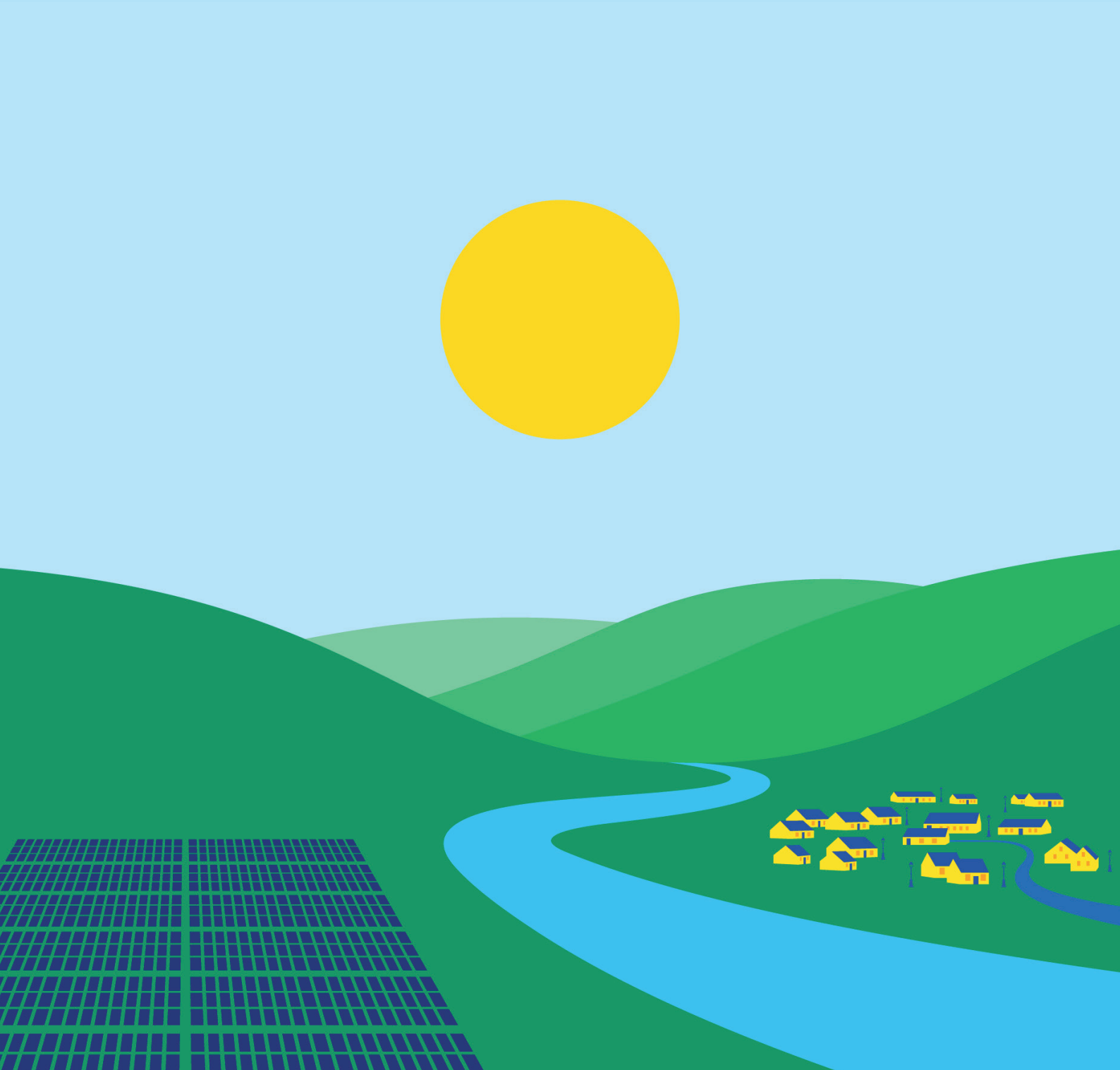


Lighting the way
making net zero a
reality with solar energy



About us

Since 1978, Solar Energy UK has worked to promote the benefits of solar energy and to make its adoption easy and profitable for residential and commercial users. A not-for-profit association, we are funded entirely by our membership, which includes installers, manufacturers, distributors, large-scale developers, investors, and law firms.

Our mission is to empower the UK solar transformation. We are catalysing our members to pave the way for 40GW of solar energy capacity by 2030. We represent solar heat, solar power and energy storage, with a proven track record of securing breakthroughs for all three.

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Solar Energy UK is calling on the UK Government to set a target to deliver 40GW of solar by 2030

Chris Hewett, Chief Executive

Solar energy has come of age as a technology. No longer in need of subsidy, solar is expanding across the world as one of the most flexible and affordable ways to deliver on climate change targets. In the UK, the industry has previously demonstrated the ability to deliver 4GW of new capacity annually, and has grown its output throughout the COVID-19 pandemic. More than 1GW of solar has been deployed in the UK since the end of the government subsidies in 2019, and that trend will accelerate. This decade, 2021 to 2030, is critical for the prevention of dangerous climate change and solar is poised to play a significant part in that story.

Solar Energy UK believes Britain can treble its solar capacity to at least 40GW by 2030, and our call for a formal government solar ambition on this scale is now backed by all major UK energy industry trade associations¹ and leading civil society and business groups on climate change.² This report sets out how it can be done and what benefits to the British economy will be produced if the government addresses the remaining policy barriers to solar energy in the UK.



Executive summary

The UK currently has over 14GW of solar generation capacity installed, a significant contribution to its clean energy transition. Indeed, 663MW was installed in the 12 months to March 2021 alone – more than double the deployment between April 2019 and March 2020. The fact this growth took place during the first year of the COVID-19 pandemic highlights the strength of the UK solar industry, and the role it can play in the UK's green recovery from the crisis.

However, analysis from the Climate Change Committee and other independent bodies shows that the UK will need to deploy at least 40GW of solar by 2030 if it is to achieve a net zero economy by 2050.³⁴⁵ Doing so will require installed solar capacity to triple over the next decade, with an average annual installation

rate of 2.6GW. Solar Energy UK expects 10% of this to be deployed in Scotland.

This will be a major challenge, even with the solar industry demonstrating strong growth. Solar Energy UK analysis shows that the UK can both set and achieve a deployment target of 40GW of solar power in the UK by 2030. This would accelerate the decarbonisation of the British economy, demonstrate global leadership in renewable energy, and create green jobs and investment.

To address the barriers which are preventing the UK from reaching its full renewable energy potential, the British and devolved governments should prioritise implementing policy reforms in the following areas:

- 1. Auctions:** Ensure new solar projects are eligible to participate in regular renewable energy auctions, alongside other technologies such as wind power
- 2. Planning:** Address inconsistencies in the planning process to maximise deployment from existing solar projects
- 3. Network charging:** A shallower 'distribution' connection charging boundary should be introduced
- 4. Public sector funding:** Provide central government support for public agencies to retrofit their buildings with a zero-carbon power supply
- 5. Business rates:** Reform the rates system so that solar is treated the same way as other power generation technologies
- 6. Capital allowances:** Incentivise business investment in solar through long-term tax credits
- 7. Building regulations:** Ensure high energy efficiency standards are implemented as quickly as possible across all new residential and commercial properties
- 8. VAT:** Solar energy and battery storage technologies should be zero-rated
- 9. Retrofit support:** Provide long-term support to homeowners and renters who wish to retrofit their homes with a zero carbon technology, such as solar power

These reforms are described in full in this report, including where they apply specifically to England, Wales, Scotland or Northern Ireland.

40GW by 2030

The UK has a legally binding target to deliver a net zero economy by 2050⁶. As part of this, the adoption of the Sixth Carbon Budget put into law the most ambitious emissions reduction targets in the world, committing the country to an interim goal of reducing greenhouse gas emissions by 78% by 2035⁷.

Under this scenario, the Climate Change Committee says that wind and solar will need to provide 75–90% of the UK's electricity in 2035, with solar alone delivering 60TWh per year⁸. This is a more than four-fold increase on current levels⁹. The minimum level of solar deployment consistent with achieving this target – and therefore a net zero economy – is 40GW by 2030.

Although the solar industry is going from strength to strength, there are policy and regulatory barriers which mean the industry is unlikely to deliver this level of growth on its own. As such, our recommendations represent a roadmap for how the Government can accelerate the deployment of solar at the pace necessary to achieve its climate change objectives.

These recommendations are not exhaustive, but implementing them would form the foundation of a Net Zero strategy that puts the UK on a credible trajectory to achieving full decarbonisation by 2050. Solar Energy UK analysis shows that delivering 40GW of solar by 2030 is a challenge – but achievable. However, it requires a level of policy ambition that matches the laudable climate objectives the UK has set.

The UK's solar industry is a success story, and without intervention is still set to see significant growth – likely a doubling of existing deployment. But this would still leave the country more than 10GW short of the 40GW needed.

In addition to helping deliver Net Zero, the UK solar industry could help create 13,000 additional FTEs if it achieved 40GW of solar energy by 2030¹⁰. Industry expansion would likely generate a minimum of £17 billion in additional economic activity, and deliver further investment as component, supply and maintenance chains are scaled up to meet demand. There will also be economic activity associated with the energy storage markets which will expand to help maximise the benefit of solar power.

A growing body of scientific evidence also indicates that well-designed and well-managed solar parks not only deliver clean renewable energy, but support wildlife habitats and can meaningfully contribute to achieving the UK's national biodiversity targets¹¹.

As such, solar energy can make a major contribution to the UK's national objectives. It will deliver a significant reduction in emissions as part of the UK's international climate change targets. It will help create thousands of green jobs, and support long-term recovery from the pandemic. And it will help deliver a healthy local environment, supporting biodiversity and responsible land management. This is why the UK should target 40GW of solar by 2030.

Introduction

In 2019 the UK became the world's first major economy to pass a net zero emissions commitment into law, pledging to end the country's contribution to global warming by 2050. This is an ambitious target, but it is reflective of what is required to limit overall warming to well below 2.0C, in line with the UK's international commitments under the Paris Agreement.

The decisions the Government takes as the UK assumes the COP presidency will determine whether the country is able to meet this target. The Government should use the opportunity to address the gaps in its own policy ambitions, and encourage other countries to do the same.

It is now well understood that achieving net zero by 2050 requires an unprecedented level of investment in clean energy, predominantly solar and wind¹². The solar energy industry and low-carbon energy advocates are looking to the forthcoming Net Zero Strategy to set a credible trajectory for the UK to deliver on its decarbonisation commitments, and this will require clear interim renewable energy targets on the road to 2050.

The 2019 Net Zero Technical Report¹³ from the Climate Change Committee (CCC) concluded that, largely due to the anticipated rapid electrification of heating and transport, by 2035 the UK will need to deliver up to 54GW of solar, in addition to 35GW of onshore wind and 45GW of offshore wind. The National Infrastructure Commission (NIC)¹⁴ has similarly concluded that up to 38GW of solar must be deployed by 2030.

From 2010 to 2020, the UK solar market grew from zero to 14GW. After an initial slow down when government subsidies were removed, the market is now showing promising signs of subsidy-free growth, delivering over 660MW of new generation capacity in the last 12 months. In 2020 alone, 545MW of new generation capacity was installed¹⁵, despite the significant social and economic impact of the coronavirus pandemic and the UK's departure from the EU. This equates to a 27% year-on-year increase in deployment, and has undoubtedly been enabled by several factors, particularly cost decreases, growing demand for decarbonisation from local and regional governments, businesses, and households, and increasing investor confidence in renewable energy projects. Very little of this growth has been specifically stimulated by policy, so there is every reason for such deployment rates to be expected to continue into the decade.

However, this rate of deployment remains far from what the best available data shows us is necessary to deliver a net zero economy by 2050. The Government currently does not have clear targets or strategies in place for delivering the amount of new onshore renewable energy required. Solar Energy UK is calling on the UK Government to set a target of delivering 40GW of solar by 2030. This equates to an annual deployment rate of 2.6GW over the next decade and is essential to enable the UK to deliver on its net zero commitment. Solar Energy Scotland is targeting 4GW in this period, 10% of the overall UK target.

Summary policy recommendations

To ensure the solar industry delivers the necessary contribution to the UK's climate change objectives while creating jobs and investment, the government should implement the following policy reforms. Doing so would set the country on course to delivering 40GW of solar power by 2030:

Policy area	Reforms needed
Utility-scale solar (>5MW installed capacity)	
BEIS Contracts for Difference scheme	Solar should be guaranteed access to renewable energy auctions to be held at least annually until 2030, beginning from Allocation Round 5 (AR5). Pot 1 should be allocated robust budget and capacity caps, and the Government should provide certainty of continued access to the CfD mechanism for Pot 1 technologies
Planning	MWp AC should be clarified as the correct definition of installed capacity for solar PV projects for the purpose of identifying the appropriate consenting regime
Network charging*	The Access and Forward Looking Charges Significant Code Review should decide in favour of a shallower or fully shallow 'distribution' connection charging boundary
Business rates*	The Valuation Office should agree reduced rateable values for solar energy assets that suitably reflect the economics of the post-subsidy market
Commercial-scale solar (4kW-5MW installed capacity)	
Business rates	Solar energy and energy storage assets should be removed from the plant and machinery tables under Class 1 in the regulations (SI2000/540)

Access to capital	The capital allowances announced in the March 2021 budget, which include an incentive to invest in solar, should be extended to 2030
Building regulations	The Future Buildings Standard at a minimum should align with the Future Homes Standard reforms. This means ensuring a minimum 31% uplift in energy efficiency requirements for new build commercial and industrial buildings from the date of implementation, currently scheduled to be 2025, with a view to increasing this to a 75-80% uplift from 2028.
Investment in public sector buildings	The 2020 English Public Sector Decarbonisation Scheme, or an equivalent funding mechanism, should run until 2030. The devolved administrations should also implement an equivalent until 2030, such that the impact of the scheme is extended UK-wide.
Residential-scale rooftop solar (<4kW installed capacity)	
Building regulations	Future Homes Standard reforms to Part L should be fully implemented along the announced timescale, with a minimum 31% energy efficiency uplift in 2020 and 75-80% uplift by 2025.
VAT*	The government should apply zero-rate VAT to solar energy and energy storage assets. At a minimum, the reduced VAT rate of 5% should be restored for solar technologies and be applied to energy storage technologies.
Retrofit support	The Local Authority Delivery element of the Green Homes Grant Scheme, or a similar funding mechanism, should be extended to 2030. A similar scheme should be implemented for private homeowners, to replace the now withdrawn Green Homes Grant voucher scheme.

*Not included in modelling

State of play: UK solar deployment and pipeline

As of the beginning of Q2 2021 there is now over 14GW of solar generation capacity deployed across the UK, with nearly 17GW of new projects in the planning pipeline.¹⁶ There has been enormous growth in this pipeline over the past 12 months especially, with 800–900MW of new projects entering the pipeline each month.

Over 1GW of subsidy free solar has now been deployed in the UK, and current projections indicate that the industry may be on track to construct over 1GW of new solar projects over the course of 2021. This would be the first time since the withdrawal of government subsidies that the industry has hit that milestone.

The solar industry has shown incredible

resilience over the past year and is showing strong signs of continued growth in the post-subsidy environment. Over the past 12 months, the UK solar industry has delivered 663MW of new solar capacity. In 2020 alone the industry delivered 545MW of new solar projects, a 27% year on year increase in deployment despite the social and economic toll of the coronavirus pandemic.

However, to deliver the 40GW of solar needed by 2030 requires an average annual deployment rate of 2.6GW. To achieve this, there needs to be a level of policy ambition which matches the ambition of industry to unlock the full potential of solar, close the deployment gap, and enable the UK to deliver on its net zero commitments.

The shape of the UK solar market

There are three main solar markets in the UK. Utility-scale projects include many solar panels mounted on the ground, and contribute power to the national grid. Commercial-scale projects tend to involve the installation of solar panels on the roofs of business premises, such as industrial buildings, offices and shops. They contribute power to the buildings on which they are installed, and may also supply the grid. The residential market refers to solar installations on private and rented homes. The policies described in this report relate to these three markets.

Utility-scale solar deployment forecast

Utility-scale solar refers to large, ground-mounted solar projects which supply electricity to the national grid. At the time of writing, there were 9.3GW of utility-scale solar installed across the UK, with nearly 17GW of utility-scale projects in the development pipeline. Between 3-4GW of these are 'shovel ready', meaning they have secured both a grid connection agreement and planning consent and are now awaiting construction. Of this, between 800-900MW of new capacity is expected to be completed by the end of 2021. How much is actually constructed will depend on a number of factors, not least of which being what happens with solar module pricing over the next few quarters.

Commercial-scale solar deployment forecast

Commercial-scale solar projects tend to be greater than 4kW and less than 5MW. These can include projects installed on businesses and public sector properties (such as schools and hospitals), as well as community energy projects, where local community members collectively develop a solar array.

As of the end of 2020, there are roughly 1.9GW of commercial-scale projects installed across the UK. Onsite solar generation is a good option for many organisations, as it reduces both energy bills and carbon emissions. As such, the commercial-scale sector has seen steady growth since the end of the subsidy era, with 147MW installed in 2020.

This is the baseline we use for our analysis, adjusted for a small annual increase from expected improvements in technological efficiency. Solar Energy UK members working on commercial-scale solar projects have reported very strong business development pipelines in 2021 to date, which should begin to be reflected in deployment figures.

Residential-scale rooftop solar deployment forecast

Residential-scale solar projects are generally considered to be rooftop installations with a capacity of less than or equal to 4kW. As of the end of 2020, there were just over 2.8GW of residential-scale projects installed across the UK.

Solar PV is a very popular home upgrade and is currently deployed across nearly a million rooftops all over the UK. These residential solar systems average 1.9kW in size.

The residential solar sector, as with other segments of the solar industry, has seen strong growth since the end of government financial support. The market has expanded steadily since the end of the Feed-in-Tariff in March 2019, including throughout 2020, when residential PV installations rebounded rapidly from the first coronavirus lockdown.

Market intelligence databases indicate that around 70MW of residential solar installations were completed across the UK in 2020. This is the baseline we use for our analysis, adjusted for a small annual increase from expected improvements in technological efficiency.

Policy scenarios, methodology and limitations

We have modelled potential trajectories of future solar deployment in the UK across four possible policy scenarios. These are:

Business as Usual: the government does not actively inhibit solar deployment in future policy changes

Low Ambition: the government makes superficial policy changes

Moderate Ambition: the government makes supportive policy changes

Net Zero: the government uses solar to its full potential to deliver its net zero commitments

Each scenario reflects a different level of assumed government ambition, and for each scenario we have estimated how reforms in priority areas would impact solar deployment. Qualitative and quantitative analysis of their potential impact has been carried out in coordination with the UK solar energy industry. This is not an exhaustive list of potential reforms, but includes priority policy interventions across the residential, commercial, and utility-scale segments of the solar market which will be essential to enable the UK to meet its net zero commitment.

Wherever possible, we have conducted quantitative analysis of the potential increase in solar PV deployment that would be enabled by each of our recommended policy reforms. This is of course dependent on available data and is not possible for every policy recommendation. Our modelling reflects only those policy interventions where it has been possible to project increased deployment potential. We consider that this is therefore a conservative assessment of the additional solar PV capacity that may be achievable under the right policy environment.

We have outlined below the general assumptions underlying each scenario. Specifically, when and to what extent known and recommended policy reforms are implemented. In some cases, the actual expected implementation timeline is much firmer, for example where the Government has already made clear decisions on policy changes such as the energy efficiency requirements set out in the Future Homes Standard. In other instances, we have used the best available information to project possible timeframes for implementation.

Grid capacity must keep pace with growth

It is important to note that the lack of available grid capacity and the growing need for reinforcement of both the transmission and distribution networks is perhaps the most significant medium to long-term barrier to solar deployment cited by our members.

There is a substantial and growing need for additional grid investment to allow the UK's electricity networks to keep pace with anticipated increases in electricity demand, largely from the electrification of heating and transport. Without commensurate investment to meet growing demand, the deployment of all renewable energy technologies in the UK could be significantly delayed.

It is beyond the scope of this report to assess the complexities of current and future grid constraints, possible future investments, and the potential additional solar deployment that could result.

However, it should not be understated how fundamental additional investment in grid infrastructure will be to enabling the UK to deliver the amount of onshore and offshore renewable electricity required to meet its net zero targets.

Four scenarios

Business as Usual: The Business as Usual (BAU) scenario is based on current government policies, and those which are confirmed will be implemented, and their projected impact on deployment.

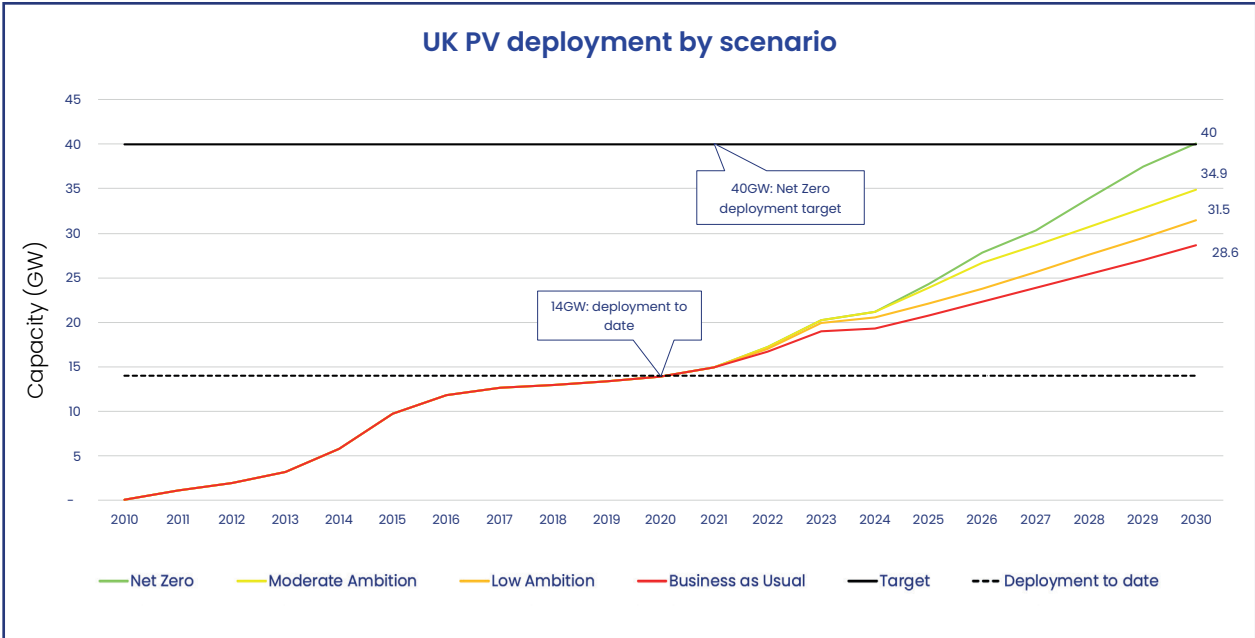
Low Ambition: The Low Ambition scenario is based on the BAU scenario, but assumes the maximum possible impact of known policies, where it is likely but not yet guaranteed that this will take place. For example, it assumes the interim standards under the Future Homes Standard come into effect from 2022 and the full standards come into effect from 2025. The precise date of expected implementation varies according to the policy reform.

Moderate Ambition: The Moderate Ambition scenario is based on the Low Ambition scenario, but also assumes that existing policies are in general extended to the end of the current UK parliament. For example, it assumes that the capital allowances announced in the March 2021 budget, which are scheduled to last until 2023, are extended until 2024. The exact year of implementation again varies depending on the policy.

Net Zero: The Net Zero scenario is based on the Moderate Ambition scenario, but also assumes that existing policies are in general extended to the end of the decade, and that they are designed to maximise solar deployment. The exact year of implementation is as early as Solar Energy UK considers it feasible for the policy to have an impact.

More information on the assumptions underlying each policy scenario is included in Annex 2.

Key findings: Delivering 40GW of solar by 2030



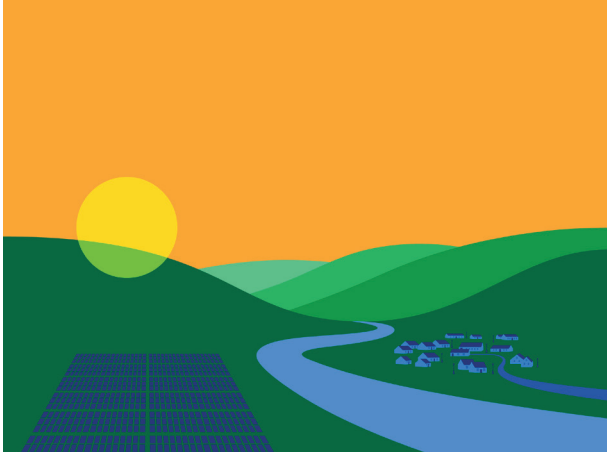
Reaching the target

Our analysis shows that, under the right circumstances, it is possible for the UK to achieve 40GW of solar PV capacity by 2030. This is what the Climate Change Committee has said is necessary to keep on track with the UK’s net zero commitments. However, despite the strong growth that UK solar industry has delivered in the last decade, and the continued strong growth projected, it is very unlikely that the 40GW target will be reached without a higher level of policy ambition from government.

Under all scenarios the strength of the UK solar industry is clear. Even under the BAU scenario the industry is expected to more than double total solar deployment over the next decade. This reflects a compound annual growth rate (CAGR) of 7%, a robust growth rate by any investment standard. This is testament to the continued innovation and strength of the UK solar industry.

However, the sheer scale of the net zero challenge means that to reach 40GW, the UK solar industry will need to deliver an even more impressive CAGR of 11% across all sectors. This is undoubtedly a rapid rate of deployment but is achievable under the right policy conditions. The UK solar industry has previously delivered over 4GW of new deployment in one year, compared to the 2.6GW of annual growth required to reach 40GW by 2030.

Our analysis highlights the untapped potential of the UK solar industry to deliver significant additional renewable energy and support the decarbonisation of the economy. However, it is also important to note that our analysis assumes sufficient available grid capacity and skilled labour, both of which are factors that Solar Energy UK members have identified as major potential barriers to achieving the rates of solar deployment required.



Delivering decarbonisation

In 2020 the UK electricity grid was the cleanest it has ever been, with an average annual carbon intensity of just 181gCO₂/kWh.¹⁷ This was due in large part to the impact of the coronavirus on electricity consumption, which allowed zero carbon renewable electricity sources, like solar, to deliver a greater share of total demand than ever before. Renewable energy has now overtaken fossil fuels as the main source of electricity in the UK, and the National Grid have committed to ensuring that the electricity grid is ready to operate entirely on renewable energy by 2025.^{18,19}

When assessing the emission reduction potential of new renewable energy capacity, it is important to consider the relative carbon intensity of other generation sources that are being offset. Based on the carbon intensity methodology of National Grid ESO²⁰, we estimate that every additional TWh of solar generation reduces UK carbon emissions by 552,500 tonnes per year. In 2020, solar PV delivered a little over 13TWh of renewable

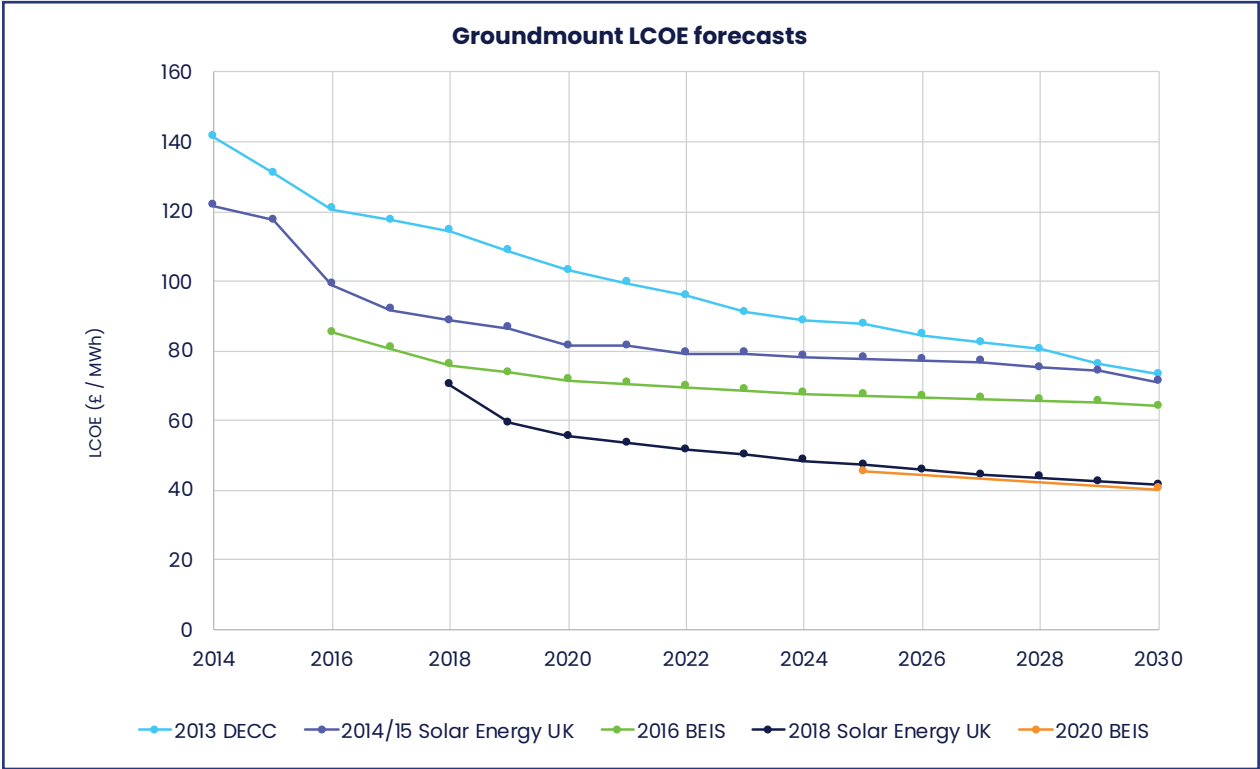
electricity generation – meeting 4% of total electricity demand and reducing UK carbon emissions by 7.1 MtCO₂e.²¹ This is roughly equivalent to offsetting the entire carbon footprint of the UK public sector.²²

Under our Net Zero scenario solar delivers 38.1TWh of clean electricity per year in 2030. This equates to 10% of total projected electricity demand and reduces UK carbon emissions by 21.2 MtCO₂e per year, nearly one-third of the carbon footprint of the entire residential sector.²³

Continued cost decreases

The success of UK solar in the post-subsidy period is largely a story of continuing declines in technology costs. The cost of solar at all scales has decreased dramatically over the past decade, reflecting the International Energy Agency's analysis that "for projects with low cost financing that tap high quality resources, solar PV is now the cheapest source of electricity in history."²⁴ This astonishing fact is the result of solar having continually outpaced even the most optimistic projections.

The global price trend is expected to continue, including in the UK. The Government's own analysis shows that solar is already the most cost-effective of any renewable generation technology, and projects that solar will represent the lowest Levelised Cost of Electricity (LCOE) for all renewables at least until 2040.²⁵



This is in line with previous Solar Energy UK cost forecasts, while our latest internal analysis, and the assessments of the CCC and NIC, corroborates these findings. The benefit is clear: increasing solar generation can help decarbonise the UK’s electricity network at least cost to consumers.

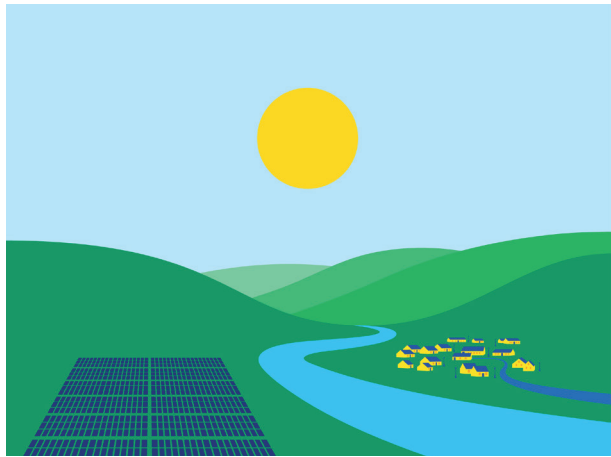
System-level benefits

It is important to note that the distributed nature of solar technology, particularly in combination with energy storage systems and smart energy controls, can deliver significant system level benefits, which will make it easier and cheaper to rapidly decarbonise our electricity grid.

The CCC projections of how much renewable energy will be required under the Sixth Carbon Budget factor in significant growth in electricity demand that stems largely from a rapid increase in the electrification of heating and transport. The government has announced its intention to deliver a

Heat and Buildings Strategy and Transport Decarbonisation Plan to enable this major transition.

There are significant system-level impacts that will result from the increased demand this entails, not least being the additional strain on the electricity distribution network, which was not built to handle the projected 200-300% increase in electricity demand over the period to 2050.²⁶



The Government's heat and transport strategies will have to include robust provisions for on-site renewable electricity generation and storage that aligns with growing demand to reduce the strain on the distribution system in the near term and minimise costs to consumers. This can be achieved most effectively through a combination of solar PV and battery storage.

Solar Energy UK research has shown that by increasing solar and energy storage deployment in line with projected demand, residential solar and smart energy systems alone could eliminate the evening peak in electricity demand on a typical winter's day.²⁷ This reflects substantial carbon savings, would significantly reduce the strain on the distribution network.

2030 onwards

It is important to note that the need for additional renewable energy deployment does not end in 2030. The 40GW target should be viewed as a floor, not a ceiling, for the UK's solar ambitions. This is an interim target which is necessary to enable the UK to remain on track to deliver the upwards of 85GW of solar necessary by 2050 to achieve net zero.

The CCC's analysis suggests that roughly 14GW of new solar generation will need to be constructed every five years for the foreseeable future. By comparison, it took 10 years for the UK to deliver the first 14GW. However, the UK solar industry is much more established and mature today and going forwards will be able to leverage significant economies of scale and continued cost decreases to accelerate deployment. Every

year that existing barriers to deployment are not addressed will mean that a steeper acceleration of future deployment is required to remain on target.

The UK has just adopted the Sixth Carbon Budget into law, enshrining the most ambitious carbon emission targets in the world and committing the country to cutting emissions by 78% by 2035. Under this scenario, wind and solar are providing 75-90% of the nation's electricity in 2035, with solar alone delivering 60TWh per year.²⁸ By comparison, total renewable electricity generation from all sources in 2020 was 77TWh.²⁹

The central scenario under the Sixth Carbon Budget assumes 3GW of new solar deployment per year out to 2050. Under no scenario does the CCC project less than 2GW of new solar per year. The Sixth Carbon Budget represents a step change in the UK's decarbonisation ambition and must be met with commensurate policy ambition from the government to deliver on these commitments.



Business as Usual:

14,500 FTEs

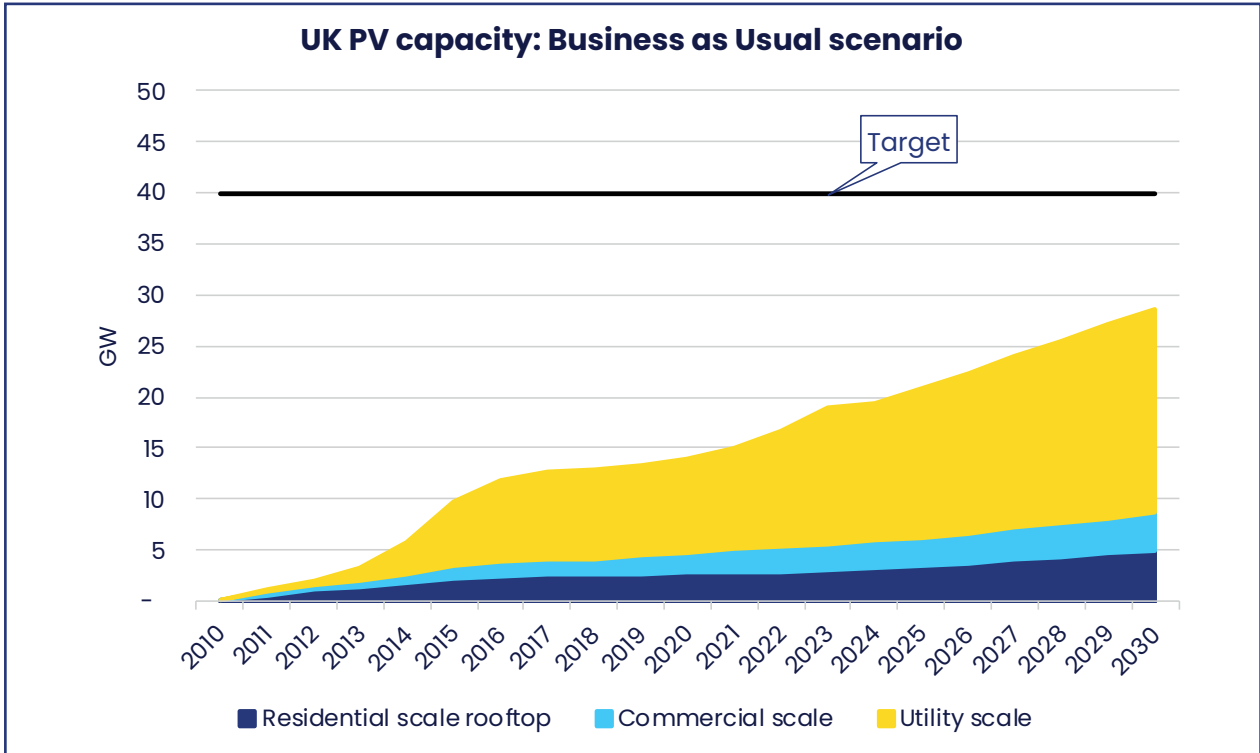
Potential solar jobs

£8 billion

Economic potential

£500 million

Spending on grid and networks



Under the BAU scenario, the UK solar industry continues its strong growth, more than doubling current installed capacity over the next decade, reaching 28.6GW of solar by 2030. This growth reflects an average annual deployment rate of 1.5GW, and a robust CAGR of 7%.

Under the BAU scenario, existing policy support for renewable energy – such as the Public Sector Decarbonisation Scheme, and Local Authority Delivery element of the Green Homes Grants Scheme – ends in 2022. Tax policies which disproportionately disadvantage clean renewable energy technologies in favour of higher carbon technologies remain in place. Non-residential building efficiency requirements remain as they are today.

Under this scenario, the government’s tax treatment of solar and storage continues to constrain the delivery of commercial and residential-scale deployment. The Future Homes Standard is assumed to be implemented as expected, and we project will deliver over 1.4GW of additional residential solar projects by the end of the decade.

The impact of the current business rates regime can clearly be seen. As it stands, disproportionately high business rates for on-site renewable assets are effectively punishing businesses and public institutions that are taking meaningful action to decarbonise and address climate change, with many opting to delay deployment until the issue is resolved. This runs directly counter to the Government’s objective of achieving net zero by 2050. The BAU scenario assumes that this remains the case out to 2030.

Low Ambition:

16,000 FTEs

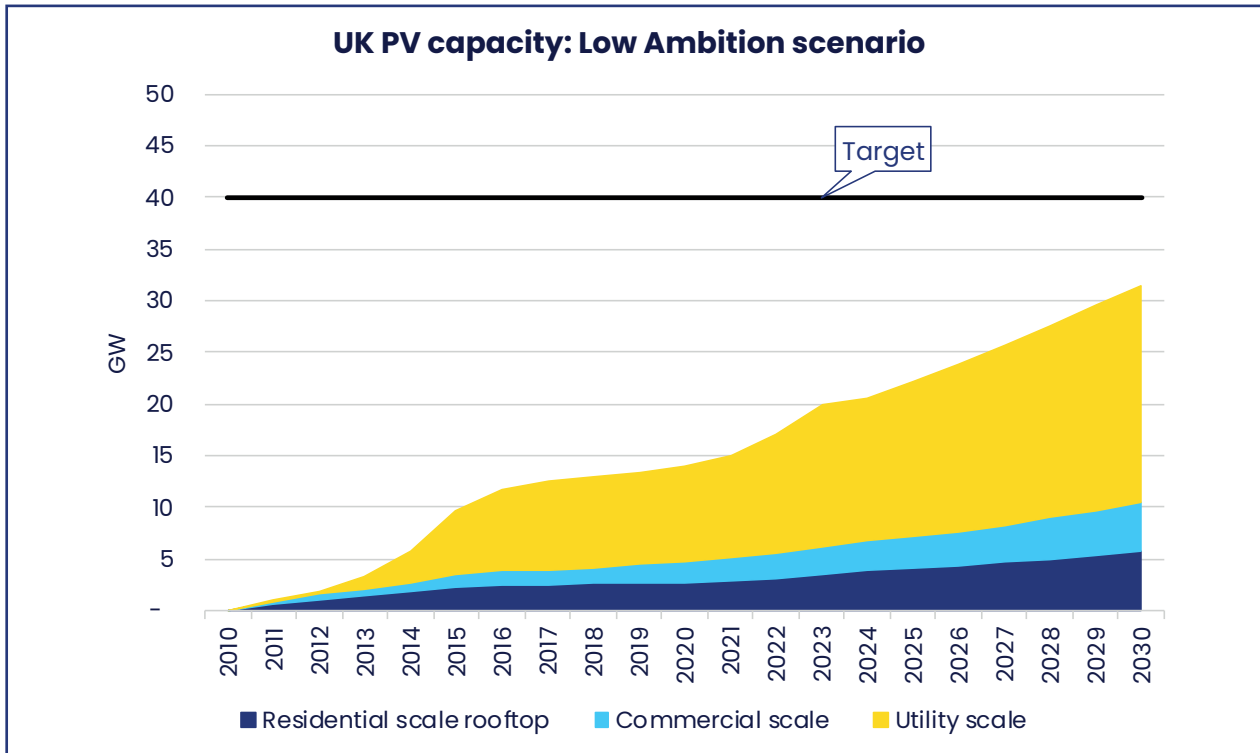
Potential solar jobs

£10.7 billion

Economic potential

£580 million

Spending on grid and networks



Under the Low Ambition scenario total deployment is projected to reach 31.5GW in 2030. Annual deployment rates under this scenario reach 1.8GW, a strong level of development but still 800MW shy of the annual deployment rates required for net zero.

Under this scenario, commercial-scale projects are further incentivised; the Future Buildings Standard comes into effect as expected in 2025, business rates for solar are put on an equal footing with gas CHP from 2028, capital allowances for investment in

renewables continue as expected, and a further round of the PSDS runs before the end of the current Parliament. Combined, this enables the sector to achieve an impressive 10% CAGR over the decade.

This scenario sees the utility-scale sector deliver nearly 12GW of additional capacity over the decade, equivalent to a 122% increase on currently installed ground-mount capacity. The commercial and residential sectors collectively represent over one third of total installed capacity at 10.5GW, more than the entire utility-scale solar capacity today.

Moderate Ambition:

17,700 FTEs

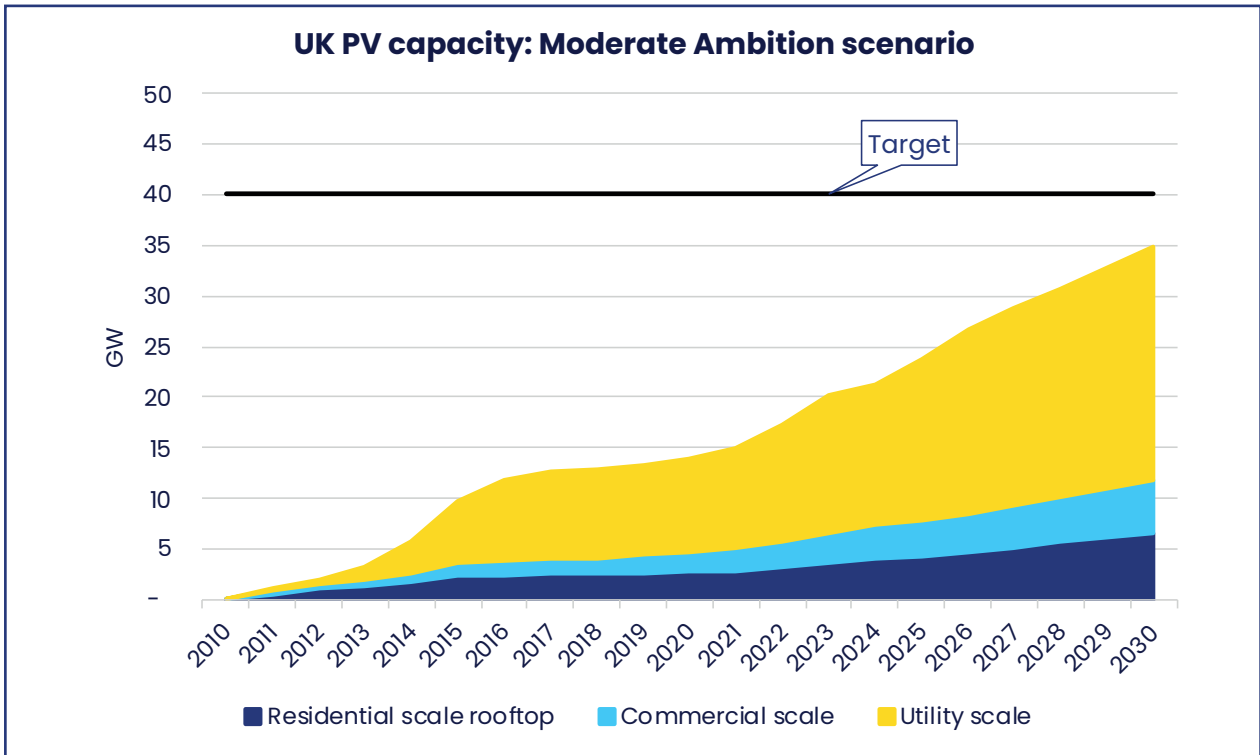
Potential solar jobs

£13 billion

Economic potential

£689 million

Spending on grid and networks



Under the Moderate Ambition scenario, annual deployment rates reach 2.1GW, and the UK delivers 34.9GW of solar generation capacity by the end of the decade. This equates to a CAGR of 10% across all sectors and a 250% increase on current installed capacity by 2030. While this is strong growth, total capacity in 2030 still falls 5GW short of the target necessary to achieve net zero. This underlines the level of policy ambition required to close the remaining deployment gap and align renewable energy growth with the government’s commitments under the Sixth Carbon Budget.

The level of growth and annual build rates projected under the Moderate Ambition scenario are not unprecedented. Between 2014 and 2016 the UK solar industry delivered on average 2.8GW of annual deployment,

above the rate required for net zero. However, this growth was driven largely by government subsidy, which has since been withdrawn. Our analysis shows achieving these deployment rates in the post-subsidy policy environment will require swift action and policy ambition on the part of government to put solar on a level playing field with other technologies.

Under this scenario, all our priority policy recommendations are at least partially implemented in the first half of the decade. Existing or previously committed public financing for commercial and residential installations is continued until at least the end of the current Parliament, and some existing funding mechanisms, such as the Local Authority Delivery element of the Green Homes Grant Scheme, are extended to be UK wide.

Net Zero:

20,400 FTEs

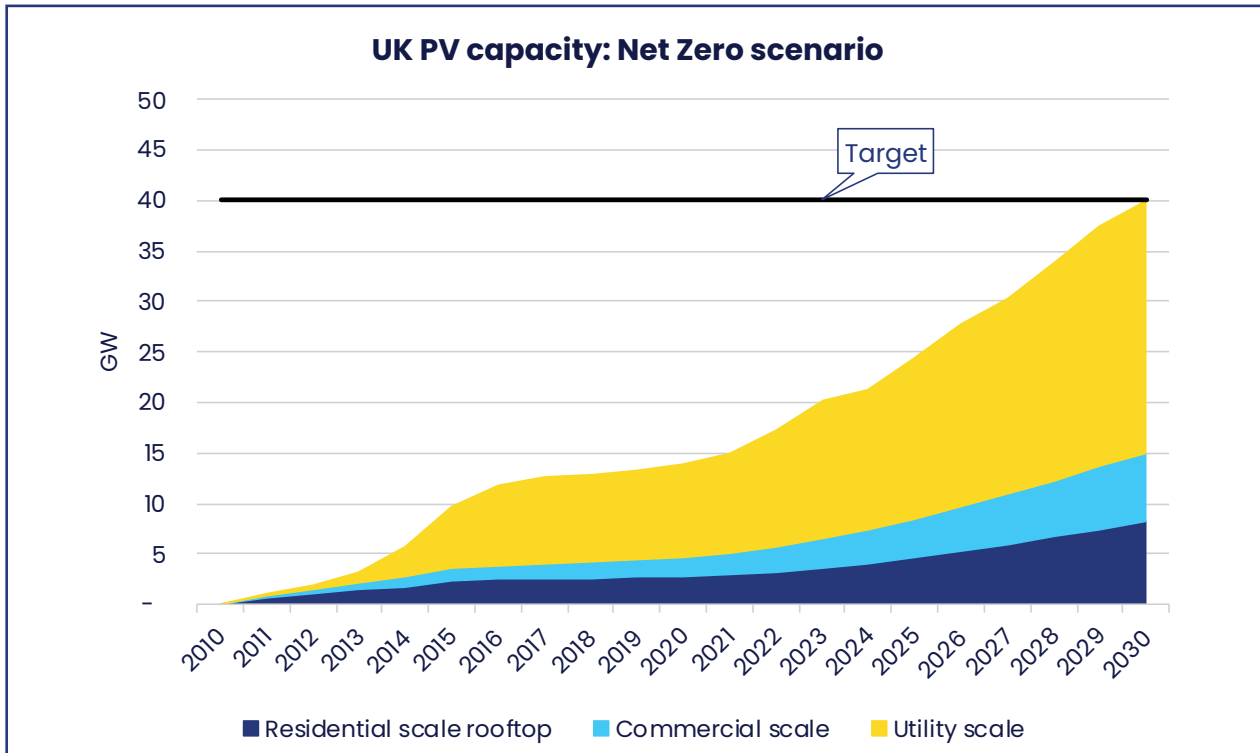
Potential solar jobs

£16.9 billion

Economic potential

£790 million

Spending on grid
and networks



The Net Zero scenario demonstrates the ability of the UK solar industry to deliver the 40GW of solar required by 2030, under the right circumstances. To achieve this rate of deployment, it is assumed under this scenario that each of our policy recommendations are implemented as soon as is reasonably possible, are extended UK wide where that is not currently the case, and remain in place until the end of the decade.

Under this scenario the UK solar industry delivers dramatic growth over the decade, nearly trebling installed solar capacity by 2030. This equates to a CAGR of just over 11%, creates at least 13,000 additional jobs over the decade and solar businesses generate nearly £16.9 billion in economic activity. This includes nearly £790 million in grid costs and investment in electricity infrastructure.

Under this scenario, all sectors are further incentivised and deliver on their full potential to decarbonise the UK electricity grid. The government holds regular CfD auctions, with at least 4GW allocated to Pot 1 technologies on a biennial basis, the Future Buildings Standard comes into full effect in 2025 as expected and property developers are incentivised to rapidly adopt new standards, solar energy technologies are exempted from business rates, and retrofit schemes are extended UK wide and continue to the end of the decade.

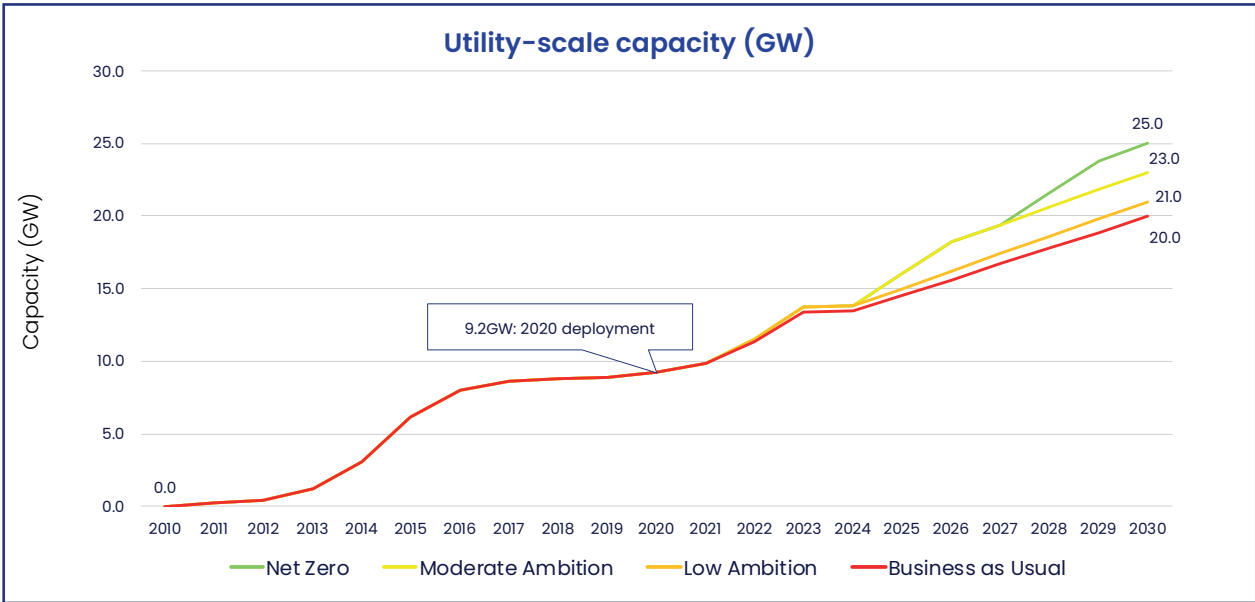
The commercial and residential sectors accelerate rapidly, achieving respective CAGRs of 14% and 11%, allowing UK businesses, public institutions, and homeowners to take full advantage of solar to decarbonise their operations and reduce their energy costs. This scenario maximises the use of existing commercial and residential roof space to deliver on-site generation which helps meet growing electricity demand from heating and transport.

This scenario demonstrates the clear potential for the UK solar industry to deliver an average annual deployment rate of 2.6GW over the next decade, resulting in total deployment of just over 40GW in 2030. This is rapid growth but highly achievable assuming the necessary level of policy ambition is met. This build rate is slightly less than the average solar deployment rates seen between 2014-2016, which peaked at 4GW.

Under this scenario, the commercial and residential sectors account for nearly 37% of total 2030 deployment, delivering more than the total solar capacity installed today across all sectors at a combined 15GW. This scenario underscores the significant potential of aggregated rooftop solar installations across the country. Utility-scale solar projects deliver nearly 16GW of additional capacity, a 270% increase in total ground-mount installations.



Utility-scale solar (>5MW)



Policy area	Reforms needed
Contracts for Difference Scheme	Auctions should be held at least annually until 2030, beginning from AR5. Pot 1 should be allocated robust budget and capacity caps, and the Government should provide certainty of continued access to the CfD mechanism for Pot 1 technologies
Planning and NSIP threshold	MWp AC should be clarified as the appropriate definition of installed capacity for solar projects with regards to the NSIP threshold
Network charging*	The Access and Forward Looking Charges Significant Code Review should decide in favour of a shallower or fully shallow distribution connection charging boundary
Business rates*	The Valuation Office should agree reduced rateable values for solar assets that suitably reflect the economics of the post-subsidy market

*Not included in modelling

Contracts for Difference

Context

The Contracts for Difference (CfD) scheme is currently the UK Government's principal programme for supporting renewable energy deployment. The decision to reopen the CfD scheme to Pot 1 technologies, which includes onshore wind and solar, was widely lauded by the renewable energy sector and is an important step to accelerating decarbonisation.

It is important to note that this scheme is not a subsidy, but rather a revenue stabilisation mechanism. The Government's own assessment shows that established technologies should be able to secure "prices below the average expected wholesale price for electricity, and so over the course of a contract may pay back as much, or more, than they receive in CfD top-up payments."³⁰

The need for this form of policy support will be increasingly important to protect both developers and consumers from the increasing price volatility expected in wholesale electricity markets. In a recent report, the International Energy Agency concluded that government targets and competitive renewable energy auctions are essential to achieve net zero by 2050.³¹

Analysis and methodology

Using data from Aures II,³² we estimated the average proportion of generation capacity awarded to solar projects in recent European energy auctions, to determine the potential additional solar capacity that could be delivered by the UK CfD scheme.

Our analysis assumes the announced 12GW of capacity intended to be procured via AR4 is evenly divided amongst the three technology Pots, for the purposes of projecting the amount of solar procured. Our analysis shows that to achieve 40GW of solar by 2030 will require regular CfD auctions over the

next decade which procure a minimum of 4GW of Pot 1 technologies in each Allocation Round. The auction frequency and capacity allocated to Pot 1 technologies has a significant impact on the overall additional solar capacity that could be delivered.

Recommendations

There are two key reforms needed to enable the CfD scheme to reach its full potential to deliver additional solar generation capacity:

1. Hold CfD auctions at least annually

Multiple independent analyses, in addition to our internal analysis, have shown that it will not be possible to deliver the additional renewable energy capacity needed to achieve net zero by 2050 if auctions are only held once every two years.³³ The economics of solar have changed significantly in recent years, and frequent auctions will enable projects to bid at prices that reflect technological developments.

Biannual and even quarterly solar auctions are held successfully in several European markets. BEIS and the Low Carbon Contracts Company (LCCC) will need to be adequately resourced to allow for scheme delivery and administration to take place alongside regular reviews and reforms to scheme design. However, annual scheme delivery is clearly possible, as the Capacity Market mechanism and other renewable energy auction schemes have already shown.

More frequent allocation rounds should improve future CfD delivery by allowing policy makers regular opportunities to revise auction design to reflect current market conditions. Regular solar auctions are needed to send a clear signal to investment markets that the UK is taking its climate change obligations seriously, thereby leveraging additional project finance and reducing the cost of capital.

Alongside this, the government should provide certainty of continued access to CfDs for Pot 1 technologies. A one-off allocation round for solar projects, as happened previously following the removal of Pot 1 after AR1, would create significant uncertainty amongst investors and developers and will not generate the level of interest and the pipeline of projects needed to meaningfully advance the Government's decarbonisation objectives.

2. Provide budget and minimum capacity allocations for Pot 1 commensurate with achieving net zero

Again, our analysis assumes 4GW of capacity is allocated to Pot 1 in AR4. We believe this is the minimum capacity of Pot 1 technologies

the government should be looking to procure on a biennial basis to allow for the delivery of net zero. Our analysis of the current utility-scale solar pipeline suggests that at least 2-3GW of projects will be eligible to compete in AR4. Roughly the same amount of onshore wind capacity is expected to be eligible for AR4, meaning a 4GW cap would still result in a highly competitive auction.

Ultimately, the budgetary and capacity caps should be designed to allow for the delivery of additional capacity across a mix of renewable energy technologies in line with the CCC's assessment of the total renewable energy generation capacity needed to deliver net zero.

Planning and National Strategic Infrastructure threshold

Context

The Planning Act 2008 sets out a capacity threshold which is applied to different electricity generation technologies for the purposes of determining the appropriate planning regime. For solar projects in England this threshold is set at 50MW of installed capacity. Projects below this threshold are subject to the Town and Country Planning Act (TCPA) and receive planning permission from the local planning authority. Projects above this threshold are classed as Nationally Significant Infrastructure Projects (NSIP) and must receive a Development Consent Order (DCO) from the Planning Inspectorate.

However, the Planning Act does not specify whether the threshold is measured in terms of Alternating Current (AC) or Direct Current (DC) capacity. In 2016 the Planning Inspectorate (PINs) gave public advice in which it inaccurately concluded that the correct approach to assessing capacity for solar farms was in terms of DC capacity. This

has unfortunately resulted in solar plants being treated differently from all other energy generation technologies, which are assessed based on AC capacity, and is inhibiting deployment.

For any electricity generating technology, the appropriate way to measure 'capacity' (the key term under section 15(2) of the Planning Act 2008) is in terms of the grid quality AC electricity delivered to the transmission and distribution network. For a solar farm this is equivalent to the inverter capacity. Energy suppliers, DNOs, National Grid, and the Government's own guidance on Contracts for Difference projects recognise solar output on an AC basis.³⁴

The incorrect interpretation of DC capacity as the NSIP limitation for solar projects has a material impact on the industry's ability to deliver subsidy free solar projects. Many projects which otherwise could have been 50MWAC (c.67MWDC) will be scaled down to c.34MWAC (50MWDC), to avoid the more

costly DCO consenting regime, or may not proceed at all as lower economies of scale will make grid costs unviable. In aggregate across the UK, this results in a major loss of potential low carbon generation.

Importantly, clarifying AC as the appropriate metric would not increase the footprint of projects approved through the TCPA regime, due to substantial improvements in panel efficiency in recent years. Comparing the relative footprints of more than three dozen sites constructed between 2013 and 2020 shows that the average site submitted to planning today requires 30% less land area per MW of installed capacity than sites constructed in 2013–2015.

Analysis & Methodology

We estimate that at least 1GW of additional generation capacity could be delivered by 2030 from this simple clarification. The increase in deployment is simply a factor of an average assumed DC/AC inverter ratio of 1.3, which results in a 30% increase in potential deployment capacity relative to the amount of DC capacity currently projected.

This is a highly conservative estimate, as we have only considered projects in the current English planning pipeline with a nameplate installed capacity of 49.9MWp DC. This is because the 50MW NSIP threshold only applies in an English planning context, and because these are the projects most

obviously constrained by the current incorrect interpretation of the capacity limit of the NSIP threshold. However, this does not mean that smaller-scale projects would not similarly benefit from this clarification.

The potential additional generation capacity that could be delivered from this policy clarification could be far higher, as it is arguable that any projects larger than 30–35MW could be materially impacted by this reform, thereby increasing the potential for additional capacity. Further, higher inverter ratios may make more economic sense in certain situations, allowing for additional over-install of DC generation capacity relative to the AC grid connection. Under all scenarios, other than BAU, we assume this reform is brought in from the beginning of 2022.

Recommendations

AC capacity should be clarified as the correct metric of installed capacity for determining the appropriate consenting regime for solar projects. We encourage the Government to include this clarification in the forthcoming review of the National Policy Statement for Renewable Energy (EN-3), which the government has announced its intention to complete by the end of 2021.³⁵ This clarification would not require any change to the underlying legislation and could be swiftly implemented, ideally from the beginning of 2022.

Network charging – distribution connection charging boundary

Context

The UK's network charging regime is a complex set of regulatory policies that are intended to encourage the most efficient use of electricity networks by setting out how the costs of using the network will be recovered. There are multiple ongoing reviews looking at how these costs are recovered across the whole of the electricity transmission and distribution network, most significantly the Targeted Charging Review (TCR) and Access and Forward Looking Charges Significant Code Review (Access SCR). The outcome of these reviews will have a significant impact in determining the competitiveness of projects across the generation, distribution, and supply markets for years to come.

We have focused here on the proposed reforms to the distribution connection charging boundary under the Access SCR, which could have significant implications for distributed generation and could be instrumental in addressing one of the most significant barriers to utility-scale solar deployment – the upfront costs of connecting to the grid.

The connection charging boundary determines how much the connecting customer must pay to cover the cost of a connection. How 'deep' or 'shallow' the charging boundary is refers to where the cut-off point is set for the network assets customers must contribute to. If a project is seeking to connect to the grid at a point where there is not enough spare capacity to accommodate the additional generation, reinforcement of the grid may be required to allow the project to go ahead. Currently, developers are required to cover the full costs of any assets required to connect to the grid, and a portion of any grid reinforcement required up to one voltage level above the voltage level of their connection.³⁶

The UK's electricity grid is highly constrained, meaning there is little spare capacity for new generation and projects often trigger a significant amount of reinforcement costs. In some instances, all of these costs are placed on the first developer that comes forward, creating a major hurdle for new renewable energy projects. The situation is becoming unsustainable as investment in the grid has not kept pace with increasing electricity demand. To meet the 2050 net zero target, there needs to be substantial investment in both the distribution and transmission networks, especially as we head towards mass electrification of heating and transport. The level of investment required to create a step change in our national electricity infrastructure simply cannot be delivered by shifting costs solely onto renewable energy project developers.

Analysis

Unaffordable connection costs are holding back the deployment of distributed energy generation and delaying the decarbonisation of our energy system. Solar Energy UK members have identified these costs as one of the most significant barriers for utility-scale solar projects and have repeatedly detailed instances where sites have been abandoned due to incredibly high reinforcement costs being imposed, often without any advance warning from the network operator.

For example, we are aware of three different 50MW sites which were issued with total reinforcement costs of roughly £15 million each, which equates to £300,000/MW. This is approximately six times the capex allowances that solar developers include for all grid and connections costs for the average 50MW project. This amount of reinforcement cost presents an insurmountable financial barrier for the average solar project, and in solely these instances led to 150MW of zero carbon

renewable energy projects being abandoned. This is despite the fact that the projects were otherwise entirely viable, had already secured land rights, and had been deemed suitable from a planning and development perspective.

Often, the commercial barrier presented by high grid reinforcement costs prevents otherwise viable projects from even coming forward in the first instance. Project-level decision making of this nature is commercially sensitive, so it is difficult to quantify how much potential capacity is not being built as result of this issue. Based on evidence provided by Solar Energy UK members, we estimate that on average 100-300MW of additional potential capacity is being lost each year. However, some Solar Energy UK members have indicated the actual amount could be much higher.

Recommendations

The Access SCR is looking at options which would involve removing some or all of the burden for upstream grid reinforcement from individual project developers. This would address a major barrier to deployment and increase the viability of utility-scale solar projects, particularly in areas where the network is heavily constrained. However, under the current review timeline, the earliest this reform would be implemented is April 2023.

Our recommended solution is to move to a 'shallow' distribution connection charging boundary. At a minimum, Ofgem should implement a 'shallower' distribution connection charging boundary. The timeline for implementation of this reform should also be accelerated wherever possible and ideally begin sooner than April 2023.

Ofgem should also consider alternative payment terms for connection charges. For example, allowing payment over a period of time and other reforms to liabilities and securities arrangements. It is critical that liabilities and securities are appropriate and proportionate to the development planned, in order not to create additional barriers. In addition, providing early notice to developers of all connection or reinforcement costs is vital to avoid project delays and cancellations.

If Ofgem moves to a shallow connection charging boundary it will become even more important for the regulator to take a comprehensive view of the strategic anticipatory investments needed for decarbonisation of the Distribution Network. Solar Energy UK continues to recommend that, in line with Ofgem's stated core priority of decarbonisation and delivering a net-zero economy, a clear net-zero regulatory remit is added to Ofgem's core regulatory functions. In turn this should drive prices down and result in a more cost-effective running of the Distribution Network.

Business rates – utility-scale

Context

Under the current system, business rates are reviewed on an infrequent basis. Rateable values for solar PV projects have not been updated since 2017 and are currently not expected to be revised until 2023.

The delay of the 2021 business rates revaluation to 2023 has significantly increased uncertainty for businesses in the solar industry. This is especially true for new projects, as the current business rates were set based on a subsidy environment which no longer exists. In other words, post-subsidy solar projects are being saddled with higher business rates based on the incorrect assumption that they are receiving subsidised revenue.

Business rates as they stand are a major element of operating expenditure for solar projects, and the outdated revenue assumptions they are based on are hampering the Government's net zero objectives and undermining the deployment of renewable energy generation.

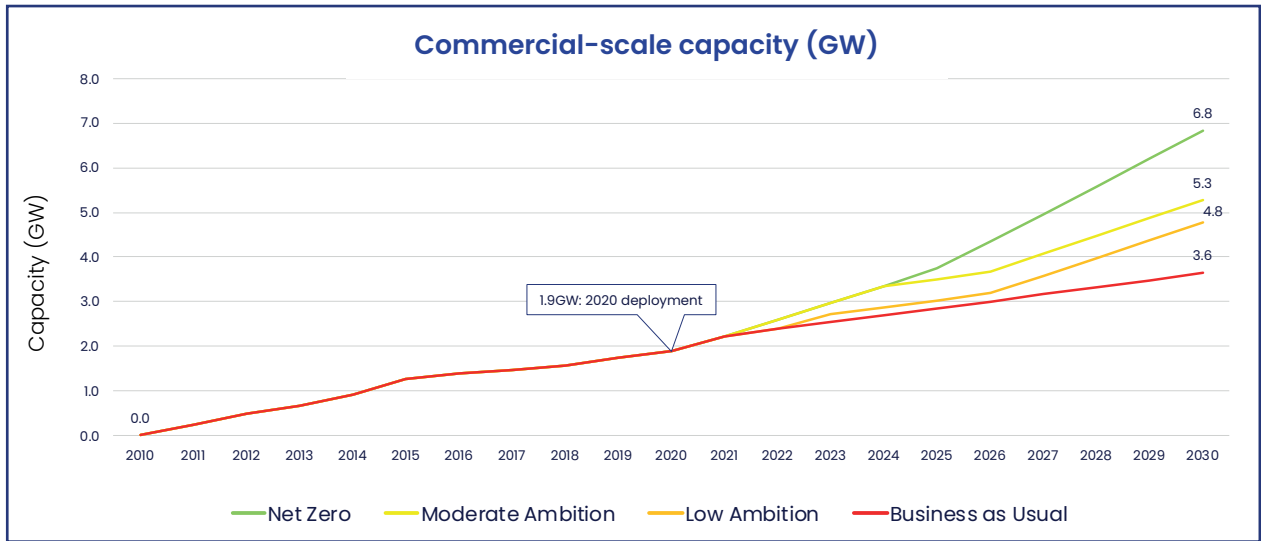
Recommendations

There is an urgent need for HM Treasury and the Valuation Office Agency (VOA) to reform business rates for unsubsidised solar projects to reflect the economic realities of the post-subsidy market.

The Treasury should also consider the introduction of temporary rates reliefs for renewable energy technologies, including solar, similar to the Business Growth Accelerator Relief introduced by the Scottish Government. This grants 18 months of business rate relief on new investments. The business rates multiplier should also be reduced across the board, or at the very least for renewable energy and energy storage assets.

The current five-year revaluation cycle is out of step with the speed at which renewable energy technologies and markets are evolving, therefore we welcome the Government's commitment to reducing the revaluation period to three years. More frequent and reliable revaluation periods, that align with the pace of change and reflect market conditions, will enable the most efficient project development cycle possible.

Commercial-scale solar



Policy area	Reforms needed
Business rates	Solar and energy storage assets should be removed from the plant and machinery tables under Class 1 in the regulations (SI2000/540)
Access to capital (capital allowances)	The current capital allowances on solar investments should be extended out to 2030
Non-residential building regulations	The Future Buildings Standard at a minimum should align with the Future Homes Standard reforms. This means ensuring a minimum 31% uplift in energy efficiency requirements for new build commercial and industrial buildings from the date of implementation, currently scheduled to be 2025, with a view to increasing this to a 75–80% uplift from 2028.
Public sector funding	The Public Sector Decarbonisation Scheme (PSDS), or an equivalent funding mechanism, should run until 2030

Business rates – on-site assets

Context

The current business rates regime for on-site assets results in disproportionately high rates liabilities for businesses and public institutions that are taking steps to reduce their carbon intensity by investing in renewable energy generation and storage. This contradicts the Government's commitment to tackling climate change, its smart energy policies, and the legally binding net zero objective.

The 2017 business rates revaluation changed the methodology for calculating rates liabilities for on-site assets. As a result, business rates for businesses that have installed renewable energy generation and storage technologies jumped by as much as 600–800% where the electricity generated is primarily consumed on-site.

However, more carbon intensive technologies, such as most gas fired combined heat and power (CHP), are currently excepted from rates liabilities under the plant and machinery classifications. The disparate treatment of these technologies is clearly out of step with the Government's stated objective to achieve net zero by 2050. The current situation penalises businesses and public institutions that are investing in renewable energy.

Analysis

Estimating the impact of business rates on investment decision-making relating to on-site renewable generation capacity is difficult. Solar industry deployment data shows roughly a 50% drop in commercial solar capacity deployed after the 2017 rates revaluation compared with CHP deployment, which appears to have remained stable.

There are of course many factors which affect investment decision-making. For the purposes of this forecast, we have conservatively

estimated that reforming the business rates regime would enable the deployment of an additional 10% of commercial-scale capacity, on top of what the market can be expected to deliver under present policies. This is a qualitative judgement reflecting evidence from Solar Energy UK members who have frequently commented on prospective installations cancelled because of the impact of the business rates regime on project economics.

Recommendations

The Government's stated ambition for the recent fundamental review of business rates was to reduce the overall burden on businesses. The Treasury has a clear opportunity to achieve this by revising the current business rates methodology which is disproportionately impacting businesses and public institutions that are taking steps to reduce their carbon intensity through renewable energy technologies like solar and battery storage. In the case of solar, businesses that want to reduce their carbon emissions are directly penalised for doing so, and instead are incentivised to install fossil fuel generation capacity.

All rooftop solar panels and associated battery storage assets should be classed as 'excepted plant and machinery' under Class 1 in the regulations (SI2000/540), following the precedent of the exemption for CHP (SI2001/846). The wording for battery storage, solar cells, and panels in Table 1 should also be amended to exclude those intended for self-consumption of electricity. There is significant demand for this, as evidenced by the 2021 Business Rates Review Interim Report, which revealed that over 40% of respondents specifically called for business rates exemptions to be applied to green energy generation, especially solar.

Access to capital – capital allowances

Context

The March 2021 budget included the welcome announcement that companies would be able to reduce their tax liabilities for investments in certain 'green' assets, including solar. This policy is currently planned to last until April 2023. The measure is intended to help generate business expenditure to support the UK's economic recovery from the coronavirus pandemic and has been widely lauded by the renewable energy sector.

Analysis

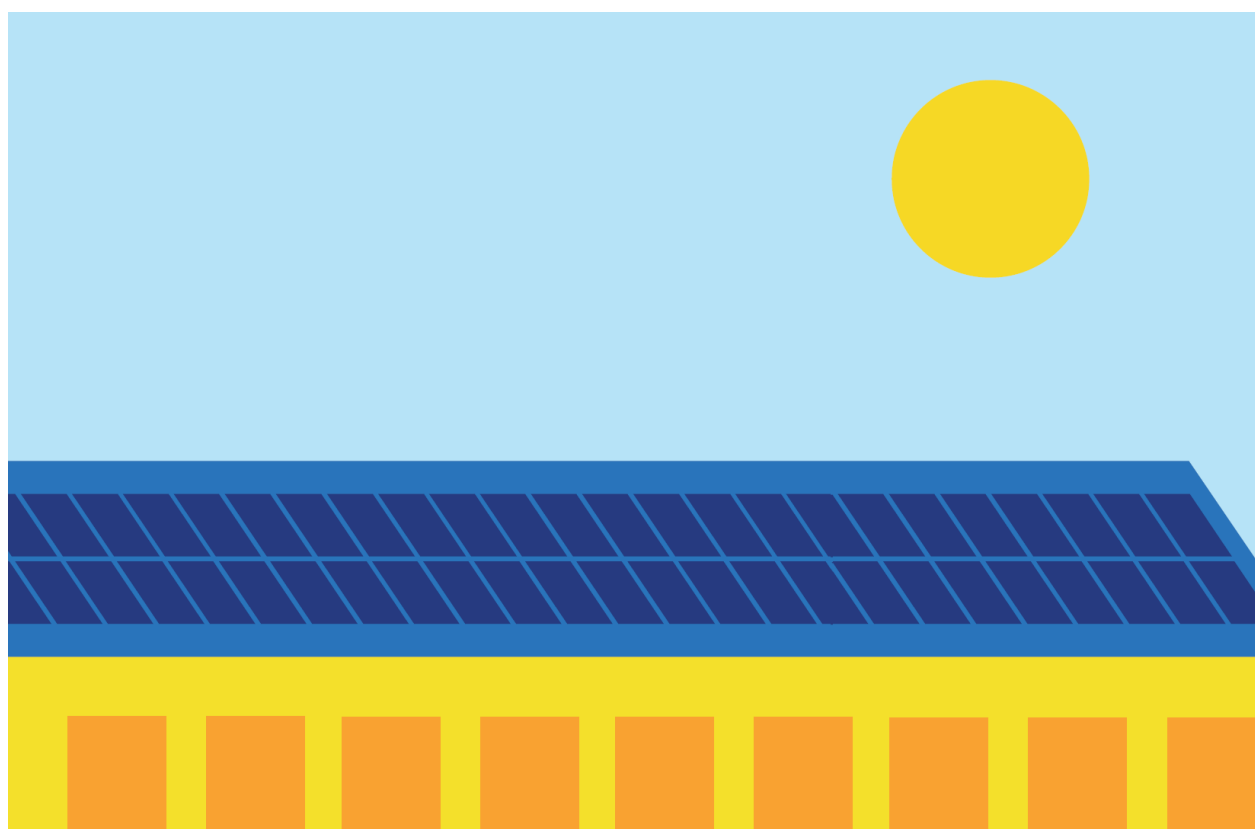
The Office for Budget Responsibility (OBR) assessment of this intervention is that, at its peak, it should increase the amount of business investment across the British economy by 10%.⁴⁰ Solar Energy UK members

have highlighted the potential of this policy change to drive investment in onsite power generation.

For the purposes of this forecast we assume that this policy change enables the deployment of an additional 7.5% of solar capacity in the first year, assuming a delay in adoption as businesses integrate the policy into their project planning, and then 10% additional capacity in each subsequent year in which the policy is assumed to be effective.

Recommendations

Capital allowances for renewable energy and storage technologies should be extended at least until the end of this parliament, but ideally to 2030.



Non-residential building regulations – Future Buildings Standard

Context

The Future Buildings Standard (FBS) builds on the Future Homes Standard (FHS) and sets out complementary proposals for reforms to Part L of the Building Regulations for non-residential properties. The Government's stated intention for this review is to provide a 'pathway to highly efficient non-residential buildings which are zero carbon ready'.³⁷

Solar and energy storage are critical enabling technologies for the decarbonisation of the UK's residential and non-residential building stock, and earlier research has demonstrated that increasing the capacity of on-site energy generation and storage can have substantial system level benefits, in addition to improving the energy performance of building stock and reducing energy costs for consumers.³⁸

The National Grid's analysis of future energy scenarios finds that under all scenarios there is a significant increase in electricity demand, as much as 300% from today by 2050. This is expected to result largely from the electrification of heating and transport.³⁹ These projected increases in electricity demand will be distributed across the country, and will undoubtedly have significant system-wide impacts, primarily on the electricity distribution network which will have to deliver a proportionate increase in supply. To help support the electrification of heat and transport, it is essential to ensure that any policies which aim to improve the energy performance of non-residential buildings support the inclusion of on-site electricity generation and storage wherever possible.

Analysis

We have based our analysis of the impact of the Future Buildings Standard on potential solar deployment on our analysis of the expected impact of the Future Homes Standard. We assume the FBS comes into effect in 2025, and it has the same impact on new build deployment as was seen in Scotland after changes to the building regulations there. The additional solar PV deployment that results is based on the adoption rates seen in Scotland, and the existing pipeline of commercial-scale projects.

Recommendations

The Future Buildings Standard should ensure that new buildings are at minimum 31% more energy efficient compared with those built to existing standards. This would be in line with the requirement being introduced as part of the interim standards for homes, in advance of the Future Homes Standard. The target for increasing energy performance for non-residential buildings should be aligned with that for residential buildings.

Further, solar PV should be added to the Government's model of the notional building under the Future Buildings Standard under all scenarios, not subject to the choice of space heating measure included as is currently the case. Developers should be supported to deliver the highest-quality buildings across all aspects of design and construction, including measures to improve energy efficiency.

Investment in public sector buildings

Context

The public sector estate – including schools, hospitals, and government bodies – covers thousands of buildings. As with other parts of the property sector, it is vital that they improve their environmental performance in order for the UK to reach net zero. With many of these buildings featuring large roofs, there is significant potential for on-site solar energy to help them achieve this.

For these organisations, with local government funding often limited, the upfront costs of installing on-site generation can be a barrier. To address this, the central government launched the Public Sector Decarbonisation Scheme (PSDS) in October 2020. This scheme provides capital grants to the public sector in England and other parts of the UK to invest in decarbonisation and energy efficiency measures, including solar PV.

Analysis

Data released to Solar Energy UK under a freedom of information request shows that £139 million of funding was allocated to public sector organisations under the first phase

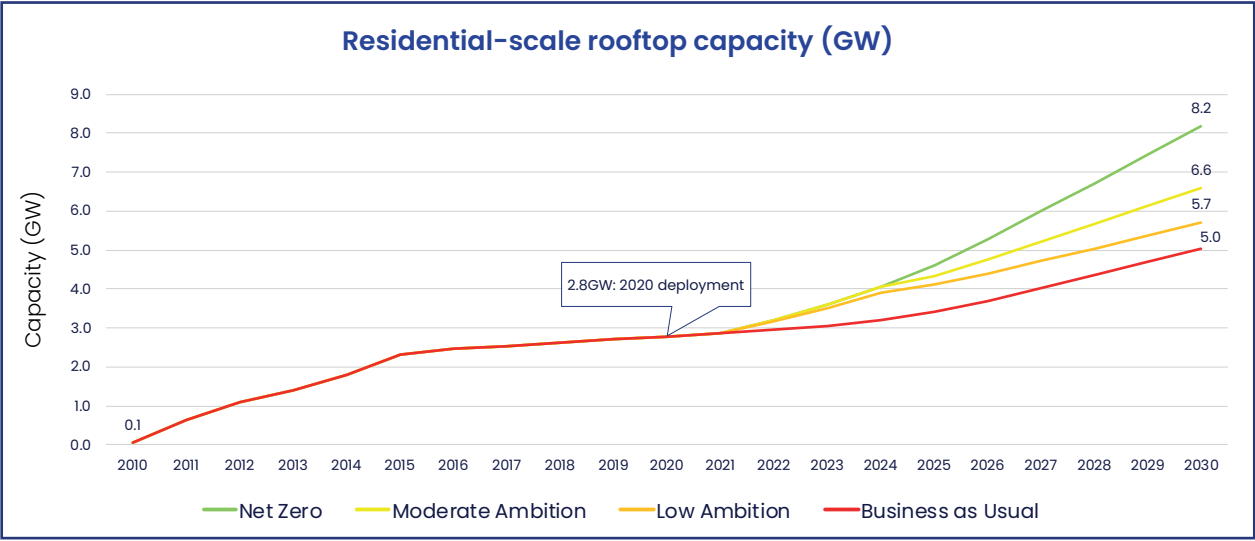
of the PSDS to be spent specifically on solar PV projects. Assuming average installation costs (based on Solar Energy UK analysis), we estimate that this amount of funding could lead to approximately 169MW of public sector solar capacity deployed under the first phase of the scheme.

We have scaled this figure up to reflect the potential additional capacity enabled by extending the scheme across the UK. Previous analyses⁴¹ of the technical potential of rooftop solar in the UK have demonstrated that there is more than enough roof space available to install at least an equivalent amount of additional solar capacity in future years, should further funding be made available.

Recommendations

The PSDS, or an equivalent public sector grant scheme, should be extended to help deliver at least equivalent additional solar PV capacity at least until the end of this Parliament, but ideally every year out to 2030. The devolved administrations in Scotland, Wales, and Northern Ireland should also establish or ensure the continuation of their own schemes to support the decarbonisation of the public estate.

Residential-scale rooftop solar



Policy area	Reforms needed
Residential new build regulations	Future Homes Standard reforms to Part L should be fully implemented along the announced timescale - minimum 31% energy efficiency uplift in 2020 and 75-80% uplift by 2025
VAT*	The government should apply zero-rate VAT to solar energy and energy storage assets. At a minimum, the reduced VAT rate of 5% should be restored for solar technologies and be applied to energy storage technologies.
Retrofit support	The Local Authority Delivery element of the Green Homes Grant Scheme, or a similar funding mechanism, should be extended to 2030. A similar scheme should be implemented for private homeowners, to replace the now withdrawn Green Homes Grant voucher scheme

*Not included in modelling

Residential new build regulations – Future Homes Standard

Context

In January, the Government released its long-awaited response to the consultation on the Future Homes Standard (FHS). This is the new set of regulations which will govern the energy efficiency of homes built in England and Wales going forwards.

The FHS made several important changes, which should improve the quality, comfort, and environmental performance of new homes. Specifically, we expect the new standards should lead to the inclusion of a solar PV system on most new homes, as it will be difficult for housing developers to build homes that meet the new energy targets without including on-site power generation.

This view is corroborated by the Government response, which states *“While we are confident that many developers will start to build new homes using low carbon heating under the interim 2021 Part L uplift, where there is insufficient supply, or the right skills are unavailable, **we envisage that many developers will instead install solar panels.**”*⁴²

Strong evidence for this comes from Scotland, where similar changes have already been made. This has resulted in around two thirds of all new Scottish homes now featuring a solar PV system, according to Solar Energy UK analysis of Scottish Energy Performance Certificates.

Analysis

Based on discussions with the housing industry and Solar Energy UK members

working on new build solar, we expect that solar energy systems will form a key part of housing developers meeting the new energy efficiency requirements. We estimated the increase in deployment for English homes by examining the impact of changes to the building regulations in Scotland.

This is likely to be an underestimate, as the changes to the English regulations imply a bigger relative increase in energy efficiency than the changes to the Scottish regulations did. In total, as much as 400MW per year of rooftop solar could be installed on new homes in England and Wales by 2030.

The changes will be implemented in two stages. From June 2022, all new homes will be required to achieve a minimum 31% reduction in emissions, subject to a grace period. A higher energy efficiency target of a 75–80% reduction in emissions is then very likely to apply from 2025 onwards, although this is still being finalised. Our scenario analysis takes these factors into account.

Recommendations

The Government response to the Future Homes Standard consultation announced earlier this year was a welcome step in the right direction. It is now important that the Government fully implement the Future Homes Standard reforms to Part L of the Building Regulations along the announced timescale, implementing the minimum 31% energy efficiency uplift from 2020 and implementing a 75–80% energy efficiency uplift requirement by 2025.

VAT

Context

Until 2019, solar PV and solar thermal technologies were eligible to receive a reduced VAT rate of 5%. This is because PV and thermal panels they are listed as Energy Saving Materials under HMRC regulations. However, under EU regulation, the UK's application of reduced VAT rates for these technologies was brought into question and resulted in several restrictions being enforced which significantly limited the circumstances under which the reduced rate would apply.

The 5% rate is now restricted only to qualifying persons or entities, or where the value of the energy saving materials used in a project does not exceed 60% of the total project cost.

While most standard standalone PV installations are unaffected as the cost of materials does not typically breach the 60% threshold, systems combined with a battery, bought via collective purchase schemes, or sold at a higher than average retail price will usually meet the conditions for a 20% VAT rate, inflating the cost for the consumer.

Analysis

Consumers frequently cite the upfront costs of residential renewable energy retrofits as one of the barriers to adoption. It is out of step with the Government's net zero ambitions that solar and energy storage should be saddled with higher VAT rates, which increase installation costs for consumers.

VAT reform for renewable energy and low carbon technologies, including solar and

energy storage, is incredibly popular and has been supported by business and consumer organisations across the political spectrum. A recent survey found that 70% of the UK supports eliminating VAT on solar and energy storage technologies.⁴³ This is in alignment with a growing chorus of institutions, including UK energy suppliers, business leaders, consumer advocates, and the Environmental Audit Committee⁴⁴, which are calling for VAT to be reduced or eliminated on green products.

The original rationale for introducing eligibility restrictions on reduced VAT for solar and storage technology was to ensure compliance with EU regulation. Now that the UK is no longer subject to the EU VAT framework, HMRC should immediately reverse the October 2019 decision to impose restrictions on reduced VAT rates for solar and energy storage.

Recommendations

At a minimum, solar PV, thermal, and energy storage technologies should be fully eligible to receive the reduced 5% VAT rate under Schedule 7A, Group 2 (as amended by The Value Added Tax (Reduced Rate) (Energy-Saving Materials) Order 2019).

However, we are calling on the Government to go further and apply zero-rate VAT to solar and energy storage technologies to further support households to invest in renewable energy technologies, thereby reducing their carbon footprint and energy bills.

Retrofit support

Context

Direct funding for residential clean energy retrofits will be essential to decarbonise the UK's existing housing stock by 2050, which accounts for 15% of all UK carbon emissions.⁴⁵

In August 2020, the Government announced the launch of the Green Homes Grant Scheme (GHGS) to help with this. The scheme was intended to provide grant support for homeowners to make energy efficiency investments in their properties. Solar thermal projects were eligible – and one of the most popular options covered by the scheme – although solar PV projects were not.

However, the part of the scheme aimed at private homeowners was poorly designed and implemented, and ultimately withdrawn in March 2021. Solar Energy UK and many other trade bodies were critical of the administrative issues and subsequent closure of the scheme, which caused major problems for installers and left many homeowners disappointed.

However, a second part of the scheme, the Local Authority Delivery (LAD) element, has proved much more successful. This programme provides funding to Local Authorities to retrofit social housing, and some of the funding initially committed to the GHGS has been redirected into the LAD element. Importantly, this element of the scheme includes support for solar PV as one of the eligible technologies.

Analysis

Our analysis is based on observed demand for solar thermal project vouchers awarded under the GHGS, while the scheme was in operation. We assume that this is at least equal to what solar PV demand would be under an equivalent scheme. Given the

historic popularity of solar PV as a residential retrofit measure, this is likely an underestimate of the potential additional solar capacity that such a scheme could deliver.

We have scaled the actual deployment figures for solar thermal according to the deployment that could be expected across the UK for both the private and social housing sectors, should a new retrofit support scheme be launched in the four home nations, with solar PV included as an eligible technology.

Recommendations

The principle of supporting homeowners to cover the upfront costs of green improvements is a good one. It will deliver more comfortable homes that are cheaper to run, which is good for consumers and for the UK's decarbonisation efforts.

We call on the government to launch a major consultation with industry on designing a long-term scheme in line with net zero for retrofitting homes with a range of zero carbon technologies, including solar and energy storage, to run till 2030. This would deliver on the intent of the original GHGS.

This scheme should integrate government grants with incentives for green mortgages, the roll-out of smart metering technology, energy storage, and EV charging infrastructure. Alongside the needed additional net zero regulatory remit for Ofgem and supportive price controls to enable rapid upgrading of the distribution network, these measures would help to rapidly decarbonise the UK's private residential building stock.

We also call on the UK government to ensure the LAD scheme continues until 2030, and on the devolved administrations to ensure a similar level of support for retrofit schemes.

Conclusion

The UK solar industry has demonstrated the ability to deploy up to 4GW of new capacity per annum, and has shown its resilience throughout the COVID-19 pandemic. More than 1GW of solar has been deployed since the formal end of government support in 2019, and there remains significant growth potential.

However, significant barriers remain, and accelerating solar deployment to meet the needs of a net zero economy will require leadership and ambition on the part of government, alongside clear onshore renewable energy targets. Developers at all scales, from residential rooftops to utility-scale ground-mount systems, are currently contending with extremely congested electricity networks, onerous planning requirements, a challenging wholesale electricity market, and other regulatory and policy barriers that stand in the way of accelerating deployment. There is much that the Government can do to level the playing field for renewable energy and drive the delivery of net zero.



Annex 1: Appendices

Annex 1 – Glossary of terms

AC	Alternating Current
AR4	Allocation Round 4
BEIS	Department for Business, Energy and Industrial Strategy
CAGR	Compound Annual Growth Rate
CCC	Climate Change Committee
CfD	Contracts for Difference
CHP	Combined Heat and Power
Commercial-scale solar	Projects with installed capacity of greater than 4kW and less than 5MW
COP26	The 26th UN Climate Change Committee Conference of Parties
DC	Direct Current
Residential-scale solar	Projects with installed capacity of 4kW or less
FBS	Future Buildings Standard
FHS	Future Homes Standard
FiT	Feed in Tariff
GHGS	Green Homes Grant Scheme
GW	Gigawatts
GWh	Gigawatt Hour
kW	Kilowatts
kWh	Kilowatt Hour
LAD	Local Authority Delivery
LCCC	Low Carbon Contracts Company
LCOE	Levelised Cost of Electricity
MtCO ₂ e	Million tonnes CO ₂ equivalent
MW	Megawatts
MWh	Megawatt Hour
MWp	Megawatt Peak
Ofgem	Office of Gas and Electricity Markets
NIC	National Infrastructure Commission
NSIP	Nationally Significant Infrastructure Projects
PSDS	Public Sector Decarbonisation Scheme
PV	Photovoltaic
RO	Renewables Obligation
Solar thermal	Solar technology which uses the sun's energy for water or space heating
TW	Terawatts
TWh	Terawatt Hour
Utility-scale solar	Projects with installed capacity of 5MW or greater

Annex 2: Policy scenario detail

Sector	Policy	Business as usual
Utility-scale	Auctions	4 GW pot 1 CfD in 2021 (AR4)
	Planning	No change in AC/DC definition
Commercial scale	Building regulations (England)	No change in building regulations for non-domestic buildings
	Building regulations (Scotland)	No change in building regulations for non-domestic buildings
	Business rates	No change in solar classification
	Capital allowances	Capital allowances continue until 2023 as planned
	Investment in public sector buildings	Public Sector Decarbonisation Scheme ends in England in 2021 as planned
Residential-scale rooftop	Building regulations (England)	Interim energy 31% home energy performance standard introduced 2022, continues at this standard. Two-year ramp to higher installation rates.
	Retrofit: social housing	No additional funding beyond existing scheme (GHG LAD Scheme, England only)
	Retrofit: private housing	No funding

Low ambition	Moderate Ambition	Net zero
4 GW pot 1 CfD in 2021 (AR4)	4 GW pot 1 CfD auction in 2021 and at least one more before the end of this Parliament (AR4 and AR5)	Three 4 GW pot 1 CfD auctions in decade to 2030 (AR4, AR5 and AR6)
AC/DC capacity definition resolved in favour of AC from 2022	AC/DC capacity definition resolved in favour of AC from 2022	AC/DC capacity definition resolved in favour of AC from 2022
Future Buildings Standard leads to average 4 - 50 KW system size installed on all new rateable properties in England. Two-year ramp to higher installation rates.	Future Buildings Standard leads to average 4 - 50 KW system size installed on all new rateable properties in England. Two-year ramp to higher installation rates.	Future Buildings Standard leads to average 4 - 50 KW system size installed on all new rateable properties in England. One-year ramp to higher installation rates.
Scottish Heat and Building Strategy leads to average 4 - 50 KW system size installed on all new rateable properties in Scotland. Two-year ramp to higher installation rates.	Heat and Buildings Strategy leads to average MCS system installed on all new rateable properties in Scotland. Two-year ramp to higher installation rates.	Heat and Buildings Strategy leads to average MCS system installed on all new rateable properties in Scotland. One-year ramp to higher installation rates.
Solar put on equal footing with CHP from 2028	Solar put on equal footing with CHP from 2023	Solar put on equal footing with CHP from 2023
Capital allowances continue until 2023 as planned	Capital allowances on solar investment provided until end of current Parliament	Capital allowances on solar investment provided until 2030
Second round of Public Sector Decarbonisation Scheme run in England before end of current Parliament	Public Sector Decarbonisation Scheme or equivalent extended UK-wide and runs every year until end of current Parliament	Public Sector Decarbonisation Scheme or equivalent extended UK-wide and runs every year until 2030
Interim energy 31% home energy performance standard introduced 2022, continues at this standard. Two-year ramp to higher installation rates.	Interim energy 31% home energy performance standard introduced 2022, 75% standard in 2025. Two-year ramp to higher installation rates.	Interim energy 31% home energy performance standard introduced 2022, 75% standard in 2025. One-year ramp to higher installation rates.
GHG LAD Scheme extended to end of current Parliament, England only	GHG LAD scheme continues until of current Parliament and extended UK-wide	GHG LAD scheme continues until 2030 and extended UK-wide
Long-term retrofit support scheme introduced England-wide from 2022 until end of current Parliament (700,000 + installations targeted)	Long-term retrofit support scheme introduced and extended UK-wide from 2022 until end of current Parliament (700,000 + installations targeted)	Long-term retrofit support scheme introduced UK-wide from 2022 until end of decade (700,000 + installations targeted)

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