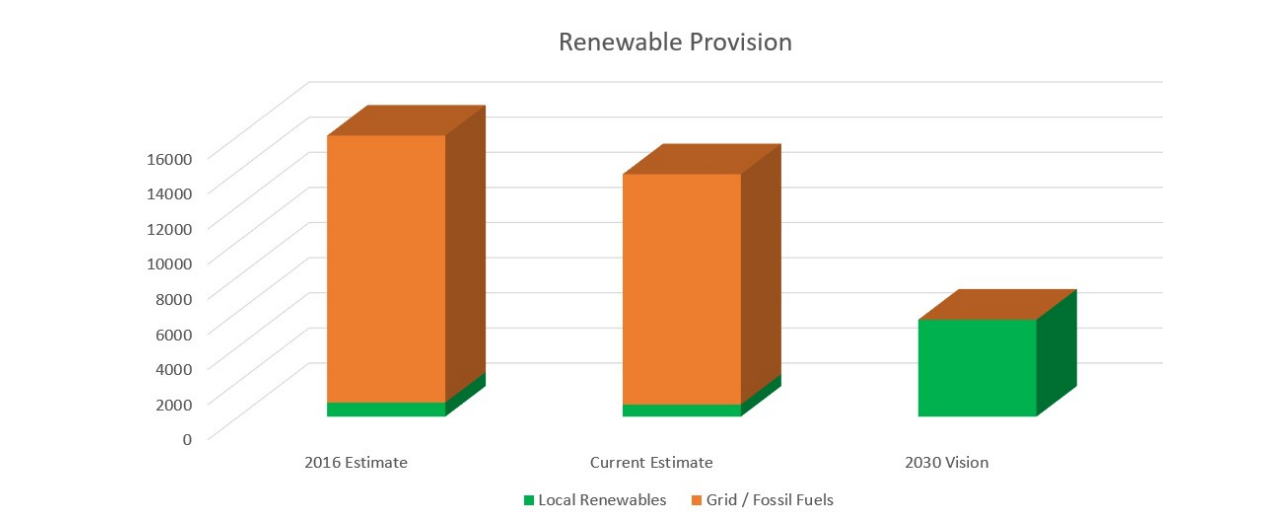

Figure 4. Current and targeted local renewable energy provision

Our model (Figure 4) shows that, following the appropriate power down activity, we should be aiming to produce around 5,600 GWh within Dorset by 2030, to meet all our energy needs.

In 2015, the Secretary of State refused consent[5] for the proposed 970 MW **Navitus Bay** offshore wind farm, mainly on the grounds of an unacceptable impact on both on- and off-shore seascape, landscape, and visual impact. However, our near neighbours in Brighton and Cornwall, both major tourist destinations, enjoy offshore and onshore wind provision respectively with no evidence of the damage to the tourist sector predicted by Navitus Bay's opponents.

[4] https://www.dorsetcouncil.gov.uk/countryside-coast-parks/countryside-management/green-dorset/renewable-energy-in-dorse

[5] https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010024/EN010024-000055-Secretary%20of%20State%20Decision%20Letter%20and%20Statement%20of%20Reasons.pdf

What do we need?

We have aligned our expectations with those in the Regen report, focusing primarily on wind and solar while recognising there are other technologies that are worth exploring, these provide both benefits to energy supply and potential economic benefits to local communities.

The importance of reducing energy is illustrated in Figure 4. This shows that without deploying offshore wind or reducing energy beyond current projections we would need to find space for 2,000 more onshore turbines or use 28% of available land for additional solar panels. This reduces dramatically if we can reduce demand by 60% and is well within the potential limits if we develop an offshore wind farm.

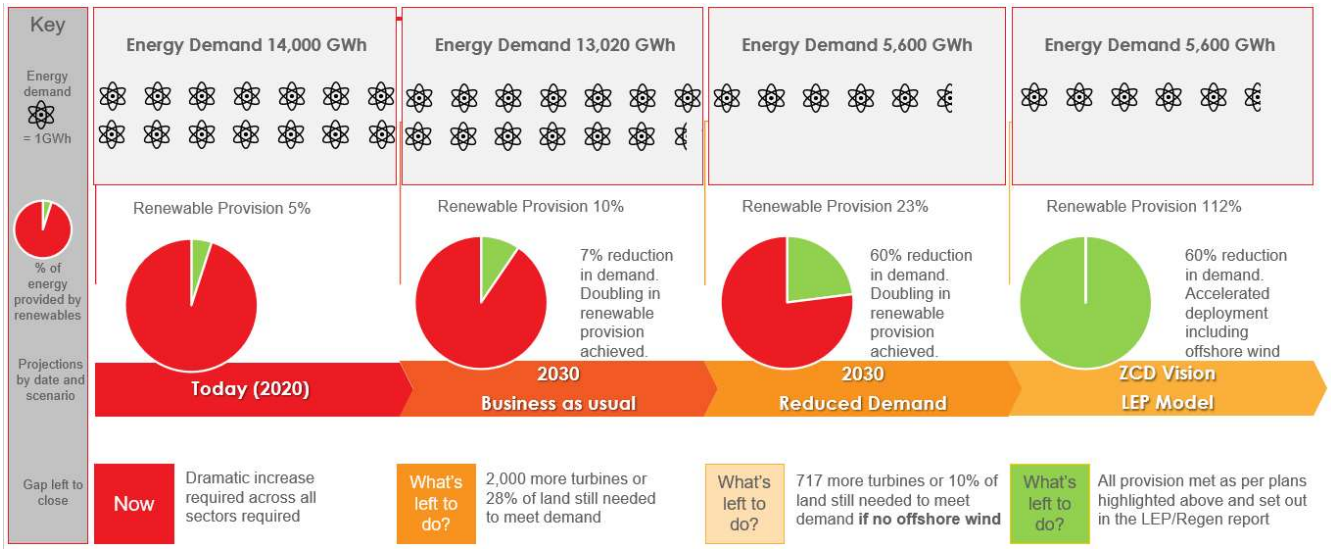

Figure 5. Routes to 100% Renewable Provision

Dorset's CEE strategy estimated we would need 4 GW of solar (around 7,700 hectares of panels) or 2 GW of wind (around 700 big turbines), or some combination of the two to meet demand (including transport) and that BCP would need to find the same. The difference is that BCP is unlikely to find the space to install these renewables and so will need to rely on other areas to meet their demand.

Dorset Council itself will need to make the switch from fossil fuels to heat pumps, electric vehicles, and hydrogen over time. It is estimated that in the region of **60 MW of solar PV** (or 30 MW of wind) will be required to cover the Council's own energy needs[6].

Offshore wind

Meeting the UK's net-zero target will require additional **offshore wind** farms, which will need to be deployed at scale and speed, whilst mitigating the impacts of offshore and onshore installations.

[6] www.dorsetcouncil.gov.uk/emergencies-severe-weather/climate-emergency/climate-ecological-emergency-strategy/climate-ecological-emergency-technical-papers/renewable-energy-technical-paper

Research by **Aurora Energy Research**[7] suggests powering every home by offshore wind by 2030 (a stated Government ambition) would cost £50bn over the coming decade (by comparison, the current roads budget is £27bn for the next 5 years).

Locally, the Regen work for **Dorset LEP**[8] assumes there will be a 1 GW offshore wind farm, which could generate 4,800 GWh. The Crown Estate is currently managing the latest round (Round 4 Leasing), of wind farm developments, which should provide at least 7 GW of energy and help meet the Government's target of installing 40 GW of offshore wind capacity by 2030. The next Crown Estates leasing round will start in early 2023 and this is the opportunity to develop an offshore Dorset windfarm. The investment required to construct and operate an offshore wind farm of 1 GW capacity would be about £1.4 billion and could create 2,300 jobs. Local support for such a scheme, including from both Councils, will be critical if it is to succeed. In fact, as covered in *Further Information* below, there would be many community benefits to be obtained if our local Councils led on this proposal rather than stood in its way. However, given the current timescale for developing such a scheme, the wind farm would not start to generate energy until 2034.

Solar

The LEP/Regen net zero scenario suggests that 1 GW of PV could be added by 2050 at a cost of £518 M and would create 1200 jobs. However, given that we need to accelerate Dorset's renewables, we have proposed a doubling of PV generation in the next 10 years, which would require an additional 500 MW of PV to be installed. We think this is not an unreasonable assumption, given there are 200 MW of solar in planning and development, including two large PV arrays being built in Spetisbury and Stockbridge (totalling 75 MW) plus two new proposals entering planning in Winfrith (totalling 70 MW). The increase for 2035 would require an additional 150 MW of solar capacity. This would mean an additional 650 MW of capacity to be installed in the next 15 years: again, not an unreasonable aspiration.

The LEP/Regen report[9] shows there is plenty of land (62,000 ha) for large scale solar farms, where only 4% would be needed to host 1200 MW of capacity (as described in their net-zero scenario) and also plenty of roof space (2,000 ha in total; of which 700 ha on domestic houses) for small-scale solar, where PVs installed on between 7 and 11% of this area would be needed to meet the net-zero scenario**.**

Onshore wind has historically seen minimal development in the area, with no large-scale sites, though the 9.2 MW Alaska Windfarm in East Stoke is currently under construction.

Regen's resource assessment, which accounts for key technical and planning considerations, has identified 25,000 ha of land area that could potentially be suitable for onshore wind, representing a total potential of 1.3 GW – local scenario projections suggest an installed capacity of up to 100 MW

[7] https://www.theguardian.com/environment/2020/oct/06/powering-all-uk-homes-via-offshore-wind-by-2030-would-cost-50bn
[8] https://www.dorsetlep.co.uk/userfiles/files/Dorset%20Low%20Carbon%20Energy%20Opportunities%20Document.pdf
[9] https://www.dorsetlep.co.uk/userfiles/files/Dorset%20Low%20Carbon%20Opportunities%20Evidence%20Base.pdf

would be in line with the UK's net zero ambitions, given the lack of existing onshore wind projects in the area. A similar GIS-based study for Dorset Council[10] found a total capacity potential of 1.1 GW in the Dorset County area alone. This 1.1 GW of onshore wind capacity could produce about 2,400 GWh of electricity per year. However, given the opposition to in-shore wind farms it is extremely unlikely all or indeed any of the three identified sites will be built in the next 10 years. For this reason, onshore wind from these three sites is not included in the figures in the table above.

Onshore renewables (PV + wind) could generate 1,300 GWh by 2040[8]. The combined on and offshore renewable energy generation could be 6,100 GWh. This would more than meet the 60% energy demand reduction scenario set out in the *Power Down* chapter (5,600 GWh) but, unless deployment is massively accelerated, most of this renewable energy will not be in place for 2030.

Other technologies

Geothermal heat

The geology of the underlying Wessex Basin hosts deep aquifers that can be accessed to provide low-grade heat for heat networks. This has been accomplished in Southampton, where the Southampton District Energy Scheme supplies heat to over 1,000 domestic and commercial properties. Depending on more in-depth study of the strata underlying major population centres in Dorset, the geothermal resource of the area may be exploitable in a similar fashion.

Can Dorset meet its energy demand from renewables by 2030?

Overall, unless there is a massive acceleration in the provision of renewable energy generation in Dorset, most of the renewable energy needed to meet Dorset's energy demand will not be in place by 2030. In addition, failure to power down energy demand will make the shortfall in renewable energy even worse. The LEP / Regen report and our figures above illustrate how much more wind and solar would be needed to meet this shortfall. Strong political leadership and community engagement is essential to drive down energy demand and install as much renewable energy as quickly as possible to aim for the 2030 target.

The installation of new renewable generation in the UK is not at the scale needed to achieve our carbon reduction targets. The Climate Change Committee has indicated that we need at least a fourfold increase in renewable generation deployment by 2050, and this will be needed at all scales, from offshore wind projects to domestic rooftop solar. Dorset and BCP have a key role in the development of renewable generation as planning authorities, as well as playing a more direct role in enabling renewable energy projects as landowners, developers or purchasers of power. Regen's guide **Local authority models for developing renewable energy**[11] provides new ways of thinking on how they can support new renewable development in our area, and in particular the importance of local community-

[10] https://www.dorsetcouncil.gov.uk/planning-buildings-land/planning-policy/dorset-council-local-plan/dorset-council-local-plan-evidence-and-background-papers

[11] https://www.regen.co.uk/wp-content/uploads/Local-authority-models-for-developing-renewable-energy.pdf

owned schemes.

Who's going to pay for it all?!

Total existing renewables installations generated around 700 GWh of electricity in 2019 against a 2030 requirement of requirement of around 5,600 GWh. Regen estimated 1 GW of offshore wind and 1 GW solar would require new investment of around £2bn[12]. Our preference would be for these to be a mix of public, community and individual household ownership. **Dorset Community Energy** has raised £1.5m over the last 5 years and **Dorset Council** has secured grants of around £25m to support renewables and energy saving in schools. These are large amounts in many contexts but clearly insufficient to meet the requirements here. The community and local authority sectors alone are not likely to be in a position to raise around £2bn, approximately two thirds of which would be towards an offshore windfarm in Poole Bay. Furthermore, there is currently no financial support for community or household renewable generation (despite a 10p/kWh grid feed-in price for new nuclear power index-linked annually for a period of 38 years after the commissioning date!).

However, the **South West's energy future** graphic (Figure 6) provides an example of many of the benefits of increasing locally owned generation, maximising the retention of energy spend in Dorset, job creation and a reduction in fuel bills. There are also opportunities for local electricity pricing including lower cost supply to households and businesses from local renewable generation including offshore wind as set out in **Policy Exchange**'s December 2020 report[13] on local electricity pricing.

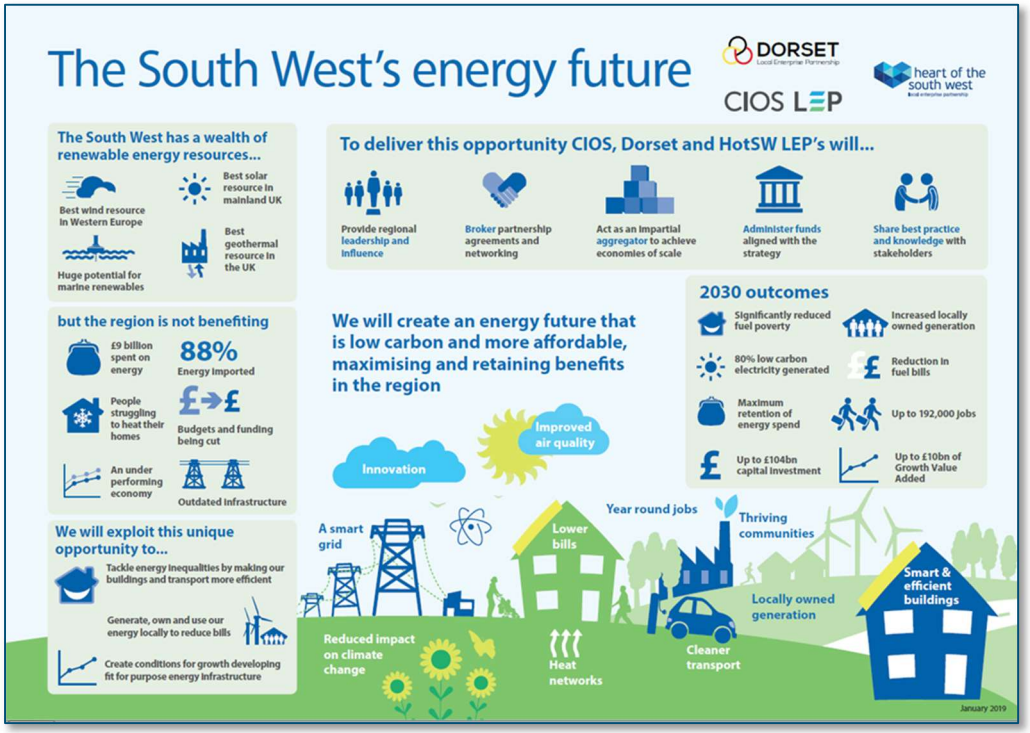

Figure 6. South West Energy Hub / LEP Energy Future ambition

[12] https://www.dorsetlep.co.uk/userfiles/files/Dorset%20Low%20Carbon%20Energy%20Opportunities%20Document.pdf
[13] https://policyexchange.org.uk/publication/powering-net-zero/

As set out in the Introduction, this is a climate emergency, "*an unexpected and serious happening which calls for immediate and determined action*". It is for this reason that this report calls for the UK Government to enact big, ambitious plans such as a **Green New Deal**[14], which reflect the seriousness of the situation and ensure appropriate funding is provided to deliver a just transition (see *Justice* chapter). A transformation plan which some equate to placing the country on a war footing (as outlined in the *What's Next* chapter). For this chapter, the focus remains on the technology.

Current assessment

Having considered the current assessment documented above the report contributors have assessed the county's current category as:

1	While the latest data is pending it is highly unlikely that more than 25% of energy needs are provided by local* renewable sources and, where plans exist, they are insufficient to address the issue, as such this area is rated "1". (* local = within Dorset's boundary or immediately offshore)

2022 Objectives

To move the assessment forward the following should be undertaken over the next year:

1. Ban all new oil and gas exploration in the county.
2. Develop a detailed map of renewable provision by technology and location to bring to life the impact on Dorset of providing all our own energy.
3. Both Councils to work with the LEP and community organisations to explore the opportunities for an offshore windfarm, including, but not limited to, exploring the options for local government funding of the scheme and the potential benefits of part or full local ownership building support for the scheme ahead of the next round of applications.
4. Both Councils and all Public Sector organisations switch to renewable tariffs for their own energy supplies (as committed to in Dorset's CEE action plans).
5. Both Councils and all Public Sector organisations to explore the opportunity to install renewable energy provision on all retained buildings and land (as committed to in Dorset's CEE plans).
6. Both Councils to work with the LEP and others to ensure the grid is updated to the required standards to facilitate the move to renewable generation and support the transition from gas for heating and to electric vehicles.

[14] https://www.investopedia.com/the-green-new-deal-explained-4588463

7. Both Councils to lobby central government to address the hurdles to renewable energy development (as committed to in Dorset's CEE plan)

8. Both Councils to promote advice for residents and businesses on switching to renewable tariffs and how to access support and funding for renewable energy provision on their own land and buildings.

9. All new properties to incorporate renewable energy generation (particularly solar panels) and include recharging facilities. All heat and hot water to be powered from electricity.

10. Both Councils to work with LEP on a hydrogen strategy for Dorset to ensure the county is ready to take advantage of this energy source in the future.

Case Studies

Across the county individuals and organisations are already taking the action that will propel us towards the vision. By sharing some of these below the aim is to encourage their sustainability, replication, and escalation.

Dorset Climate Action Network (CAN) Energy Group

Energy is one of Dorset CAN's working groups, a team of local residents considering both the saving of energy and the switch to renewables. The group is open to anyone interested in getting involved and further information can be found on their website[15].

Springhead Trust

Springhead's mission is to encourage people of all ages and backgrounds to experience and value the rural environment, and to learn about the sustainable use of natural resources; as well as to conserve the buildings and gardens as a special place for education, enjoyment of the arts, music and rural culture[16].

[15] https://www.dorsetcan.org/energy-team.html
[16] www.springheadtrust.org.uk/

Figure 7. Springhead's Solar Panel Array

The ground-mounted solar photovoltaic array, which was installed next to Springhead's car park in May 2015[17], converts sunlight into electricity. Any surplus electricity generated is fed into the National Grid, which helps reduce the need to generate electricity from fossil fuel power stations. Springhead's 3 kW crossflow hydropower turbine, which uses water from the lake to generate electricity, has also been a successful investment, generating nearly 50,000 kWh since it was installed in 2016.

Both the installations are owned and managed by local community investment company, **Energize Stur Valley Industrial and Provident Society** (ESVIPS). Keith Wheaton Green, a volunteer with ESVIPS, who helps to maintain the renewable technology, explains that as well as saving energy, the panels and turbine save money for the charity: "*To date, we have billed Springhead £3,403 for the electricity used, saving Springhead £6,760 in electricity bills from their supplier*".

Blandford Hill Eco Hub

One of the additional benefits of renewable energy installations is their ability to be deployed directly in the location required. The **Blandford Hill Eco Hub**[18] project is a local example of this. The proposal consists of an electric vehicle (EV) charging station, a 15MW ground-mounted solar farm and a 3MW battery storage facility on land south of the A354 at Blandford Hill, Winterborne Whitechurch near Blandford Forum.

Figure 8. Blandford Eco Hub

[17] www.springheadtrust.org.uk/2021/05/renewable-energy-milestone/
[18] https://www.blandfordhillecohub.co.uk/

By combining green electricity generation, storage and charging, the project is 14maximising the potential of renewable power with charging for up to 19 EVs at a time. Around 6 ultra-rapid (up to 350kW) and 6 rapid (43-100kW) charging points with additional fast chargers and Tesla "Superchargers" are proposed. These chargers would allow all types of EVs to charge at the eco hub.

After starting the public consultation process for the plans in February 2021, the planning application was submitted to Dorset Council in July 2021.

Low Carbon Dorset

Low Carbon Dorset is a major five-year programme of activities to help stimulate growth in Dorset's low carbon economy and reduce the county's footprint. One example is below but there are many more case studies available on their website[19].

Lyme Regis Baptist Church

Centuries old, the Lyme Regis Baptist Church and its community are leading the way in the green energy revolution, with environmental considerations embedded deep within their values. Only the second church in the UK to be awarded the Bronze Eco Church Award (beaten only by St. Paul's Cathedral), the church currently holds a Silver certification and is always on the lookout for ways to further reduce their environmental impact.

With the help of a **Low Carbon Dorset** grant, the Church has installed a 10kWp array of Solar PV panels on two of their buildings' roofs and replaced old inefficient lighting with LEDs. It is estimated that the panels will generate just under 10,000 kilowatt hours (kWh) each year. If the church can use 100% of the energy generated this would lead to an annual saving of around £1.3k. Duncan Wood, from Lyme Regis Baptist Church is reported as acknowledging "*The amount of help and advice that we received from Low Carbon Dorset was incredible. We believe that Creation Care is part of our Christian responsibility. This project was an essential part of that outlook – the financial gains were a very welcome, but secondary, benefit*."

Figure 9.
Lyme Regis Baptist Church

Dorset Community Energy

Dorset Community Energy (DCE)[20] is a not-for-profit Community Benefit Society, registered with the Financial Conduct Authority, which facilitates community ownership of renewable energy production. The Society was established in 2013 with support from the BIG Lottery-funded '*Communities Living Sustainably in Dorset*' project. It has 152 members and is managed by a board of Non-Executive Directors. These members have invested £490,000 in DCE, which has financed the installation of solar

[19] https://www.lowcarbondorset.org.uk/case-studies/
[20] www.dorsetcommunityenergy.org.uk

photovoltaic panels on twelve schools and four community buildings in Dorset; the total installed capacity is 420 kW.

Electricity is currently provided to 18 schools, 4 community buildings and 3 hospitals at zero or low cost, saving the sites a total of £55,000 per year, any electricity not used on site is exported to the national electricity grid. Revenue is generated from the sale of electricity and from the government's feed-in-tariff. The income covers the operational cost of the Society and provides a return on investment to member shareholders.

In 2019 DCE launched its third share offer and raised £445,000, and also secured a 40% grant from Dorset Council's EU-funded Low Carbon Dorset programme. This will enable the installation of a further 700kW of solar photovoltaic panels across ten sites bringing DCE's total capacity to 1120kW. As of April 2021, 602kW of the 700kW has been installed with completion expected by June 2021. DCE recently reopened its 3rd Share Offer and reached the target of £194,000 in just 10 days. This will allow the installation a further 467kW of rooftop solar on three more Dorset schools.

Energy Local Clubs also create new opportunities for community energy. In Phase 2 for **Energy Local Bridport**, DCE would like to invest in building one or two 250kW ground-mounted solar PV arrays in the Bridport area. The array(s) would be financed by a Dorset Community Energy share offer, and the electricity generated sold to local households or businesses through an Energy Local Club.

DCE is currently conducting feasibility studies and pre-planning applications on two potential sites just outside of Bridport. The sites have been selected for their grid connection and low visual impact.

This follows the pilot scheme which will allow 60 households in the Bridport area to purchase the electricity generated by the 50kW wind turbine at Salway Ash. After some delays from Covid 19 and the development of local supply metering and billing technology by Octopus Energy, Energy Local Bridport is anticipated to be operational by late September 2021. It will be the first example in England of locally generated renewable electricity supplied to local households through the grid at lower cost than existing grid electricity costs.

Solar Streets, Swanage

Solar Streets[21] is a way of getting solar panels for your house or business at discounted prices. In this project Swanage residents can directly help in the fight against climate change, as well as helping their local community, with a donation to the **Swanage Sustainable Community Fund** given on every install. Solar panels will be installed by **IDDEA Ltd**. Established in 2008, IDDEA have installed over 1,000 solar projects across the South and are committed to supporting communities to take action against climate change. They have installed Solar Streets projects in the South of England, including Frome, Glastonbury, Wells, Bruton & Castle Cary, as well as St Albans, Henley, and others.

[21] https://solarstreets.co.uk/Swanage

The Standard Offering is a 3.6 kW system including installation and costs about £4,100, saving about a tonne of carbon dioxide per year according to the **Energy Saving Trust**[22]. Participants can also take advantage of optional extras, such as 16optimisation software, battery storage and electric car charging points.

Residents need to pay for the panels but as well as the are the usual funding avenues, residents in the South-West of England can access support from **Lendology**[23] who work with local Councils to provide loans to householders.

The scheme is being championed by **Sustainable Swanage**[24] who work on projects that help the community lower their carbon footprint and improve the local environment and explained "We are really excited by the Solar Streets project, it is a fantastic opportunity for our community, it fits with our aims and helps residents access renewable energy options more easily and at a reduced cost." Residents can contact Sarah Spurling via SARAH.SPURLING@DORSETCOUNCIL.GOV.UK for more information.

ECO, Solar Farms

Since 2013, **Eco Sustainable Solutions**[25] has been working to develop a number of Solar Power installations surrounding its Eco Park near Bournemouth.

To date, this has resulted in three major developments which now form one of the largest spreads of solar panels in the UK, totalling some 380 acres. The solar farms have the ability to generate 70MW of electricity and power 27,000 homes.

The Chapel Lane solar farm was the largest in the UK when it opened in 2014, covering 310 acres, which is equivalent to 5,000 tennis courts or 175 football pitches.

The panels are mounted on the ground on racks at a 30-degree angle. The heights range from 2ft7ins and 9ft6ins and this ensures that the land can still be used for agriculture – particularly grazing by sheep.

Trelawney Dampney (Managing Director) points out, "*We managed to achieve the solar farm with minimal disruption to our neighbours, while still keeping the land for sheep grazing. I am very proud that our vision to create a solar farm providing clean, green energy has been 16realised*."

[22] energysavingtrust.org.uk
[23] https://www.lendology.org.uk/
[24] www.litterfreecoastandsea.co.uk/sustainable-swanage
[25] www.thisiseco.co.uk/energy/solar.html

Renewable energy generation, Bournemouth University

BU has invested in renewable technologies to help cut grid supplied gas and power, carbon and costs[26] All four new builds met BREEAM 'Excellent' and EPC A standards. Three of the buildings incorporate ground source heat pumps to provide renewable heat and cooling for the buildings. All have extensive PV arrays on their roofs and BU now has more than 1,500 solar photovoltaic panels across buildings on the Talbot and Lansdowne campuses. This equates to approximately 500kW of peak generation capacity.

BU has also invested in a biomass boiler, which provides most of the heat and hot water for Poole House on Talbot campus. Whilst biomass is considered to be carbon neutral there is still a carbon impact involved in the felling, processing and transportation of the wood chip that the boiler uses as well as in the disposal of the ash created as a biproduct of the combustion process. In order to mitigate these impacts, BU sources wood chip from a local company, just outside of Ringwood, who grow crops of trees in a renewable manner for biomass. The same company collects the ash and uses it to fertilise the ground to grow more trees.

Household renewable energy generation

Further examples of Dorset properties where householders have invested in renewable heat and power schemes can be seen on-line[27].

North Fossil Farm, Winfrith Newburgh

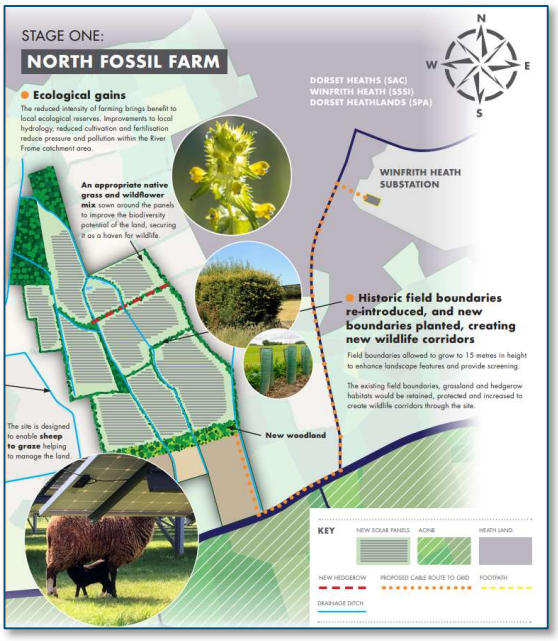

Figure 10. North Fossil Farm

This is a pioneering project that delivers new renewable energy, significant ecological benefits and where farming continues, providing a model of how agriculture, clean energy and wildlife can thrive side-by-side. Two solar farms are proposed as part of one master plan to achieve this.

North Fossil farm, East Knighton, Dorchester is the first project and consists of a 40MW solar farm covering 47 hectares of land. Annually the renewable energy could power 14,000 homes and save 9,000 tonnes of CO_2 according to developers **Spring**[28] The scheme is designed to deliver a number of ecological benefits.

The reduced intensity of farming brings benefit to local ecological reserves. Improvements to local hydrology and reduced cultivation reduce pressure and pollution within the River Frome catchment area. Native grass and wildflower mix will be sown around the panels to improve the biodiversity potential of the land, securing it as a haven for wildlife. Field boundaries will be allowed to grow to 15 metres in height to enhance landscape features and provide screening. The

existing field boundaries, grassland and hedgerow habitats will be retained, protected and increased to create wildlife corridors through the site.

Farming will continue, with cattle and sheep grazing the land created in the wide buffers (45 m) between field boundaries and solar panels.

Storage

One of the key technologies for successful renewable energy conversion is the provision of battery storage to enable electricity to be fed back into the grid when renewable energy generation is low. Two local commercial developments of this technology are planned.

Holes Bay battery storage

Fotowatio Renewable Ventures (FRV) and Harmony Energy have joined forces to commission their first utility-scale battery system in the UK[29]. The project will include six Tesla Megapack lithium-ion batteries, with a total capacity of 15MWh. The Holes Bay energy storage project will be connected to the Southern Electric Power distribution network and will mark FRV's first step into the storage market.

Hawkers Hill Energy Park

TagEnergy has started construction on a £16 million 20 MW/40 MWh battery storage facility at The Hawkers Hill Energy Park near Shaftesbury[30]. It uses a system of Tesla Megapack lithium-ion batteries together with Tesla's Autobidder AI software for real-time trading and control. It is expected to be complete and connected to the grid by June 2022.

Further Information

Dorset Local Enterprise Partnership (LEP)

Dorset LEP commissioned **Regen** to produce two reports. **The Decarbonising Dorset: Dorset Low Carbon Investment Opportunities**[31] document builds on existing strategic documents relevant to 18decarbonisation in the county (including the **Dorset Investment Prospectus** and local authority plans). Underpinning this is a comprehensive **Dorset Low Carbon Investment Opportunities Evidence Base** which presents a range of opportunities for decarbonising18 Dorset to help the region deliver on net zero, jobs and green recovery.

[26] https://www.bournemouth.ac.uk/about/sustainability/energy-carbon-water)
[27] http://dorset.greenopenhomes.net/dorset-open-greener-homes-254
[28] https://www.springche.com/northfossil
[29] https://www.solarpowerportal.co.uk/news/harmony_energy_partners_with_frv_for_utility_scale_storage_project
[30] https://www.energy-storage.news/uk-renewables-players-anesco-foresight-partner-again-with-100mw-of-battery-storage/
[31] https://www.dorsetlep.co.uk/userfiles/files/Dorset Low Carbon Energy Opportunities Document.pdf

The **Joint LEP Energy Strategy Framework**[32]: Cornwall and Isles of Scilly, Dorset and Heart of the South West lays out the vision for energy infrastructure in the south west with '*an energy future that is low carbon and more affordable, 19maximising and retaining benefits in the region*'. **Dorset LEP** is working with these LEPs to develop a Delivery Plan for the Strategy, across the South West region and within

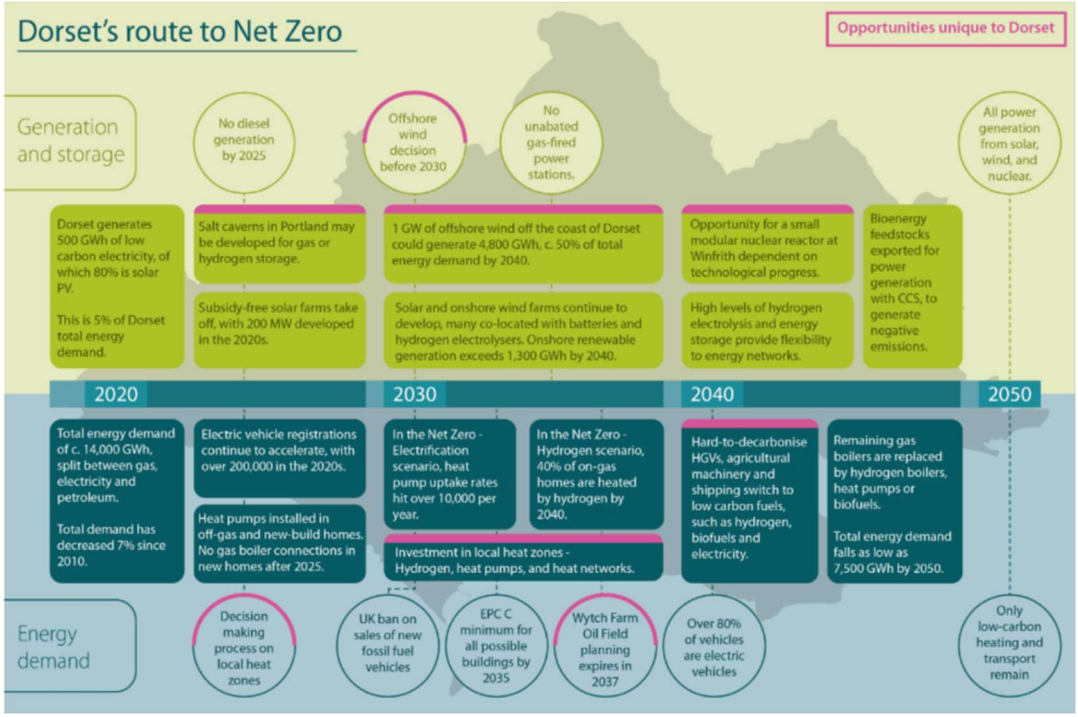

Figure 11. Dorset LEP Route to Zero

Dorset. This will also include working in partnership with Local Authorities to build on the **Dorset's Renewable Energy Strategy**[33] and **Low Carbon Dorset**[34] that is currently underway. Interestingly and encouraging is their inclusion of an offshore wind farm as part of this solution.

There are many opportunities to align the proposals in this report with those from the LEP noted above. The main area of contention is their target date of 2050, with our challenge of targeting 2030 likely to create a number of different approaches.

[32] https://www.dorsetlep.co.uk/userfiles/files/Strategy and plans/Clean Growth/HotSW%2C Dorset%2C CIoS Joint LEP Energy Strategy Framework.pdf
[33] https://www.dorsetcouncil.gov.uk/countryside-coast-parks/countryside-management/green-dorset/dorsets-renewable-energy-strategy.aspx
[34] https://www.lowcarbondorset.org.uk/

South West Energy Hub

To further support the local delivery of energy projects **Department for Business, Energy and Industrial Strategy** (BEIS) allocated £1.1 million to set up a local energy hub[35] that will cover the geography of the seven South West LEPs.

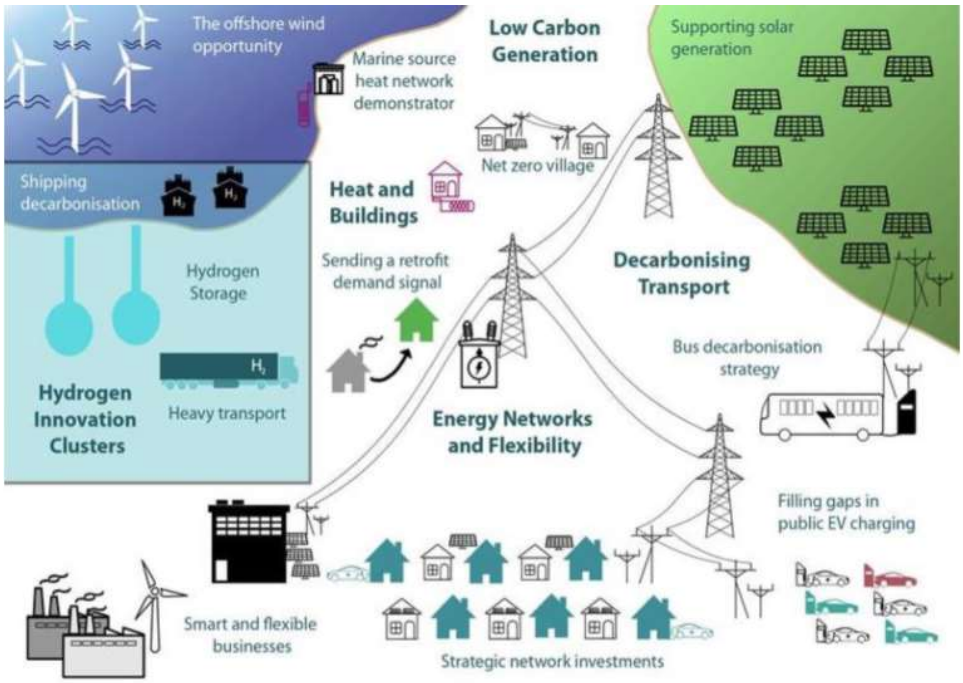

Figure 12. South West Energy Hub / LEP Energy Future ambition

Bournemouth, Dorset and Poole Renewable Energy Strategy

Extensive analysis and research were undertaken for the '*Bournemouth, Dorset and Poole Renewable Energy Strategy*' (and the associated '*Unpacking the technologies*'), produced in 2013[36]. Together with reports from the Dorset Energy Partnership these provided a strong foundation on which future plans could be developed. They all warrant study for further background information not covered here.

UK Hydrogen Strategy

In summer 2021, the UK Government launched its Hydrogen Strategy[37] which sets out the plan to develop a thriving low carbon hydrogen sector in the UK. Working with industry, the ambition is for 5GW of low carbon hydrogen production capacity by 2030 for use across the economy. This could produce hydrogen equivalent to the amount of gas consumed by over 3 million households in the UK each year.

[35] https://www.dorsetlep.co.uk/dorset-net-zero

[36] https://www.dorsetcouncil.gov.uk/countryside-coast-parks/countryside-management/green-dorset/renewable-energy-in-dorset

[37] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1011283/UK-Hydrogen-Strategy_web.pdf)

The **International Energy Agency** (IEA) describes Hydrogen as "*a versatile energy carrier, which can help to tackle various critical energy challenges*". It is, however, quite energy intensive in its production with much of the hydrogen in use, according to the IEA, "*mostly covered by hydrogen from fossil fuels, with significant associated CO2 emissions*"[38]. **Green** hydrogen, where splitting water into hydrogen and oxygen in an electrolyser, is fully powered by renewable energy, presents an exciting opportunity for a technology that has been around for some years, with the possibility of powering vehicles and other mechanical devices with a gas that produces zero emissions. This could be most effectively deployed where renewable capacity is greater than demand, using the excess supply on windy or sunny days, to power the production of hydrogen. However, much of the current production is **grey** (provided by fossil fuels) or **blue** (produced using natural gas with emissions captured and stored underground).

As Tom Baxter, Honorary Senior Lecturer in Chemical Engineering, University of Aberdeen, pointed out in response to the proposals[39], that many reports have questioned how 'green' blue hydrogen really is "*because… methane emissions throughout the supply chain, … (could) actually be 20% worse for the climate than simply burning natural gas for heat and power*". Baxter's report highlights a number of areas where we need to be very careful about hydrogen being such a large part of the solution.

As indicated previously **ZCB** reports have already established, we can meet all our energy needs with known technologies, and no nuclear, as long as we reduce demand. We cannot afford to wait for the hydrogen economy to mature and any hydrogen that is produced from renewables should be used for transport and to 21decarbonise hard to abate industry sectors, such as steel and cement, rather than for heating buildings.

Sweden delivers world's first fossil-free steel

A great example of where hydrogen can be used came to fruition as this chapter was being completed. According to Reuters[40] "*Swedish green steel venture HYBRIT said on Wednesday (*18th August 2021*) that it had made the world's first customer delivery of steel produced without using coal as it looks to revolutionize an industry that accounts for around 8% of global greenhouse gas emissions*".

Rather than using coking coal in its steel-making process, HYBRIT used fossil fuel–free electricity and hydrogen, with the steel produced destined for Volvo.

Rampion Offshore Windfarm

As an example of what could be achieved in Poole Bay, **Rampion Offshore Wind Farm** was the first offshore wind farm off the south coast of England and will be providing energy for at least 25 years. It has become an integral part of the south coast community and a 21recognised landmark on the horizon.

[38] https://www.iea.org/fuels-and-technologies/hydrogen
[39] https://theconversation.com/hydrogen-uk-government-sees-future-in-low-carbon-fuel-but-whats-the-reality
[40] https://www.reuters.com/business/sustainable-business/swedens-hybrit-delivers-worlds-first-fossil-free-steel-2021-08-18/

It has an installed capacity of 400 megawatts (MW) and will generate almost 1,400 Gigawatt hours (GWh) of power each year. This is equivalent to the amount of electricity used annually by almost 350,000 British homes, or around half the homes in Sussex.

The wind farm is located in the English Channel between 13 and 20 km from the Sussex coast, and stretches from East Worthing in the west, to Brighton in the east. It covers an area of 72 sq km, which is just larger than the island of Guernsey.

Figure 13. Rampion Wind Farm 2019 From Above. Source: Commons.Wikimedia.Org

The wind farm is now fully operational and has created around 60 full-time permanent jobs. It is being operated and maintained from a purpose-built base at Newhaven Port, and from early in its construction began acting as a catalyst for the regeneration of the port area, again an indication of the potential benefits for Dorset's ports of a local wind farm.

The aim of the **Rampion Visitor Centre**[41] is to increase awareness and understanding of the wind farm itself, as well as to raise knowledge about offshore wind energy and global climate change. It houses exhibitions, videos, VR experience, and other interactive displays so that visitors can learn more about wind energy and discover the whole Rampion story since its inception over ten years ago.

In addition to the direct relationships it has with numerous groups and organisations near its Newhaven base and across the region, the 22organisation also has a defined £3.1 million Rampion Community Benefit Fund. The fund has been launched to support projects which benefit the Sussex community.

[41] https://www.rampionoffshore.com/visitor-centre/

A nine-week public consultation on proposals for the expansion of Rampion Offshore Wind Farm[42], which could power over one million homes in the UK and reduce carbon emissions by around 1.8 million tonnes per year, has started.

An 'Area of Search' eight miles off the Sussex coast has been assessed by renewable energy producer RWE for a maximum of up to 116 turbines, the same number as the existing Rampion Wind Farm but using the latest turbine technology, so that the Rampion 2 Wind Farm could create up to three times the amount of power. An underground cable route is proposed to carry the power under Climping Beach to Bolney Substation in Twineham, to connect to the National Grid via a new substation required close by.

ChangeNOW Resource Hub

ChangeNOW, held in Paris, claims to have been the "*World's Largest Event for the Planet*" with more than 1,000 sustainability solutions and 500 speakers at their 2020 event[43]. With subsequent activity being taken on-line there is now a wealth of information available to view on their website and virtual exhibition[44]. Registration is required to participate but is available free of charge if only viewing material. The following video (available via https://event.changenow.world/en/session/4fefdd26-2fa8-eb11-94b3-501ac5921410) explores the opportunities hydrogen presents.

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HYDROGEN

Exploring the opportunities and challenges of hydrogen with Frans Timmermans (European Commission), Bertrand Piccard (Solar Impulse Foundation), Luc Bodineau (ADEME), Matthieu Guesné (Lhyfe), Christelle Rouillé (Hynamics, EDF), Johannes Trüby (Deloitte), and Manuella Cunha Brito (Climatescape)

[42] ps://rampion2.com/rampion-2-wind-farm-expansion-project-opens-public-consultation/
[43] https://event.changenow.world/en
[44] https://event.changenow.world/en/content/map