Harvesting the sun:
Increasing rooftop solar in the North West

Research compiled by the CPRE, the countryside charity groups of Cheshire, Cumbria, Lancashire, Liverpool City Region and Greater Manchester

June 2024

Contents

Glossary

Acronym	Definition
BEIS / DESNEZ	Department of Business, Enterprise, Industrial Strategy / renamed Department for Energy Security & Net Zero
BREEAM	Building Research Establishment Environmental Assessment Method
CCC	Climate Change Committee
CCS	Carbon Capture and Storage
DLUHC	Department for Levelling Up, Housing and Communities
EPC	Energy Performance Certificate
GMCA	Greater Manchester Combined Authority
NG	National Grid
NLUD	National Land Use Database
NZES	Net Zero Energy Scenario
PDL	Previously Developed Land (i.e. brownfield)
PV	Solar Photovoltaic
REPD	Renewable Energy Planning Database
Units	
Prefixes	k kilo (thousand), M million, G Giga (billion), T Tera (trillion)
kW, MW, GW	Power W Watts (Capacities)
kWh, MWh, TWh	Energy Wh Watt-hours (Energy Production)
MJ, GJ	Energy J Joules
kg, t	Mass metric: k kilogramme, t tonne
ha	Area: hectare (1/100 of a km2)
km2	Square kilometre
CO2	Carbon dioxide
CO2e	Global warming equivalent carbon dioxide

Executive Summary

I. The CPRE, the countryside charity, North West groups set out the urgent need to reduce the region's energy demands and to decarbonise the energy supply in a way that is least harmful to rural places, in recognising that the climate emergency poses the greatest threat to our rural way of life due to the increase in flooding and loss of pollinators reducing production and threatening food security in the future.

II. The government has increased the national solar power target of 70GW by 2035. The proportion of solar energy anticipated from ground-mounted solar photovoltaic (PV) panels is 60% and from PV installed on empty roof space 40%, equal to 157,000 hectares of farmland, the size of Greater London. CPRE thinks the proportions are the wrong way around and that 60%, or more, of solar energy could and should be realised from wasted spaces on rooftops, brownfield land and other wasted 'grey spaces' such as car parks and other underutilised land.

III. CPRE supports increased reliance on renewable energy, but there are recognised environmental harms arising from ground-mounted PV, namely the loss of farm land used for food production and its potential for nature recovery.

IV. CPRE recognises that land will need to be used for ground-mounted solar but argues that it should be identified on the basis of environmental assessment, avoiding best and most versatile farmland (Agricultural Land Classification grades 1 to 3a) and other farmland in productive use. Prioritising lease fertile (ALC grades 5 and grades 4) and avoiding significant harm to ecology and our finest rural landscapes is recommended. Without prejudice where ground-mounted solar is consented, decommissioning should be guaranteed in planning conditions with the land return to the same or better agricultural use and not allowed to be considered brownfield land.

V. CPRE research *Building on Our Food Security, 2022* evidenced that since 2010 the nation has lost 14,500 hectares of its best agricultural land, which could grow at least 250,000 tonnes of vegetables a year has been permanently lost. More high quality farm land will be lost, and this is despite an increasing amount of previously developed (brownfield) land, more than 27,000 hectares, lying in an underused state.

VI. CPRE commissioned WPI Economics to analyse approaches being taken internationally to deliver rapid growth of rooftop solar capacity. The *Lighting the way*: *international policies for making the rooftop solar revolution a reality* report, April 2024 shows that where governments have chosen focused energy investment and commitment solar rooftop installations have increased rapidly and have helped those countries to decarbonise but to avoid volatile fuel prices. Good examples from approaches in Germany, Japan, China, Poland, and Italy are provided.

VII. Legally binding international commitments help focus effort on reducing greenhouse gas (GHG) emissions (carbon dioxide, methane, and nitrous oxide). The UK Carbon Budget is 2,239 millon tonnes of carbon dioxide (MtCO2). The overall Carbon Budget is apportioned by region by three key approaches: Grandfathering, Population and by Gross Value Added. The North West has the second highest 'Grandfathering budget' in the UK, with 246.4 MtCO2 allocated by the year 2100. This report considers the strategies and actions of each local authority in the North West. Some are achieving more success on solar deployment than others, with Cheshire East Council and the City-Regions of Liverpool and Greater Manchester showing impressive ambition with targets for net zero by 2025, 2030 and 2038, respectively.

VIII. The last quarter of 2023 reported that renewable electricity generation in the UK grew 7% over the year due to increases in capacity (up 5%) and better weather. Renewable generation increased to 44.5% of total energy generated, outpacing fossil fuel's share for the fourth consecutive quarter. In 2023 the UK was an exporter of electricity and over the last year, 2.9GW of new renewable capacity was added, equal to a 5.4% increase. The largest growth to new capacity was in solar PV, which at 1.1GW, is the highest for almost six years and it continues to be driven by small scale installations.

IX. Solar energy supports more labour in the supply chain than wind energy and this provides potential for 99,936 jobs in the North West. Previously a 'solar boom' was experienced with the 'Feed in Tariff' and 'Contracts for Difference', and this has dropped since the removal of funding commitments. Although there are good examples of solar PV delivery, the UK lags behind other countries and the North West lags behind other regions of the UK. The CPRE NW groups consider that this underperformance ought to be addressed by the next government.

X. UK100 focused on potential "growth opportunity" from decarbonisation, highlighting that the benefits are greater if we act faster on decarbonisation. It pointed to a lack of policy clarity, capital awaiting investable propositions, infrastructure bottlenecks and planning system barriers. The Solar Taskforce was established in May 2023 and was due to run up to February 2024. Commentators including the private sector, including the UK Warehousing Association want it to continue based on its own research showing that there is a clear imperative for the government to support more rooftop solar.

XI. Nationally, the total installed solar represents almost half of all renewable projects generating 42GW. CPRE commissioned UCL[1] to undertake research and it found potential for 117GW of solar energy derived from roofspace and other wasted space, such as brownfield and 'grey space'. Disappointingly, only 2.4% of solar installed

[1] Net zero emission energy scenarios and land use (ucl.ac.uk)

capacity is derived from rooftop solar. When interrogating the Renewable Energy Planning Database, there are thirteen projects under construction, eight are roof-mounted including private companies (food and pharma), Council, School, Royal Northern College of Music, and the National Cycling Centre.

XII. Installed capacity by parliamentary constituency from published government energy statistics is also considered in the report. The North West Solar capacity is low at 0.38MW equal to 2.45% of the total UK solar capacity, which is 15.7GW. Greater Manchester City Region has the highest installed solar capacity at 116.8MW equal to 30% of that in the North West, and Cumbria the lowest at 44.9MW, equal to 12%. Rural areas contribute 17.6% of solar, and urban areas contribute 82.4%.

XIII. Penrith and The Border in Cumbria has the highest amount of installed capacity with 13.3MW from 3,461 installations. The second is Eddisbury in Cheshire with 10.2MW from 2,508 installations and the third is Westmorland and Lonsdale in Cumbria with 9.2MW from 2,584 installations. Fifth and four highest capacity is installed by constituencies in Ribble Valley and Knowsley, with 8.7MW and 8.5MW, respectively. The lowest capacity is in Blackpool South with only 1.9MW from 550 installations. The second, third, fourth and fifth lowest capacities are in constituencies in the Liverpool City Region. This position could be improved without harming the agricultural and other land based sectors if more PV on roofspace was encouraged.

XIV. The warehousing sector is steadily increasing its energy efficiency, through improved lighting, electrification of material handling and system efficiency; however, rooftop solar projects have expanded more slowly. Lack of solar take up is considered to be a missed opportunity. This is particularly so when considering that the warehousing sector has approximately one third of all commercial roof space. This wasted space has potential to better support the rollout of solar PV generation. The report considered barriers and opportunities.

XV. There are a range of drivers including future automation of the warehousing sector that already is advanced in terms of technology and automation, and how price reduction and battery storage make solar energy on otherwise wasted roof and other ‘grey space’ a more attractive investment.

XVI. The research also considered the amount of brownfield land in the North West as compared to elsewhere it has a large amount. Despite the abundance of brownfield land in the North West, only 33% (1,217 hectares) is approved for development and when compared to elsewhere this is low. There are health benefits from regenerating brownfield land. There is a clear win-win opportunity to overcome the blight associated from vacant and neglected land into potential value from solar PV development and renewable energy use.

XVII. Section 8 sets out seven case studies. Useful action is evident, yet despite the clear potential for solar energy expansion in the North West, several challenges are currently preventing this potential from being fully realized such as a lack of a clear and consistent energy and planning policy framework for solar energy at both the national, sub-regional and local levels and this is a significant barrier.

XVIII. A clear and consistent policy framework for solar energy at the national, sub-regional and local levels is necessary. A mandatory requirement for the installation of solar panels on new buildings is an imperative to support more rooftop solar and solar on brownfield land and 'grey space' and policy drivers to address current gaps. An approach to remove barriers to rooftop, brownfield and 'grey space' solar PV take up, with green field installation only allowed as a last resort with locational criterion based on environmental assessment to:

- avoid loss of Best and Most Versatile agricultural land;
- avoid unacceptable loss of landscape character, particularly in National Parks and Protected Landscapes, but also in 'ordinary countryside';
- avoid Green Belt due to its important purpose of keeping land permanently open;
- and to avoid harm to nature's recovery with commitments to support Biodiversity Net Gain[2] of +10%, , which came into force on 12th of February 2024, in line with Local Nature Recovery Strategies.

XIX. Financial commitments to overcome barriers are required to better support the uptake in solar energy on rooftop projects. The deficiencies of the current Smart Export Guarantee should be resolved to provide accessible and affordable financing options for solar energy projects for all stakeholders.

XX. The technical challenges associated with the installation of solar panels on rooftops, including issues related to building structure and orientation, grid connectivity, and energy storage should be resolved.

XXI. Employment and training opportunities, especially in the North West should help decarbonise our energy supply and help areas of Cheshire, Lancashire, and Cumbria level up with other areas to positively contribute to the UK economy in the future.

XXII. The next government should have an increased role to drive rooftop solar PV in the future, to harness the potential of rural places without needlessly harming farmland.

[2] https://www.gov.uk/government/collections/biodiversity-net-gain

1. Introduction

1. This research funded by the CPRE North West groups[3] focuses on Cheshire, Cumbria, Lancashire and Greater Manchester and Liverpool City Regions in terms of solar PV installation on roofspace, particularly on non-domestic properties, and brownfield land, and grey spaces (car parks and other publicly owned land).

2. CPRE, the countryside charity, recognises that the climate emergency poses the greatest threat to our rural way of life with impacts from our warming climate causing flooding of productive agricultural land[4] and wildlife habitats, leading to concerns for food security[5] and the decline in biodiversity[6]. In the year 2024, the scale of the challenge facing us all to reduce greenhouse gas (GHG) emissions (carbon dioxide, methane, and nitrous oxide) cannot be ignored.

3. Our research *Building on Our Food Security, 2022* shows that since 2010 we have lost 14,500 hectares of our best agricultural land, which could grow at least 250,000 tonnes of vegetables a year has been permanently lost. This is equivalent to two million fewer people being fed their five a day from England, and flooding relating to climate change threatens 60% of remaining high grade farm land. Nearly 300,000 homes have been built on prime farmland, with an extra 1,400 developed for renewable energy projects, despite more than enough previously developed (brownfield) land lying in an underused state.

4. CPRE supports the government in reaching its legally binding GHG reduction targets. The government has set out a target of 70GW of solar energy by 2035 of which 60% is focused on ground mounted, which takes land out of food production with harm to biodiversity. Yet, research[7] commissioned by CPRE shows 117 GW of solar energy could be delivered on rooftops and other wasted space to avoid 'needless' loss of farmland, wildlife habitat, and loss of rural character.

5. The Department for Levelling-Up, Housing and Communities (DLUHC) has consulted on making rooftop solar mandatory through its proposed changes to *The Future Homes and Buildings Standards: 2023 consultation*[8]. With changes to permitted

[3] CPRE Lancashire, Liverpool City Region, and Greater Manchester, and Friends of the Lake District (CPRE Cumbria) and CPRE Cheshire
[4] https://www.nfuonline.com/media/03dpvggn/integrated-water-management.pdf
[5] https://www.cpre.org.uk/resources/building-on-our-food-security/
[6] https://www.wildlifetrusts.org/sites/default/files/2022-06/AdaptationReport.pdf
[7] https://www.ucl.ac.uk/bartlett/energy/sites/bartlett_energy/files/ucl_ei_net_zero_land_use_for_cpre_barrett_scamman_180523.pdf
[8] https://www.gov.uk/government/consultations/the-future-homes-and-buildings-standards-2023-consultation

development rights and to national planning policy, this should support houses and other buildings to become net zero in the future.

Demand Reduction

6. CPRE recognises how we grow our food, insulate properties, manage water, reverse decline in nature and connect places, matters in terms of the overall energy demanded. There are clear choices for society to achieve sustainable solutions through the planning system and it has urged the government to use a national land use framework to steer strategic land uses, such as, agriculture, energy, water, nature, transport, etc to the most sustainable locations[9].

7. Reduced energy demands would help to achieve climate change targets along with the reliance on energy efficient, decarbonised infrastructure, employing renewables in a way that protects our energy security and rural assets of farm fields, beautiful landscapes, and wildlife habitats.

The climate emergency and the urgent need for renewable energy

8. The year 2023 was the hottest year on record. Our planet, including its atmospheric temperature, has been heating up steadily over the period of time since the last ice age, but it is well documented that the rate of increase (as shown in the bar chart graphic on the front of the report) is beyond the ability of our environment to cope. Problems associated with the climate emergency include more frequent intense rainfall events, flooding, crop failure, ecological collapse, sea level rises, and mass migration, among other threats.

9. Scientists have directly attributed, beyond any reasonable doubt, that the global temperature increases are linked to the amount of GHG arising from human activity. They warn that we must all act urgently to reduce our carbon footprint to prevent further heating. There is an imperative to act.

10. CPRE's 'Greener Better Faster'[10], 2020 publication examined the transformational change required across society to reach net zero and our recommendations were to disincentivise fossil fuel energy, invest in renewables and empower local communities to shape their future. CPRE groups in the NW want to better understand issues holding back the installation of solar energy on non-domestic premises.

[9] https://www.cpre.org.uk/news/we-call-for-land-strategy-and-new-planning-rules-to-guard-food-security/
[10] https://www.cpre.org.uk/resources/greener-better-faster/

Solar energy

11. Solar technologies harvest the sun's energy to create heat or power, most commonly via Solar photovoltaic (PV) technology. Solar PV systems convert energy from the sun into electricity through semi-conductor cells, connected together and mounted into modules. Modules are connected to an inverter to turn their direct current (DC) output into alternating current (AC) electricity for use in buildings. Photovoltaics supply electricity to the building, with excess unused energy either sold onto the grid, or stored in a battery for use in the building later.

12. PV systems rely on direct and diffuse radiation coming across the sky so require daylight, not only sunlight to generate electricity (although more electricity is produced with more sunlight), so energy can still be produced in overcast or cloudy conditions. Research by the University College London (UCL) Energy Institute, commissioned by CPRE, independently reviewed, and modelled the land use/landscape implications of different energy scenarios. The UCL report[11] evidenced that, in the UK, about 60% of solar energy is diffuse and 40% direct. London was chosen as a location to be representative of England's solar resource. The total annual solar energy for London is about 830k watts per square metre (Wh/m2) on a horizontal surface and a maximum of 985 kWh/m2 on a surface facing due south (azimuthal angle of 180^{o} from north) with an elevation of 40^{o}. A less than optimal angle will reduce the radiation received. For a surface with 30-50^{o} elevation (typical domestic roof pitch) the reduction in output is less than the south facing maximum by about 10% if the panel faces between southeast and southwest. The UCL report sets out factors that impact on Solar PV efficiency and how when designed in to new builds they can be orientated to maximise solar gain.

13. Solar PV can be placed on the ground, or it can be roof mounted. Solar farms on the ground if poorly sited can harm ecology, among other disbenefits, such as loss of farmland for producing food. Although some limited grazing may be possible, solar panels block out sunlight needed for grass to grow, and solar panels are cleaned using chemicals that degrade the soil quality. Some PV are mounted on concrete bases, making it necessary to ensure a planning condition covering decommissioning post operation to ensure the ground is restored to its original condition, and importantly not considered as previously developed land. Ground mounted solar farms bring our energy system into increasing conflict with protection of England's already damaged and highly fragmented landscapes. There are also cumulative impacts where solar farms are located near to one another causing harm to rural landscapes urbanising the character and eroding the aesthetic value and tourism offer.

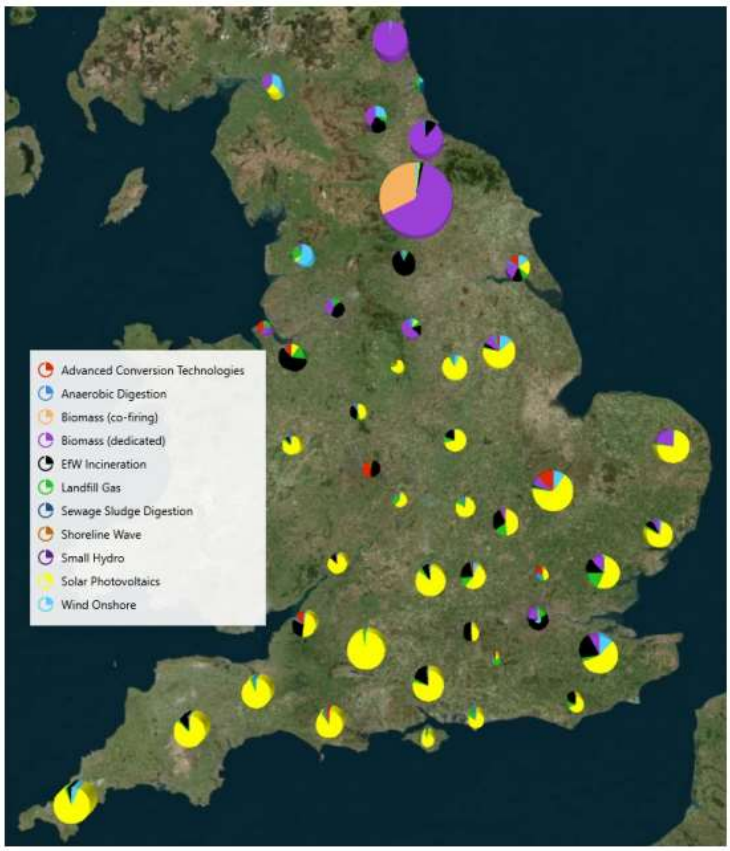
[11] Net zero emission energy scenarios and land use (ucl.ac.uk)

14. PV panels mounted on top of the roof covering of tiles, slates, etc. Panels are generally about 1m by 2m. Smaller solar tiles look similar to conventional roofing and replace it in new build and can be used if visual amenity is critical, but they are less efficient and more expensive than standard panels. They can be utilised to optimise otherwise wasted space.

CPRE Shout from the Rooftops: delivering a common sense solar revolution, May 2023

15. In May 2023, CPRE launched its solar rooftop hero campaign[12], which calls on the government to fully realise the potential of rooftop solar by committing to a national target of delivering at least 40GW (of the required 70GW of solar by 2035) through rooftop solar installations on new builds, commercial buildings, and car parks. Putting solar panels on rooftops would help the effort to generate more clean electricity needed to cut our carbon emissions and would spare land for food, farming, and nature.

Figure 1: Extract from the UCL Report, Figure 5 Map of England Renewable Energy Projects



Source REPD – Operational, under construction, planning permission granted

[12] https://www.cpre.org.uk/resources/shout-from-the-rooftops-delivering-a-common-sense-solar-revolution/

16. It found that there is potential for up to 117GW of low carbon electricity to be generated from rooftops and other developed spaces across England. This is substantially more than the government's target for 70GW of solar energy by 2035. Meeting national solar targets would otherwise require land totalling 157,000 hectares, equivalent to the loss of farmland the size of Greater London. If the proportion of solar from ground was reduced to 40% and roof mounted to 60% this would save in the region of 52,334 hectares from being lost from farming and nature recovery.

17. The research report includes a map of all the facilities in England recorded in the Renewable Energy Planning Database, see Figure 1, with a notable lack of renewable projects that are operational, under construction or with planning permission granted in the North West. We consider the REPD data further in Section 4 of this report.

18. Yet, the ongoing rush for ground mounted solar sites, irrespective of the externalities, and the failure to capitalise on the opportunities of rooftop solar across the country indicates a major market failure in investment in solar energy for the future. The UCL report recommends that:
    - a national rooftop solar target be established;
    - rural landscapes are protected via the progression of a national land use framework, with revised national and local planning policies to set clear requirements for solar on roofspace and other wasted built space, achieving multi-functional benefits, and avoiding the harm from loss of farmland (specifically BMV).
    - planning regulations should be reformed to require a *Future Homes and Building Standard* to ensure audit of potential space, orientation of roof space, improvements to existing, and requirements to enable planning consents.

19. Rooftop solar can be installed incredibly rapidly, and recent research has highlighted that these schemes have a much lower environmental cost. Research by CPRE has shown that there is potential capacity on rooftops to deliver substantially more than the government's current solar target, and even taking the most low-lying fruit could allow us to meet 60% of target with lower impacts and far greater benefits in terms of lowering bills because providing direct supply rather than simply adding to international commodity markets.

20. The campaign has already been immensely popular with CPRE members, the public, and politicians of different parties, with 35 MPs (and counting) signing up to become a 'CPRE Rooftop Solar Champion'. They are already being a voice for 'common-sense solar' in Parliament.

21. CPRE recommends an approach to prioritise the removal of barriers to use of roof space, brownfield, and grey space, such as car parking, and other ancillary uses for

solar. Only as a last resort should green fields be used and, in such cases, a locational criterion applied to ensure based on thorough environmental assessment they are located and designed to:

- avoid loss of Best and Most Versatile agricultural land;
- avoid unacceptable loss of landscape character, particularly in National Parks and Protected Landscapes, but also in 'ordinary countryside';
- avoid Green Belt due to the purpose of keeping land permanently open;
- and to avoid harm to nature's recovery with commitments to support Biodiversity Net Gain[13] of +10%, , which came into force on 12th of February 2024, in line with Local Nature Recovery Strategies.

UCL Net zero emission energy scenarios and land use

22. The UCL report[14] sets out the net zero energy scenarios (NZES) of government, the Committee for Climate Change and National Grid the land use impacts of solar PV, biomass, and onshore wind technologies, which tend to be deployed in rural places. There is discussion on the various costs including, technology, social environmental (such air pollution from biomass or loss of visual amenity due to wind turbines and assessment of ecological impacts). Commentary concerning other technologies including transmission and offshore wind is included, and also, the report considers the potential of urban areas looking at rooftops, brownfield land and grey spaces (car parks, areas around service stations).

23. The maximum England PV capacity in the NZES is 83GW and the urban technical potential of solar PV is estimated as 117GW. Currently in England there is about 14GW of operational PV comprising 4.0GW on dwelling roofs, 1.0GW on non-domestic roofs, and 9GW of large systems in the Department of Business, Enterprise, Industrial Strategy (BEIS) renamed as the Department for Energy Security & Net Zero (DESNEZ) Renewable Energy Planning Database (REPD) (BEIS, 2022f) comprising 8GW operational and 1GW under construction, assumed to be built. This gives a total existing capacity of 14GW, so an additional 69GW (83 – 14GW) is required. The remaining urban potential of 111GW can be located in existing and new car parks and on non-domestic roofs which will be comparable in cost to solar farms, to more costly systems retrofitted on existing dwellings. In general, as well as requiring less financing, the lower cost PV systems require less labour per capacity installed and may therefore be built more quickly. This leaves a potential urban surplus of 42GW (111 – 69GW).

24. An extended analysis would be needed to construct robust and balanced development pathways for solar PV capacity in different urban and rural situations. This would account for retrofit and new PV system installation costs for different sizes

[13] https://www.gov.uk/government/collections/biodiversity-net-gain
[14] Net zero emission energy scenarios and land use (ucl.ac.uk)

and mounting, and for ancillary costs such as transmission. The environmental impacts of systems in different locations need detailing. The pace at which capacity could be expanded to minimise cumulative emissions on the path to net zero would require assessment of the supply chain capacity in terms of labour and finance, and the different regulatory and financial mechanisms that might be applied.

25. The UCL Report considered the use of car parks for solar PV. Most non-domestic buildings have associated car parking, and in addition there are public car parks and residential car parking (excluded here from the estimate of potential) and some of this area can be used for PV. France has approved legislation that will require all car parks with more than 80 spaces to be covered over by solar panels[15].

Lighting the way: international policies for making the rooftop solar revolution a reality

26. CPRE commissioned WPI Economics to explore how the enormous opportunity of solar can be realised at speed, looking at the approaches being taken internationally to deliver rapid growth in rooftop solar capacity. The findings of this *Lighting the Way* research[16] shows that other major economies are pursuing a range of innovative policies to accelerate the deployment of rooftop solar and a bold and ambitious government here could turbocharge our installation rates by adapting these policies to a UK context. Key findings, include:
    - In Germany, financial incentives play a key role in promoting rooftop solar with generous grants and feed-in tariffs. Reforming the Smart Export Guarantee to deliver fixed-rate payments closer to the £0.08 per kilowatt hour offered in Berlin would substantially improve the investment incentive for rooftop solar in the UK.
    - In Japan, several local authorities are promoting power purchasing agreements (PPA) through a "zero yen" policy. The UK government should consider establishing a similar national scheme to offer households the opportunity to have rooftop solar panels installed for free in return for a 10–20-year PPA through which they purchase the electricity they need.
    - In China, a 'whole-county' solar policy is being used to aggregate opportunities for developers to install solar panels on a wide range of buildings across a local authority area. Implementing a comparable policy in the UK could help turn disparate roof space into a single attractive contract for developers.

[15] https://theconversation.com/frances-plan-for-solar-panels-on-all-car-parks-is-just-the-start-of-an-urban-renewable-revolution-194572
[16] CPRE Lighting the Way: International policies for making the solar revolution a reality

- Many of the major economies achieving rapid deployment of rooftop solar have mandatory requirements for installations on new buildings. The UK government should implement similar regulations as swiftly as possible.
- Countries like Poland and Italy are delivering process reforms aimed at streamlining and speeding up the installation of rooftop solar panels. The UK government has made important steps in this direction but should consider opportunities to go further, such as giving rooftop solar projects priority access to grid connections.

27. The research by WPI makes recommendations of how the UK could learn from overseas examples to rapidly rollout rooftop solar, by better guiding investment into a rooftop solar revolution which is both good for people and the planet.

2. Document Review

28. In this section, relevant documents from international to local authority level relevant to the development of solar energy, particularly roof-mounted, starting with international commitments are reviewed for information.

International Level - United Nations Conference of the Parties (COP)

29. The Earth Summit of 1992 and subsequent United Nations conferences, the most recent one held in Dubai, COP-28[17] have secured international commitments to limit global warming to well below 2.0^{c}, and to work hard to keep the 1.5^{c} target alive.

30. In the last 30 years, considerable progress has been made to reduce the amount of greenhouse gas emissions across the globe. However now a concentrated effort is needed to hit targets set out for 2050. Last year marked a significant step-change for work on climate technology under the United Nations Framework Convention on Climate Change (UNFCCC) and Paris Agreement, setting the scene for more ambition in 2024. A key agreement at COP28 was requirement on Parties to take actions towards achieving, at a global scale, a tripling of renewable energy capacity and doubling energy efficiency improvements by 2030.

31. Technology will need to increasingly play a fundamental role in galvanizing climate action and building a greener and more sustainable future. Such technologies can be applied to systems for water, food, energy, buildings (solar), and other infrastructure, along with the broader sectors of business and industry.

United Kingdom Level - The Climate Change Act 2008

32. The Climate Change Act 2008[18] gave the government a duty for the level of the "net UK carbon account" (the amount of net UK emissions of targeted greenhouse gases for a period adjusted by the amount of carbon units credited or debited to the account) to reduce greenhouse gas emissions by 80% against the baseline by 2050. In June 2019, Theresa May, Prime Minister increased the target to 100%.

[17] https://unfccc.int/process-and-meetings/conferences/un-climate-change-conference-united-arab-emirates-nov/dec-2023/about-cop-28
[18] https://www.legislation.gov.uk/ukpga/2008/27/contents

Committee on Climate Change

33. The Committee on Climate Change role is to set out Carbon Budgets under the Climate Change Act. The first six budgets, shown in Table 1, have been legislated and cover the period 2008 to 2037. The UK met the 1st and 2nd budgets of 3,108 MtCO2e and 2,782 MtCO2e, respectively, from 2008 to 2017 achieving 32% reduction. The 3rd Carbon Budget of 2,544 MtCO2e will be reported on later in 2024.

Table 1: The Carbon Budgets set by the Committee on Climate Change

Carbon Budget	Carbon budget level	Reduction below 1990 levels	Met?
1st (2008 to 2012)	3,018 MtCO2e	26%	Yes
2nd (2013 to 2017)	2,782 MtCO2e	32%	Yes
3rd (2018 to 2022)	2,544 $MtCO^2e$	38%	To be assessed in 2024
4th (2023 to 2027	1,950 MtCO2e	52%	To be assessed in 2029
Nationally Determined contribution		68%	To be assessed in 2032
5th (2028 to 2032)	1,725 MtCO2e	58%	To be assessed in 2034
6th (2033 to 2037)	965 MtCO2e	77%	To be assessed in 2039
7th (2038 to 2042)	To be set in 2025	-	-
Net Zero Target		**At least 100% by 2050**	

The Local Authorities and the Sixth Carbon Budget report, 2020

34. The report[19] headline was that the UK government and local authorities can only achieve net zero if government, regional agencies, and local authorities work seamlessly together. Key findings were:
    - More than half of the emissions cuts needed rely on people and businesses taking up low-carbon solutions - decisions that are made at a local and individual level.
    - Many of these decisions depend on having supporting infrastructure and systems in place. Local authorities have powers or influence over roughly a third of emissions in their local areas.
    - Top-down policies go some way to delivering change but can achieve a far greater impact if they are focused through local knowledge and networks.

35. Nationally, 300 local authorities have a climate emergency declaration, with a third setting out ambitious aims and action plans to meet targets faster than the UK government target of 2050. Local authorities want to catalyse investment and add value by maximising social, environmental, and economic returns from spending on energy efficiency, heat decarbonisation and transport. Evidence of potential is provided by example:

[19] https://www.theccc.org.uk/publication/sixth-carbon-budget/

- West Berkshire Council - first Community Municipal Investment through a Bond offer raising over £1 million from 600 investors, a fifth from the local area, to finance solar, LED lighting, cycling routes and environmental investments.
- Shropshire Council's HECA return gave the reason for establishing its own housing company as providing homes with higher energy efficiency standards.
- Nottingham's Trent Basin has a 2MW community battery and urban solar farm.
- Norwich and Bristol have RIBA award-winning Passivhaus developments.

36. The examples are encouraging and show how good progress on solar take up is possible with good leadership.

Energy Trends

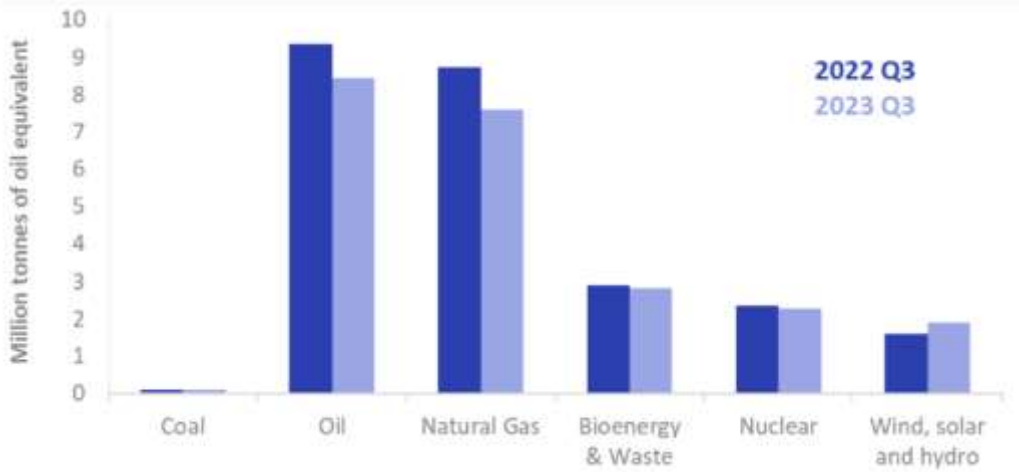
37. Information on energy production, trade, and consumption for total energy in the UK is published by government[20]. The last quarter of 2023 reported that renewable electricity generation grew 7% on the last quarter of 2022 due to increases in capacity (up 5%) and better weather. Renewable generation increased to 44.5% of total energy generated, outpacing fossil fuel's share for the fourth consecutive quarter. Electricity demand was 71.5TWh in Quarter 3 2023, the lowest value on the published data series and a decrease of 1.9% compared to the same period in 2022.

38. Electricity generation also decreased substantially, down 13% to 67.5TWh. The difference was accounted for by net imports of 3.9TWh, in contrast to Quarter 3 2022 when the UK was a net exporter of electricity.

39. Low carbon sources generated 60.1% of the total in Quarter 3 2023, a 9.9 percentage point increase. This reflects higher renewable generation, up 6.8% compared to the same period in 2022 at 30.1TWh, driven by a large increase in generation from wind. Nuclear generation decreased by 2.9% to 10.5 TWh in Quarter 3 2023 with outages at all but one nuclear plant during the quarter. Fossil fuels generated 25.0 TWh in Quarter 3 2023, the third lowest quarterly value on the published data series and 31% lower than the same period the previous year.

[20] https://www.gov.uk/government/statistics/electricity-section-5-energy-trends

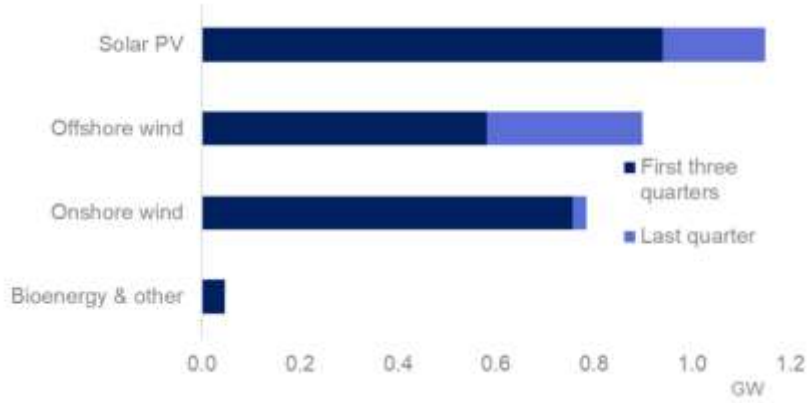
Figure 2: Graph showing the split of UK energy production in Q3 of 2023 compared to 2022



40. Total consumption of electricity was 60.4TWh in Quarter 3 2023. This was the lowest value on the published data series and a 3.4% decrease compared to Quarter 3 of 2022. Domestic consumption was also the lowest value on the published data series as consumer costs remain high and September 2023 was unusually warm. Electricity consumed by the industrial sector decreased by 2.5% compared to Quarter 3 2022, while consumption by other final users decreased by 4.3% in Quarter 3 2023.

41. Fossil fuel electricity generation decreased, by -31% largely to near a new record low due to more renewable generation and higher net imports from France. Last year the UK was a net exporter of electricity. The fossil fuel share of generation decreased nearly 10 percentage points to 37.0% . For Renewables. Key headlines:
    - Renewable electricity generation was 30.1TWh in Quarter 3 2023, +6.8% than 2022 and a record for the third quarter of a year. Most of the increase was in wind generation driven by higher wind speeds and new onshore and offshore capacity. Solar PV generation was down slightly in 2022 with new capacity being offset by shorter average sunlight hours.
    - Over the last year, 2.9GW of new renewable capacity has been added, a 5.4% increase. The largest growth to new capacity was in solar PV, which at 1.1GW, is the highest for almost six years and it continues to be driven by small scale installations. New capacity in offshore/onshore wind accounted for most of the remaining new capacity at 0.9 GW/0.8GW respectively.
    - Renewables' share of electricity generation was 44.5% in Quarter 3 2023, up 8.2 percentage points on last year due to a combination of the increase in renewable generation and a fall in total generation, with the share of renewables outstripping fossil fuels' share for four consecutive quarters.

Figure 3: Graph showing added capacity for energy production in the quarters of 2023



42. Figure 3 shows added capacity in the last 12 months. It shows that new solar PV capacity added in quarter 3 2023 (in light blue) was only marginally lower than the average for the three preceding quarters as it continues its recent strong growth in small scale installations; just over three quarters of this new capacity was accounted for by installations of 50 kW or less.

43. Solar generation increased in 2022 with increased capacity and more favourable weather conditions. Average daily sun hours were up 21% against 2021, and up 13% against the 20-year mean. Overall, this meant that UK solar generation increased 10.0% in 2022, in part due to a 5.3% capacity increase. All nations saw an increase in solar generation. Scotland had by far the greatest increase in generation (up 19%) with England following with an increase of 10% . Wales and Northern Ireland increased by 4.7% and 4.8% respectively.

Value of Green Jobs in England

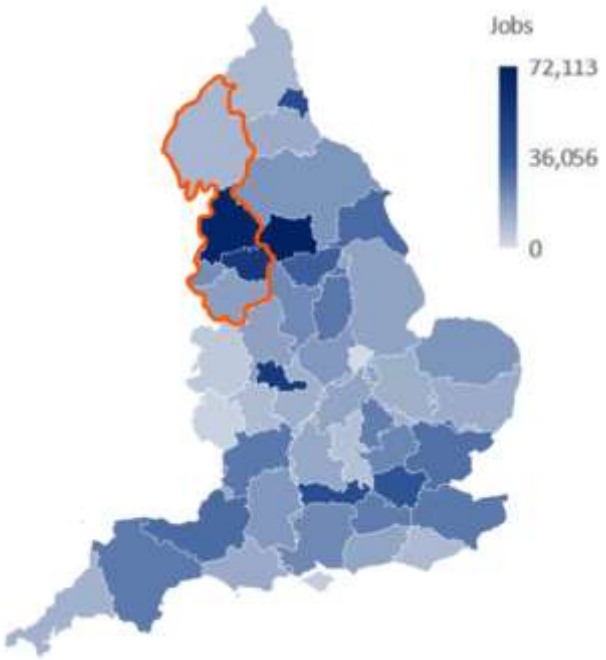
44. An Ecuity Consulting report[21] commissioned by the Local Government Association, estimates that there could be 694,000 direct total jobs in England's low-carbon and renewable energy economy by 2030 and more than 1.18 million by 2050. Nearly half could be in clean electricity generation and providing low-carbon heat for homes and businesses (manufacturing wind turbines, installing solar panels and installing heat pumps).

45. Solar requires more labour than wind and the supply chain is noted as relatively secure, but training at NVQ Level 3, equivalent to develop a larger installer base to deliver grid connected solar is observed.

[21] https://www.local.gov.uk/local-green-jobs-accelerating-sustainable-economic-recovery

46. Of note, the North West of England has potential to absorb 14.4% of the low carbon jobs by 2050 (99,936 jobs). Perspectives from solar photovoltaics industry stakeholders included that the rapid 'solar boom' following the 'Feed in Tariff' and 'Contracts for Difference', somewhat plateaued when it was removed in 2019.

Figure 4: Extract Fig 6 Distribution of jobs by English Counties, Ecuity calculations



47. Solar deployment in England lags behind other European nations, constraining demand and growth in the supply chain. At the regional scale, as PV cells are cheap, even business and households in northern areas can benefit despite lower solar irradiation levels.

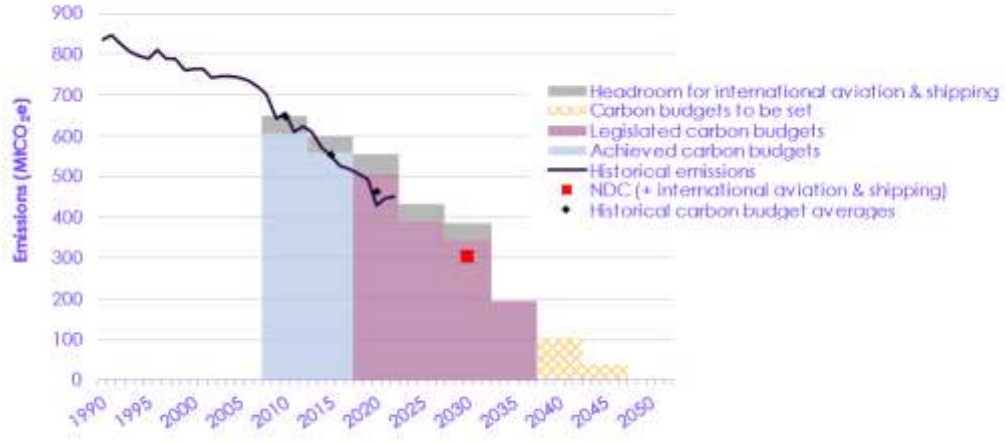
48. The Local Authorities and the Sixth Carbon Budget report, 2020 also sets out that community-led delivery has an important local role often funded through charitable funds, crowdfunding or community shares and developing low cost innovative projects. Examples of good practice are provided, including Carbon Co-op and Urbed in Greater Manchester, which have set up People Powered Retrofit.

49. No single technology can deliver all the generation that is needed to meet new electricity demands, meaning that a portfolio of zero-carbon generation technologies will be needed, also including onshore wind, solar and nuclear.

7th Carbon Budget

50. In November 2023, the Committee on Climate Change published the methodology for the 7th Carbon budget. It will rely on analytical work and a call for evidence.

Figure 5: Extract of Fig 1.1 UK Carbon Emissions and Budget of the 7th Carbon Budget



51. Since 1990 the UK emissions have almost halved from circa 850 Metric tons of carbon dioxide equivalent (MtCO2e) to 450MtCO2e in 2020 when legislated carbon budgets were introduced. Although this represents a positive outcome, there is a lot more effort required to achieve net zero by 2050, because the easy wins have been won, and the more difficult actions remain. The Energy Saving Trust and Green Alliance research[22] from June 2023 draws on international examples to produce key lessons for UK policymaking, highlighting areas where policy has the potential to reduce emissions, cut household or business costs and improve energy security at home. It shows that the planning system can provide local authorities with more flexibility to respond to local views and planning barriers to rooftop solar could be removed. In particular, the UK government's Net Zero Review called for a solar "rooftop revolution" with potential to deliver up to 70GW of capacity by 2035.

52. A case study from New York[23] provides low-income households to access to community solar – New York State US (2.14). It considers the applicability to the UK and focuses on reducing costs for lower and medium income households and an incentive to rapidly decarbonise. However, the report highlights although there are some community solar PV schemes across the UK that planning barriers, and grid connections issues tend to be a more significant barrier than the cost of PV. The report shows there is still a great deal of untapped potential on both domestic and non-domestic buildings.

[22] https://www.theccc.org.uk/wp-content/uploads/2023/06/Climate-policy-that-cuts-costs-International-policy-comparisons-Energy-Saving-Trust-and-Green-Alliance.pdf
[23] NYSERDA website

53. Increased access to micro-generation and low carbon technology choices for low-income households are recommendations that the UK government should consider with design schemes that provide low-income households with more access to low carbon technologies to spread the benefits from the energy transition. Currently there is an identified UK policy gap.

Spatial planning for climate resilience and Net Zero (CSE & TCPA)

54. The Climate Change Committee (CCC) commissioned the Centre for Sustainable Energy and the Town and Country Planning Association to conduct research[24] into the barriers and opportunities to delivering climate mitigation and adaptation through the spatial planning system at the local authority level in England. This research highlighted that the planning system has the potential to be a key tool for Net Zero and climate resilience at the local level but is not delivering on this, and it makes a series of recommendations on the need for systemic change required to align the planning system with climate policy.

55. In particular, the NPPF must make clear the primacy to be afforded to climate change in plan-making and decision-making, so climate change is embedded in spatial planning across decision-making levels. More specific measures are required, such as improved guidance on local carbon budgets; more detailed methodologies, enabling multi-agency delivery, revoking the 2015 Written Ministerial Statement; improved guidance and raising awareness in all stakeholders in the planning system, such as the Planning Inspectorate.

Powers in Place: The handbook of local authority Net Zero powers, April 2023

56. UK100 is a network of local leaders who seek a rapid transition to Net Zero with Clean Air in their communities ahead of the government's legal target. It commissioned research[25] to consider the "growth opportunity", to highlight that the benefits are greater if we act faster on decarbonisation; that the risk of delay is significant and local areas are hampered from going as fast as they want to, in part due to lack of policy clarity, capital awaiting investable propositions, infrastructure bottlenecks or delays in the planning system. The research identified the importance of local action, and there is specific reference to solar farms under section 6.3.2 and microgeneration in 6.3.4. Exemplars include C40 Cities members who have begun a process of Climate Budgeting, which has been taken up by the Mayor of London who has issued a

[24] https://www.theccc.org.uk/publication/spatial-planning-for-climate-resilience-and-net-zero-cse-tcpa/
[25] UK100_Powers in Place_FINAL 2.1 web-compressed.pdf

consultation budget for 2023/24 that includes a climate with solar panels across the GLA estates.

57. Local Plans are referred to as a barrier to higher standards in new buildings, as they take too long (up to 10 years to develop and enact). Policies written early in the process can be overruled by national policy changes or government statements (all requiring extra time). Viability assessments cannot be revisited, for example, but easily becomes out of date, one done in 2012 would now be wrong by a factor of ten. Some authorities have undertaken Local Plan Updates in light of their Climate Emergency Declarations, but this is time consuming and subject to examination.

58. The report urged for the planning reforms, *"To support energy efficiency improvements, significant weight should be given to the need to support energy efficiency improvements through the adaptation of existing buildings, particularly large non-domestic buildings, to improve their energy performance (including through installation of heat pumps and solar panels where these do not already benefit from permitted development rights).*

59. In the Section on Energy Infrastructure, *Powers in Place* suggests that the use of Local Area Energy Plans (LAEP) can help direct focus on particular actions in key areas, such as initiate discussions about locations for investment. They can also equip the local authority with useful information for discussions with the District Network Operators or Gas Network Operator. However, LAEPs do not produce a list of projects and costings for individual investments, such as sites for solar PV etc. When considering a local authority as a developer, the research sets out that the Energy Bill will formalise powers to develop heat networks for authorities designated as Zone Coordinators and it lists Bristol, Plymouth, and Manchester City Councils. The latter is taking part in a Greater Manchester city region wide Heat Networks Zoning Pilot study to inform the national policy.

60. The report also turns to Renewable Energy in Planning. The report observes that since 2016 planning applications have been dominated by solar PV, which have increased in scale from sites of typically 5MW sites in 2105, to 50MW in 2022, with a few applications for 500MW schemes. Applications for battery storage have increased significantly since 2019. Data for 2021 shows that Cornwall has the highest number of renewable generating sites in England[26], at 21,482, of which 21,021 are solar PV and 426 on-shore wind sites, followed by Wiltshire, Dorset, and Peterborough. Shropshire has the highest number of anaerobic digestion facilities (37 sites), reflecting its rural nature, and its strong support in the Local Economic Partnership's

[26] Regional renewable electricity in 2022 (publishing.service.gov.uk)

Energy Strategy. In the Powers in Place report, (page 153) the dominance of Solar with 1,011 applications nationwide and 7,878 (MWelec) is shown. The report highlights that solar farms are typically not as controversial as onshore wind, but that large ground-mounted schemes are unpopular and cause public backlash.

61. Under the Planning and Energy Act 2008, local authorities have the power to include policies imposing reasonable requirements for a proportion of energy used in development to be from renewable sources however, it is noted that this is an under-used tool and the majority of new homes or non-domestic buildings do not have renewable energy installed. This represents a lost opportunity as it is far cheaper to install at the time of construction than to retrofit later.

    Microgeneration is often the subject of permitted development rights (PDR) under the Town and Country Planning (General Permitted Development) (England) Order 2015,346 so there is no role for local authorities (other than where exclusions apply, such as sensitive sites: listed buildings, conservation areas, World Heritage Sites, Scheduled Monuments).

Large Solar Farm at Pre-planning stage in Frodsham, Cheshire West and Chester

62. Below an example of a large solar farm in Frodsham in Cheshire West and Chester is provided. Phase one of a massive solar farm went out to consultation in June 2023 with Cubico Sustainable Investments[27], a joint venture between Peel NRE. The proposal is for a large-scale renewable energy facility on 315.7hectares, (780 acres) in Cheshire. The capacity of around 150MW would be generated enough to power more than 34,000 homes. In the public consultation leaflet it sets out that most of the energy would be pumped into the Frodsham Substation and then distributed to the wider Merseyside and Cheshire area by operator SP Energy Networks. Peel Cubico Renewables also said it was exploring private and direct connections.

63. The solar farm itself would take place on 780 acres, in Figure 6, located between the M56 and the River Weaver, just north of Frodsham. Of the 780 acres, 720 would be used for the solar panels, the remaining saved as green space. No development would take place on land designated as part of the Mersey Estuary wildlife site. The site is in designated Green Belt. There are wind turbines installed at the existing Frodsham Wind Farm.

[27] https://www.frodshamsolar.co.uk/

Figure 6: Map of proposed Frodsham solar farm in Cheshire West & Chester

Figure 7 : Indicative Timeline for the Frodsham solar farm

64. Due to its size, Frodsham Solar would be deemed a Nationally Significant Infrastructure Project. As such it would need to go through a Development Consent Order application procedure and be signed off by the Planning Inspectorate and the secretary of state. The current project timetable, shown above in Figure 7, which anticipates having the scheme in operation by 2028, contingent on its securing planning permission of course. Ground mounted take longer to realise than roof-mounted solar PV.

Solar Taskforce

65. In May 2023, the Solar Taskforce of the Department for Energy Security and Net Zero held its first meeting with the purpose of bringing together key players from government, industry, regulatory and other relevant organisations to drive forward the increases in rooftop and ground mount solar needed to meet the expectation of a fivefold increase in solar PV deployment (up to 70GW) by 2035. It will run up to February 2024, and its key objectives are:
    - Strategic roadmap: assisting in the development of, and securing cross government and industry buy in to a UK roadmap for solar setting out a clear step by step deployment trajectory.
    - Taking action: government and industry working together to identify and drive forward processes and measures to unlock deployment
    - Securing investment and value for money: as the sector grows, put in place structures to facilitate continued progress on cost reduction and ensure investment in UK supply chains, jobs, skills, innovation, and infrastructure is enabled that sustainably drive forward the actions needed.

66. Andrew Bowie MP, the Minister for Nuclear and Renewables and CEO of Solar Energy UK, Chris Hewitt, are joint chairs of the Solar Taskforce, which has set out a Solar Roadmap for networks, skills, rooftop solar, supply chains and innovation and communications. The Taskforce considered four key areas of the planning regime that can cause barriers to deployment:
    I. resourcing in local authorities, the Planning Inspectorate, and statutory consultees;
    II. capacity threshold for Nationally Significant Infrastructure Projects (NSIPs);
    III. planning fees structure; and
    IV. permitted development rights (PDR).

67. Mr Michael Gove's speech in December 2023 addressed some of the barriers as he set out how planning departments would be able to increase fees, NSIPs would be speeded up and additional PDR would be allowed to enable more solar rooftop.

Government extends Permitted Development Rights (PDR) for solar panels

68. The Government extended PDR to allow the installation of solar panels on flat rooftops of homes and car parks without a planning application being necessary. At the time of writing there is a live consultation on further PDR[28]. Now, solar equipment is permitted on flat roofs of domestic premises, although it can be no higher than 0.6 metres above the highest part of the roof (excluding the chimney) and standalone solar equipment within the curtilage of domestic buildings. Prior approval with regard to the impact of the appearance of the solar equipment on the character of a conservation area is required.

69. A similar change has been made with respect to standalone solar equipment within the curtilage of non-domestic buildings and for the installation of overhead solar arrays on canopies(up to 4.0m not within 10.0m of a dwelling house or block of flats) in non-domestic off-street car parks at ground level is also created by the legislation. Such canopies cannot be used for displaying advertisements, the memorandum says. Where a solar canopy would be installed above a permeable surface, it adds, provision must be made to direct run-off water from the solar canopy to a permeable or porous area or surface within the parking area. When no longer needed, the legislation says, it must be removed as soon as reasonably practicable, and the land must be restored to its original condition.

70. CPRE welcomes this extension to PDR with prior approval required in Conservation Areas. The Bat Conservation Trust advises that heritage properties can often be roosts for bats and has guidance on installation following British Standard BS42020:2013 when assessing roofspace for solar PV.

National Planning Policy Framework changes concerning Solar Energy

71. In December 2023, DLUHC updated the National Planning Policy Framework[29] to include *significant weight to the need to support energy efficiency and … low carbon heating improvements to existing buildings, both domestic and non-domestic (including through installation of heat pumps and solar panels where these do not already benefit from permitted development rights). Where the proposals would affect conservation areas, listed buildings or other relevant designated heritage assets, local planning authorities should also apply the policies set out in chapter 16 of this Framework*.

[28] https://www.gov.uk/government/consultations/changes-to-various-permitted-development-rights-consultation/changes-to-various-permitted-development-rights-consultation
[29] https://www.gov.uk/guidance/national-planning-policy-framework

72. It is noted that significant weight should support rooftop solar to come forward where it exceeds the PDR threshold and this should be welcomed, however where harms are identified, such as landscape character and visual amenity harms, these would weigh against development in the planning balance.

Summary

73. Based on the documents reviewed above, there is a clear imperative for more intervention from our government on solar on the rooftops of all development, existing and new in the future and this should apply to both domestic and non-domestic development.

74. In addition to government establishing the right policy, planning instruments and investment commitments for more solar on rooftops, it is the local authorities that will be able to support the installation of more solar through planning and local actions.

75. Businesses, and other organisations need to help decarbonise our electricity supply and benefit from cheaper electricity from solar PV that has least harm to the environment, by not being ground mounted and keeping space for food production and nature. Ground mounted projects are unpopular and take a long time to be realised.

76. In the future CPRE should continue to encourage increased take up of solar PV on wasted roofspace, brownfield land and grey spaces such as canopies and car parks.

3. North West Carbon Budgets by Local Authority

78. In this section, the Carbon Budgets for the North West authorities are considered. A map, in Appendix 1, shows the location of each of the 35 local authority areas (previously 39 as in April 2023 Cumberland was formed from Allerdale, Carlisle and Copeland; and Westmorland from Barrow-in-Furness, Eden and South Lakeland) areas in the North West.

Tyndall Centre Carbon Budget

79. The Global Carbon Budget of 900 Gigatons of CO2 (GtCO2) is taken from the Intergovernmental Panel on Climate Change (IPCC). The UK Carbon Budget is 2,239 Million tonnes of Carbon Dioxide (MtCO2).

80. The Tyndall Centre is an interdisciplinary academic research group for Climate Change Research. It has established a Carbon Budget Tool[30] that presents the targets for UK local authority areas, based on the commitments in the United Nations Paris Agreement. The budgets are split between the regions, shown in Table 2 below. The North West has a range of between 246.4 million tonnes of Carbon Dioxide equivalent (MtCO2e) to 216MtCO2e depending on which approach is applied.

Table 2: The Tyndall Centre Carbon Budgets by Region

	Grandfathering to from UK (7.5%)		Population split to from UK (7.1%)		GVA split to from UK (5.7%)	
	Budget (MtCO2)	**Average Annual Mitigation Rate (%)**	**Budget (MtCO2)**	**Average Annual Mitigation Rate (%)**	**Budget (MtCO2)**	**Average Annual Mitigation Rate (%)**
East Midlands	171.6	-13.80%	160.7	-14.60%	130.6	-17.30%
East of England	200.5	-13.50%	208.3	-13.10%	188.6	-14.20%
London	203.5	-12.20%	295.1	-8.80%	517.6	-5.10%
North East	127.2	-11.00%	90.9	-14.70%	68.4	-18.70%
North West	246.4	-13.20%	247.8	-13.10%	216.4	-14.70%
South East	284.7	-13.30%	307.2	-12.40%	333.7	-11.60%
South West	172.1	-13.40%	187.9	-12.40%	165.9	13.80%
West Midlands	188	-13.30%	198.1	-12.70%	163	-15.10%
Yorks & Humber	220.7	-13.40%	186.1	-15.50%	149	-18.60%
Scotland	203	-13.40%	185.8	-14.40%	175.8	-15.10%
Northern Ireland	73	-13.10%	63.9	-14.70%	49.2	-18.30%
Wales	148.5	-13.60%	107.3	-17.80%	78.3	-22.90%

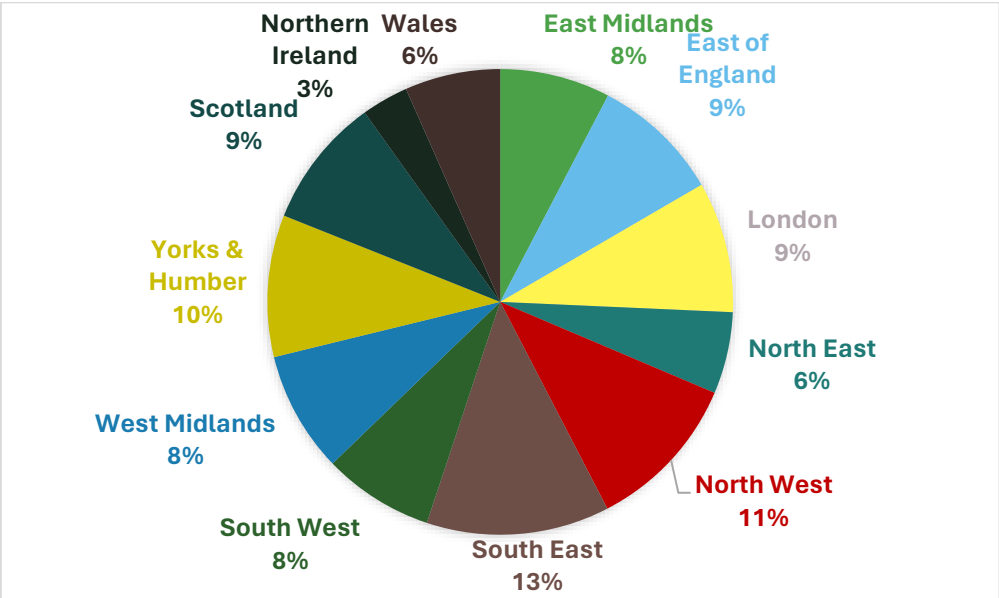
[30] https://carbonbudget.manchester.ac.uk/reports/

81. The calculations are informed by the latest science on climate change and defined by science based Carbon Budget setting, the three approaches to delivering the carbon budget, are fully set out with associated graphs at the link provided in footnote28.
    - Grandfathering Carbon Budgets are based on emissions data.
    - Population Carbon Budget are on a per capita basis.
    - GVA Carbon Budgets are based on Gross Value Added economic metric.

82. The North West has the second highest 'Grandfathering budget', more than London, and more than Scotland, with 246.4MtCO2 for the period of 2020 to 2100 is, which is 11% of the UK target. Only the South East has more with 284.7MtCO2. The Population based split is 247.80MtCO2 and the GVA split is 216.4MtCO2.

83. The Average Annual Mitigation rate reductions shown represent the North West's fair contribution to the Paris Agreement. In 2042, 95% of the recommended Carbon Budget is emitted and low level CO2 emissions continue at a diminishing level to 2100. At 2017 CO2 emission levels, the North West will exceed the recommended Budget available within 7 years from 2020. To stay within the recommended Carbon Budget the North West will, from 2020 onwards, need to achieve average mitigation rates of CO2 from energy of around -13.2% per year. This will require that the North West rapidly transitions away from unabated fossil fuel use.

Figure 8: The Grandfathering budget split by region of UK



84. Each LPA has its own Carbon Budget and an agreed strategy to achieve targets in line with the government's legally binding commitments. Below we consider the information available on each local authority areas in Cheshire, Lancashire, and Cumbria areas. Greater Manchester and Liverpool City Region are also considered. To

avoid duplication, we consider local planning authorities within their Combined Authority or joint planning structures.

Climate Emergency Declaration

85. Thirty-Five authorities have climate emergency declarations. Trafford was the first to declare in November 2018 with Tameside the most recent in February 2020. Notable omissions are Carlisle, Copeland, Fylde, and the Ribble Valley. The former two being located in the newly formed Cumberland Authority.

86. In Table 3, the Carbon Budgets per county and city region are considered. Greater Manchester has the highest Carbon Budget range from 77.3 to 94.9MtCO2 and Cumbria has the lowest from 15.2 to 26.2MtCO"

Table 3: The Carbon Budgets by North West County/sub-region

	Grandfathering to from UK (7.5%)		Population split to from UK (7.1%)		GVA split to from UK (5.7%)	
	Budget (MtCO2)	**Average Annual Mitigation Rate (%)**	**Budget (MtCO2)**	**Average Annual Mitigation Rate (%)**	**Budget (MtCO2)**	**Average Annual Mitigation Rate (%)**
Cheshire	48.2	-13.8%	31.7	-19.6%	37.4	-17.1%
Liverpool City Region	46.1	-12.6%	52.8	-11.2%	40.8	-14.0%
Greater Manchester	77.3	-13.0%	94.9	-10.9%	82.9	-12.2%
Lancashire	48.7	-13.3%	51.2	-12.7%	40.1	-15.7%
Cumbria	26.2	-13.0%	17.3	-18.4%	15.2	-20.5%
North West	246.4	-13.20%	247.8	-13.10%	216.4	-14.70%

Cheshire

87. Cheshire is located to the south of the North West area. The are covered by CPRE Cheshire group comprises of six authorities of Cheshire East, Cheshire West and Chester, Halton, Stockport, Trafford, Warrington, and Wirral. To avoid duplication, in this report, Halton and Wirral are considered as part of the Liverpool City Region, and Stockport and Trafford are considered under the Greater Manchester. The areas of Cheshire East, Cheshire West and Chester and Warrington are set out in Table 4.

Table 4: The Tyndall Centre Grandfathering Carbon Budgets for Cheshire*

Area	Comment	Grandfathering (2020-2100) MtCo2
Cheshire East	The Council will be off-setting roughly 3,000 tonnes of total CO2 emissions through renewable energy sources.	15.9
Cheshire West and Chester	In 2020 its own carbon emissions had been reduced by 50.9%, since 2009.	24.0
Warrington	In 2020, Warrington's territorial carbon emissions were 1,319.6 ktCO2e.	8.3
Total		48.2

*To avoid duplication, Halton and Wirral are considered as part of the Liverpool City Region, and Stockport and Trafford are considered under the Greater Manchester.

88. All Cheshire Councils have plans to reduce emissions, and solar PV on rooftops of council owned assets is an action to combat their organisational emissions, combined they have a Grandfathering budget of 48.2 MtCO2.

89. Cheshire East's Environment Strategy[31] committed to reducing the Council's own emissions and becoming carbon neutral by 2025[32]. Thirteen of the buildings, including libraries, leisure centres, and day centres now having solar panels, with a generating capacity of 1MW, producing up to 850,000 kWh per year of renewable energy. Low carbon heat pumps have been installed at Macclesfield Town Hall and indoor market, and also at Wilmslow Library. A district heat network is planned for the Lifestyle Centre in Crewe.

90. Cheshire West and Chester has the largest Grandfathering Carbon Budget of 24.0MtCO2. It updated that it was installing solar PV on council assets was part of the climate Emergency Response Plan using Salix funding[33].

91. In 2020, Warrington's territorial carbon emissions were 1,319.6 ktCO2e, reduced from 1,459.4 ktCO2e the previous year, due to the impact of the COVID pandemic restrictions. In 2021 emissions rose again to 1,439.7 ktCO2e, post lockdown. The rise means Warrington is currently overspending on its Carbon Budget. The Council has also provided capital grant funding to install LED lighting and a 39.13kW solar PV system on the roof at the Centre for Independent Living.

92. The neighbouring Cheshire local authorities have developed a joint solar group buying opportunity. Warrington also operates three solar farms which now generate more than the Council's total requirement for electricity.

[31] Environment Strategy 2020-24 (PDF, 683KB)
[32] https://www.cheshireeast.gov.uk/environment/carbon-neutral-council/carbon-neutral-council.aspx
[33] Salix is a non-departmental public body, owned wholly by government. It administers funds for the Department for Energy Security and Net Zero (formerly the BEIS), the Welsh and Scottish governments and the Scottish Funding Council. https://www.salixfinance.co.uk/

Liverpool City Region

93. The Liverpool City Region comprises six authorities at the Mersey Estuary. In Table 5, below, the Grandfathering Carbon Budgets are set out.

94. Halton Borough Council's Action Plan[34] shows progress in reducing emissions from 2006/07 from 26,338 tonnes of CO2 to 9,327 tonnes. In addition to solar PV installed at various Council sites (producing over 750,000 kWh of renewable energy) there has been installation of a 1.25MW Solar Farm in Widnes producing energy for the DCBL Stadium – producing on average 900,000kwh per annum. Future decarbonisation works at various buildings on a phased rolling basis, subject to funding, covering St Lukes & St Patrick's care homes, the other covering Runcorn Town Hall, Picow Farm Depot, and Kingsway Learning Centre. Of note, bids were originally submitted, but Salix aborted the process due to problems with their website and asked applicants to resubmit.

Table 5: The Tyndall Centre Carbon Budgets for Liverpool City Region

Area	Comment	Grandfathering (2020-2100) MtCo2
Halton	Project reductions have been derived from solar PV installed at various Council sites. Halton through the Solar Together scheme, where 2nd lowest take up is observed.	6.4
Knowsley	Via the Solar Together scheme, Knowsley has the lowest take up of solar panels.	5.3
Liverpool	Is part of the Solar Together scheme, where 2nd largest take up is observed.	11.9
Sefton	Solar Together scheme, lead to installation of solar panels and battery storage to over 200 homes (3rd largest take up in LCR)	7.3
St Helens	Is part of the Solar Together scheme, where 3rd lowest take up is observed.	7.3
Wirral	Is part of the Solar Together scheme, where the highest take up is observed.	7.8
Total		**46.1**

95. Knowsley has a Grandfathering Carbon Budget of 5.3 MtCO2. Since declaring a climate emergency in 2020, it has progressed a Net Zero Delivery Plan, which sets out how the Council will manage its use of energy particularly to decarbonise heating its buildings, fleet of vehicles, procurement of services, encourage a circular economy

[34] https://www3.halton.gov.uk/Documents/planning/climate/strategy.pdf

and plan for resilience including supporting nature's recovery. The Council is working collaboratively with partners, to enable and support people to take climate action and achieve net zero emissions.

96. Liverpool Net Zero Action Plan sets out a target of 2030. It has a target of achieving 77,714 solar PV installations on suitable buildings (focus on residential, business, and public buildings) in Liverpool as part of effort on decarbonisation of electricity supplied to the network. It aims to be an urban exemplar. A stated solution is the Installation of 760MW of solar PV integrated with storage and demand flexibility.

97. Detailed analysis carried out in support of the Liverpool Net Zero Action Plan estimates that this is the technical potential for installations in Liverpool city, at a cost of around £775 million, assuming electricity generated is valued at 10p/kWh and that only arrays capable of achieving an internal rate of return of >5% are considered deployable. The co-benefits of solar with heat pumps are highlighted and reducing the risk of critical infrastructure failure by decentralised supply. Constraints of planning controls in Conservation Areas and the need to upgrade the capacity of the electricity distribution network are identified. Solar is seen as having a role to top up supply in peak times, particularly with the development of battery storage to discharge energy during non-sunlight hours. Large scale solar PV installation is envisaged.

98. Sefton Council has published its Climate Emergency Annual Report[35], confirming a 7% reduction in emissions in the last year as continued progress is made towards the Council's ambitious net zero 2030 target. Since 2019, when the Council began to track its emissions, there has been a 2,036 tonne-reduction in total emissions, which represents an 18% decrease. The reduction can be contributed to a number of factors and successful Council-led projects including the ongoing street lighting LED replacement programme. Retrofitting programmes include solar PV fitting.

99. St Helens sets out a carbon zero target of 2040 in its Pathway to Net Zero[36] report. It sets out how it will make existing homes greener with funding from the Department for Business, Energy & Industrial Strategy through Local Authority Delivery (£1.3m for 30 properties), Home Upgrade Grant (Sustainable Warmth Fund £2.4m to retrofit some 250 low energy efficiency properties in the borough) and Social Housing Decarbonisation Fund (external wall insulation and other retrofit measures to an estate of 150 homes all of the same type).

100. Wirral's Environment and Climate Emergency Action Plan will provide the route map to carbon neutrality by 2030. Workstream WS18 Regeneration sets out the reuse of

[35] https://www.sefton.gov.uk/media/7447/climate-emergency-annual-report-2022-23.pdf

[36] https://www.sthelens.gov.uk/media/5898/P5-Climate-Change-Plan/pdf/P5_climate_change_repsonse_plan.pdf?m=1681727375623

brownfield land at the port and former industrial areas as a key pathway. A total of £3.6m Green Recovery Funding has been awarded to OFGEM to upgrade the local power networks.

North West Zero Hub

101. The North West Net Zero Hub[37] is a regional programme to promote investment in energy projects. It works with public sector organisations to improve the business case for their energy schemes. The North West Net Zero Hub supports communities to take action and participate in the climate agenda. It can help direct businesses to available funding for clean energy solutions. The team can also help publicise the achievements of organisations that have delivered pioneering projects.

Solar Together

102. Liverpool City Region and the Hub have been accelerating the 'Solar Together' programme which aims to encourage solar PV and battery storage across the region. The programme is a group-buying scheme targeted at those who are 'able to pay' and reduces average installation costs by 26%. A total of 1,185 homes registered interest in the scheme at the back end of 2022. As of April, 460 installations have been completed.

103. Solar Together LCR Project gave residents the chance to have solar PV survey with a quote for work if they were suitable. The scheme was most popular in Wirral, with 444 installations, followed by Liverpool with 254 and Sefton with 207. St Helens accounted for 92 installations with 91 in Halton and 26 in Knowsley.

Towards a Spatial Development Strategy for the Liverpool City Region up to 2040

104. The Liverpool City Region Spatial Development Strategy Stage 3 was consultation in February 2024. Policy LCR DP1 – Planning for Climate Change sets out that as a priority development plans and proposals should be making the fullest possible contribution towards the mitigation of climate change and adaptation. Liverpool City Region Combined Authority Five Year Climate Action Plan 2023-2028. According to the Five Year Emissions from the electricity supply have reduced from 4MT to 1MT consumption from 2005 to 2020. This is due to the retirement of coal plant and the addition of offshore wind, solar and possibly tidal power, to our system.

Greater Manchester

105. The Tyndall Centre for Climate Research calculated an evidence based carbon budget for Greater Manchester to make it compatible with the Paris Agreement. This means holding cumulative carbon dioxide emissions at under 77.3 million tonnes (MtCO2). Greater Manchester gas a total renewable generation target of 45MW by 2024, and in Table 6 below, the breakdown by local authority is set out.

[37] https://www.liverpoolcityregion-ca.gov.uk/north-west-net-zero-hub

Table 6: The Tyndall Centre Carbon Budgets for Greater Manchester City Region

Area	Comment	Grandfathering (2020-2100) MtCo2
Bolton	With partners the Council will look at potential for buildings to install solar power generation.	7.8
Bury	It is looking at the feasibility of solar on more Council building assets. It was seeking a policy in '*Places for Everyone*' DPD.	5.4
Manchester	The LAEP graph of small-scale renewable energy installation and solar PV is most popular with peaks linked to grants	14.0
Oldham	In March 2020, Oldham Council adopted the UK's first local authority Green New Deal Strategy	5.1
Rochdale	Target of 32% of energy from renewables. 141GWh from solar PV by 2030, creating 1,838 new jobs by 2038 and 2,643 jobs by 2050. Includes a ground mounted solar farm in Green Belt	6.2
Salford	A total CO^2 saving by end of December 2019 of 59% - equivalent to a reduction of 21,777 Tonnes of CO2 since 2007= £100,000 a year.	7.7
Stockport	The Council has already installed 2,300 PV on homes and 28 solar PV systems installed on our corporate estate. It plans for more.	7.7
Tameside	Council support for the roll out of solar PV scheme for residents and it will roll out renewables, such as solar PV across the Councils' estate when opportunity.	5.4
Trafford	commitment to the GM carbon budget, in the form of up to 550 Megawatt Peak (MWp) of rooftop solar PV.	9.5
Wigan	produces 33,920MWh of renewable energy per year, with 1,425 homes receiving the benefit of solar PV's. 949MWh will be sought by 2030.	8.4
Total	**Across GM achieve a renewable generation target of 45MW by 2024.**	**77.3**

106. Monitoring of progress will underpin the overall approach, but a key issue is finance and funding, partnerships, leadership, engagement of others, upskilling and establishing a clean growth mission. As we are now in 2024, we can look at how the 5-Year Environment Plan delivered and understand performance to share more widely.

5-Year Local Area Environment Plan 2019-2024 (5YLAEP)

107. Andy Burnham, Mayor of Greater Manchester focuses on the opportunity for action by everyone – individuals, communities, businesses, public sector, and voluntary and

community and social enterprises to achieve a carbon neutral city region by 2038 in the 5-Year Local Area Environment Plan 2019-2024[38] (5YLAEP). It sets out for Greater Manchester a green revolution to build on its industrial legacy. Every household could save money to combat the cost of living crisis. With this in mind, an identified pathway for upskilling and innovation and commitment to deliver a more sustainable future is set out.

108. There are Priorities identified in the 5YLAEP Greater Manchester, and Priority 1: Increasing local renewable regeneration, adding a further 45MW by 2024 This would require 50% of all households to have the equivalent of 16m2 solar PV system, with an additional 5.5km2 on commercial rooftops or in ground mounted installations.

109. It identifies a lack of information available regarding energy efficiency in the commercial sector. It comments on the limited ways of measuring change in non-domestic heat demand and efficiency when compared to public buildings, which require an Energy Performance Certificate when sold or leased.

110. In 2021, Bolton Council officially adopted an ambitious climate change strategy[39] that aims to make council operations carbon neutral by 2030. The wide-ranging plan also sets out how the council will work with other organisations in Bolton to address climate change and contribute its share of the GM 45MW renewable electricity generation target.

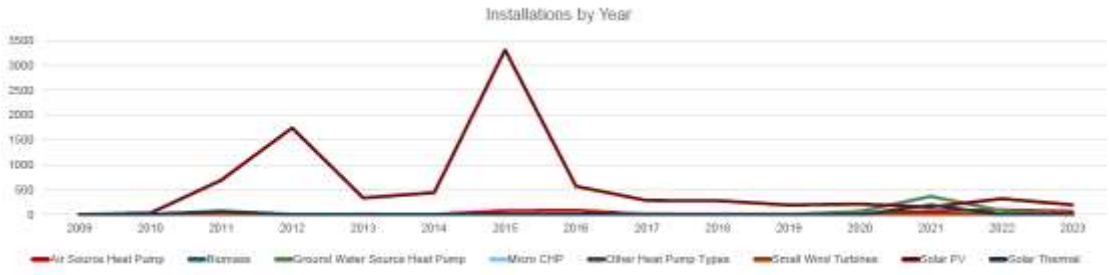
111. Climate actions are set out in Bury Council Climate Action Plan 2022/23 Updated March 2023[40]. It states that Bury Council will work to generate and source all local energy needs from zero-carbon renewable sources by 2038. It is considering the potential of school buildings. Six Town Housing have successfully bid for Decarbonisation Fund to install solar PV on 100 properties in Chesham Estate. The Council will look at procuring energy from renewable sources. With GMCA it is looking at the feasibility of solar on more Council building assets. It was seeking a policy in Greater *Places for Everyone* Development Plan Document, see the case study later in this report.

112. Manchester's Local Area Environment Plan[41] identifies two separate scenarios going forward, the primary scenario utilises existing technology (such as heat pumps, increased insulation, PV solar panels, etc) whilst the secondary one takes into account a greater use of hydrogen for domestic energy usage, should this become available.

[38] https://www.greatermanchester-ca.gov.uk/media/1986/5-year-plan-branded_3.pdf
[39] https://www.bolton.gov.uk/sustainability-1/climate-change-strategy
[40] https://www.bury.gov.uk/pests-pollution-and-food-hygiene/pollution/lets-go-green-carbon-neutral-bury/burys-climate-action-strategy-and-action-plan
[41] https://democracy.manchester.gov.uk/documents/s41174/Appendix%201%20LAEP%20Monitoring%20Report.pdf

113. Solar is considered in terms of local energy generation existing and under construction. Information about the Council's estate retrofit is also available with reference to the new operatives required to undertake large scale retrofit and need for the labour supply to be trained and upskilled. Housing retrofit has led to 130 solar PV and battery system being installed. The LAEP contains a graph (Figure 9) of small scale renewable energy installation. Solar PV is clearly the most popular with peaks corresponding to availability of government grants.

Figure 9: The Installations by year of small scale projects



114. In March 2020, Oldham Council adopted the UK's first local authority Green New Deal Strategy. The strategy sets challenging carbon neutrality targets of 2025 for Council Buildings and Street Lighting, and 2030 for the borough as a whole.

115. Rochdale currently has 15GWh of renewable energy. In the Climate Change Strategy and Delivery Planit sets out that this should be increased to 141GWh so that 32% of energy is fulfilled by renewables by 2030. It estimates that 1,838 new jobs in the low carbon and renewable energy sectors in the borough by 2038 and 2,643 jobs by 2050 can be created.

116. Salford's Climate Action Plan[42] total CO2 saving via the Carbon Management plan up to end of December 2019 was 59% - equivalent to a reduction of 21,777 Tonnes of CO2 since 2007 and now saves the council well over £100,000 a year in energy bills. It is estimated that this is equivalent to one year's emissions from over 17,000 cars. The council has invested heavily in solar panels, fitting over 100 photo-voltaic solar at the Civic Centre in Swinton, along with panels on many other buildings such as schools, leisure centres and community hubs.

117. Stockport Climate Change Strategy[43] sets out that the Council has already installed 2,300 PV on homes and 28 solar PV systems installed on our corporate estate. It has ambitions for 40% of the council housing stock to also have renewable energy installed. It is considering three solar farms.

[42] https://www.salford.gov.uk/your-council/climate-change/salford-s-climate-action-plan/
[43] https://live-iag-static-assets.s3-eu-west1.amazonaws.com/pdf/PolicyStrategy/Stockport+Climate+Change+Strategy.pdf

118. Tameside Climate Change & Environment Strategy[44] 2021-2026 sets out the Council's support for the roll out of solar PV scheme for residents. It will continue to roll out renewables such as solar PV across the Councils' estate when it has the opportunity to do so.

119. Trafford Council is installing a range of low carbon energy improvements (Heat Pumps, Solar Panels & ultra-efficient Lighting) across Public Buildings including schools, reducing greenhouse gas emissions by over 500 tonnes per year. Trafford Council has secured £4.9m Public Sector Decarbonisation Scheme grant for further work to cut emissions from Altrincham and Urmston leisure centres. Renewable electricity production in Trafford is to increase to contribute to the GM carbon budget, predominantly in the form of up to 550MWp of rooftop solar PV, with opportunity for a further 81 Megawatt Peak (MWp) ground mounted solar PV across Trafford[45]. Renewable generation (if the ground mounted PV potential is maximised), provides up to 748GWh annually (30%), with 1,770GWh (70%) of electricity supplied from the grid. This scale of solar PV is an ambitious aspiration.

120. Wigan sets out in the Net Zero Carbon – Vision 2038[46] that it produces 33,920MWh of renewable energy per year, with 1,425 homes receive the benefit of solar PV's. Tenants benefit from free electricity during daylight hours and the Council receives an annual feed in tariff. It will ensure its public estate is utilising certified renewable energy. In the future 428,949MWh will be sought.

[44] https://tameside.moderngov.co.uk/documents/s118330/ITEM%2010%20-%20Appendix%201%20-%20Climate%20Change%20and%20Environment%20Strategy%20FINAL.pdf
[45] https://gmgreencity.com/wp-content/uploads/2022/08/Trafford-LAEP-Final.pdf
[46] https://www.wigan.gov.uk/Docs/PDF/Council/Strategies-Plans-and-Policies/climatechange/Outline-Climate-Change-Strategy.pdf

Lancashire

121. Table 7, below, sets out the grandfathering (2020-2100) Carbon Budgets for the local planning authorities across Lancashire. Chorley, Preston, and South Ribble have a joint Central Lancashire Development Plan, which is currently in the process of being refreshed.

Table 7: The Tyndall Centre Carbon Budgets for Lancashire

Area	Comment	Grandfathering (2020-2100) MtCo2
Blackburn with Darwen		4.0
Blackpool		3.2
Burnley		2.4
Chorley		4.0
Fylde		2.9
Hyndburn		2.3
Lancaster District		4.8
Pendle		2.6
Preston		4.6
Ribble Valley		3.4
Rossendale		2.4
South Ribble		4.3
West Lancashire		4.0
Wyre		3.8
Total		48.7

122. The overall Grandfathering (2020-2100) Carbon budget for Lancashire is 48.7 MtCo2.

Blackburn with Darwen

123. Blackburn with Darwen's Climate Emergency Action Plan[47] has a carbon zero target of 2030 to tackle climate change. In 2021, 653,200 tonnes of GHG were emitted from the Borough's homes, road transport and industry and commerce, a reduction of around half of what was emitted in 2005.

124. Energy efficiency measures: The Council installed LEDs in 5 buildings, solar PV arrays on 10 buildings, a heat pump for one building, an upgrade to the Uninterruptable Power Supply at the Data Centre and upgrades to the Building Management Systems

[47] https://www.blackburn.gov.uk/council-and-democracy/our-vision-missions-and-strategies/our-vision/deliver-our-climate-emergency

at 10 of the sites – funded by the Public Sector Decarbonisation Scheme and saving around 125 tonnes of CO2 a year.

Blackpool

125. In 2020, Blackpool's carbon footprint was 468.5 ktCO2e. The carbon emissions were:
    - 48% domestic
    - 23% industry and commercial
    - 19% transport
    - 0.05% agriculture
    - 0.08% public sector emissions

126. Blackpool has set a target of 2030[48] for being net zero and it is working to mitigate climate change through green energy production, increasing energy efficiency and reducing emissions caused by the biggest emitters.

Burnley

127. Burnley has set out in its 5-year Climate Change Strategy 2022-2026[49] that in 2019, operational renewable energy schemes and those with permission to operate in Burnley had a capacity of 35.7MW. The number of equivalent homes powered using this renewable energy capacity is 20,755 or 49.6%, half of the Borough's total housing stock.

128. Under Theme 2 – Emissions from use and occupation of buildings, Objective 2 - achieve higher standards of energy efficiency in new and existing buildings it has an action to assess the suitability of roof structures for the installation of solar PV.

Chorley

129. Chorley Climate Change Strategy 2022-2024[50] has a goal to be net zero by 2030. The total emissions for 2019 for the Borough were 651,900tCO2e, of which the largest was transport. It wishes to embed climate change in all policy and decision making. It is exploring how to best decarbonise the council's owned assets including its fleet. As part of its approach Green Bus Stops with solar PV powered lighting is being explored. It will work with housing providers and landlords and businesses to promote more energy efficiency to decarbonise buildings.

Fylde

[48] https://www.blackpool.gov.uk/Residents/Planning-environment-and-community/Climate-emergency/The-road-to-net-zero.aspx
[49] https://burnley.gov.uk/council-democracy/climate-change-strategy/
[50] https://chorley.gov.uk/ClimateChange

130. The total estimated carbon footprint[51] for Fylde in 2018 was approximately 387.1 tonnes CO^2. Census data from 2018 suggests 79,800 people live in the local area. Spread across everyone, this carbon footprint equates to 4.9 tonnes CO2 per person, per year. The three main sectors contributed to these emissions were:
    - Industry and Commercial sector (35%, 133.8 tonnes CO2)
    - Domestic sources (34%, 132.9 tonnes CO2)
    - Transport (31%, 120.5 tonnes CO2)

131. Among these sectors, the single largest contributors to Fylde greenhouse gas emissions were:
    - Domestic gas 93.4 tonnes CO2
    - Road Transport (A roads) 57.5 CO2
    - Road Transport (minor roads) 53.4 CO2
    - Industry and commercial gas 52.3 CO2

132. Fylde Council is working with the Chamber Low Carbon Scheme through the UK Shared Prosperity Fund, to help business reduce energy bills and reduce environmental impacts.

Hyndburn

133. Hyndburn Borough Council pledged to be carbon neutral by 2030[52]. Its Action Plan looks to decarbonise its building assets. Although it doesn't directly refer to solar, it does want to increase the installation of renewables to domestic property, however no mention of non-domestic solar is mentioned, although it does have a SME concordat and a green purchasing guide for procuring services, which may encourage more solar PV on supplier premises.

Lancaster

134. Lancaster District is a hero in the Lancashire area as it is 'Top of the Leaderboard' for district councils in assessment of actions taken to achieve net zero. This considered seven areas: building and heating; transport; governance and finance; planning; biodiversity; collaboration and engagement, and waste reduction and food.

135. It has a carbon zero target of 2030. The Council has spent £1million on improving the energy efficiency of its buildings. Works will vary depending on the property but will include a mixture of LED lighting, air, and ground source heat pumps, upgraded insulation, secondary glazing, and solar PV. Together it is estimated that these

[51] https://new.fylde.gov.uk/business/environmental-protection/carbon-reduction/
[52] https://www.hyndburnbc.gov.uk/climate-change/

measures could save up to around 133 tonnes of CO2 each year from natural gas and reduce electricity consumption by as much as 231,000 kWh, equivalent to running 80 average homes for a full year.

136. It used Salix funding to develop a solar farm on the adjacent disused landfill site at Salt Ayre to generate electricity, which will then be provided to the leisure centre using a direct wire. Comprising nearly 3,000 panels, the solar farm is capable of generating enough electricity to fully power the centre during peak times. This is a good use of a brownfield site. The work has reduced the council's emissions from natural gas by 35%, and along with a new green energy tariff, means Salt Ayre is now one of the first leisure centres in the country to become carbon neutral, the Council won an award for this project.

137. CPRE has engaged with the planning team when it refreshed its local plan to respond to the climate declaration. This also won an award for showcasing digital engagement.

Pendle

138. Pendle has a Climate Emergency Action Plan 2020 to 2025[53]. It sets out it will reduce carbon emissions across all our service areas and encourage key partners and local residents and organisations to also take action. It is looking at how to encourage energy efficiency and has actions to support communities and future generations to take action. The Council will achieve carbon zero by 2030 by including climate considerations in all new policies and plans and embed it into the Council's Strategic Plan. It will produce annual emissions reports to monitor progress against a baseline.

Preston

139. Preston Council is also seeking a net zero target of 2030[54]. Data from the Met Office - UK Climate Projections 18 (UKCP18)[55] shows that northern England is around 11% wetter today than between 1961-1990 and the top 10 warmest years on record have been since 1990. In Preston, summer temperatures have now reached over 30C over the last 3 years, and this is likely to become more common and for longer periods.

140. The Council is reducing its own carbon footprint through the installation of energy efficient measures, including solar panels and it is encouraging residents, businesses, and communities to make the "Preston Pledge" and pledge to make 3 small changes to help make Preston greener.

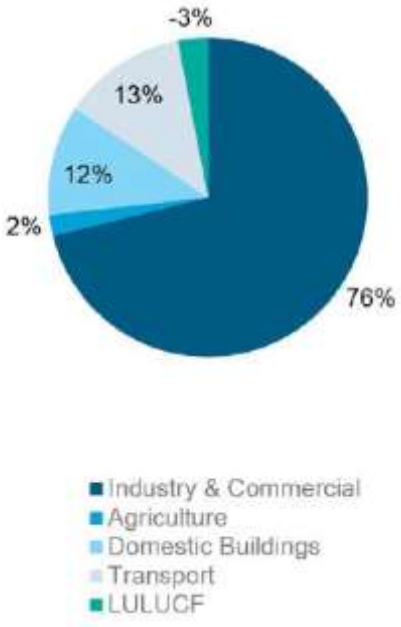
[53] https://www.pendle.gov.uk/info/20003/community/567/climate_change/2
[54] https://www.preston.gov.uk/climatechange
[55] https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/index

Ribble Valley

141. Ribble Valley has a vision of being carbon neutral by 2030[56] and it has produced a Climate Change Strategy 2021-2030, which sets out CO2 emissions have fluctuated between 2008 and 2018, but hover between 800 and 1000 kt per annum. As the largest district in Lancashire covering 632 square kilometres and with a population of 60,057 people, this equates to 1.6t per km and 215.2t of CO2 emissions per head of capita in 2018.

142. Figure 10 below shows that by far the largest contributor of CO2 emissions is the Borough's industry and commercial sector with 713.9 tonnes.

Figure 10: Chart showing CO2 emissions (kt) for Ribble Valley in 2021[57]



143. The council's endeavours to ensure its own operations will be clean and efficient, and it will play a positive role enabling the wider district to achieve net-zero emissions, working with others.

Rossendale

144. Rossendale Council declared a climate emergency in 2019 and has a target of 2030 for being carbon neutral[58].

[56] https://www.ribblevalley.gov.uk/climate-change/climate-change-1
[57] https://www.lancashire.gov.uk/media/933543/lancashire-net-zero-pathways-report.pdf
[58] https://www.rossendale.gov.uk/environment/climate-change

145. In its Climate Change Strategy, Rossendale Borough Council provides a case study of Futures Park Solar Panels, which cost £112,000 as part of a 25year plan. Since being installed they have produced 553,043 KWH of electricity and for every KWH produced the Council receives 11.5p from the Government subsidy - The Feed in Tariff (FIT). Over this period the total FIT is £63,599. One third of the electricity needed for Futures Park is generated making an annual approximate saving of £4,000 and a total saving over the eight years of £32,000. Unused electricity produced through the solar panels is exported back into the National Grid for which we are paid 4.5p KWH. Annually this equates to £1,500.

146. The Council is currently reviewing the Carbon Reduction Grant for Community Buildings.

South Ribble

147. In 2019, South Ribble Borough Council declared a climate emergency, pledging to work to make the Borough carbon neutral by 2030. In order to tackle this, a Climate Emergency Working Group was formulated, and a Climate Emergency Strategy was developed followed by a Climate Emergency Action Plan . The total carbon footprint for 2021 - 2022 was 3,373,957 kilogram of Carbon Dioxide equivalent (KgCO2e). Our Climate Emergency strategy encompasses two broad themes of Carbon Reduction Measures and Resilience. The Council has made progress in reducing the carbon footprint of its own buildings. See case study 9.3 later in this report.

West Lancashire

148. West Lancashire Borough Council declared a Climate Emergency in July 2019. The declaration included an aspiration to be a carbon neutral Council by 2030 and to take action across the borough of West Lancashire[59]. The Council identified key contributors of GHG emissions both from the Council operations and Borough-wide activities, the Strategy identifies seven key priority areas for action:
    - Delivering a Carbon Neutral Council
    - Sustainable Procurement
    - Transport and Travel
    - Residential buildings
    - Commercial activity
    - Community Action
    - The Natural Environment

[59] https://www.westlancs.gov.uk/environment/climate-change-and-green-living.aspx

149. The measures identified include solar PV installed on 588 properties, providing free electricity for tenants alleviating fuel poverty. Plus, eight corporate solar PV schemes to generate renewable energy from buildings.

150. The Council is also investigating a solar farm. Initial investigations indicate an identified area of Council land could accommodate a 7MW solar PV installation. This would have the potential to generate over 6.1million KWh of renewable electricity per year, giving annual savings of 1,462 tonnes of CO2e. However, most of the land in West Lancashire outside settlement boundaries is in the Green Belt and the is a significant amount of Best and Most Versatile land, including grade 1, the most fertile, and grade 2 both of which is scarce nationally, and an asset to be protected.

Wyre

151. Wyre, as a coastal borough, is particularly at risk of sea level rise and flooding. The Council recognises that it is crucial it does its bit to reverse these changes and reduce our impact on the environment.

152. Overall, estimated total emissions from Wyre Borough in 2018 were approximately 500,300 tonnes CO2e. According to population statistics, the population of Wyre in 2018 was 111,223. This equates to approximately 4.50 tonnes CO2e per person.

153. In the Carbon Footprint Report[60] sets out that the total Council emissions for the 2018/19 financial year was 2,726.62 tonnes CO2e. 2019/20 financial year was 2,282.00 tonnes CO2e. This represented a drop of 16% (444.62 tonnes CO2e) from 2018/19 data. Fleetwood the largest settlement emits 18,983 tonnes of CO2e and is particularly high due to the concentration of industrial premises and location of a more densely populated area.

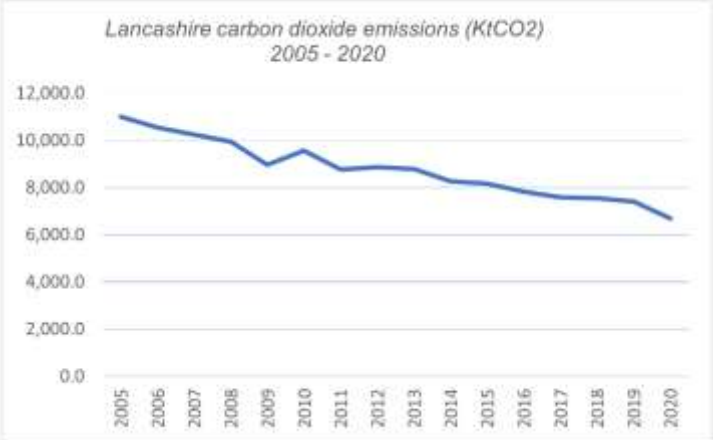
Lancashire County Council Environment and Climate Strategy 2023-2025

154. The Strategy sets out how average annual temperatures in the North West of England are already around 1.5°C higher in the 21st century compared with the end of the 19th century. It is observed that at Heysham, recent rates of sea level rise are around 4mm per year, a faster rate of change than the long term average for the UK.

155. This strategy sets out how the Council will reduce harmful emissions. It sets out that in Lancashire, a 46% decrease in Lancashire's carbon dioxide (CO2) emissions since 1990, mainly driven by a large reduction in the amount of coal used for electricity generation. The rate of reduction has levelled in recent years.

[60] https://www.wyre.gov.uk/climate-change/climate-change-wyre-council

Figure 11. Lancashire carbon dioxide emissions (KtCO2)



156. The focus is on action that Lancashire County Council has direct or strong control and influence over, its own estate, services, our policy making and our role as a community leader. It aims to show how a strategy focused on the environment and climate can contribute to wider strategic objectives. For example, it can create the conditions to align low carbon industries with the skills of our workforce as a driver of economic growth, improved resident health and other priority outcomes for Lancashire and the organisation.

157. Communication, engagement, and collaboration with partners, communities and residents will be important in achieving the Council's objectives as it notes that the small changes individuals make have a significant cumulative impact. The Council recognises that alongside it developing its policies and projects it will need to engage and raise awareness to help everyone take the steps needed to make changes to lifestyles and behaviours. Young people have been at the forefront of raising awareness on environment issues and the Council will engage with them through the schools and local youth councils.

Cumbria

158. Table 8 shows the Tyndall Centre Grandfathering Carbon Budget for Cumbria as 26.2MtCO2, which is equal to 10.6% of that for the North West.

Table 8: The Tyndall Centre Carbon Budgets for Cumbria

Area	Comment	Grandfathering (2020-2100) MtCo2
Cumberland		**11.9**
Allerdale		4.9
Carlisle		4.6
Copeland		2.4
Westmorland		**14.3**
Barrow-in-Furness		2.7
Eden		6.2
South Lakeland		5.4
Total		**26.2**

159. In April 2023 a local government reorganisation occurred with structural changes to local authority area boundaries in Cumbria, North Yorkshire, and Somerset. The previously separate, district and county level authorities replaced by new larger unitary ones with the six districts replaced by two unitary authorities of:
    - Cumberland Council - Allerdale Borough Council, Carlisle City Council and Copeland Borough Council;
    - Westmorland and Furness Council - Barrow-in-Furness Borough Council, Eden District Council , and South Lakeland District Council

160. Previously, Cumbria commissioned A Carbon Baseline for Cumbria[61] in February 2020, which covered the areas of Allerdale; Barrow-in-Furness; Carlisle; Copeland; Eden and South Lakeland. The Carbon Baseline for Cumbria report looks at Cumbria's GHG emissions in three ways, Extraction, Production or Consumption based.

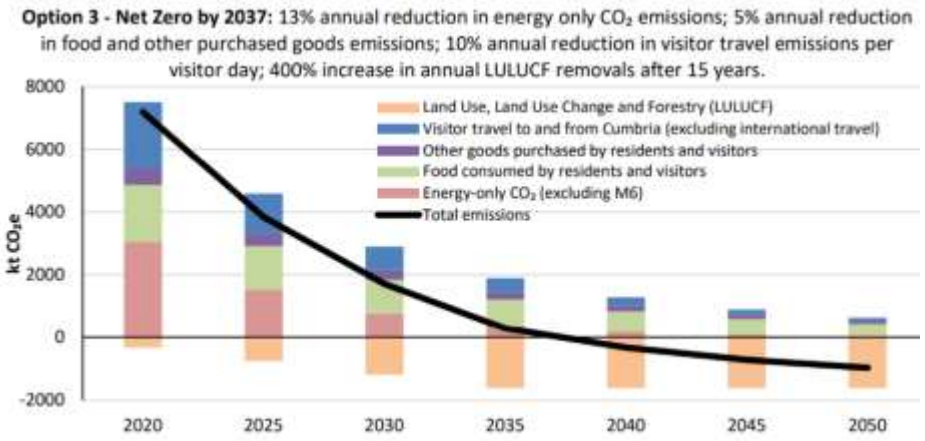
Sustainable tourism

161. A vision for low-carbon Cumbria which would improve quality of life for residents and promote sustainable tourism. A target that includes the following components:
    - Energy-only CO^2 measured on production basis, excluding the M6 (which Cumbria has little influence over);
    - GHG emissions for Food consumed by residents and visitors;
    - GHG emissions for other goods purchased by residents and visitors;

[61] https://cumbria.gov.uk/elibrary/Content/Internet/536/671/4674/17217/17225/4414012219.PDF

- GHG emissions from visitor travel to and from Cumbria, excluding international visitor travel; and
- Land Use, Land Use Change and Forestry (negative emissions).

Figure 12. Cumbria's recommended pathway to net zero for Cumbria by 2037



162. In Figure 12, five possible targets are provided, and from these recommend Net Zero by 2037, which is the most feasible target that can be regarded as being in line with the IPCC for "well below 2.0 degrees and in pursuit of 1.5 degrees."

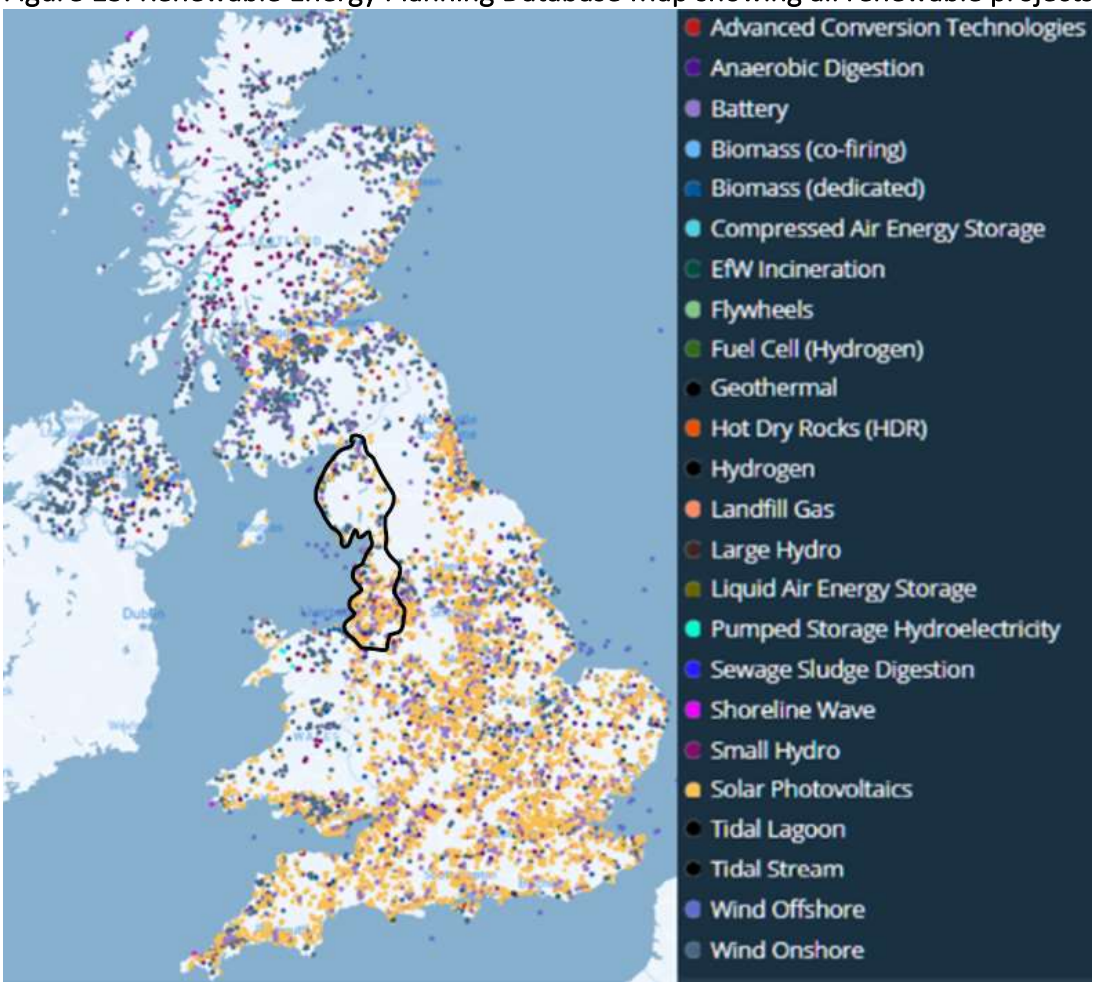
163. Extraction-based emissions and renewable and nuclear energy production figures are excluded from the methodology for the net-zero trajectory for Cumbria.

164. It is suggested that separate targets for renewable energy produced in Cumbria are adopted and exported to the national grid, and for extraction-based emissions reporting. How much energy is sought from Solar PV is unclear.

4. North West Data from the Renewable Energy Planning Database (REPD), Jan 2024

165. Nationally, the Renewable Energy Planning Database (REPD)[62] shows the total number of renewable projects to be 10,333 with an installed capacity of 229.4GW. The REPD maps[63] the spatial distribution of renewable projects as shown below with twenty-four renewable energy project types, as shown on the legend in Figure 13.

Figure 13: Renewable Energy Planning Database Map showing all renewable projects



(N.B. The minimum threshold for installed capacity (MW) in the database was 1 MW until 2021, at which point it was lowered to 150 kW. This means that projects below 1 MW that were going through the planning system before 2021 may not be represented in the REPD. The estimated energy production (GWh) of a plant depends on its capacity factor.)

[62] https://www.gov.uk/government/publications/renewable-energy-planning-database-monthly-extract

[63] Renewable Energy Planning Database | DESNZ & Barbour ABI (barbour-abi.com)

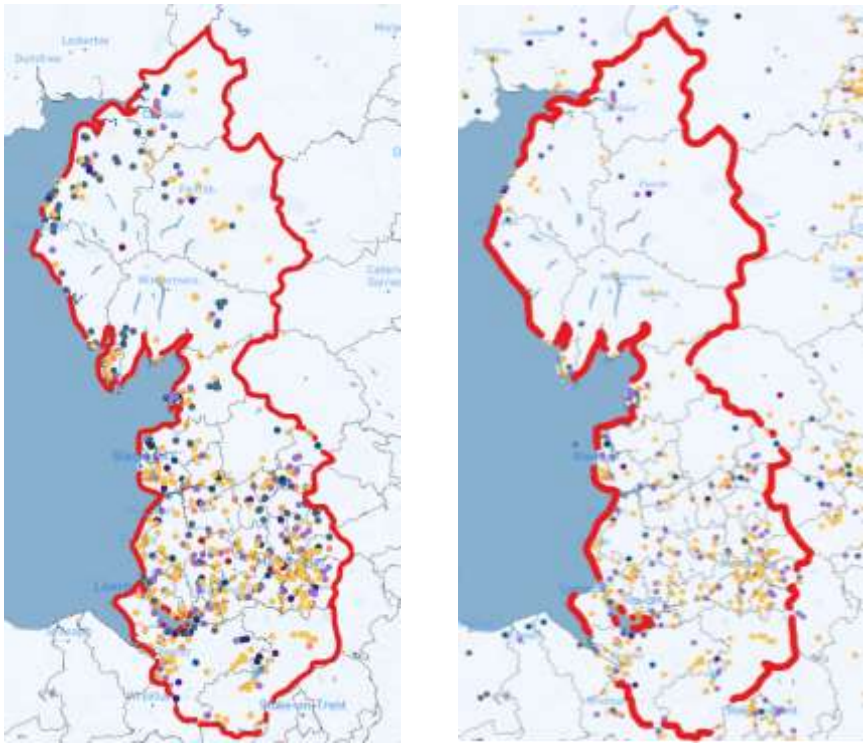
166. Table 9, below, shows 4,901 are solar (47.4%), with an installed capacity of 42.0GW, equal to (18.3%). Roof mounted represent roughly one fifth of the solar projects with a combined installed capacity of 2.4%.

Table 9 showing REPD Data for the UK, January 2024

Total Renewables	10,333
Total Installed Capacity	229,398MWelec
Solar	4,901
Solar Installed Capacity	41,958 MWelec
Floating	3
Ground Mounted	2,929
Mixed	12
Roof	1,898
Roof Installed Capacity	1,001 MWelec

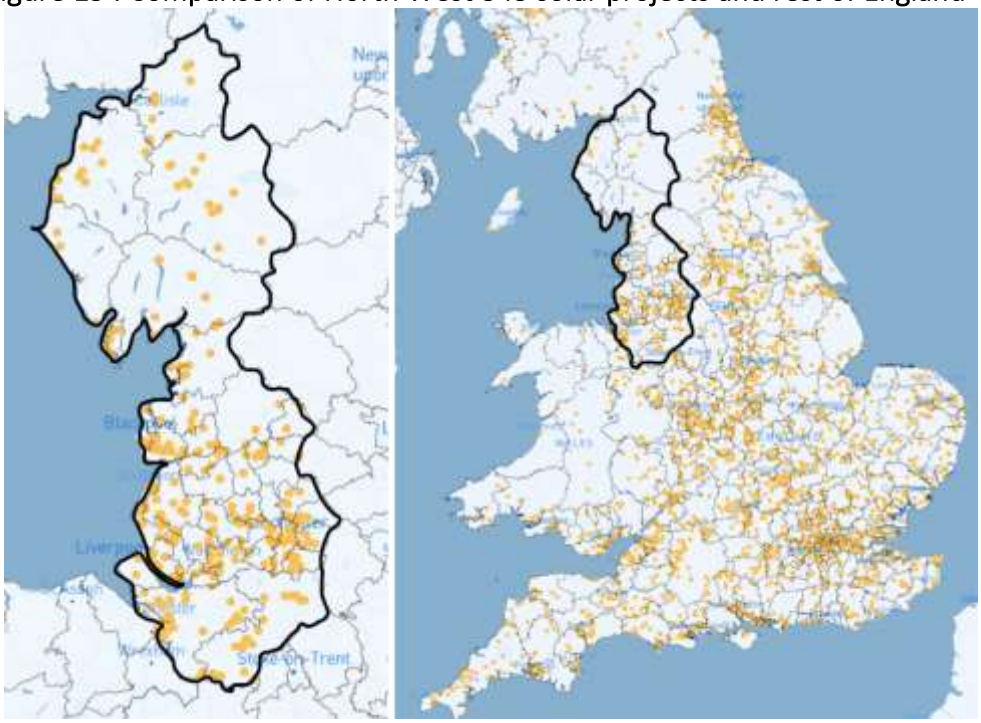
167. Figure 14 maps show (left) all the NW energy types, totalling 731 projects, and (right) those NW energy projects registered in past 5 years (from March 2017 to March 2024)

Figure 14: NW energy projects registered (left) ; projects from March 2017 (right)



168. In the North West there are clusters of renewables around the City-Regions and Cumbrian coast. In the past five years there are more solar and battery projects compared to other renewable types.

Figure 15 : Comparison of North West 343 solar projects and rest of England



169. Figure 15 maps the North West's 343 solar projects, equal to 7.0% of the national solar projects of 4,893 projects. The North West solar projects are distributed throughout the area with clusters in the City-Region areas. Table 10 shows that across the North West there are 235 projects. More than two-thirds, 68.5% are identified on the map in Figure 15, above range from Micro 0-5MW, Medium sized 5-50MW, and Major >50MW. As shown in Table 10, the majority of projects are micro in energy generation capacity.

Table 10 REPD data of North West installed solar projects by scale

	Micro 0MW-5MW	Medium 5MW-50MW	Major 50+MW	Total
Cumbria	22	9	0	31
Lancashire	42	10	0	52
Greater Manchester	66	0	0	66
Liverpool City Region	28	2	0	30
Cheshire	42	13	1	56
	200	34	1	235

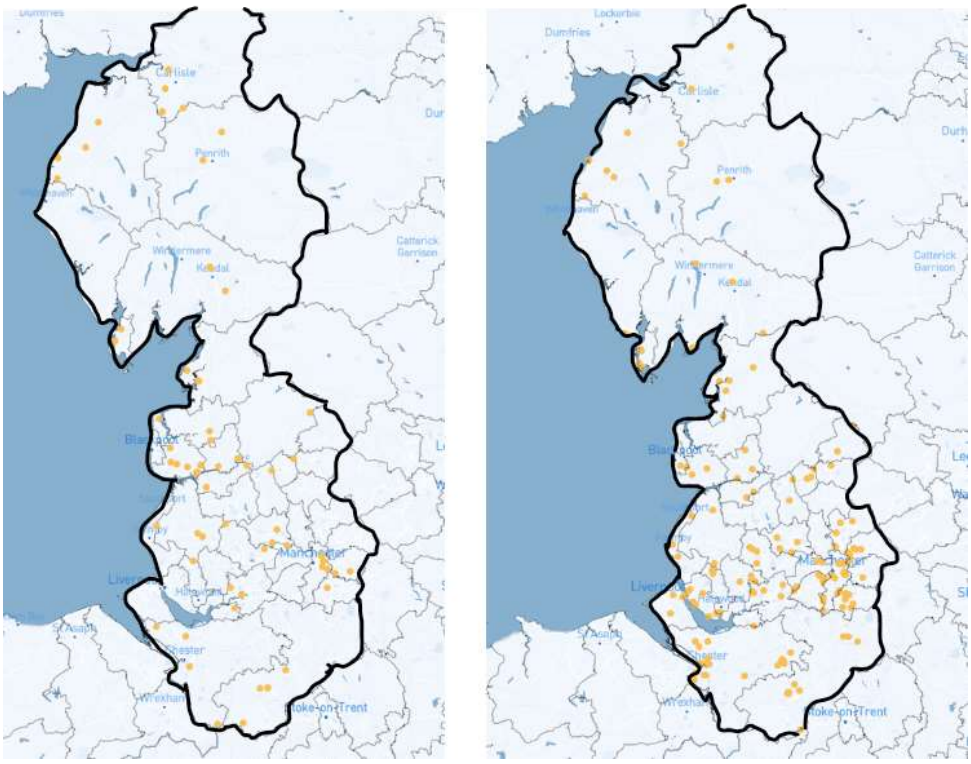
170. The remaining 106 project or 31.5% have been either abandoned, withdrawn, refused, had projects revised or planning permission expired. Further detail is set out in Table 11, below. One third of projects are not materialising showing a high risk of not achieving planning consent.

Table 11 showing the status of solar applications across the UK and North West share.

Status/level	UK	NW	%
Abandoned	125	14	11.2
Appeal lodged	0	0	0.0
Appeal withdrawn	8	3	37.5
Refused	319	25	7.8
Submitted	506	31	6.1
Application withdrawn	146	9	6.2
Awaiting Construction	1,956	153	7.8
Decommissioned	0	0	0.0
Finished	0	0	0.0
No application required	5	0	0.0
Operational	1,333	66	5.0
Planning permission expired	135	10	7.4
Projects revised	219	19	8.7
Under construction	141	13	9.2
Total	4,893	343	7.0

171. Figure 16 shows map extracts show (left) the 66 operational projects and (right) the 153 projects awaiting construction . It shows an imminent doubling of projects.

Figure 16: Map extracts showing Operational projects and those Awaiting construction



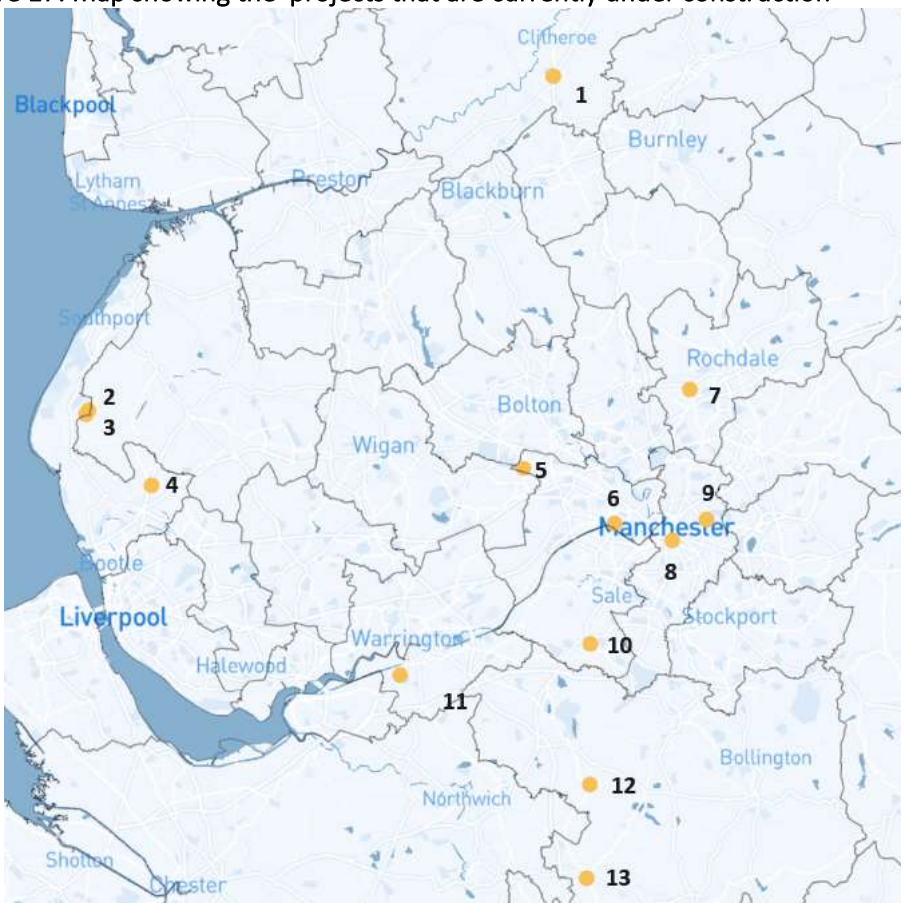
172. There are 13 projects under-constructed (or recently completed) are shown in Table 12 below.

Table 12: Showing solar projects in the North West currently under construction

Operator	Solar type	(MW)	Date	App Ref/Comment
1.Total Food Services	Roof	0.2	Nov-22	Ribble Valley 3/2022/1006 PDR prior approval not required
2.BE Renewables	Ground	5.0	Jul-15	Sefton DC/2015/01265 In 2020 varied the permission for 40 years
3.Beacons Cross Solar	Ground	5.0	Aug-15	Sefton DC/2015/01266 In 2020 varied the permission for 40 years
4.Deyes High School	Roof	0.6	Mar-22	Sefton DC/2022/00375 Net zero sixth from college with a green roof and canopy with solar PV
5.Private Developer	Ground	1.9	Mar-20	Salford 20/74960/FUL Land used for recreation and in a designated wildlife corridor. The adjacent site to the south and west is in Green Belt.
6.Turnpike Deport	Roof	0.5	May-23	Salford 23/81528/FUL installation of solar car ports in the car park areas at a council owned operations depot, at Turnpike House on Eccles New Road
7.Rochdale Council	Ground	4.0	Jun-20	Rochdale 20/00687/FUL This was permitted on the 10.8 hectare site in the Green Belt.
8.Royal Northern College of Music	Roof	0.2	Aug-21	Manchester 131256/FO/2021 Roof top PV for onsite electricity, Air Source Heat Pumps
9.National Cycling Centre	Roof	0.9	Apr-22	Manchester 101166/PRJ/20 Cannot see application on Council planning applications system. The canopies in the car park are complete.
10.Tesco	Roof	0.5	Jul-20	Trafford 101166/PRJ/20 Roof mounted PV
11.Former golf course	Ground	1.0	Feb-18	Halton 18/00087/FUL. Solar farm at St Michaels Jubilee Golf Course, Widnes Cheshire WA8 8BS
12. Barclays Plc	Roof	2.5	Feb-22	Cheshire East 22/0560M Solar PV above existing car parking spaces at Radbroke Technology Centre, Knutsford, Barclays centre of excellence.
13.Recipharm HC Limited	Roof	0.96	Feb-21	Cheshire East 21/0777C Prior approval not required under Schedule 2 Part 14, Class J of the GPDO 2015

173. Figure 17 shows the location of the projects currently under construction in the North West, see Map and Table below. Due to the controversial nature of ground mounted solar, the timescale for project coming forward is generally longer than roof mounted.

Figure 17: Map showing the projects that are currently under construction



174. Figure 17 shows the location of the 13 projects currently under construction in the North West, see Map and Table.

175. It is observed that the timescale for ground mounted solar projects is generally longer than roof mounted solar PV.

5. North West Installed Capacity by Parliamentary Constituency

176. Published government energy statistics[64] , show (provisionally) that at the end of December 2023 there was a total of 15.7GW of solar capacity in the UK across 1,441,285 installations. This is an increase of 6.9% (1.0GW) since December 2022.

177. In the North West there is a total of 385.1MW (0.385GW) of installed capacity, equal to only 2.45%. This is from 114,332 installations, equal to 7.9% of the national solar projects. The Table below shows the North West installed capacity and number of installations by county area and sub-region, and the table in Appendix 2 shows the information by constituency.

Capacity by county and sub-region area

178. Table 13 shows the breakdown of capacity and number of installations by sub-region.

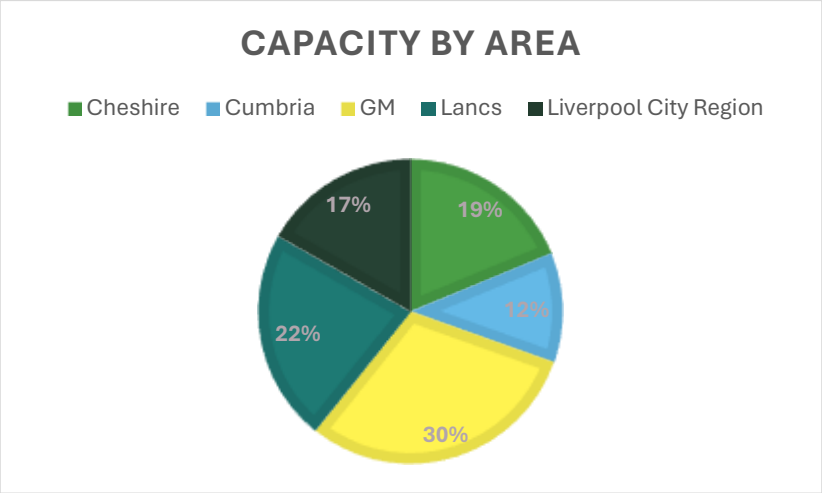
Table 13 showing the summary of capacity by sub-region

County/City Region	Installed capacity (MW)	Installed Capacity (%)	Number of installations	constituencies	No of LPAs
Cheshire	72.3	19	20,450	11	3
Cumbria	44.9	12	12,041	6	6
GM	116.8	30	37,575	26	10
Lancs	86.7	22	24,165	16	14
Liverpool City Region	64.4	17	37,575	16	6
North West	**385.1**	**100**	**114,332**	**75**	**39**
*N.B. To avoid duplication each constituency is only referred to once. Where within a city-region it is not repeated in the county					

179. Greater Manchester area generates the largest amount of energy from solar with 30% of the North West capacity at 116.8MW from 37,575 installations, as shown in the Table above and illustrative pie chart in Figure 18 below. The second largest capacity of 22% comes from Lancashire, the third largest Cheshire with 19%, with Liverpool City Region 17% in fourth position and Cumbria with 12% of capacity in fifth.

[64] https://www.gov.uk/government/publications/desnz-standards-for-official-statistics/statistical-revisions-policy

Figure 18: Chart showing installed capacity by county/ sub-region



Urban/rural split

180. Table 14 shows the 75 constituencies split by urban/rural classification.

Table 14 of North West constituencies by urban/rural classification and capacity

Constituency	number	Installed capacity (MW)	Number of installations	Watts/ installation
Largely Rural	4	32.5	7,810	4.15
Mainly Rural	4	35.2	9,345	3.76
Urban with City and Town	18	87.2	25,874	3.37
Urban with Major Conurbation	41	178.1	56,839	3.13
Urban with Significant Rural	8	52.1	14,464	3.60
North West Total	**75**	**385.1**	**114,332**	**3.36**

181. The Largely Rural authorities (of Congleton, Eddisbury, Lancaster and Fleetwood and Ribble Valley) have a combined total of 32.46MW from 7,810 installations; and similarly, the four Mainly Rural authorities (of Copeland, Penrith and the Border, Westmorland and Lonsdale and Workington) have a combined total of 35.22MW and 9,345 installations. Rural areas contribute 17.6%.

182. There are 18 Urban with City and Town Authorities with a combined total of 87.2MW and 25,874 installations. Urban and Major Conurbations are the largest group of 41 constituencies and these combined have the highest solar contribution with 178.1MW for 56,839 installations. Finally, there are eight constituencies classified as

Urban with Significant Rural which have 52.1MW. Combined, the Urban areas contribute 82.4%.

183. The table shows when the installed capacity is divided by the number of installations and times by 1,000 to translate from Mega Watts (MW) to Watts (W) the average Watts per installation is highest in Largely Rural areas with 4.15 compared to the lowest of 3.13 in Urban with Major Conurbation. This might indicate that in rural places the installations are either ground mounted or achieved from larger roof spaces, whereas in urban places the solar installations are more likely to be from smaller domestic rooftops due to higher density development.

By capacity

184. Penrith and The Border in Cumbria has the highest amount of installed capacity with 13.3MW from 3,461 installations. The second is Eddisbury in Cheshire with 10.2MW from 2,508 installations and the third is Westmorland and Lonsdale in Cumbria with 9.2MW from 2,584 installations. Fifth and four highest capacities by constituency installed is in Ribble Valley and Knowsley with 8.7MW and 8.5MW, respectively. Conversely, the lowest capacity is in Blackpool South with only 1.9MW from 550 installations. The second, third, fourth and fifth lowest capacities are in constituencies in the Liverpool City Region.

By number of installations

185. The highest number of installations corresponding to the highest installed capacity is in Penrith and The Borders with 3,641 installations. Knowsley has the second highest number of installations with 3,041 followed by Blakely and Broughton with 2,753 and Warrington North. With 2,628 solar installations. Westmorland has the fifth highest number with 2,584 and Eddisbury has the seventh highest with 2,508. The higher capacity with a lower number of installations may imply ground mounted in these two areas.

186. Blackpool South has the lowest number of installations with only 550 installations, and Blackpool North fairs sixth lowest with 777 installations. The second, third, fourth, and fifth lowest take up is in Liverpool City Region.

Summary

187. The North West contributes 385.1MW, which is only 2.45% of the national solar energy from 7.9% of the installations. Greater Manchester generates the most solar energy with 30% and Cumbria the lowest with 12% of the installed capacity. Rural areas contribute less than a fifth of solar energy. This position could be improved without harming the agricultural and other land based sectors if more PV on roofspace was encouraged.

6. Warehousing and Logistics

188. In compiling the research for the report CPRE met with representatives of the UK Warehousing Association(UKWA), which is the voice of the logistics industry. It has researched the value of installing solar photovoltaics (PV) in the warehousing sector. It considers that *"Warehousing is in a unique position for solar power, providing an unparalleled amount accessible roof space close to industrial and residential centres".*

189. Baroness Anne McIntosh of Pickering, Honorary President of UKWA in its Policy Paper on How the UK's Warehousing Sector can double Britain's solar capacity and accelerate the journey to net-zero said " *I wholeheartedly support the work of the UK Warehousing Association in its campaign to promote more sustainable and secure energy sources for warehousing and logistics, to the benefit of both the sector and the UK….In my view, this is a clear opportunity for the Government to work with the sector to achieve its targets on net zero and the decarbonisation of electricity."*

190. UKWA also published a new report by Savills *The Size and Make-Up of the UK Warehouse Sector*[65]*,* showing since its first report, development of warehouses of over 1 million sq ft has risen by a staggering 345%. The North West is the fourth largest for warehouse stock when considering the 2015, 2021 and 2024 data with Transport being the sector occupying the most warehouse property. Rooftop solar will have an increasing role to play as the warehousing sector is driven by further automation and the greater emphasis on achieving an EPC rating of B or above for new leases to be signed.

National level

191. In 2022 the UKWA commissioned research to investigate the overall case for installing rooftop solar PV systems in the warehousing sector. In the Investment Case for Rooftop Solar Power in Warehousing report[66] it shows that Warehousing has steadily been increasing its energy efficiency over the last 10 years, through improved lighting, electrification of material handling and system efficiency; however, rooftop solar projects have expanded more slowly.

192. There are 18,500 acres of rooftop space, yet only 5% has rooftop solar. This appears to be a missed opportunity, as the warehousing sector possesses approximately a third of all commercial roof space it has a large potential role to support the rollout of solar PV generation.

[65] Savills-UKWA-Report-The-size-and-make-up-of-the-UK-warehousing-sector-2024-DIGITAL.pdf
[66] UKWA Investment-Case-for-Rootop-Solar-Power-in-Warehousing-August-2022

193. This report summarises the potential benefits for rooftop solar PV in warehousing for the sector's key players and the overall national and local benefits. The key barriers are described, future opportunities for increased deployment have been explored.

194. Finally, three priority areas addressing key barriers have been identified. In overview, UK warehousing has the roof space for up to 15GW of new solar, which would double the UK's solar PV capacity. This could meet National Grid's minimum requirements for solar expansion by 2030 according to their 2022 future energy scenarios (FES), producing up to 13.8 TWh of electricity per year enabling the warehouse sector to become a net producer of green electricity. The UK's 20% largest warehouses can provide 75million square metres of roof space, avoiding the need to develop new land equivalent to the footprint of 500,000 houses.

Local level

195. The Savills 2024 Report shows that the North West warehousing stock has risen by 41% to 92.7 million sq ft. Predicting what will happen in the future Statistica sees online retail as set to grow further, resulting in more warehousing. Cost and sustainability issues are likely to mean a push for more electrification of operations to avoid volatile fuel prices and to reduce carbon footprints. However grid constraints a

196. Rooftop solar PV in warehousing can play a significant role in delivering local renewable energy, particularly in urban areas where limited alternative options are available due to land and planning constraints. Local energy planning to support installations and help achieve higher uptake is currently lacking.

Logistics Sector

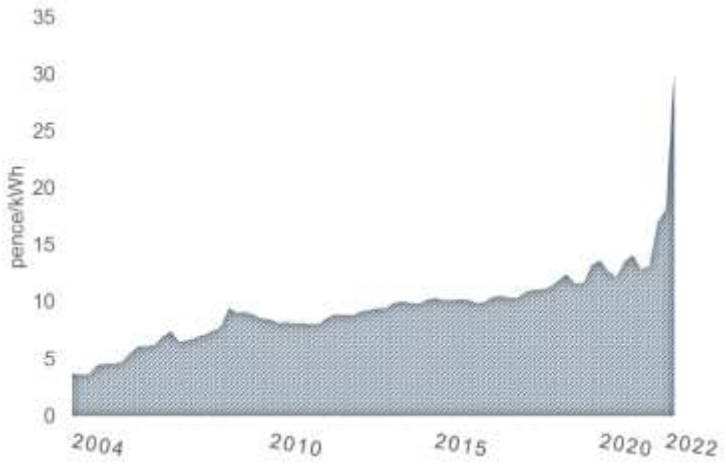
197. Figure 19 shows that commercial electricity prices have doubled since the start of 2022 and are set to continue to rise into 2023. Solar PV can reduce annual electricity costs by 40-80% and protect occupiers against future electricity price rises while preparing for increased demand from electrification of heat and transportation. The UKWA report contains a graph showing the steep hike in prices since 2020, from Department for Business, Energy, and Industrial Strategy, now the Department for Energy Security and Net Zero (DESNEZ), following Prime Minister, Rishi Sunak's reshuffle on 7 February 2023.

198. Solar PV UK rollout expanded significantly in the early 2010's due to generous feed-in tariff support. However, as this subsidy was reduced and ultimately removed in 2019, there has been a significant downturn in solar installations.

199. At 2022 prices, aggregate rooftop solar PV has the potential to save the industry £3 billion per year. Rooftop solar PV presents the sector with a unique opportunity to

significantly reduce environmental impact, potentially reducing CO2 emissions by 2 million tonnes/year while also providing a good financial investment.

Figure 19: Average Commercial Electricity Price 2004-2022



Source BEIS, 2022 Q2 price through consultation

200. For owners and landlords solar PV has a major role in levelling up the UK's warehouses increasing the value and desirability of the warehouse assets. It also supports the drive for increased efficiency and meeting energy performance regulations.

Key barriers

201. Four key barriers were identified in the UKWA research:

- Grid connection constraints are a major barrier to larger scale deployments and require local and national support.
- Energy demand in warehousing is relatively low per unit floor area and does not match solar PV generation profiles.
- Larger installations require adopting different market risk as a power producer, either through outsourcing or a culture shift in the sector to see warehouses as solar power plants and maximise installation size.
- Legal agreements on repair and maintenance to manage landlords and occupiers liability may delay and complicate installations. This can make some smaller projects uneconomic.

202. The costs included relate to upfront planning, installation, and ongoing maintenance, (typically 70-80%) of overall project costs. Income is generated from self-consumption and exporting (avoided cost typically 2 to 3 times more valuable than exported power). Seasonal fluctuations mean more energy in summer and less in winter.

203. The research considered solar sizing and optimisation options it found that smaller installations with high self-consumption provide low risk returns, while larger systems can provide higher overall payback. Power purchasing agreements work for larger installations rather than smaller ones.

204. Also, the terms of business rates can make investment unviable as they go up when premises are improved. It seeks change in the way business rates are applied as not to penalise solar PV on roof take-up.

205. In terms of grid connection, it was noted that local energy planning does not currently coordinate grid upgrades or facilitate local energy generation and consumption. Grid connection permits are a major barrier to rooftop solar installations, increasing costs and constraining project size.

206. An emerging opportunity for smaller installations is the increasing capabilities of aggregators to combine smaller generators into virtual power plants.

207. The warehousing market is increasingly segmented, in particular with the rise of third party logistic models requiring agile operations to manage short term customer contract risks (1-3 years) and shorter leases. Solar PV projects are longer term investment 10-25 years and linked to the warehouse, this mismatch in timescales deters investment from occupiers. Extracting the full benefits is challenging when ownership and delivery are separated. There is a need for standardisation to reduce interface frictions.

208. The report summaries the barriers as: *Investment costs, low electricity demand and grid connections are the main barriers to systems, and a culture shift is required to develop larger installations.*

Future opportunities

209. Electrification of heat, new automation systems and critically electric transportation could significantly increase electricity demand in warehousing. This will improve the economics of rooftop solar through increased self-consumption.

210. Increasing initiatives to streamline the aggregation and resale of excess renewable energy from smaller facilities in local communities will enable higher incomes from exported power, allowing larger systems to operate more economically.

211. Reduction in the costs of local energy storage could allow greater flexibility, improving self-consumption and reducing impact on local network infrastructure.

212. So, the benefits are difficult to ignore and are summarised in the report as: *Rooftop solar PV provides, lower and secure electricity costs, reduced environmental impact, no additional land use and increased asset value and efficiency.*

Key Drivers

213. Solar is expected to expand greatly through the 2020's to support the transition to net zero. Warehousing is also forecast to grow and has a unique asset to support the rollout.

214. A combination of increasing energy prices, the drive to net zero and the prospect of heat and transport electrification means there is a strong need for low cost, low carbon and reliable electricity in the warehouse and logistics industry.

215. What is more, solar panel cost reduction combined with energy price increases is improving the economics making solar PV more attractive to business, resulting in installations rising in 2021 and 2022, they are forecast to rise through to 2025 at least.

216. The analysis from the National Grid, Climate Change Committee and National Infrastructure Commission model predicting a doubling of solar capacity by 2030, with some scenarios requiring much higher deployment means solar installation take up must be realised. National Grid's future energy scenarios[67] consider up to 70GW of solar will be needed to take the current 14 GW of solar to 91 GW by 2050 as part of the leading the way scenario (see table on page 106).

217. The UK government published Energy Security Strategy in April 2024, shows an increase in solar by five times by 2035. A major question is where all this new solar capacity will be built; over the last decade the majority of solar installations have been utility-scale ground-based systems, usually on farmland. With growing pressure on food security and housing there is an increasing need consider commercial rooftops as a priority for solar PV capacity.

218. While regulatory ambitions and the market conditions for solar are improving, there remain barriers to unlocking the full potential opportunity of the UK's commercial rooftops and, in particular, the unique position in the warehousing logistics sector which has the largest combined commercial rooftop space.

[67] https://www.nationalgrideso.com/document/283101/download

219. Logistics has the most automation of any sector and as growth is predicted over the next 5 to 10 years. Decarbonisation of light and heavy goods vehicles is likely to cause be the biggest increase in energy demand in the logistics sector in the near future. Technology is advancing and energy storage has the potential to offset grid connection limitations and improve economics as costs reduce. On-site battery storage can improve solar PV financial viability as likely to decrease in cost as the market grows.

Recommendations

220. The UKWA research calls on government to support solar PV deployment through tax incentives and electricity market reform and reduce barriers in accessing grid connections, including:
    - Financial support to overcome the upfront costs (70% of costs for Solar PV are upfront). In April 2021 the UK government extended a super deduction on capital investment including solar panels, which will end in 2023. UKWA called for this to be extended to 2030 to support continued investment;
    - DEZNEZ, Ofgem, National Grid and District Network Operators should address how new arrangements will improve planning and reduce grid connection barriers for deployment of commercial rooftop solar.
    - There is a need to provide best practice guidance to the industry for solar projects, especially in regard to contractual arrangements between tenants and landlords, and the opportunities for third party financing.
    - UKWA is providing a step-by-step guide for UKWA members outlining the overall process of developing a solar project, the key design options, economics financing and legal considerations.
    - The Savills 2024 Report shows how warehousing has grown by 345%

7. Brownfield Land

221. In the CPRE State of Brownfield research report 2022[68] the number of brownfield sites recorded on Council Brownfield Registers in England was shown to have increased to 23,002, up by 30% since 2018, as shown in Table 15 below. The overall amount of land totalled 27,342 hectares, which at an average build rate of 45 dwellings per hectare could accommodate 1,232,592 homes.

Table 15 : Extract of Table 1 showing brownfield data

Year	Number of sites	Hectares	Number of housing units
2022	23,002	27,342	1,232,592
2021	21,566	26,256	1,162,969
2020	20,750	24,684	1,061,346
2019	18,277	26,002	1,077,292
2018	17,656	28,349	1,052,124
Difference (2018 – 2022)	**30%**	**-4%**	**17%**

222. The State of Brownfield report also shows the breakdown of brownfield land by region. The North West has a comparatively high level, sufficient for 165,919 homes, equal to 13.7% of the national total. In 2022, Manchester was identified as the fourth top local authority for brownfield land capacity and Trafford was the fifth largest increase in brownfield capacity.

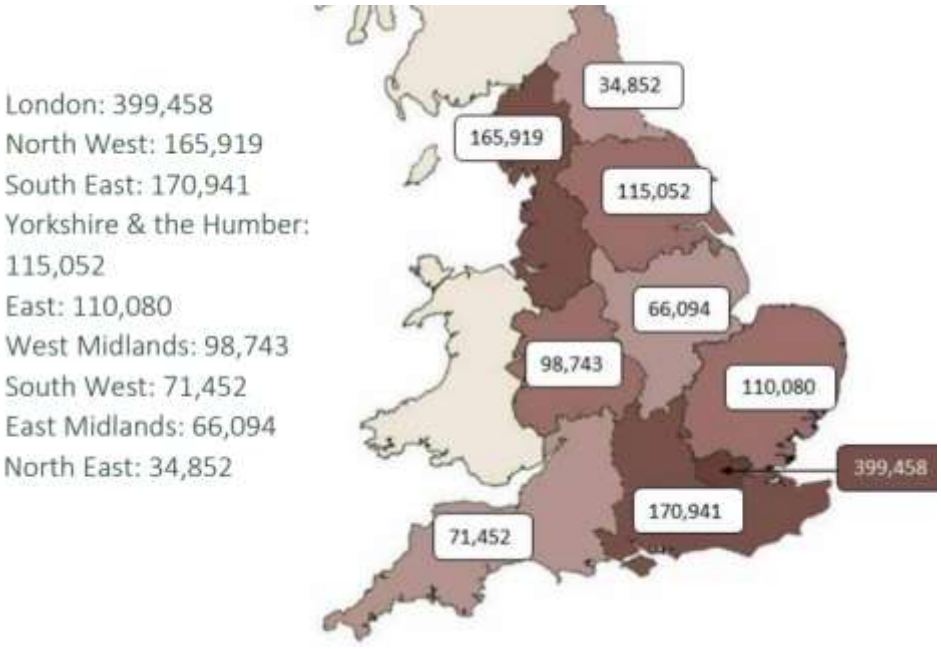
223. Nationally 45% of brownfield land suitable for housing is consented for development, whereas only 33% is permitted for development in the North West. The North West has more brownfield land than elsewhere, and less of it permitted for development (1,217 hectares permitted) when compared to other regions in England.

[68] https://www.cpre.org.uk/wp-content/uploads/2022/12/State-of-Brownfield-2022-FINAL-FORMATTED-15-12-2022.pdf

Table 16 Extract of Table 2 showing minimum housing capacity and % with consent

Region	Minimum housing capacity 2022	Proportion of housing units with planning permission (%)
East	110,080	54%
East Midlands	66,094	59%
London	399,458	46%
North East	34,852	46%
North West	165,919	33%
South East	170,941	48%
South West	71,452	56%
West Midlands	98,743	36%
Yorkshire and the Humber	115,052	40%
Total	**1,232,592**	**45%**

Figure 20: Extract of Figure 1 showing regional distribution of brownfield land



224. If an average build out of 45 dwelling per hectare is applied, this translates into 3,687 hectares. If applying the calculations of the UCL report[69] to convert brownfield to installed capacity for the North West. Looking at Figures 11 and 12, England urban solar potential in the UCL Report, it assumes that 20% of the dwelling footprint is the dwelling and the remainder the garden and curtilage. The category for dwellings on brownfield nationally is 54.7km2 of which 18.6Km2 has installed capacity of 3.3GW or 3.8Twh. When considering the North West, 7.37 km2, would lead to 2.5km2 of installed capacity of 0.44GW or 0.51Twh.

Parliamentary Evidence of Brownfield and health impacts

225. Written evidence[70] to a Parliamentary Committee in April 2016 submitted by Dr Karen Johnson of Durham University highlighted the problems to health and early death arising from people living in proximity to brownfield land. The Government's Environmental Audit Committee Inquiry on soil health was appraised of two published papers of relevance to this issue.

226. The first one, a national-level study (Bambra et al, 2014). The findings from this paper showed that after adjusting for potential confounders there is a strong and significant association between brownfield land and self-reported health measures across England.

227. The second paper (Bambra et al, 2015), examined inequalities both WITHIN and BETWEEN English regions. The within-region analysis results showed that two regions had significant within-region inequality for not good health: North West and South West.

228. Overall, it was concluded that for self-reported health and limiting long-term illness there is a strong, adjusted significant association between brownfield land and poor health outcomes across England and between regions. Based on these findings, brownfield land is a potential public health issue and it was recommended that plans for remediation and redevelopment of brownfield land would improve self-reported health.

229. In Appendix 3. North West Brownfield Land data includes a map of all the brownfield sites in the North West, dated March 2024. This shows large clusters of sites around Greater Manchester and Liverpool City Regions and the cities and towns of Barrow-in-Furness, Blackpool, Carlisle, Lancaster, Preston, and the North West there is less reason to develop solar PV on farm land when brownfield alternatives exist in such large amounts.

[69] Net zero emission energy scenarios and land use (ucl.ac.uk)
[70] https://committees.parliament.uk/writtenevidence/66694/pdf/

8. Case studies

230. In this section, case studies across the different counties and sub-regional City Regions are considered to better understand the strengths and weaknesses of solar energy from roof mounted equipment or development of underused 'grey space'

8.1 Cheshire dairy farms

231. The government's statistics for the North West region[71] in 2022 show the total income from farming was £383 million, an increase of 96% since 2018. The largest contributor to the output value (£2.5 billion) was milk (£1.1 billion), which was equal to 42%. So dairy farming is important to the North West economy.

232. Cheshire's farming sector is typified by dairy herds, many of which have large sheds for sheltering cattle in winter months and for breeding, feeding and milking purposes.

233. Figure 21 shows how local solar PV suppliers advertise the benefits of solar photovoltaic systems to save money on electricity bills and protect against increasing fuel prices and for offsetting a business's carbon footprint. Benefits of Solar PV can also be combined with LED lighting to further reduce the carbon footprint and overall running costs. 25-year warranty and 15-year performance guarantees are offered. The farming magazine advert of eleckenergy.com says it all "Run your farm on free electricity". Options for between 80 and 500 cows are set out at a cost of between £22,164.28 for 20KW of Solar and a 17.4kWh Battery Storage system to £84,877.00 for 100kW of Solar and 52.2kWh Battery Storage.

Figure 21 Solar PV on a barn roof in a rural setting (photo from https://eleckenergy.com/)

234. The government's Improving Farm Productivity grant[72,] now at round 2 stage (updated February 2024) supports farm and horticulture businesses through solar PV systems

[71] https://www.gov.uk/government/statistics/agricultural-facts-england-regional-profiles/agricultural-facts-north-west-region#section-1-key-statistics

[72] https://www.gov.uk/government/publications/improving-farm-productivity-grant-round-2-applicant-guidance/about-the-improving-farm-productivity-grant-round-2-who-can-apply-and-what-the-grant-can-pay-for

among other capital items. Applications range from a minimum grant of £15,000 and a maximum grant of £100,000 per applicant business. Farmers need to be able to pay the remaining project costs, using loans, overdrafts, and certain other monies. For example, money received through the Basic Payment Scheme or agri-environment schemes such as the Countryside Stewardship scheme. However, other public money cannot be used. The grant can be used to pay for the following items: solar PV panels; solar batteries; inverters; utility meters; electrical grid connections; and power diverters. These are for Solar PV panels on farm building rooftops and irrigation reservoirs, not for ground mounted and it is via a two stage application process.

235. However, as National Farmers' Union (NFU) Chairman, Richard Blackburn, a Cheshire dairy farmer, set out in his blog[73] in August 2021, that earning a living through farming can be on a knife edge, with margins "*squeezed so tight that only a small detrimental influence can mean financial ruin*". He put this down to rising costs of fertiliser, feed and fuel prices, loss of important crop sprays and poor contracts with processors will all play their part. He would agree that reducing farming energy costs would be beneficial.

236. NFU Energy offers services including for solar[74], including an assessment of whether a renewable energy project is "worth it". NFU Energy's Renewable Energy Solutions service gives a one-stop shop "taking away the hassle and headache of knowing where to start". Generally solar requires an application for consent, are strictly controlled in protected areas, such as national parks; ; areas of outstanding natural beauty; and conservation areas etc, and when of a smaller-scale may fall under 'permitted development rights' (PDR). A Lawful Development Certificate for those installed via PDR is recommended as helpful when seeking grants or in the event that the property is later sold. General limits are:
    - on a wall, or a pitched-roof, must lie within 200mm from the surface of the building.
    - PVs installed on a flat roof should not protrude more than one metre above the highest part of the roof (excluding the chimney).
    - Equipment mounted on a roof or wall must not be within 1m of the external edge or junction to another wall or roof.
    - Roof-mounted PV capacity cannot exceed 1MW.
    - Solar panels must not be installed on a listed building or on a building within the grounds of a listed building, or on a site designated as a scheduled monument.
237. Dairy farmers make an important contribution to the North West economy. They have wasted roofspace. The environmental benefits of installing roof-mounted solar are not disputed. Due to income volatility some farmers appear to consider the installation of solar either "*not worth it*" or/and "*too much hassle or a headache*". The government could take action to tackle these challenges to ensure more take up.

[73] https://www.nfuonline.com/updates-and-information/chairman-s-blog-cheshire-s-richard-blackburn/
[74] https://www.nfuonline.com/updates-and-information/planning-ahead-for-solar/

8.2 Cumbria Action for Sustainability

238. Cumbria Action for Sustainability (CAS)[75] is Cumbria's climate change and sustainability charity with a vision for a zero carbon. It aims to achieve this by promoting and facilitating low carbon and its benefits; inspiring and supporting individuals, communities, and organisations across Cumbria and beyond to decarbonise by 2037 or sooner.

239. The charity is funded mostly through grant income, 88% and the rest through earned and investment income and it supports homeowners and small businesses in Cumbria to install solar PV, by providing independent advice and improving access to good installers. It considers renewable energy generation as one of the most important weapons in fighting the climate emergency. It confirms that there is plenty of sunshine in Cumbria to generate worthwhile amounts of power.

240. The 'Solar Made Easy' project helps to encourage the installation of more solar PV infrastructure. CAS want to help people understand solar PV, how it works and how to go about getting it installed and we also want to get people thinking about energy efficiency. Figure 21 shows the Frequently Asked Questions leaflet and project outputs.

Figure 21: FAQs and a mapping tool to assess the viability of roof space

241. In 2020, CAS developed a mapping tool including a purple 'blob' to denote that a roof is viable for solar PV. Hovering over the roof, a pop up shows the potential electricity that could be generated from solar PV. The mapping tool recognises whole roof shapes and doesn't recognise property boundaries or ownership, so, for example, the amount of

[75] https://cafs.org.uk/

potential generated electricity might relate to panels on both your roof and the neighbouring property. The estimate can be verified with a site survey.

242. The potential for green jobs in Cumbria report, 2021[76] found that additional green jobs can be created when renewable energy is added into the measures adopted, for example, from renewable electricity generation from wind (offshore and onshore), hydro, solar PV, tidal and anaerobic digestion. Together, over 5,700 jobs in the first 15-year 'transition' and 1,709 in the longer term would be created, of which 5,000 would be in west Cumbria. Furthermore, Cumbria could provide all its own electricity from onshore renewables, even with a doubling of consumption, and still provide a substantial contribution to the national demand.

243. The report notes that the solar capacity predicted in 2011 (of 150.5MW) was all small-scale microgeneration. Since 2011, the price of solar panels has fallen substantially.

Kendal Solar Audit

244. Kendal Town Council's Environment Committee (KTCEC) commissioned such a solar audit of the whole town after receiving a recommendation from Kendal Citizens' Jury on Climate Change. The audit measured the height of terrain and alignment of every roof in Kendal, to assess which roofs in the town are most suitable for solar generation and relied on ordnance survey information and speciality mapping software.

245. The Council, with CAS, which had experience of similar work in Burneside and Ambleside, looked at different options. One, for a community energy scheme concentrated on the larger suitable buildings in Kendal which would allow all residents to invest and own shares. The audit used ordnance survey information and speciality mapping software which measured the height of terrain and alignment of every roof in Kendal, to assess which roofs in the town are most suitable for solar generation.

246. Kate Willshaw of Friends of the Lake District said: "It is great to see the Council, listen to the local group, and seek an innovative approach to urgently act on climate change."

247. The audit will make it easier for residents to put solar panels on their roofs, should they wish to do so, even in Conservation Areas. The Council is also considering a local energy scheme for Kendal to generate their own clean energy.

248. CAS has helped more individuals and organisations understand the benefits of solar PV on rooftops and has created a useful mapping tool to help assess roofspace viability.

[76] The-potential-for-green-jobs-in-Cumbria.pdf (cafs.org.uk)

8.3 South Ribble Council Climate Emergency Task Group

249. Figure 22 shows the solar panels installed on the roof space of the Civic Centre by South Ribble Borough Council, after it declared a Climate Emergency in 2019, and it pledged to be net-zero by 2030 under the terms of the Climate Change Act 2008.

250. A cross-party Climate Emergency Task Group progressed a Climate Emergency Strategy and a Climate Emergency Action Plan in 2021. These identified actions to minimise Greenhouse Gases (GHG) emissions for the Council's activities for 2018-2019, based on calculations provided by Department for Business and Industrial Strategy (BEIS). The seven main GHGs, as covered by the Kyoto Protocol are: carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF6) and nitrogen trifluoride (NF3).

Figure 22: Photograph of Civic Centre Solar PV and the Climate Emergency Action Plan

251. A standard approach to allow the Council to benchmark against others and share best practice was followed, and the resulting report made the following recommendations:
- The amount of natural gas used, primarily used for heating, to be reviewed, with an audit, and if possible reduced. More efficient methods to insulate the Council buildings to be investigated and heating systems, or renewable energy sources for heating, e.g. infrared panel heaters, air source heat pumps (ASHPs), ground source heat pumps (GSHPs), solar thermal, solar PV plus others.
- The total carbon footprint for 2020–2021 was 2,450,179.48 kgCO2e. (CO2e= GHG equivalent emissions). The most significant sources of CO2e emissions for this period were for fuel use, primarily natural gas, also diesel and petrol in the fleet vehicles. These emission sources were prioritised.

252. Councillor Ken Jones proposed the Council progressed a strategy to decarbonise the energy sources of the Council's owned assets. These included the Civic Centre building,

leisure centres and also the council built some new affordable housing for social rent. In Bamber Bridge an old office building has been refurbished for housing and other new builds with best available technology to minimise the carbon footprint has been installed. Now the Council owns 100 residential properties that are energy efficient, 75 of these are extra care homes.

253. Through the work of the Council's climate change task group, the opportunity emerged of attracting significant new investment into six key Council buildings including the four Leisure Centres, the Civic Centre and the Council's Depot, identified as the Big 6. Despite the building improvement works (aid source heat pumps and solar panels) being completed in March 2023 due to cabling connection capacity issues, North West Electricity has said it can only connect the infrastructure later in 2024. This also applies to electric vehicle charging points (EVCP).

254. There were two parts to the public sector funded decarbonisation project. Part 1 related to works on the Civic Centre for air source heating and solar panels on the roof, came from a government grant of £145,004, approved by the Cabinet on the 22nd of September 2021. UK Leisure Framework was used to complete the works.

255. Part 2 was a Salix (BEIS fund replaced by the Public Sector Decarbonisation Grant, a competitively applied for grant with criteria aimed at decarbonisation of heat) loan based on a model of paying back from cost savings. On the 23rd of March 2022, That Cabinet authorised a spend of £5,468,854.00 which includes a grant of £4,968,854.00 from the BEIS Public Sector Decarbonisation Scheme (PSDS) and £500,000 allocated in the Council's Capital programme.

256. A Council report explains the rationale for using the UK Leisure Framework, a procurement model, which was developed by Denbighshire County Council. Alliance Leisure managed the contract and Leisure Energy helped the Council (and others in Hyndburn, Ashfield, and Buxton) secure the funding and manage the design and delivery. Part 2 decarbonisation works were focused on the Council's Leisure Centres, the Civic Centre, and the Depot. £25,000 was spent on batteries and there was a 12 month time limit for spending, which resulted in other councils having to give the money back to the government, as it was too short a timescale to work within.

257. Progress has been made by the Council, despite administrative pressures arising from the tight timescales and system, which seemed to incur unnecessary expense. The Council avoided spending money in a way it considered not value for money. As the cost of electricity has gone up, the savings are lower. The benefit is removing the energy supply from gas network, which is fossil based source. Councillor Keith Martin has subsequently taken on the action. The Council is promoting latest available techniques. Paul Foster, leader is seeking for VAT not to be chargeable on renewables by government to any purchaser to help improve the take up.

8.4 Edge Hill Uni: Lancashire Climate Action Network, Community Energy Preston

258. The following information is taken from the Lancashire Climate Action Network website. CPRE Lancashire, Liverpool City Region and Greater Manchester is engaging with the initiative.

Edge Hill University

Lancashire Climate Action Network — LancsCAN

Community Action Preston

Climate Action Preston (CAP) is a Friends of the Earth local action group. In 2022, several projects were agreed upon by CAP including Community Energy Preston (CEP), a not-for-profit community group, now about to be Incorporated.

COMMUNITY ENERGY PRESTON

Its primary mission was to reduce carbon emissions by increasing the amount of local renewable energy generation. The community share offer will provide the opportunity for clean green investment with annual returns. Net profits will support local projects such as those dealing with fuel poverty and the energy efficiency of homes. For more information on this scheme click here

CEP offer solar panel arrays to businesses and community organisations across Central Lancashire. They will provide roof top solar installations that will lower electricity costs by as much as 15% as well as slashing carbon emissions.

They are looking for premises that use over 10,000 units of electricity per year with non-northerly facing pitched roofs in good condition. If you want to send an 'expression of interest' in the scheme to get solar panels or want to know more, click this LINK to fill in the form. This will also trigger a follow-up where they do an initial desk-top survey of your roof.

If you would like to be involved in the group to make **Community Energy Preston** happen, contact: energy@climateactionpreston.org

You will be sent details of the Zoom and hybrid meetings which take place every three weeks.

Hoping to hear from you!

LancsCAN — Edge Hill University

8.5 Liverpool City Region logistic warehousing shedscapes

259. In recent years, a logistic warehouse 'shedscape' has emerged in the Green Belt between the City Regions of Liverpool and Greater Manchester along the M62 and M6 motorway corridors. Two large logistics sites at Parkside and Omega were recently approved by the Secretary of State via "Call-in" decisions.

Parkside road based logistics in St Helens

260. The land in St Helens, to the west of the M6 Motorway, was historically farmed and then used for coal- mining. Figure 24 is an east facing photo, of the site of the colliery (in the foreground) and the M6 running north to south and the prime farmland beyond.

261. The site is a strategic brownfield site, located at the intersection of two motorways and two rail lines (connecting north to south and east to west). In the North West Regional Spatial Strategy, Parkside was a Strategic Rail Freight Interchange allocation.

Figure 24: Extract from Parkside Regeneration LLP Reserved Matters application documents

262. Parkside Regeneration LLP (PRLLP), a Joint Venture between St Helens MBC and Langtree Property Partners, progressed a large 'road based' logistics warehouse complex of 92,900m2 (use class B8 with ancillary B1 (a)) and associated servicing and infrastructure including car parking, which would breach the M6 motorway to the east incurring a large swathe of high grade farm land. A separate link road development was also approved.

263. Parkside Action Group (PAG), a local community objection group considered that the Green Belt harm and other environmental harms from the cumulative impacts of the two developments formed a negative planning balance. Harm included loss of high grade farm land, ecology, and adverse landscape impacts. There remains concern that

although a stretch of rail siding has been retained the site will never realise its rail freight potential.

264. Without prejudice, CPRE recommended measures to reduce the carbon footprint of the development such as Electric Vehicle Charging Points (EVCP) and Solar PV if consented. Although EVCP were secured by planning condition, the requirement for the installation of solar PV was not included meaning the Council has no ability to ensure solar PV are installed on the vast roofspace of the building or in the extensive car park. This is a missed opportunity and a matter to be addressed by DLUHC.

265. The decision was 'called'-in under Section 77 of the Town and Country Planning Act by the Secretary of State who approved the developments in line with the Inspector's conclusions on 11th of November 2021, (Appeal ref: APP/H4315/V/20/3253194). Although PAG did not managed to stop the development outright, it did ensure improved planning conditions to make the development more sustainable. This included that the buildings should comply with Building Research Establishment Environmental Assessment Method (BREEAM) 2014 'Excellent' and that at least 10% of the energy should be from decentralised and renewable low carbon sources. The proposal is now at Reserved Matters stage, P/2023/0341/RES, the local community and local CPRE group should engage to ensure the installation of Solar PV maximises the benefits.

Omega road based logistics in Warrington

266. Similarly, Omega in Warrington is a large logistic shed development, which was also consented in November 2021, by the Secretary of State at 'Call-in'. It relates to (application ref: P/2020/0061/HYBR) for 205,500 sqm of B8 logistics warehouse (for 30% B2 and 70% B8 split) with ancillary offices, associated car parking, infrastructure, and landscaping; and outline planning permission for manufacturing B2 and logistics (B8) development with ancillary offices and associated access infrastructure works.

267. The site was previously used for farming and would entail the loss of the farm business and ecological harms due of declining farm bird species. Again, this was a 'Call-in' application progressed under Section 77 of the Town and Country Planning Act 1990 with a public inquiry held in April and May 2021 The application was made by Omega St Helens Ltd and TJ Morris Ltd for land at Omega Zone 8, West of Omega South, and South of the M62, St Helens Merseyside. The Inspector recommended that planning permission be granted subject to conditions and planning obligations of the Section 106 Agreement. The Secretary of State agreed with the Inspector's conclusions, except where stated, and agrees with his recommendation.

268. Figure 25, below, shows four images: of the M62 facing east; an indicative illustration of the warehouse with HGVs to show the vast scale; the redline boundary showing the

farmland and woodland to be lost; the masterplan. In the application documents there are no details about installation of solar PV.

Figure 25: Extract Omega application documents showing the large scale of the site

269. Renewable energy was not mentioned at all in the detailed report of the Inspector, or in the planning conditions, and there was not reference to solar PVs. This is considered a missed opportunity. Renewable energy generation would have improved the planning balance by helping decarbonisation in the future.

Summary

270. Parkside and Omega are two very large-scale employment developments allowed at "Call-in". In each case the planning outcomes were improved by planning conditions suggested by CPRE. Sadly, a specifically worded condition concerning solar PV on the roofspace of the giant logistic sheds, or vast car parking area did not occur at Parkside and Omega and this is considered as a missed opportunity.

271. In the future, CPRE will seek solar PV development to be located on roofspace and other wasted space to avoid unnecessary ground mounted on farmland, which will cause unnecessary harm to the area's ecology and will have adverse landscape and visual impact consequences.

8.6 *Places for Everyone* Joint Development Plan and Solar PV

272. Nine authorities in the Greater Manchester Area (Bolton, Bury, Manchester, Oldham, Rochdale, Salford, Tameside, Trafford, and Wigan) are covered by the emerging '*Places for Everyone*' Joint Development Plan, see Figure 26, which has been approved by all Councils, post the examination. N.B. Stockport is preparing its own local plan, due to opposition to large scale Green Belt release and desire to be brownfield focused.

273. CPRE Lancashire, Liverpool City Region and Greater Manchester group (jointly with CPRE Cheshire and CPRE South Yorkshire and Derbyshire) engaged with all stages of the emerging plan consultation and attended the examination, which took part between November 2022 and July 2023, urging for policies that best protect and enhance rural parts of the sub-region as new development is planned, including solar on rooftops.

Figure 26: Extract images from Greater Manchester *Places for Everyone*

274. During the main modifications stage, under JP-S2 Carbon and Energy, the GMCA planners commented in Main Modification ref MM5.2 commented that proposed policy did not take account of the Written Ministerial Statement on Local Energy Efficiency Standards published on 13 December 2023, and it sought the inclusion of this wording, "Local Area Energy Plans have been developed by the PfE districts in collaboration with the GMCA and Energy Systems Catapult (ESC). The Local Area Energy Plans are being funded by BEIS and are consistent with government policy (new footnote). They will become a critical evidence base for Local Plans in setting out possible and cost-effective options whilst highlighting where investment is needed and will inform planning decisions. It is anticipated that Local Plans will further identify geographical locations for such energy

assets, as considered necessary/appropriate within individual local planning authority areas."

275. The Inspectors' Report, which was received by GMCA on 14 February 2024 responded by stating "The examination panel do not consider it would be appropriate or pragmatic to prolong the examination to consider the implications of the WMS." Fortunately, the report did consider that that JP-S2 Carbon and Energy net zero target by 2038 was justified, and the use of the 'energy hierarchy' to deliver this target; this first requires measures to minimise energy demand, followed by maximising energy efficiency, then using renewable energy, then low carbon energy and only then other energy sources should be retained. Other criteria and policy establish some of the ways in which the requirements of the hierarchy can be met, including through connection to renewable energy/heating/cooling networks (8c), energy demand reduction (8d) and promotion of the use of PV installations as a priority.

276. Part 8c encourages connections to renewable energy/heating/cooling networks where practicable. Although the onus will be on applicants to demonstrate this is not practicable, the policy still provides sufficient scope for flexibility so as not be unduly prescriptive. Part 8d states the targets for space heat demand, hot water energy and delivery of on-site renewables. A cross reference to Table 5.1, which includes targets for energy demand reduction, is necessary for clarity. Table 5.1 establishes targets for each of the three categories. The targets for hot water heating refer to the now out of date Part L Building Regulations. These need to be modified to bring the table up to date and consistent with other elements of the policy.

277. The Inspectors Report refers to solar as part of 'renewable energy production' and in paragraph 42, it states "Action on climate change is embedded into the Plan's Vision and Strategic Objectives. The Plan contains ambitious targets and requirements in relation to carbon neutrality and net zero development. These objectives and policy are supported by a range of thematic policies which seek to make the most of previously developed land, avoid or mitigate flood risk, promote sustainable travel, protect, and enhance green infrastructure and biodiversity and support energy efficiency and renewable energy production'.

278. The Report recommended the Main Modifications to make the Plan sound and legally compliant, and thereby capable of adoption as it satisfies the requirements referred to in section 20(5)(a) of the 2004 Act and is sound. As submitted, policies JP-J3 and JP-J4 set requirements of a minimum of 1,900,000 sqm of office floorspace and 3,330,000 sqm of industry and warehousing floorspace respectively across the plan area for the period 2021- 2037. All of the local authorities have approved the *Places for Everyone* spatial plan for adoption.

279. Lancaster City Council experienced similar difficulties at examination due to national policy when it sought imore ambition for development and net zero standards.

8.7 Bentley Motors Headquarters in Crewe

280. The UCL Report[77] considered the use of car parks for solar PV. Most non-domestic buildings have associated car parking, and in addition there are public car parks and residential car parking (excluded here from the estimate of potential) and some of this area can be used for PV. France has approved legislation that will require all car parks with more than 80 spaces to be covered over by solar panels. It referenced that several companies are developing solar car parking.

281. It provided this example of Flexisolar, which claims to have built the largest commercial solar carport in the UK at Bentley Motors, Crewe, with 1,378 bays and capacity 2.7MW (Solar Power Portal, 2023b)[78], see Figure 27 and 28.

Figure 27: Bentley motors Flexisolar car park: 1,378 bays, capacity 2.7MW

282. The Bentley motors example, illustrates that solar PV covering 50% of car park area may be a reasonable assumption to apply to future development through the Future Homes and Buildings Standard.

283. Construction of the UK's largest solar carport at the site of Bentley Motors' Crewe headquarters has been completed.

[77] Net zero emission energy scenarios and land use (ucl.ac.uk)
[78] https://www.solarpowerportal.co.uk/uks_largest_solar_carport_completes_at_bentley_motors_hq/

284. The 2.7MW facility is now being completely utilised after Cambridge-based carport specialist Flexisolar completed the project.
285. Solar Power Portal first broke news of the project in November 2016 when it entered planning, and Flexisolar was appointed to conduct the installation of the project before work started in April last year.

286. Around 10,000 panels now cover 27 separate rows of parking at the Cheshire manufacturing facility, and work was completed in sections in order to allow Bentley to use large areas of the car park during installation.

287. Robert Carpenter, interim managing director at Flexisolar, praised his design and installation teams in delivering the solution.

Figure 28: Bentley motors solar PV car park in its rural setting

288. CPRE would prefer to see such urbanising headquarter office developments located in existing urban areas, however, it acknowledges it is much more land efficient to use the roofspace of buildings and in this case solar canopies over car parks, than on adjacent farm fields due to the loss of agricultural land to grow our food and landscape impacts urbanising rural places.

9. Findings & Recommendations

Findings

289. The CPRE North West groups, in Section One of this report, set out the urgent need to reduce our energy demand, and to decarbonise energy supply in a way that is least harmful to rural places. It observes the government's increased national target of 70GW by 2035. However, the proportion of solar anticipated from solar PVs on the ground is 60%, equal to 157,000 hectares of farmland the size of Greater London, and 40% from rooftops and other wasted 'grey' space, which is clearly the wrong way around. The harms that arise from ground-mounted solar farms due to the loss of farmland for food production and its potential for nature recovery is much greater than roof-mounted solar PV. Rooftop, brownfield and 'grey' space solar is seen as a win-win as wasted space is optimised for solar generation without taking land out of use for farming and nature.

290. CPRE has evidenced that nationally since 2010 we have lost 14,500 hectares of our best agricultural land, which could grow at least 250,000 tonnes of vegetables a year has been permanently lost. Flooding threatens 60% of remaining high grade farm land. Our food security is under increasing pressure as is the potential for nature's recovery.

291. In May 2023, CPRE commissioned research highlighted that nationally there is capacity for 117 GW of solar energy to be delivered on rooftops and other wasted space to avoid 'needless' loss of farmland, wildlife habitat, and loss of rural character. This was based on evidence compiled by UCL, which evidenced why the government should commit to:
    - a national rooftop solar target to be established;
    - a land use framework to protect farmland (especially best and most versatile grades) and for nature's recovery;
    - reform of planning rules, so the Future Homes and Building Standard include mandatory installation on new build and are retrofitted on existing premises.

292. The North West of England is comprised of 35 local authority areas, a map shown the locations in Appendix 1. Together these areas present significant potential for the expansion of solar energy, particularly in the untapped areas of commercial rooftops and grey spaces. Technological advancements mean solar PV is more efficient requiring diffuse radiation and the UK average annual solar energy is about 830 watts per square metre (Wh/m2).

293. Whilst the future capacity of solar PV is estimated at 83GW, currently only 14GW capacity is operational and planned, with 4GW installed on domestic rooftops and 1GW on non-domestic. The Renewable Energy Planning Database (REPD) (BEIS, 2022f) showed 8GW operational and 1GW under construction, assumed to be built. Therefore, an additional 69GW of solar PV is needed in the future. The urban potential of 111GW

located in existing and new car parks and on non-domestic roofs which are comparable in cost to solar farms, represent an untapped opportunity.

294. Understanding what urban capacity, the North West has is of interest to avoid loss of farm fields and potential for nature recovery.

295. CPRE's *Lighting the way: international policies for making the rooftop solar revolution a reality,* research report April 2024, shows evidence from WPI Economics, which shows where government's commit to focused energy investment, there is rapid deployment of solar rooftop installations. Those countries, which have chosen solar on rooftops have supported the diversification of their national energy supply in the future with the advantage of decarbonisation and they are no longer vulnerable to volatile fuel prices. Good examples from Germany, Japan, China, Poland, and Italy are included. The success has come from mandating solar on new buildings, providing financial incentives and also from improving planning rules to support rooftop solar, such as has already occurred in the UK with the doubling of solar PV on rooftops, outside areas in designations areas (National Parks, Areas of Outstanding Natural Beauty, and Conservation Areas).

296. Legally binding international commitments help focus effort on reducing greenhouse gas (GHG) emissions. The most recent Conference of Parties (COP-28) saw agreement to triple renewable energy capacity. The global carbon budget of 900GtCO2 is taken from the Intergovernmental Panel on Climate Change (IPCC).

297. The Committee on Climate Change has established carbon budgets to reduced greenhouse gas emissions by 100% against the baseline by 2050. The UK Carbon Budget is 2,239MtCO2. The 6th Carbon Budget Key findings were:

- More than half of the emissions cuts needed rely on people and businesses taking up low-carbon solutions - decisions that are made at a local and individual level.
- Many of these decisions depend on having supporting infrastructure and systems in place. Local authorities have powers or influence over roughly a third of emissions in their local areas.
- Top-down policies go some way to delivering change but can achieve a far greater impact if they are focused through local knowledge and networks.

298. Already 300 local authorities nationally have declared climate emergency declarations, 35 of which are located in the North West of England. There are good examples across the country of strategies and actions to reduce GHG emissions, in Section 8 the research looks at examples in the North West.

299. The last quarter of 2023 reported that renewable electricity as a proportion of the UK generation grew by 7% on the last quarter of 2022 due to increases in capacity (up 5%) and better weather. Renewable generation increased to 44.5% of total energy

generated, outpacing fossil fuel's share for the fourth consecutive quarter. Last year the UK was an exporter of electricity, and 2.9GW of new renewable capacity has been added, equal to an increase of 5.4%. The largest growth to new capacity was in solar PV, which at 1.1GW, is the highest for almost six years and it continues to be driven by small scale installations.

300. Of note, solar energy supports more labour in the supply chain compared to wind and this provides potential for 99,936 jobs in the North West. Previously a 'solar boom' was experienced with the 'Feed in Tariff' and 'Contracts for Difference', and this has dropped since funding commitments have been removed. Although there are good examples of solar PV delivery, the UK lags behind other countries, and the North West lags behind other UK regions. Whilst it is recognised that no single renewable technology can deliver all the future needed capacity to meet demand, solar energy, particularly that which uses vacant roofspace and other wasted space, including brownfield and 'grey space', could make a more significant contribution in the North West.

301. Since 1990 the UK emissions have almost halved from circa 850 Metric tons of carbon dioxide equivalent (MtCO2e) to 450 MtCO2e in 2020 when legislated carbon budgets were introduced. The 7th Carbon Budget will be set out in 2025. Although this represents a positive outcome, there is a lot more effort required to achieve net zero by 2050, because the easy wins have been won, and the more difficult actions remain.

302. The Centre for Sustainable Energy and the Town and Country Planning Association recommended based on research that the DLUHC amend the NPPF to make it clear the primacy to be affordable in plan making and decision making. In December 2023 the National Planning Framework was amended to include 'significant weight' to the need to support energy efficiency and solar panels are mentioned specifically.

303. UK100 focused on potential "growth opportunity" from decarbonisation, highlighting that the benefits are greater if we act faster on decarbonisation; risk of delay is significant and local areas are hampered from going as fast as they want to, in part due to lack of policy clarity, capital awaiting investable propositions, infrastructure bottlenecks or delays in the planning system. The research identified the importance of local action, and there is specific reference to solar and microgeneration. It called for more supportive local plan policy. The report highlights that solar farms are typically not as controversial as onshore wind, but that large ground-mounted schemes are unpopular and cause public backlash.

304. The timescale for large solar farms is lengthy as they have to go through a Development Consent Order process and if in Green Belt there is no certainty of success. An example of a large solar farm at pre-planning stage in Frodsham, Cheshire West and Cheshire is provided.

305. The Solar Taskforce was established in May 2023 and was due to run up to February 2024. It focused on key objectives of a strategic roadmap, taking action and securing investment and value for money. During the research commentators said the Taskforce had been useful, and the UK Warehousing Association, wished for it to continue as it sees there is a clear imperative for the government to support more rooftop solar.

306. In Section 3 the Carbon Budgets recommended by the Tyndall Centre are set out by region following three approaches of "Grandfathering", by population and by economic performance (Gross Value Added). The North West has the second highest 'Grandfathering budget' in the UK, with 246.4 MtCO2 allocated for the period of 2020 to 2100. This is equal to 11% of the UK's carbon reduction. To stay within this budget, the North West needs to achieve average mitigation rates of CO2 from energy of around -13.2% per year. This requires a rapid transition away from unabated fossil fuel use.

307. The Carbon Budget of the North West is split down by county, and sub-region and in Appendix 2 by local authority area.

308. Commentary is provided in Section 3 about the strategies and actions of each local Council. Some are achieving more success on solar energy deployment than others. Cheshire East and the City-Regions of Liverpool and Greater Manchester show more ambition than government with targets for net zero by 2025, 2030 and 2038, respectively.

309. In Section 4 the Renewable Energy Planning Database is considered. Nationally the total installed solar represents almost half of all projects generating 42.0GW. Despite the potential for 117GW shown in the CPRE commissioned UCL research, only 2.4% of solar installed capacity is derived from rooftop solar.

310. When interrogating the REPD data, thirteen projects under construction it is noted that eight are roof-mounted including private companies (food and pharma), Council, School, Royal Northern College of Music, and the National Cycling Centre. There are five ground mounted projects, including in land in protected Green Belt being promoted by the private sector, and Councils of Halton and Rochdale Council.

311. Section 5 considers the installed capacity by parliamentary constituency based on published government energy statistics. The North West Solar capacity is 0.38 MW equal to 2.45% of the total UK solar capacity of 15.7GW. Within the North West, Greater Manchester City Region has the highest installed solar capacity at 116.8MW equal to 30% of that in the North West, and Cumbria the lowest at44.9MW, equal to 12%. Rural areas contribute 17.6% of solar. Combined, the Urban areas contribute 82.4%.

312. Penrith and The Border in Cumbria has the highest amount of installed capacity with 13.3MW from 3,461 installations. The second is Eddisbury in Cheshire with 10.2MW from 2,508 installations and the third is Westmorland and Lonsdale in Cumbria with

9.2MW from 2,584 installations. Fifth and four highest capacities by constituency installed is in Ribble Valley and Knowsley with 8.7MW and 8.5MW, respectively. The lowest capacity is in Blackpool South with only 1.9MW from 550 installations. The second, third, fourth and fifth lowest capacities are in constituencies in the Liverpool City Region. This position could be improved without harming the agricultural and other land based sectors if more PV on roofspace was encouraged.

313. Section 6 considers the contribution of the logistics sector. In 2022 the UKWA commissioned research to investigate the overall case for installing rooftop solar PV systems in the warehousing sector. It shows that warehousing has steadily been increasing its energy efficiency over the last 10 years, through improved lighting, electrification of material handling and system efficiency; however, rooftop solar projects have expanded more slowly. This appears to be a missed opportunity, as the warehousing sector possesses approximately a third of all commercial roof space it has a large potential role to support the rollout of solar PV generation. The report considered barriers and opportunities.

314. One barrier is that the terms of business rates can make investment unviable as they go up when premises are improved. It seeks change in the way business rates are applied as not to penalise solar PV on roof take-up. However, as commercial electricity prices have doubled since the start of 2022 and are set to continue to rise into 2023. Solar PV can reduce annual electricity costs by 40-80% and protect occupiers against future electricity price rises while preparing for increased demand from electrification of heat and transportation.

315. There are a range of drivers including future automation of a sector that already is advanced in terms of technology, and how prices reduction and battery storage make solar a more attractive investment.

316. In terms of grid connection, it was noted that local energy planning does not currently coordinate grid upgrades or facilitate local energy generation and consumption. Grid connection permits are a major barrier to rooftop solar installations, increasing costs and constraining project size.

317. UKWA have a number of findings that identify recommendations to government and warehouse owners and tenants, calling for more installation to improve the productivity of the logistics sector.

318. In Section 7, the amount of brownfield land in the North West is considered as it is high with enough space for 165,919 homes, when an average 45 dwelling per hectare is applied this gives a land area of 3,687 hectares. Yet only 33% (1,217 hectares) is approved for development and there is a clear win-win opportunity to overcome the blight from vacant and neglected land into energy use. There is published evidence

concerning the association of brownfield land and associated poor health arising. Appendix 3 shows the location of brownfield land across the North West. The map shows large clusters of sites around Greater Manchester and Liverpool City Regions and the cities and towns of Barrow-in-Furness, Blackpool, Carlisle, Lancaster, Preston, and the North West there is less reason to develop solar PV on farm land when brownfield alternatives exist in such large amounts. The category for dwellings on brownfield nationally is 54.7km2 of which 18.6Km2 has installed capacity of 3.3GW or 3.8Twh. When considering the North West, 7.37 km2, would lead to 2.5km2 of installed capacity of 0.44GW or 0.51Twh.

319. Section 8 sets out seven case studies, including:

8.1 Cheshire dairy farms
8.2 Cumbria Action for Sustainability
8.3 South Ribble Council Climate Emergency Task Group
8.4 Edge Hill Uni: Lancashire Climate Action Network, Community Energy Preston
8.5 Liverpool City Region logistic warehousing shedscapes
8.6 Greater Manchester Places for Everyone Joint Development Plan and Solar PV
8.7 Bentley Motors Headquarters in Crewe

320. Some useful action is evident, yet despite the clear potential for solar energy expansion in the North West, several challenges are currently preventing this potential from being fully realized. Broadly these fall into four areas:

321. Firstly, the lack of a clear and consistent policy framework for solar energy at both the national and regional levels is a significant barrier. The absence of mandatory requirements for the installation of solar panels on new buildings and the lack of a national rooftop solar target are key policy gaps that need to be addressed by DLUHC.

322. Secondly, financial barriers are a major obstacle to solar energy expansion. The current Smart Export Guarantee does not provide sufficient financial incentives for the installation of rooftop solar panels, and there is a lack of accessible and affordable financing options for solar energy projects.

323. Thirdly, there are technical challenges associated with the installation of solar panels on rooftops, including issues related to building structure and orientation, grid connectivity, and energy storage.

324. Fourthly, public awareness and acceptance of solar energy are crucial for the expansion of this renewable energy source. Misconceptions about the cost and feasibility of solar energy, as well as aesthetic concerns, can hinder the adoption of rooftop solar panels.

Recommendations

325. To help the UK and North West areas increase the amount of solar PV projects and installed capacity, making the most of wasted space and saving land in countryside from needless development, and the associated harm, the CPRE NW groups make the following recommendations:

- The government should ensure for a clear and consistent policy framework for solar energy at the national, sub-regional and local levels. The Department of Levelling-Up, Housing and Communities (DLUHC) with the Department for Energy Security and Net Zero should ensure a mandatory requirement for the installation of solar panels on new buildings in national planning policy. This is an imperative to support more rooftop solar, and solar on brownfield land and 'grey space' and policy drivers to address current gaps.

- CPRE recommends that DLUHC commits to an approach to prioritise the removal of barriers to use of roof space, brownfield, and grey space, such as car parking for solar PV. Only as a last resort should green fields be used for solar PV and, in such cases, a locational criterion should be applied through national planning policies to ensure based on thorough environmental assessment they are located and designed to:
  - avoid loss of Best and Most Versatile agricultural land;
  - avoid unacceptable loss of landscape character, particularly in National Parks and Protected Landscapes, but also in 'ordinary countryside';
  - avoid Green Belt due to the purpose of keeping land permanently open;
  - and to avoid harm to nature's recovery with commitments to support Biodiversity Net Gain[79] of +10%, , which came into force on 12th of February 2024, in line with Local Nature Recovery Strategies.

- financial commitments to overcome barriers are required to better support the uptake in solar energy on rooftop projects. The deficiencies of the current Smart Export Guarantee should be resolved to provide accessible and affordable financing options for solar energy projects for all stakeholders.

- the technical challenges associated with the installation of solar panels on rooftops, including issues related to building structure and orientation, grid connectivity, and energy storage should be resolved.

[79] https://www.gov.uk/government/collections/biodiversity-net-gain

- Employment and training opportunities, especially in the North West should help decarbonise our energy supply and help areas of Cheshire, Lancashire, and Cumbria level up with other areas to positively contribute to the UK economy in the future.

- The government through DLUHC and DESNEZ has a role in raising public awareness on the benefits of solar PV on rooftops to decarbonise our energy supply to aid future energy security and to tackle the cost of imported energy. There are health benefits from regenerating brownfield land. Misconceptions about the cost and feasibility of solar energy, as well as aesthetic concerns, which can hinder the adoption of rooftop solar panels should be tackled. The case studies in this report help to illustrate good practice and where constraints exist. CPRE NW groups consider it is in the wider good to promote solar PV on wasted space in the future in order to avoid loss of our farm fields and the potential for nature's recovery.

Appendices

Appendix 1. List of Local Planning Authorities

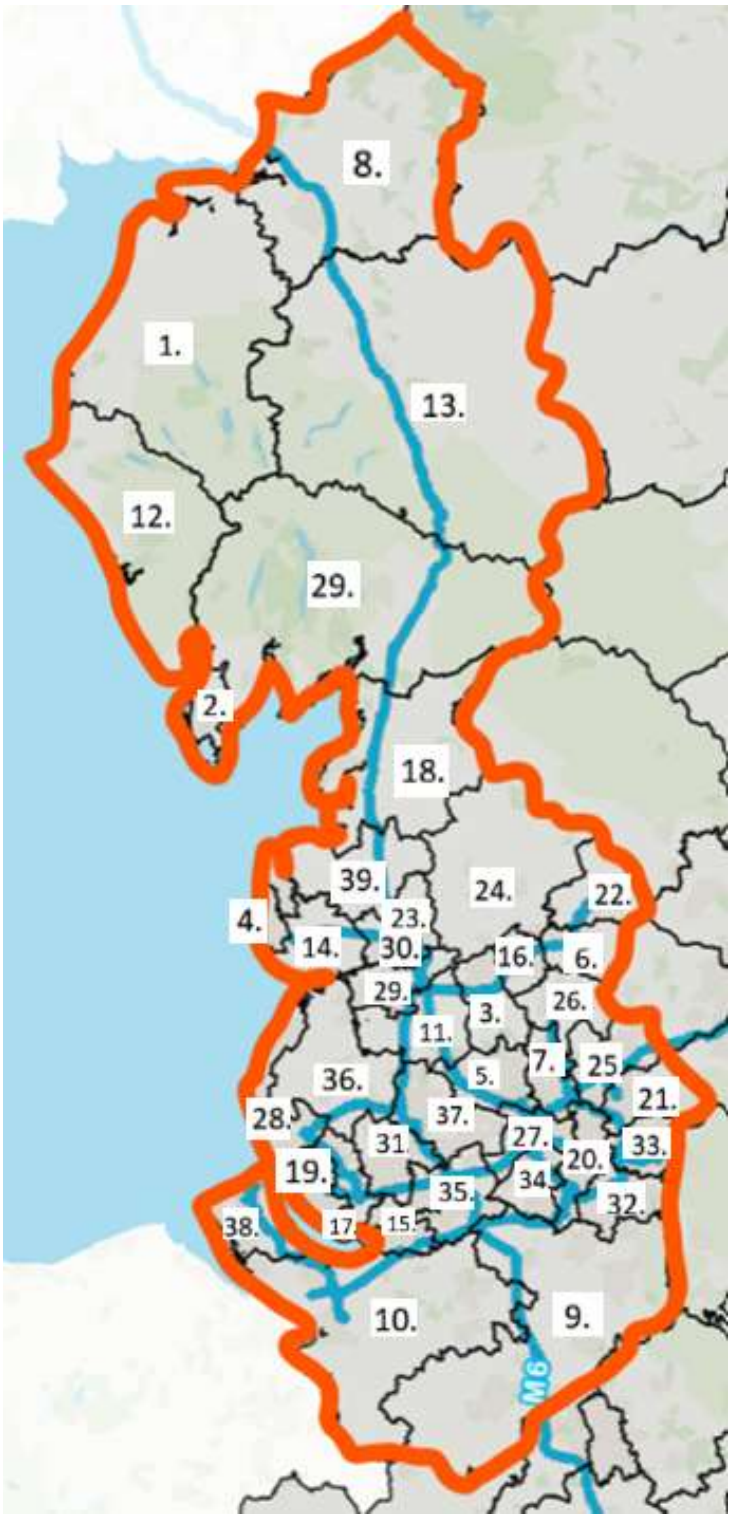
Appendix 2. North West data on solar installations

Appendix 3. North West Brownfield Land data

Appendix 1. List of Local Planning Authorities

Figure: List/Map to show the 39 Local Planning Authorities in the North West Area

1. Allerdale*
2. Barrow-in-Furness**
3. Blackburn with Darwen
4. Blackpool
5. Bolton
6. Burnley
7. Bury
8. Carlisle*
9. Cheshire East
10. Cheshire West and Chester
11. Chorley
12. Copeland*
13. Eden**
14. Fylde
15. Halton
16. Hyndburn
17. Knowsley
18. Lancaster
19. Liverpool
20. Manchester
21. Oldham
22. Pendle
23. Preston
24. Ribble Valley
25. Rochdale
26. Rossendale
27. Salford
28. Sefton
29. South Lakeland**
30. South Ribble
31. St. Helens
32. Stockport
33. Tameside
34. Trafford
35. Warrington
36. West Lancashire
37. Wigan
38. Wirral
39. Wyre



Cumberland authorities * Westmorland **

Appendix 2. North West data on solar installations by constituency

This appendix includes solar installations reported in a December 2023 survey of Major Power Producers (MPP), the Renewable Energy Planning Database (REPD), the Microgeneration Certification Scheme database (MCS) and those subsidised by the Renewables Obligation, Feed-in Tariff, and Contracts for Difference. It does not currently include unsubsidised solar installations below 150 kW capacity that are not recorded in these data sources. We are reviewing data sources to improve coverage and intend to make use of data from other sources when available, such as Embedded Capacity Registers.

Main trends

Provisionally, as of the end of December 2023 there is a total of 15.7GW of solar capacity in the UK across 1,441,285 installations. This is an increase of 6.9% (1.0GW) with since December 2022.

During December 2023, there were 10,291 installations, accounting for 45MW of capacity. While this is the lowest monthly figure since April 2022, these are much higher than average figures seen between 2016 and 2021. These numbers are subject to revision in future months.

After a sharp drop in April 2020 due to Covid-19 lockdown measures, the number of installations recovered by the second half of 2020 and gradually exceeded pre-pandemic levels. Between the closure of RO to new entrants in 2016 and 2021, the median number of new monthly installations was around 3,000 per month. The median over the past 12 months is over 16,000 installations per month.

Domestic installations represent the bulk of the solar PV fleet in the UK, but they only account for 29% of the total capacity. The share of domestic capacity dropped rapidly after the first years of FiT and has lingered at or below 25% since 2016. It has crept back up over the last 18 months, driven by a surge in solar PV installations: in December 2023, 82% of the new schemes were installed on a residential building for a total of 35MW (77% of the new capacity).

Over the course of 2023, a total of 191,524 installations came online, the second highest number in any year, outstripped by 2011 only. However, the amount of new capacity in 2023 is only the fifth highest on record as most of the new installations were small in size.

At the end of September 2023 (end Quarter 3), 50% of capacity (7,708MW) came from ground-mounted or standalone solar installations. This includes the two operational solar farms accredited on Contracts for Difference (Charity and Triangle).

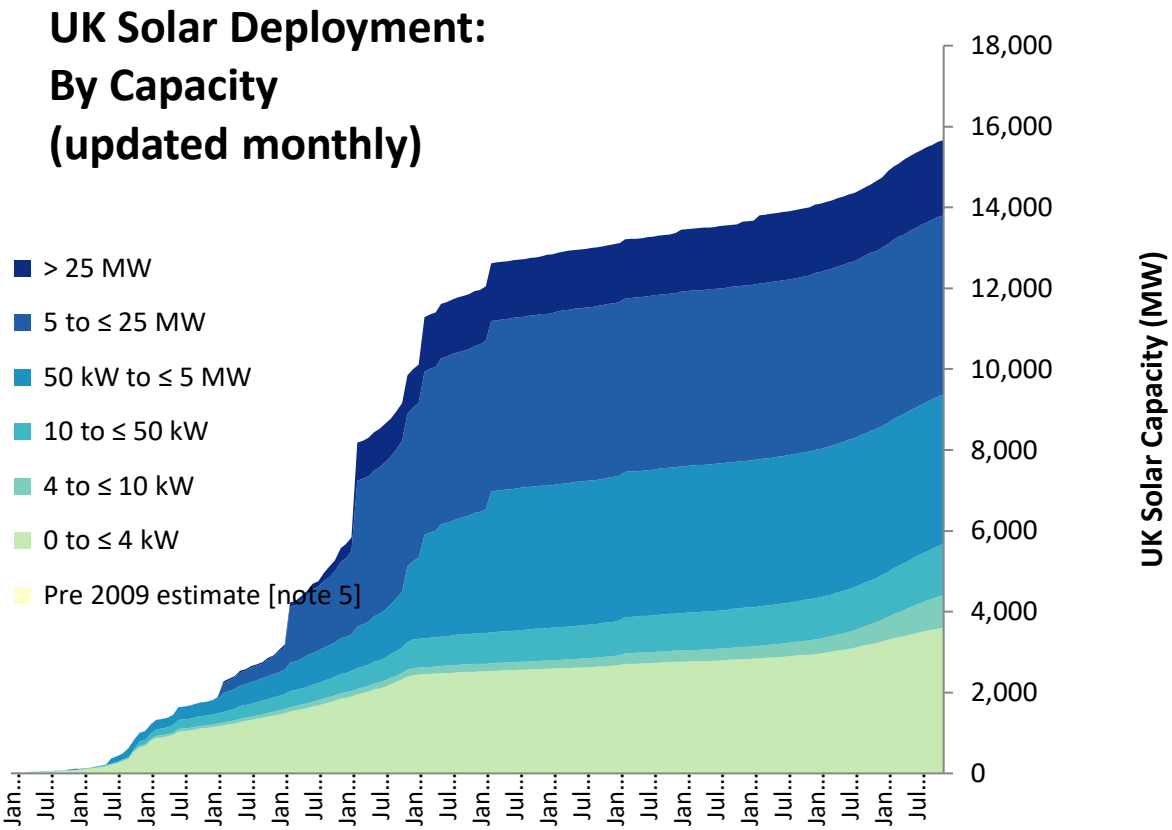
Methodology notes

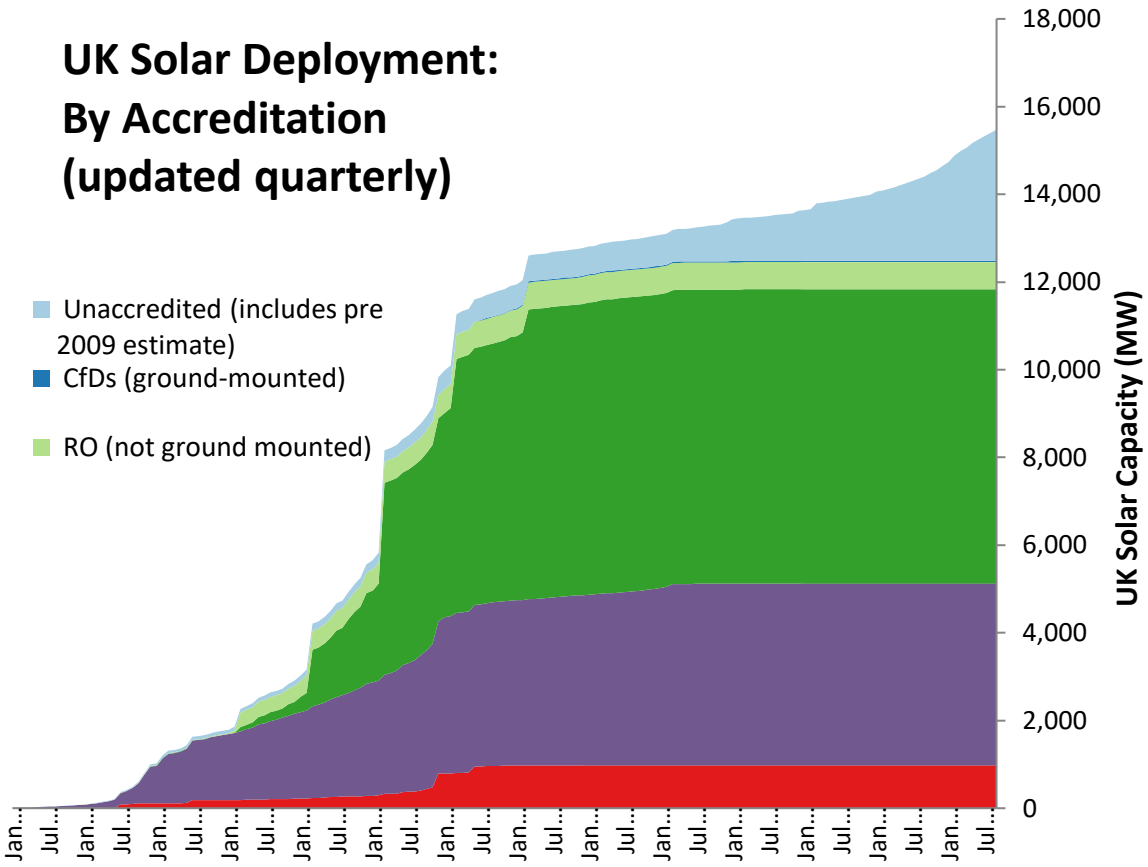
The figure for deployment within the latest month should always be taken as provisional - it is likely to be revised as further data are received on newly operational sites. See the revisions note on the cover sheet for further details.

The time series contains significant step changes for capacity in March for the years 2013 to 2017. This is due to various RO capacity deadlines as well as changes to FITs rates in those months.

In March 2022, the Department published an article alongside these tables seeking feedback on our solar PV statistics. After engaging with external stakeholder, several changes were made to this table to bring it in line with DUKES and Energy Trends. See the Revisions paragraph in the Cover Sheet for more details. The article is available at:

https://www.gov.uk/government/publications/energy-trends-march-2022-special-feature-articles




UK Solar Deployment:
By Accreditation
(updated quarterly)
Unaccredited (includes pre 2009 estimate)
CfDs (ground-mounted)
RO (not ground mounted)
UK Solar Capacity (MW)
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
Jan...
Jul...

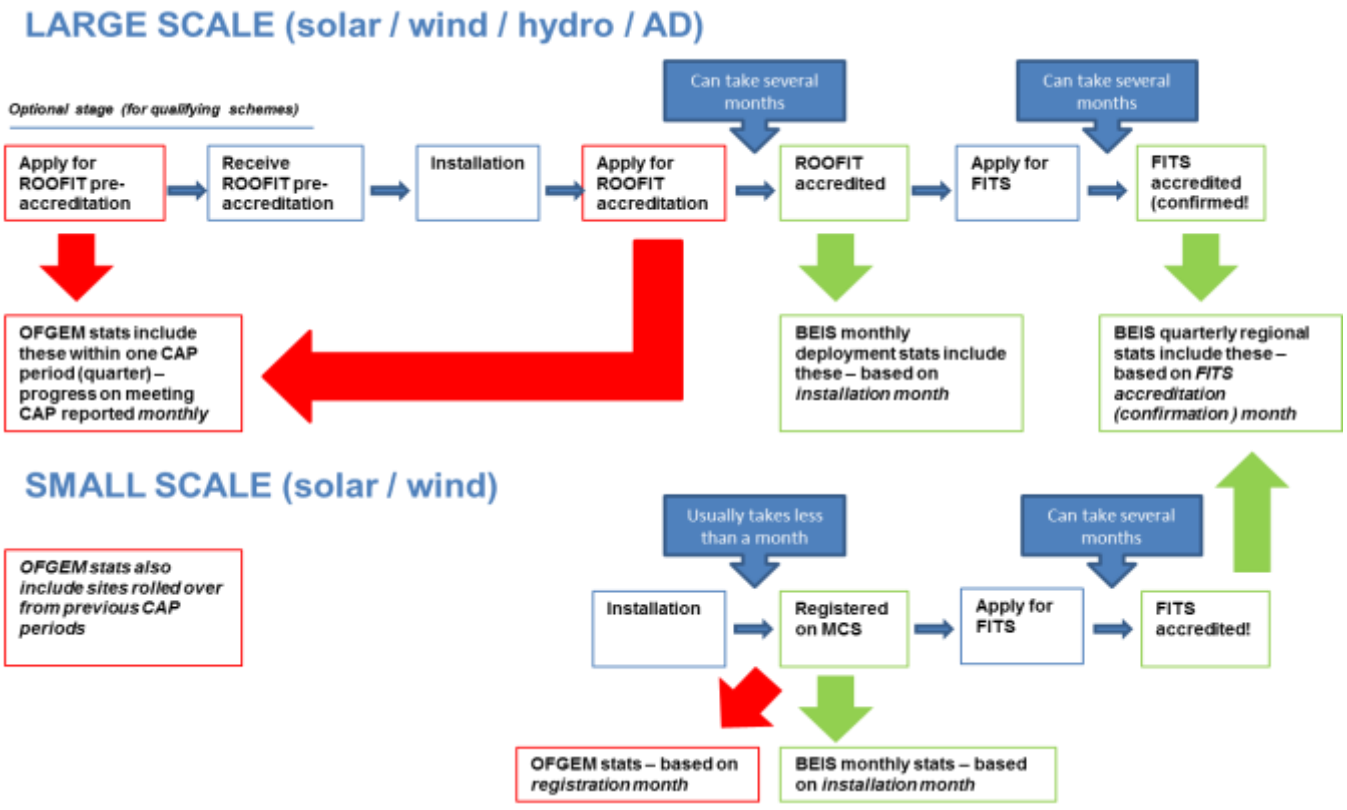

LARGE SCALE (solar / wind / hydro / AD)
Optional stage (for qualifying schemes)
Apply for ROOFIT pre-accreditation
Receive ROOFIT pre-accreditation
Installation
Apply for ROOFIT accreditation
Can take several months
ROOFIT accredited
Apply for FITS
Can take several months
FITS accredited (confirmed!
OFGEM stats include these within one CAP period (quarter) – progress on meeting CAP reported monthly
BEIS monthly deployment stats include these – based on installation month
BEIS quarterly regional stats include these – based on FITS accreditation (confirmation) month
SMALL SCALE (solar / wind)
OFGEM stats also include sites rolled over from previous CAP periods
Usually takes less than a month
Installation
Registered on MCS
Apply for FITS
Can take several months
FITS accredited!
OFGEM stats – based on registration month
BEIS monthly stats – based on installation month

Table: Constituency by county/city region showing capacity and installation

Constituency	Urban/ Rural	Installed capacity (MW)	Number of installations
Cheadle	Urban with Major Conurbation	4.4	1,287
City Of Chester	Urban with City and Town	5.5	1,430
Congleton	Largely Rural	8.0	1,996
Crewe and Nantwich	Urban with Significant Rural	6.5	1,785
Eddisbury	Largely Rural	10.2	2,508
Ellesmere Port and Neston	Urban with City and Town	5.3	1,543
Macclesfield	Urban with City and Town	5.4	1,431
Tatton	Urban with Significant Rural	6.6	1,835
Warrington North	Urban with City and Town	7.0	2,628
Warrington South	Urban with City and Town	6.1	1,859
Weaver Vale	Urban with Significant Rural	7.3	2,148
Cheshire		**72.3**	**20,450**
Barrow in Furness	Urban with Significant Rural	4.7	1,365
Carlisle	Urban with City and Town	4.9	1,331
Copeland	Mainly Rural	6.1	1,640
Penrith and The Border	Mainly Rural	13.3	3,461
Westmorland and Lonsdale	Mainly Rural	9.2	2,584
Workington	Mainly Rural	6.6	1,660
Cumbria		**44.9**	**12,041**
Altrincham and Sale West	Urban with Major Conurbation	3.2	890
Ashton-Under-Lyne	Urban with Major Conurbation	4.8	1,668
Blackley and Broughton	Urban with Major Conurbation	7.7	2,753
Bolton North East	Urban with Major Conurbation	2.9	833
Bolton South East	Urban with Major Conurbation	3.1	917
Bolton West	Urban with Major Conurbation	5.1	1,346
Bury North	Urban with Major Conurbation	3.5	953
Bury South	Urban with Major Conurbation	3.2	839
Denton and Reddish	Urban with Major Conurbation	4.4	1,491
Hazel Grove	Urban with Major Conurbation	5.1	1,659
Heywood and Middleton	Urban with Major Conurbation	5.3	1,646
Leigh	Urban with Major Conurbation	5.4	1,892
Makerfield	Urban with Major Conurbation	4.9	1,473
Manchester Central	Urban with Major Conurbation	4.1	1,518
Manchester, Gorton	Urban with Major Conurbation	2.5	807
Manchester, Withington	Urban with Major Conurbation	6.5	2,473
Oldham East and Saddleworth	Urban with Major Conurbation	4.0	1,097
Oldham West and Royton	Urban with Major Conurbation	4.1	1,226
Rochdale	Urban with Major Conurbation	4.0	1,237
Salford and Eccles	Urban with Major Conurbation	3.4	1,092
Stalybridge and Hyde	Urban with Major Conurbation	6.0	1,988
Stockport	Urban with Major Conurbation	4.9	1,824
Stretford and Urmston	Urban with Major Conurbation	3.1	832

Wigan	Urban with Major Conurbation	4.3	1,319
Worsley and Eccles South	Urban with Major Conurbation	7.4	2,411
Wythenshawe and Sale East	Urban with Major Conurbation	3.9	1,391
GM		**116.8**	**37,575**
Blackburn	Urban with City and Town	6.6	2,004
Blackpool North and Cleveleys	Urban with City and Town	2.7	777
Blackpool South	Urban with City and Town	1.9	550
Burnley	Urban with City and Town	4.1	1,183
Chorley	Urban with City and Town	6.9	2,429
Fylde	Urban with City and Town	5.0	1,372
Hyndburn	Urban with City and Town	3.7	1,006
Lancaster and Fleetwood	Largely Rural	5.5	1,288
Morecambe and Lunesdale	Urban with Significant Rural	5.1	1,251
Pendle	Urban with City and Town	5.6	1,588
Preston	Urban with City and Town	2.7	810
Ribble Valley	Largely Rural	8.8	2,018
Rossendale and Darwen	Urban with City and Town	6.4	1,809
South Ribble	Urban with Significant Rural	7.2	1,865
West Lancashire	Urban with Significant Rural	6.4	1,748
Wyre and Preston North	Urban with Significant Rural	8.3	2,467
Lancs		**86.7**	**24,165**
Bootle	Urban with Major Conurbation	2.3	643
Birkenhead	Urban with Major Conurbation	3.1	907
Garston and Halewood	Urban with Major Conurbation	7.8	2,574
Halton	Urban with City and Town	4.0	1,182
Knowsley	Urban with Major Conurbation	8.5	3,041
Liverpool, Riverside	Urban with Major Conurbation	2.1	574
Liverpool, Walton	Urban with Major Conurbation	2.2	671
Liverpool, Wavertree	Urban with Major Conurbation	2.1	666
Liverpool, West Derby	Urban with Major Conurbation	3.7	1,317
Sefton Central	Urban with Major Conurbation	3.8	1,024
Southport	Urban with City and Town	3.5	942
St Helens North	Urban with Major Conurbation	5.2	1,643
St Helens South and Whiston	Urban with Major Conurbation	5.5	1,857
Wallasey	Urban with Major Conurbation	3.5	1,089
Wirral South	Urban with Major Conurbation	3.5	931
Wirral West	Urban with Major Conurbation	3.7	1,040
Liverpool City Region		**64.4**	**20,101**
North West		**385.1**	**114,332**

Appendix 3. North West Brownfield Land data

Figure: Map to show the location of Brownfield Land in the North West Area