



2. Power Down

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

Full text available at
www.Dorset2030.com

Authors: Neil Smith & Mark Chivers

2. Power Down

Defining a Vision for 2030

We cannot solve the climate and ecological crises simply by switching to renewable energy. Our natural resources are being depleted faster than they can be replenished. Although enough sunlight reaches the earth to provide 16,300 kW energy for every person in the world¹, and research has shown that current energy demands could be met using just 0.1% of total land surface, if we don't address our growing demand for energy, the whole of the land mass of the Earth would need to be covered by solar panels to meet our needs in the future². Equally, although the 'fuel' used by renewable technologies is limitless, the infrastructure needed to capture it is not. We must 'power down'.

In 2030...

Everyone lives in a home that is dry and warm in winter and comfortable in summer. Following the success of the Smart Community Project's Bridport affordable housing development, this new model for living was adopted as a template for many new housing developments across the county. Every new home in the county is now built to Passivhaus standards, and all existing properties have been retrofitted to a similar standard of insulation. Running costs have declined in line with improved standards and the costs of retrofitting were backed by a series of Government and Council led programmes that ensured everyone could afford the improvements required. There has been a concerted effort to move from gas to electricity as the principal energy source for residential and commercial properties and this has also provided opportunities for re-skilling the workforce and contributing to the 'green' economy.

Local community groups working with the two Councils have been instrumental in helping households understand and reduce their energy use by adopting low-carbon lifestyle choices. All households have integrated smart meter technology that enables appliances to be used when renewable energy generation is at its highest (and costs at their lowest), linked to local energy generation. Energy use and running costs have also fallen through employing smart technology, with home appliances running on timed systems, activated when excess energy is available from the grid and local energy systems. Groups in each workplace and neighbourhood consider on-going energy requirements and develop and share ideas to create bio-city opportunities in their areas; built on a model pioneered through the Dorset Green Living Project. Commercial and industrial premises have been built to similar standards since the mid- 2020's and the fitters who were part of the mass retrofitting programme have now moved over to look at the remaining commercial premises across the county.

¹ There is No Planet B, Mike Berners Lee (2019) p66

² There is No Planet B, Mike Berners Lee (2019) p68

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	Little evidence of energy use in Dorset's buildings being addressed beyond individual efforts.
2	Energy use in Dorset's buildings is beginning to decrease but is reliant on ad-hoc programmes and individual efforts.
3	Energy use in Dorset's buildings has been reduced by more than 20% from 2019 levels, with large-scale programmes being initiated to address energy usage across the county. These plans include the switch from gas to electricity for heating homes, widespread retrofitting to insulate homes and community engagement to reduce energy demand through lifestyle choices.
4	Energy use in Dorset's buildings has been reduced more than 40% from 2019 levels; large-scale, comprehensive programmes are in place to ensure the remaining reductions are secured across the county.
5	Energy use in Dorset's buildings has been reduced by more than 60% from 2019 levels.

2021 Assessment

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

The **Dorset Local Enterprise Partnership (LEP)** recently commissioned Regen to produce a comprehensive **Dorset Low Carbon Investment Opportunities Evidence Base**³, which presents a range of opportunities for decarbonising Dorset to help the region deliver on net zero, jobs and green recovery. We have considered the data and projections in this, alongside information published by both Councils in assessing Dorset's energy demand.

Importantly, electric vehicles and electric heat pumps are around four times more efficient than their petroleum vehicle and gas boiler counterparts. As a result, when combined with high ambitions for domestic and nondomestic energy efficiency, much lower total energy consumption is projected over the coming decades. By 2050, overall energy demand in the scenarios is between 55% and 67% lower than the existing baseline. However, we believe this level of *power down* is not ambitious enough given the climate and ecological emergency we face, particularly as the higher the demand the more renewable energy is needed to meet it.

Dorset's current energy needs are estimated to be around 14,000 GWh⁴. After transport, businesses and residential are the county's two largest sources of GHG emissions, contributing 60% of the total. Energy consumption has decreased steadily over the last decade; total energy demand per person in Dorset is 23 MWh, which is 7% lower than in 2010. Three quarters of this demand is met through fossil fuels, predominantly natural gas for heating and petroleum for vehicles. This energy, and the emissions generated from it, is predominantly used in buildings (heating, lighting, ventilation and cooking) with some additional industrial use. Because of this, this chapter focuses predominantly on buildings with the other areas covered elsewhere.

While newly constructed buildings are more energy efficient, projecting forwards, 80% of buildings will have been built prior to improved standards, so a major priority is decarbonising our existing stock. The UK government has

set some high targets for heat pump rollout in the coming decade, aiming for 600,000 installations per year by 2028. If achieved (and there are some doubts – see comments below), this should result in the majority of off-gas properties being electrically heated by the early 2030s, and a significant number of on-gas properties converting to a heat pump. Around 5% of homes in Dorset are heated by oil, LPG or solid fuel, and switching to a heat pump would likely provide long-term benefits to both carbon emissions and heating bills in these properties. Although increasing local manufacturing and population growth will create further demand, with energy efficiency improvements we anticipate industrial emissions will be similar to today⁵ (this is in line with the ZCB scenario).

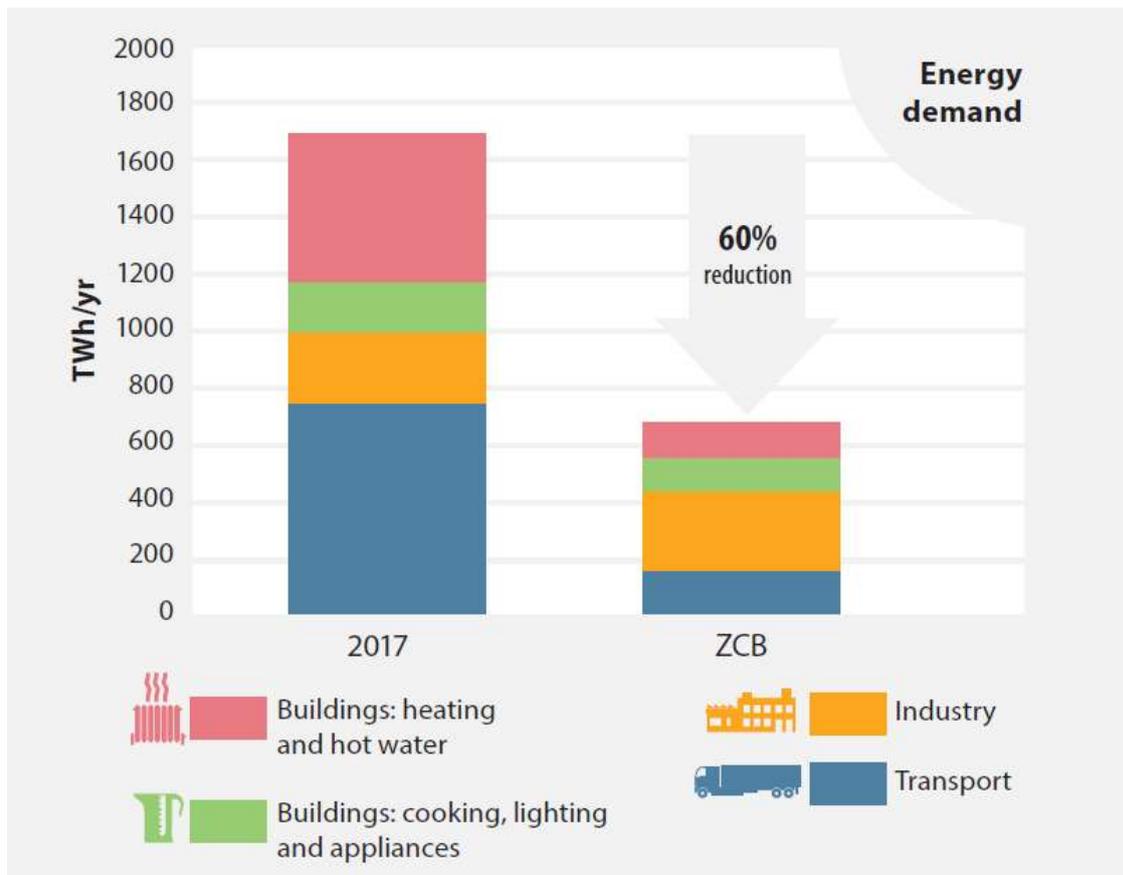


Figure 1. Total energy demand by sector in UK in 2017 (BEIS 2018) from ZCB Rising to the Climate Emergency p39

The target is to **reduce the current energy consumption by 60%**, as per the scenario in the ZCB report. This includes a 50% reduction in energy use for heating homes through technology and behaviour change. Energy consumption in Dorset reduced by around 7% between 2010 and 2019⁶ (see Figure 2) due to the installation of more energy-efficient appliances and heating systems and insulation. This shows the scale and urgency of the problem if energy demand is to be reduced by 60% in the next 10 years.

As noted above this chapter focuses on *buildings* because they account for about 60% of the energy demand (with building energy demand to be cut from 7,885 GWh now to 3,154 GWh by 2030). The *Power Up* chapter will

³ www.dorsetlep.co.uk/userfiles/files/Dorset%20Low%20Carbon%20Opportunities%20Evidence%20Base.pdf

⁴ <https://www.dorsetlep.co.uk/userfiles/files/Dorset%20Low%20Carbon%20Opportunities%20Evidence%20Base.pdf>

⁵ ZCB Rising to the Climate Emergency p40

⁶ <https://www.gov.uk/government/statistical-data-sets/regional-and-local-authority-electricity-consumption-statistics>

<https://www.gov.uk/government/statistical-data-sets/gas-sales-and-numbers-of-customers-by-region-and-local-authority>

focus on what Dorset needs to do to provide 100% renewable energy to meet this reduced demand.

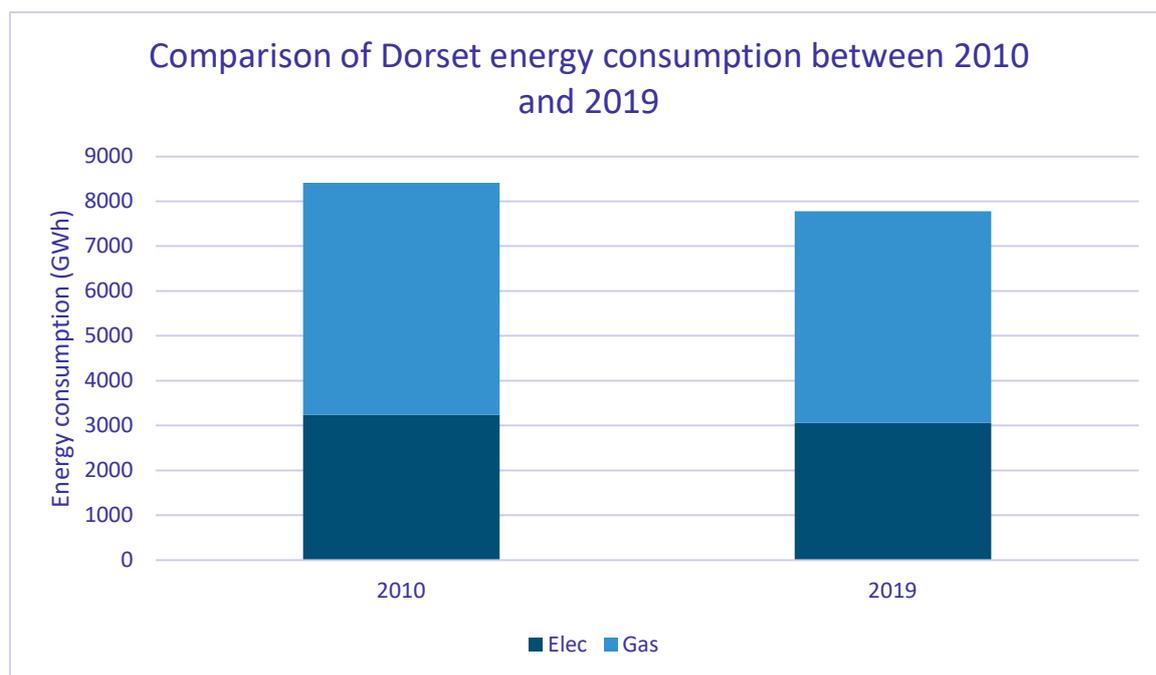


Figure 2. Dorset Energy Consumption Comparison, 2010 and 2019

A number of the case studies also include installing on-site renewable energy. While this is technically *powering up* it makes sense, alongside reducing demand through technology and behaviour change, to include these in this chapter to provide a holistic view on *buildings* in general.

According to Regen, of Dorset’s 400,000 homes, only 5% have an EPC rating of B or better and 66% (around 265,000) are likely to require some form of retrofitting to bring them up to standard. The Government’s **Energy White Paper**⁷ sets the target for existing homes to move from an average EPC D rating to a C by 2035, where practical, cost-effective and affordable (where the energy-efficiency grade is between A and G, with A being the most energy-efficient and G being the worst). Just meeting an EPC of C or above would therefore require improvements to the majority of the 66% of homes that currently fail to meet this standard. The illustration below from the latest Zero Carbon Britain report sets out the typical impacts of specific measures that could be applied.

⁷ <https://www.gov.uk/government/publications/energy-white-paper-powering-our-net-zero-future>

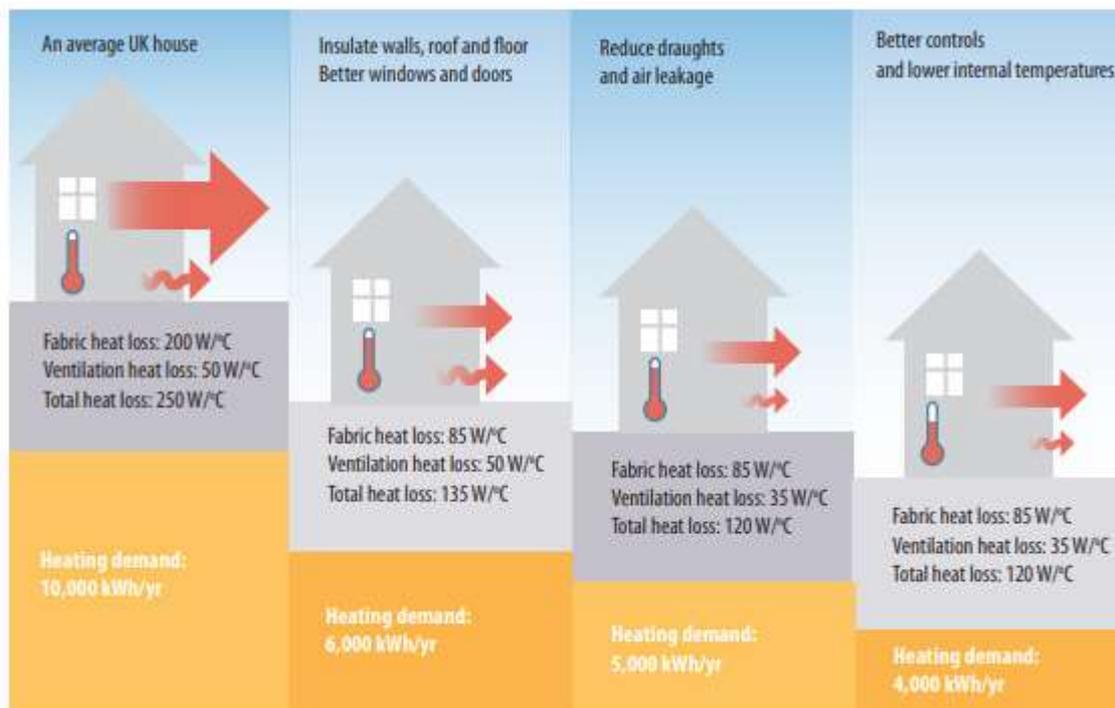


Figure 3. Impact of measures to reduce a building's heat loss and heating demand⁸

Various initiatives are in place to assist with these measures including programmes available through funded organisations such as **Healthy Homes Dorset**⁹ who provide free energy advice and can install insulation and heating systems to qualifying residents. **Low Carbon Dorset**¹⁰ also provide free technical advice and grant funding for projects (with support for organisations on energy reduction schemes).

The **Energy Company Obligation**¹¹ (**ECO**) is the main scheme for supporting energy efficiency improvements including insulation and some heating improvements in low income and vulnerable households. Advice on energy efficiency measures and available grants to help with energy bills can be found on the website.

National schemes have helped in a small way but have also been problematic and often failed to deliver. The cancellation in March of the UK Government's flagship £1.5bn green homes grant¹² after just six months being one such example. UK Government action is urgently needed to support the move from gas to electricity to heat homes.

Dorset Council's **CEE Strategy** document acknowledges that the encouraging 40% reduction in building emissions since 2005 is largely due to grid decarbonisation with "150 homes a year benefitting from ... Dorset Council's *Healthy Homes Scheme*". However, as we can see from the numbers above this is a fraction of the numbers likely to need attention.

⁸ Zero Carbon Britain – Rising to the Climate Emergency (2019) p43

⁹ Healthy Homes Dorset - <https://www.healthyhomedorset.org.uk/>

¹⁰ Low Carbon Dorset - <https://www.lowcarbondonorset.org.uk/>

¹¹ <https://www.simpleenergyadvice.org.uk/>

¹² UK government scraps green homes grant after six months - <https://www.theguardian.com/environment/2021/mar/27/uk-government-scrap-green-homes-grant-after-six-months>

Several community-focused schemes such as the **Dorset Green Living Project**¹³, have been implemented in the last decade, the DGLP was funded by a relatively small National Lottery Grant and took a community-led approach to engaging residents in small groups to develop practical solutions to the climate emergency, including reducing energy usage. Feedback from participants has been positive both in terms of results and the structure of events.

Both Councils' CEE plans include many positive recommendations for addressing this issue but at the time of writing there is little evidence of any of these being put into effect. Dorset Council has been awarded £19M to upgrade its own properties, focusing on switching heating systems away from fossil fuels to heat pumps, improving energy efficiency through measures like insulation, LED lighting and the installation of solar panels on building roofs¹⁴. The UK Government's announcement regarding heat pump grants¹⁵ is welcome, but considering this is available to just 90,000 households, it is clearly insufficient to meet the scale of the challenge in Dorset, let alone across the UK. Elsewhere, we'll argue for more comprehensive national schemes as part of a **Green New Deal**, but for this chapter we'll focus on local actions.

This chapter has focused on operational energy use, but the embedded carbon in the materials used in construction and retrofitting, in particular national and international efforts to decarbonise steel and concrete production and move to low carbon alternatives, such as cross laminated timber¹⁶, must also be urgently addressed. Opportunities for the use of local construction products, such as straw bales, are covered in the *Land Use* chapter.

Current assessment

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

2

This measure is focused on energy reduction (for the reasons set out in the introduction) and so the reduction in emissions (due to grid decarbonisation) is not applicable here. While the Councils' CEE plans largely acknowledge the steps required and a number of encouraging initiatives are in place, the lack of action on the former and the lack of appropriate scale on the latter have resulted in a rating of 2.

2022 Objectives

1. Immediately implement those sections of the CEE plans focused on this area, in particular:
 - a. Set true net-zero carbon homes standards through the Local Plan (DC). (BCP to match this rather

¹³ Dorset Green Living Project <https://greenliving.sustainabledorset.org/about-the-project/>

¹⁴ <https://news.dorsetcouncil.gov.uk/2021/03/05/dorset-council-celebrates-receiving-19-million-of-funding-to-reduce-its-carbon-footprint/>

¹⁵ <https://www.bbc.co.uk/news/business-58959045>

¹⁶ <https://www.greenspec.co.uk/building-design/crosslam-timber-introduction/>

than 'seek to influence'.). All new houses to be zero carbon homes.

- b. Ensure housing strategies and policies incorporate reduction of carbon emissions (DC).
 - c. Develop trials and pilots of localised offsite manufacturing for new build and retrofit (DC).
 - d. Work in partnership to deliver programmes to improve energy efficiency of housing stock, particularly for those in fuel poverty. Enforce minimum energy standards in the private rental sector (DC & BCP). Educate sectors on energy efficiency (DC).
2. Add to these the following recommendations (a number of which have been made in the responses to the CEE plans and Local Plans):
- a. Initiate a review of all housing to identify the scale of the issue and upgrade the insulation of all homes to required standards (anticipated to be c.25,000 per year). Switch to electric heating for all buildings.
 - b. Move beyond 'encourage designs and layouts which lend themselves to low-carbon solutions' and 'advice and guidance on zero carbon standards (DC)' to ensure developers meet zero carbon standards (Dorset CAN).
 - c. Promote the choice of aspect, layout and vegetation which maximises the direct use of energy from the sun (Dorset CAN).
 - d. Promote the use, in construction, of bio-based materials which have low embodied energy and which lock-in carbon, such as timber, clunch (a traditional building material of chalky limestone rock) and straw.
 - e. Support the roll out of energy-efficient electrical heating systems, e.g. heat pumps (Friends of the Earth estimate around 64,000 houses in Dorset and 71,500 in BCP will require this).
 - f. Explore and share stories where local residents have installed better heating/lighting controls and smart meters etc. and reduced their energy demand and bills
3. Initiate community-focused activity based around the Dorset Green Living Project and the concept of Bio Cities (see *Further Information* below).
4. Create new council housing, using the model developed in Leeds and Exeter (see *Case Studies*) meeting net-zero standards, while helping to address the chronic shortage of affordable housing in the county.

Case Studies

Across the county individuals and organisations are already taking the action that will propel us towards the vision outlined above. By sharing some of these here 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 website¹⁷.

Zero Carbon Dorset Webinar

Some of the case studies below were discussed in detail during an on-line webinar organised by Zero Carbon Dorset. The full video is available to view on our website.

What is a Zero Carbon Building?

Net zero carbon - construction (1.1):
"When the amount of carbon emissions associated with a building's production and construction stages up to practical completion is zero or negative, through the use of offsets or the net export of on-site renewable energy."

Net zero carbon - operational energy (1.2):
"When the amount of carbon emissions associated with the building's operational energy on an annual basis is zero or negative, a net zero carbon building is highly energy efficient and powered from on-site and/or off-site renewable energy sources, with any remaining carbon balance offset."

Zero Carbon Policy
The policy, as set out below, requires all new homes from 2016 to integrate, through various measures, all the carbon emissions produced on-site as a result of the regulated energy use. This includes energy used to provide space heating and cooling, hot water and hot lighting, as outlined in Part L6 of the Building Regulations. Emissions resulting from cooling and 'plug' appliances such as televisions and printers are not being addressed as part of this policy.

This policy is well aligned with European Policy, specifically the **Energy Performance of Buildings Directive** (revised) which requires all new buildings to be nearly Zero Energy Buildings from 2020 (NZEB), as mentioned in Article 9 of the EPBD.

There are three core requirements which must all be met for a home to qualify as zero carbon:

1. The fabric performance must, at a minimum, comply with the defined standard known as the Fabric Energy Efficiency Standard (FEESt) and
2. Any CO₂ emissions that remain after consideration of heating, cooling, fixed lighting and ventilation, must be less than or equal to the Carbon Emissions Limit established for zero carbon homes; and
3. Any remaining CO₂ emissions from regulated energy sources (after requirements 1 and 2 have been met), must be reduced to zero.

Requirement 3 may be met by either additionally 'over-performing' on requirements 1 and 2 so that there are no remaining emissions, or by investing in **Disabler Solutions**.

This was set out in a **copy** of the code in 2010, which included a proposed definition of a zero carbon home:
It would require a 75 per cent reduction in carbon emissions against 2006 standards through a combination of energy efficiency, on-site low and zero carbon energy supply and/or connections to low carbon heat networks ('carbon compliance'). The remaining emissions, including a calculated amount to cover the use of appliances, would be addressed through a system of offsets.

Source: UK Green Building Council
<https://www.ukgbc.org/wp-content/uploads/2019/04/Net-Zero-Carbon-Buildings-A-framework-definition.pdf>

Source: Zero Carbon Hub
<http://www.zerocarbonhub.org/zero-carbon-policy/zero-carbon-policy>

Source: House of Commons Library
<https://www.parliament.uk/briefing-papers/sn06678.pdf>

1.104 Building A Greener Future: Towards Zero Carbon Development, December 2006
10. Dec 1 March 2010, C6820 with C10, **Code for Sustainable Homes: A guide to compliance from building stage 0**, November 2006
HM Treasury, **Plan for Growth**, March 2011

1.105 Building A Greener Future: Towards Zero Carbon Development, December 2006
10. Dec 1 March 2010, C6820 with C10, **Code for Sustainable Homes: A guide to compliance from building stage 0**, November 2006
HM Treasury, **Plan for Growth**, March 2011

5. Zero Carbon Homes

'allowable solutions' (including achieving further reductions on-site and a range of off-site measures)
The build on previous announcements that the route to zero carbon would involve a series of regulatory steps of improvements against 2006 requirements of 25 per cent in 2010, 44 per cent in 2013 and finally to zero carbon in 2016.

Slide: Solar PV House (see 'Solar PV House – A Victorian Terraced House' below)

Straw Bale Building Huff and Puff Construction

Phil Christopher heads up **Huff and Puff**¹⁸, a straw bale consultancy and design company based in Wareham. Straw bales are an agricultural by product and their use as a building material provides benefits for the local environment and economy. Straw bale insulation has a U value of 0.1, and so has much better heat retention compared to the regulations (0.3) or cavity wall insulation (0.2). Since 2019 Huff and Puff Construction have been hard at work on an exciting project to deliver a new flagship straw-bale building for Hastings Borough Council – a new Visitor centre at Hastings Country Park. Phil's story is one of those on the ZCD Webinar noted above.

Queen Elizabeth Sustainability Centre, Dorset (2009)

Developed from concepts by Dorset County Council, **ARCO₂**, using its unique experience of straw bale construction on previous projects, produced the working drawings for this ambitious new building¹⁹. The building provides 5 temporary classrooms for art and music during the construction of a new secondary school. However, rather than providing temporary buildings which would be later removed, this facility would be adapted at the end of its first phase of use to provide changing facilities for school and a cafe at ground floor with conference and meeting facilities over the first floor. The construction is based on a glue-laminated timber frame with straw bale infill and natural reclaimed lambswool insulation. It also supports a bio-diverse brown roof and includes the extensive use of wood-based products, lime-based renders and local western red cedar claddings and facias. At 710m², this ambitious and highly innovative building represents one of, if not the largest Education Building in the UK constructed with straw bale.

¹⁷ <https://www.dorsetcan.org/energy-team.html>

¹⁸ www.huffpuff.me/

¹⁹ <https://www.arco2.co.uk/sustainable-projects/qe-sustainability-centre/>

House case study (2014) Claremont Road, Bridport

Claremont Road is a street of similarly built brick 1960s bungalows. John & Anna have been building a load bearing strawbale extension²⁰ to one of them, insulating the existing building by wrapping it with strawbales.

Retrofitting

Dorset Open Greener Homes show-cases²¹ how local people have improved their homes and saved money. An opportunity for interested residents to view such homes, gardens and a church took place over two weekends in Autumn 2021.

Gull View, Bridport

This house²² was built in the 1930s, but when John and Mary moved in they were determined to lower their carbon footprint. Insulation in the loft and an internal wall insulation have reduced heat loss, and roof 'lanterns' make use of natural lighting. A 25kW biomass pellet stove provides hot water and cooking, and new double glazing has sustainable oak frames.

Solar PV House - A Victorian Terraced House

One of the major obstacles for Jason with his project²³ was to overcome council objections to the re-development. Once underway however the house extension project achieved a change from EPC F to a B through wall and floor insulation, passive solar gain (through large south facing windows), a large PV array, thermal store (for hot water), battery storage and efficient appliances. Use of Octopus agile electricity tariff to charge up the battery and thermal store when electricity prices at their lowest (average cost 3.66p/kWh). Jason's story is one of those on the ZCD Webinar noted above.

Carlinford, Boscombe

Zoe's retrofit of a flat (about £40k) was restricted by the layout of the building and options, particularly for installing renewables, were restricted. The approach to building design considered all aspects of a low carbon retrofit, including appliances, furnishing and paint. All the electrics, and plumbing were replaced. New insulated internal battened walls and ceilings were installed and the loss of space due to the thickness of the insulation was masked by painting the walls white. Electric infrared panels, which are more efficient than cheaper convector panels, were also installed as they are cheaper to run. Zoe's story can also be heard on the ZCD Webinar.

²⁰ <https://strawworks.co.uk/projects/extensions/dorset-extension-and-retrofit/>

²¹ <http://dorset.greenopenhomes.net/dorset-open-greener-homes-254>

²² <http://dorset.greenopenhomes.net/homes/gull-view-bridport-2197>

²³ <https://solarpvhouse.com>

Dorset Passivhaus

An energy positive house in Dorset, built to Passivhaus standards, designed by **LTS Architects** with **Enhabit**, was completed in June 2018²⁴. A private, three-bedroom family home, equipped with a photovoltaic roof, triple glazed windows and rainwater recycling, it is an ‘energy plus’ residence, exporting more energy than it consumes. The structure is fabricated from structurally insulated panel (SIPS) and was erected in 11 days.

The house is organised into two distinct halves; one for living and the other sleeping. The ‘sleeping’ block, essentially private and inward looking by design, is housed within a masonry shell and holds all the bedrooms and bathrooms. Strategically placed windows respond to the internal requirements of the rooms while also maintaining privacy.

To meet Passivhaus standards, a fabric first approach was adopted using very low U-values for the entire external envelope. Enhabit carried out thermal modelling to ensure solar gain was introduced in the winter and eliminated in summer. The extensive PV and solar thermal array ensures very little energy is required from the grid, and excess PV energy is delivered to the thermal store.



The use of wastewater heat recovery to preheat the cold-water supply also reduces energy demand. There is a substantial amount of winter heat produced through solar gain with the large south facing windows. The balconies and external shading prevents this glazing overheating the house in the summer. Ventilation to the whole house is provided via a mechanically ventilated heat recovery (MVHR) system giving continuous fresh air with minimal heat loss. The Solar Edge energy monitoring system provides all the information on these systems throughout the year for the owner.

The project was designed using a timber structure and SIPS panels with blown insulation (derived from renewable vegetable oil) to Passivhaus standards. The embodied carbon of the entire structure was therefore considered almost neutral or very low.

Bridport Renewal Corridor

The emerging vision for the **Bridport Renewal Corridor**²⁵ is for an innovative, sustainable, and high quality “renewal” that is easily accessible by narrow gauge train, by cycle, by hoof and on foot. One in which local communities, landowners and businesses can thrive sustainably, in a zero-carbon way that enhances biodiversity, wellbeing, and reduces our environmental footprint whilst honouring the outstanding natural beauty of the landscape. Central to this is the development of new housing built Emerging Principles Inspired by VeloCity and applied to the Bridport Renewal Corridor:

- People over cars creating new movement networks
- Compact not sprawl keeping the special character of our village
- Opportunity over decline unlocking land for new places to live and work
- Connected not isolated linking villages with shared resources, to benefit everyone
- Resilient not fragile promoting sustainable environments, health, and well-being

Housing will be affordable, use less energy and so be lower carbon dwellings with integrated transport infrastructure to provide access to facilities without a car.

Low Carbon Dorset

Low Carbon Dorset²⁶ is a five-year programme of activities to help stimulate growth in Dorset's low carbon economy and reduce the county's footprint. Low Carbon Dorset provides FREE technical advice and financial support to local Business, Community and Public Sector organisations to deliver carbon reduction projects in Dorset. Low Carbon Grants are available for up to 40% of project costs, between £5,000 and £250,000, depending on the project and organisation. A range of case studies can be seen on their website²⁷. These include:

Marshall Village Hall

Charlton Marshall had a very busy, but very old village hall. Housed in a wooden building built in the mid 1930's, it was expensive to run, and not fit for purpose. So, they decided as a village to build a new low carbon one. The new hall will have LED lighting throughout, better-than-needed insulation, an 8kW air-source heat pump to provide most of the heating, and a 6kW array of Solar PV Panels. These energy efficiency measures will far exceed building regulations, and its carbon footprint is 30% smaller than the hall it will replace.

Harlees Fish & Chips - Energy Efficiency and Solar PV Project

Harlees is a family run fish and chips business with seven locations across Dorset and Wiltshire. Low Carbon Dorset highlighted the shop's three biggest energy demands, their frying range, refrigeration and lighting.

When a fryer needed replacing at their Verwood shop, Harlees decided to use this opportunity to reduce their carbon footprint²⁸. Instead of replacing like-for-like, Harlees invested in a high efficiency replacement fryer. A grant from Low Carbon Dorset covering 25% of the costs of replacing the fryer allowed Harlees to invest in a more advanced high efficiency fryer which would have previously been beyond their budget. The new Kiremko fryer is expected to be 25% more efficient than the fryer it has replaced and will use around 30% less gas. It will also be more efficient than cheaper modern fryers on the market. By making this switch, rather than either continuing with their old fryer or buying a less expensive new one, Harlees will be saving an estimated eight tonnes of CO₂e every year and can expect around £1.4K off their annual gas bill.

What's more, they also installed as much solar PV as their roof space would allow (6kWp) to help tackle the emissions from their lighting and refrigeration. Combined these measures are expected to save around 11 tonnes of CO₂e, and over £2K in energy bills, each year. Dr Kaylee Herbert, Director – Harlees Fish & Chips said 'This project with Low Carbon Dorset has not only provided us with funding for our project, but also knowledge, ideas and inspiration to make future improvements across the business to reduce our carbon use. The onsite visit was really beneficial, highlighting areas that could be easily improved to reduce carbon use across the business.'

²⁴ <https://www.ukgbc.org/solutions/case-study-dorset-house/>

²⁵ <http://www.bridportrenewal.org.uk/>

²⁶ <https://www.lowcarbondorset.org.uk/>

²⁷ <http://dorset.greenopenhomes.net/homes/gull-view-bridport-2197>

²⁸ <https://www.lowcarbondorset.org.uk/harlees-case-study>

Bournemouth University: A Greener Campus

BU has cut carbon emissions by 45% between 2010-20²⁹. This has been achieved by a strong focus on energy management, installing energy conservation measures, achieving high sustainability standards for new buildings and encouraging staff and students to help save energy in the workplace. The reduction in emissions is also due to installing on site renewable energy generation (see *Power Up* chapter) and the decarbonisation of the grid.



BU is one of few universities to hold both ISO14001 and ISO50001 certifications for their environment and energy management system. These independently audited management systems provide a robust framework for continual improvement in driving down energy, carbon emissions and costs. All new builds have achieved BREEAM³⁰ 'Excellent' (the sustainability standard for new builds); and EPC A rating, delivering world class facilities that are energy efficient through air tightness, insulation and more efficient equipment³¹. Existing infrastructure, such as pumps and boilers, have been systematically replaced by more energy efficient equipment. The building management system ensures close monitoring and control on energy use whilst delivering comfortable internal environmental conditions. A Green Rewards staff scheme encourages greener choices and lifestyles and is designed to encourage a reduction in carbon emissions at home and in the workplace.

BU's new carbon plan, the CECAP acknowledges they will need to continue to focus on energy use to achieve the net zero target by 2030/31.

Dorset Green Living Project

For those without access to project funding the **Dorset Green Living Project**³² offers a community-led approach to reducing energy demand and making the transition to a greener lifestyle. Sustainable Dorset were originally awarded nearly £10,000 by the National Lottery Community Fund to support the project, the aim of which is to engage groups of neighbours to work together to reduce their carbon footprint whilst saving money on their bills and building stronger local communities.

Ridgewater Energy

Ridgewater Energy³³, based near Wimborne, provides expert advice and assistance to home owners, landlords and private tenants in assessing and sourcing funding and quotations for insulation, heating and renewable energy upgrades in the South of England.

The company is owned and managed by the directors Peter Bywater and Alan Plumridge, who have been working together in the energy efficiency field since 1997, when they worked on the Home Energy Efficiency Scheme (HEES) as assessors. From 2000 they both joined Energy Action Grants Agency (EAGA) to work on the Warmfront Grant Scheme.

Peter worked at Dorset Energy Advice Centre from 2005-2015, and whilst there he ran several Insulation Projects with landlords, including the multi award-winning Bournemouth Landlord Project which worked with over 1000 landlords and assisted 13,000 tenants. Peter and the team ensured both the landlords and tenants understood the benefits of improving the insulation of their properties. The scheme was also taken up in Southampton, Poole, Weymouth, Exeter and then across Dorset. There were over 50 projects across the energy and

sustainability spectrum which were delivered by Dorset Energy Advice Centre during this period.

Ridgewater Energy deliver a number of local and national energy improvement schemes, including **Healthy Homes Dorset** which is funded by Bournemouth, Christchurch and Poole Council, Dorset Council and Public Health Dorset. The scheme is designed to help Dorset residents to keep warm and healthy in their homes by providing access to free energy advice and funding for energy saving measures, such as cavity wall insulation, loft insulation, heating measures and enabling works. They work with a network of local, trusted installers who can assist with various energy efficiency and heating measures. As a landlord or tenant, you can find out more about what advice and funding is available by going to their website³⁴.

Ridgewater have also been working alongside DWP Housing for many years, and assisting them and their tenants, many of whom are on low incomes. More recently they have been helping upgrade their property portfolio's EPC ratings and carrying out new EPC's on their 3500 properties to ascertain and plan what funding might be accessible and assessing those works, ready to make the necessary energy efficiency, heating and renewable energy upgrades.

Argyll Road, Bournemouth

This property had very old, failed fibre cavity wall insulation, Ridgewater sourced ECO funding to remove the old insulation, after which DWP Housing carried out extensive remedial works to ensure the bricks, pointing and guttering were in good repair, ready for the new improved poly-bead insulation to be fitted. They also upgraded the electric heating in these bedsits and studio flats from on-peak panel heaters to High Heat Retention Dimplex Quantum storage heaters, and this has seen an average 35-45% reduction in energy bills and/or tenants reporting improved comfort. The tenants were also offered a **LEAP** visit to get additional assistance with LED bulbs and energy advice. The EPC ratings on all 11 flats is now at a 'C' which means that DWP Housing will continue to be compliant with the Minimum Energy Efficiency standards for at least the next 10-15 years, at the same time reducing the tenants' bills, achieving more affordable warmth, reducing carbon emissions and reducing maintenance associated with condensation and damp.

Ridgewater have also carried out similar projects for DWP in properties in Ashley Road and Palmerston Road, Bournemouth replacing the cavity wall insulation and, in some cases assisting them with an application to the Warm Homes Fund, where an assisted gas connection and meters were installed and a new full gas central heating boiler and radiators.

With the completion of all possible loft and cavity wall extraction and re-insulation works happening by the end of 2021, the next chapter will see properties with rooms in the roof or flats in the roof space receive insulation upgrades, along with suitable properties with suspended timber floors receiving underfloor insulation. There are also other retrofit works which will be considered for Solar PV and Air Source Heat Pumps using part-funded routes. The aim is to raise all EPC's to at least a 'C' in the next 2 years.

²⁹ <https://www.bournemouth.ac.uk/about/sustainability>

³⁰ <https://www.breeam.com/>

³¹ <https://www.bournemouth.ac.uk/about/sustainability/net-zero-campus>

³² <https://greenliving.sustainabledorset.org/about-the-project>

³³ <https://www.ridgewaterenergy.co.uk>

³⁴ www.ridgewaterenergy.co.uk

Lush Cosmetics

As part of Poole-based **Lush Cosmetics** company structure, **Cosmetic Warriors Ltd** was recently created to oversee all aspects of their research and development, from product development to shop design, from packaging to manufacturing processes. **Unit 1 Witney Road** in Poole, Dorset became their first major property acquisition and hub dedicated to this business purpose.



After acquiring Unit 1 in September 2017, the team were tasked with transforming this traditional engineering warehouse into a future-thinking, environmentally friendly hub to support the R&D activities in Lush. Many of those R&D activities are also eco-friendly initiatives themselves, so it made sense that they would be nested in an inspirational building that could embody and reflect the values of the Lush brand in every space.

The vision for the project was summarised in two aspects:

- an innovative, inspirational and low-impact building that communicates our ethics;
- a functional space for research and development of products and processes that can also support us in lowering our environmental footprint.

The design, earth care, construction and project management teams set out to develop this aesthetically pleasing project combining functional, flexible, multi-use working spaces, in a low-energy building, and a healthy environment where Lush staff could deliver their best work.

Lush, have a long-term goal of *“leaving the world Lusher than we found it”*. Ultimately, they would like to have a net positive benefit on the planet, giving back more than they take. Part of this goal is their commitment to responding to the climate emergency with a strategy that includes electrification of their energy supplies, reducing energy waste and a commitment to purchasing renewable electricity. This project contributes to all of those targets.

Further Information

Passivhaus

Passivhaus buildings³⁵ provide a high level of occupant comfort while using very little energy for heating and cooling. They are built with meticulous attention to detail and rigorous design and construction according to

principles developed by the **Passivhaus Institute** in Germany and can be certified through an exacting quality assurance process.

Zero Carbon Homes

Exeter

As Oliver Wainwright's article in **The Guardian**³⁶ on 6th March this year makes clear, **Passivhaus** are fast becoming mainstream with around 30,000 projects in the pipeline.

Commenting on how *"after scrapping Labour's zero-carbon homes target in 2015, the Conservative government has finally developed a future homes standard, which will mandate all new homes to be "zero-carbon-ready" – although not until 2025 at the earliest."* He then points out that *"it has been the landlords with a long-term interest in the wellbeing of their tenants, and the longevity of their building stock, who are forging ahead with low-energy housing. Exeter city council, for example, has been quietly building zero-carbon homes for the last decade, with more than 200 council houses built so far to the exacting Passivhaus low-energy standard, and 1,000 more in the pipeline"*.



Norwich

Goldsmith Street, a development of 105 brick properties on the outskirts of Norwich city centre, was the first social housing project to be awarded the Stirling architecture prize. The judges hailed the development, owned



wholly by the city council, as a "modest masterpiece", saying it represented "high-quality architecture in its purest, most environmentally and socially conscious form"³⁷.

³⁵ https://www.passivhaustrust.org.uk/what_is_passivhaus.php

³⁶ <https://www.theguardian.com/artanddesign/2021/mar/06/eco-homes-become-hot-property-in-uks-zero-carbon-paradigm-shift>

³⁷ <https://www.theguardian.com/society/2019/oct/11/spacious-and-green-norwich-award-winning-new-council-houses-goldsmith-street>

Architects Mikhail Riches describe the development as *'the largest Passivhaus scheme in the UK'*³⁸ and residents will benefit from them being *'designed to be as airtight as possible, with a mechanical heat and ventilation system that circulates air through the rooms'* with heating bills expected to be about £150 a year.

Bristol

268 'sustainable homes', 55% of which are for social housing and shared ownership, are to be built on former school land³⁹, with all the new homes connected to air source heat pumps. As part of the Joint Venture, during construction, Vistry Partnerships and Goram Homes will be running a Skills Academy – *"an innovative training programme that has been designed to create opportunities for local people to gain work experience and vocational qualifications, including NVQs and CSCS cards – a crucial first step into the industry"*.

These are great examples which Dorset and BCP Councils could follow; helping not only to address issues around energy saving but also going some way to addressing some of our local housing issues. We note as this report was being finalised that BCP Council has released plans for investing £10m in low carbon, social housing developments⁴⁰. This is welcome and we will review the detailed plans with interest.

LETI

LETI is a network of over 1000 built environment professionals working together to put the UK on the path to a zero-carbon future. The voluntary group is made up of developers, engineers, housing associations, architects, planners, academics, sustainability professionals, contractors and facilities managers, with support and input provided by the GLA, Local Authorities and other organisation.

Established in 2017 as the **London Energy Transformation Initiative** they have recently published a Climate Emergency Retrofit Guide⁴¹, available for free via the link in the reference.

Further guides and videos are on their website covering a wide range of related subjects for individuals and policy makers including embodied carbon, net carbon buildings and proposals for energy policy.

Bio Cities

Bio Cities is a concept and a component part of the **Unlocking Sustainable Cities "Manifesto for Real Change"** by Paul Chatterton⁴². While focused on addressing the rift between the natural and urban worlds and focusing on *"radical emerging approach to urban nature including urban rewilding, permaculture, biomimicry, biophilia, urban agriculture, continuous productive urban landscapes."* it sets the context for how buildings should form part of this 'blue-green infrastructure'.

³⁸ <http://www.mikhailriches.com/work/>

³⁹ <https://www.goramhomes.co.uk/plans-approved-for-a-sustainable-new-community-of-268-homes-at-romney-house-in-lockleaze-bristol/?fbclid=IwAR1Zeagka8TOvydPS58OApKb07KI7-JIC-Y6mXSwdhFbBGN3ZUw3OnniLAU>

⁴⁰ <https://www.bcpCouncil.gov.uk/news-article.aspx?title=development-plans-for-three-new-housing-schemes-to-be-considered>

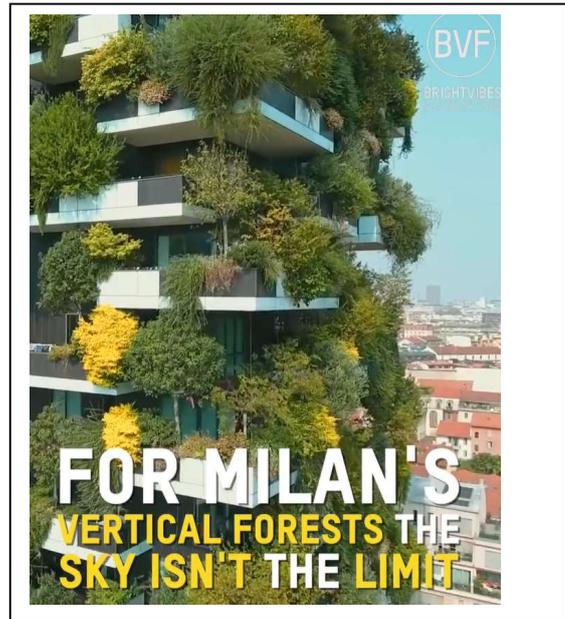
⁴¹ <https://www.leti.london/retrofit>

⁴² Unlocking Sustainable Cities, Paul Chatterton (2019)

Really Green Buildings

Other than when discussing straw bale building above, or in the Bridport case study, we haven't focused much on the benefits of holistically planning new buildings using the Bio Cities concept, and elements of this can often seem quite futuristic. However, in many places around the world ideas of vertical forests and green walls has been gathering pace.

This [short video](#)⁴³ shows how these two towers in Milan house 3 hectares of forest with 800 trees, 15,000 perennials, and 5,000 shrubs, moderating the temperature and sequestering 30 tonnes of carbon a year. What's more it helps ease air and noise pollution and provides a micro-habitat for insects.



Centre for Alternative Technology Webinars

The three webinars below are all available on the CAT website⁴⁴ and can be viewed at any time.



Building with nature in mind

In this webinar, Senior Lecturer on CAT's MArch Sustainable Architecture course Gwyn Stacey explored how we can make our homes and buildings more wildlife friendly, and the role of the...



Sustainable materials and the circular economy

In this webinar, environmental consultant, author and guest lecturer at CAT's Graduate School of the Environment, Callum Hill discusses whether circular economies can really provide the answer to sustainable societies....

⁴³ <https://www.facebook.com/watch/?v=263083971861316>

⁴⁴ <https://cat.org.uk/past-webinars/#building>



Tried and tested solutions for a green recovery - New homes and places

Explore the most sustainable new build and development planning solutions and hear from experts Mark Barry (Architype) and Ben Burton (Housing Development manager at the City of York Council) share...

Zero Energy Affordable Homes

Why *reduce* energy when you can *eliminate* it! Affordable, zero-energy homes for growing families, can be built as demonstrated by these houses in Örebro, Sweden which “utilize passive building principles and photovoltaic panels to generate as much energy as they use each year. Stockholm-based Street Monkey Architects designed the zero-energy homes to be well insulated and nearly airtight, with ventilation systems that retain as much heat as possible.”



As Duncan Neilson describes in the Dwell article⁴⁵ “The homes are almost completely powered by rooftop solar panels, and on-site batteries store unused energy that can be sold back to the grid. Additionally, the buildings’ energy consumption is measured on an ongoing basis to adjust for power needs. Each two-story, 1,600-square-foot structure is composed of six factory-built modules that arrived on-site with finished interiors. Once erected, the facades were connected together to smooth over transitional moments between the homes.” The solar panels are angled to ensure maximum exposure to the sun.

Green Building Council Net Zero Carbon

The **GBC** mission is to radically improve the sustainability of the built environment, by transforming the way it is planned, designed, constructed, maintained and operated.

⁴⁵ <https://www.dwell.com/article/3-in-1-housing-street-monkey-architects-229de90d>

GBC developed a framework⁴⁶ to achieve net zero carbon buildings in both construction and operation (in-use energy consumption), whilst beginning to provide direction for addressing whole life carbon in the industry. As a freely available resource, the framework is intended to be used by building developers, designers, owners, occupiers and policy makers to inform the development of building tools, policies and practices.

Insulate Britain

Insulate Britain⁴⁷ have made headlines for their disruptive activity on the UK's road network. Their demands (which have been less well discussed) for the UK Government to fully fund the insulation of all social housing in Britain, and to produce a national plan to fully fund the full low-energy and low-carbon whole-house retrofit of all homes in Britain as an immediate step towards dealing with the climate & ecological emergency, is consistent with the data we have explored in preparing this report.

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 event⁴⁸. With subsequent activity being taken on-line there is now a wealth of information available to view on their website and virtual exhibition⁴⁹. Registration is required to participate but is available free of charge if only viewing material. The following two videos explore some of the areas we have touched on above.



PLANNING THE SUSTAINABLE CITY

Ref ⁵⁰

Discussing the role of urban planning in the transition with Elisabeth Laville (Utopies), Sébastien Maire (France Ville Durable), Xavier Matilla (Barcelona City Council), Meka Brunel (Gecina)

Ref ⁵¹



RESILIENT CITIES

Discover what is a resilient strategy and how to build it with Kate Raworth (Doughnut Economics Action Lab), Célia Blauel (Deputy Mayor of Paris), Kotchakorn Voraakhom (Porous City Network), Marieke Van Doorninck (Deputy Mayor of Amsterdam), and Barbara Trachte (Brussels-Capital Region), moderated by David Barroux (Les Echos)

⁴⁶ <https://www.ukgbc.org/ukgbc-work/net-zero-carbon-buildings-a-framework-definition/>

⁴⁷ <https://www.insulatebritain.com/>

⁴⁸ <https://event.changenow.world/en>

⁴⁹ <https://event.changenow.world/en/content/map>

⁵⁰ <https://event.changenow.world/en/session/57efdd26-2fa8-eb11-94b3-501ac5921410>

⁵¹ <https://event.changenow.world/en/session/55efdd26-2fa8-eb11-94b3-501ac5921410>