New Hall Solar Farm
Land at New Hall Farm, New Hall Lane, Overton, Wakefield, WF4 4RP

Statement of Need
July 2023

Humbeat Limited specialises in the development and optimization of commercial power generation assets within integrated, liberalised and low-carbon energy systems.

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July 2023

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1 Personal background

Qualifications and experience

1.1 My name is Si Gillett. I am a UK energy market professional with experience including integrated oil majors, integrated electricity utilities, and independent consultancy.

1.2 Humbeat is an independent electricity consultancy, established by me in 2016, to support participants in the UK's transition to a low-carbon electricity and energy system. The consultancy supports and advises private individuals and organisations with pre- and post-construction electricity developments by providing commercial and strategic advice in relation to those developments.

1.3 I work across all electricity generation technologies which are important to the transition to a zero-carbon electricity system and since 2017 ground mount solar developments have played an increasingly major role in the work that I do. I have been commissioned to provide electricity market expertise to over 12,000MW (MW = megawatt) of development-phase renewable generation developments across the UK, including over 3,000MW of ground mount solar, ranging from 10MW sites to large-scale nationally significant infrastructure developments. I specialise in assessing, describing, and quantifying the benefits specific technologies and individual developments bring to the overarching and urgent need for decarbonisation in the UK.

1.4 Specifically, I authored the Statements of Need for Cleve Hill Solar Park (CHSP) and Longfield Solar Farm – both of which are Nationally Significant Infrastructure Projects (NSIPs). I represented CHSP as an expert witness for the Applicant during its Open Hearings and input into the written Examination process for both. CHSP received its Development Consent Order (DCO) in May 2020, the first of its kind in the UK, and Longfield received its DCO in June 2023.

1.5 I also provided energy need and policy support to both Hornsea 3 and Hornsea 4 Offshore Wind Farms as they developed IROPI (Imperative Reasons of Overriding Public Interest) arguments to support their applications for DCO (granted December 2020 and July 2023 respectively).

1.6 I am currently supporting ten other nationally significant low-carbon electricity generation infrastructure developments by providing electricity market and low-carbon transition expertise to their development teams, as well as multiple engagements on TCPA planning applications for solar and solar + storage developments.

1.7 I have 20 years' experience in energy sectors including petroleum and natural gas liquids and conventional, nuclear, and renewable electricity – on both the generation and sale side. A wide range of energy experience provides a robust basis for a balanced assessment and analysis of the UK energy sector as a whole. This is especially important as the journey to Net-Zero involves more integrated and system-level thinking than has ever previously been required in the electricity sector.

1.8 I also hold master's degrees in mathematics and nuclear regulation.

1.9 The evidence that I have prepared and provided in this report is true. I confirm the opinions expressed are my true and professional opinions, irrespective of by whom I am instructed.

Author's knowledge of site and context

1.10 Humbeat was appointed by the Applicant, Boom Developments Ltd, in May 2023 to support the application to Wakefield District Council to grant planning permission for the provision of a renewable energy scheme comprising ground mounted solar photovoltaics (PV) arrays with ancillary equipment on land at New Hall Farm, New Hall Lane, Overton, Wakefield, WF4 4RP.

1.11 This report provides context on the national need for solar generation in the UK and the local need in the administrative area of Wakefield District Council.

1.12 The Proposed Development is located within the Green Belt. This Statement of Need provides evidence which could constitute very special circumstances justifying development in the Green Belt.

1.13 I have been provided with the documents submitted by the Applicant as part of the aforementioned planning application and I have reviewed these in preparing this Statement. I acknowledge that national planning policy (NPPF Para 158(a)) expressly confirms that when determining applications, there is no requirement for applicants to demonstrate the overall need for renewable or low carbon energy. However, there is a compelling and urgent need for renewable energy development at all levels and the important contribution made by the Proposed Development should be given very substantial weight in decision making.

1.14 The benefits associated with solar generation at the Proposed Development should be accorded very substantial weight in the overall planning balance and could constitute very special circumstances justifying development in the Green Belt.

1.15 This Statement of Need explains its conclusions on the need and benefits of the Proposed Development in terms of its contribution to the decarbonisation of UK energy supply, including local energy supply, to achieve Net-Zero and also in helping to improve the UK's energy security.

1.16 This Statement of Need draws on published documents, policy and strategy – at both the national and local level – and contains conclusions which I have reached based on the documents presented and my own professional judgement.

2 Introduction

Document purpose

2.1 This Statement of Need has been prepared on behalf of the Applicant to be submitted as part of a planning application to Wakefield District Council in summer 2023 for planning permission for the Proposed Development in the proposed location.

2.2 This Statement of Need demonstrates the important contribution the Proposed Development will make to the three important national energy policy aims:

- Net-Zero and the importance of urgently deploying low-carbon generation assets at scale
- Security of supply (geographically and technologically diverse supplies)
- Affordability and reducing exposure to volatile international markets

2.3 This Statement of Need also considers more local energy needs and in particular the contribution which would be made by the Proposed Development to the published decarbonisation plans for Wakefield District Council. This Statement of Need additionally analyses other opportunities for low carbon generation to be developed in the administrative area of Wakefield District Council and concludes that in order to connect assets to the distribution grid without also constructing excessive lengths of connecting cables, Green Belt land will be required to house the capacities of low-carbon generation Wakefield District must accommodate in order to achieve its Net Zero targets.

2.4 This Statement of Need recognises that the commitment to decarbonise extends across the United Kingdom of Great Britain and Northern Ireland. Northern Ireland is interconnected with the mainland power system through interconnectors but is operated under a different electricity market framework. Therefore, hereinafter we refer to Great Britain (GB) in relation to electricity generation and transmission, but the UK in relation to the national commitment to Net-Zero carbon emissions by 2050.

2.5 Where there is ambiguity in source evidence cited in this report with regards to the attribution of quantitative data to either a UK or GB geography, it should be noted that Northern Ireland represents approximately 3% of UK electricity generation and 3% of UK electricity supply and as such that ambiguity is not material in respect of the conclusions reached on reviewing the quantitative evidence.

Structure of document

2.6 This document provides relevant legal, policy, and industry evidence in support of the Applicant's case that there is a national need for solar generation in the UK in general and in Wakefield in particular, and therefore that the benefit the proposed development provides to both the national and the local urgent need for low-carbon

generation, should be accorded very significant weight when assessing the planning balance.

2.7 This report should be read in conjunction with national and local policy relevant to the need for and benefits of this proposed development, the relevant sections of which are signposted in my Chapter 3 below. Chapter 3 also summarises the local planning policy and strategies which are particularly material to some of my evidence.

2.8 The three pillars of national energy policy are decarbonisation, security of supply, and affordability and I will deal with these in my evidence as below.

2.9 Chapter 4 provides evidence that the need for decarbonisation is growing, as is the urgency for the actions required to deliver decarbonisation.

2.10 Chapter 5 provides evidence that decarbonisation will increase demand for electricity and describes the policies and strategies already in-flight which are already increasing or are set to increase electricity demand.

2.11 Chapter 6 provides evidence that the supply of low carbon electricity must increase in order to meet growing demand-through-decarbonisation, as well as to replace existing low-carbon and carbon-intensive generating stations which are at or close to their economic end of life. Chapter 6 also provides an overview of Wakefield's grid network and concludes that low-carbon generators sited on Green Belt land and connecting to nearby substations are highly likely to be required in order to connect sufficient low-carbon generation in Wakefield for the Council to achieve its net zero targets. The final section of Chapter 6 describes the development in relation to the significant contribution it will make to achieving local decarbonisation policies.

2.12 Chapter 7 provides evidence which demonstrates the contribution solar makes to the second and third pillars of national energy policy: those of national security of supply, and of affordability for GB consumers.

2.13 The overall conclusions of this Statement of Need are provided in Chapter 8.

2.14 An executive summary of each of the chapters of this Statement of Need are included in the following section.

Executive summary of key conclusions from each Chapter

2.15 Chapter 3 concludes that there is an urgent national need for solar developments such as the Proposed Development.

- The UK has legal climate change obligations and these require the development of large capacities of renewable energy. The Proposed Development is for renewable energy generation
- Government recognises that developing non-fossil fuel, UK-based electricity generation will reduce UK's exposure to volatile international energy markets and Government has consistently expected and continues to expect the UK's future

electricity system to consist predominantly of offshore wind and solar. The Proposed Development is for solar generation, the implementation of which both the British Energy Security Strategy (BESS) (Ref 22) and Mission Zero (Ref 40) recommend should be accelerated

- Government policy recognises the importance of near-term actions. The Proposed Development is capable of achieving a 12-15 months post-consent construction duration (Ref 6). The Proposed Development is located close to a part of the existing local electricity network which has the capability of connecting the scheme
- Wakefield District Council (WDC) declared a climate emergency in 2019. Wakefield's Pathway to Net Zero report (Ref 2) focuses on whole-District carbon emissions across five sectors of society. In order to meet the "*more realistic although still a significant challenge*" of achieving District-wide net-zero emissions by 2038, the council needs to prioritise "*reducing our reliance on natural gas and increasing our use of renewable energy*" across Industry and Power as well as decarbonising transport through shifting "*from petrol and diesel vehicles to low-emission alternatives*" (Ref 2, p2) thereby adding to future electricity demand. WDC's Pathway to Net Zero report describes a vision for Wakefield in 2038 of increased local renewable generation using over 1,000ha of land (approximately 2,500 acres) and local generation providing 79% of total electricity demand. By approving plans for the Proposed Development, the Council would be using its powers to support the delivery of up to 27.4MW of low-carbon solar generation capacity, thereby delivering significant benefits to the vision set by WDC of the District becoming carbon neutral by 2038 (Ref 2)

2.16 Chapter 4 concludes that other solar developments of a similar scale to the Proposed Development are capable of achieving single-year post-consent construction durations (Electricity Generation Costs, Ref 6). The Proposed Development, which will connect to part of the existing local electricity network which has the capability of connecting the scheme, is highly likely to deliver against the urgent requirement of decarbonisation actions. This is of utmost importance because:

- The urgency for decarbonisation actions to progress decarbonisation on a national, and indeed an international, scale is increasing
- The UK is an international leader in the fight against climate change but faster delivery of decarbonisation actions is required to secure the delivery of its climate change target and budgets
- Because some complementary low-carbon technologies have long delivery timeframes and are not yet consented, it is essential that urgent action is taken to rapidly develop low-carbon technologies such as solar which are able to achieve consent and commence operation in relatively short timescales

2.17 Chapter 5 concludes that:

- GB electricity demand will start to increase during the 2020s through the take-up of electricity as a substitute in sectors which are currently using carbon-intensive fuels as a source of energy
- Policies are already in place to substitute electricity for fossil fuel as a source of energy in non-traditional sectors and many of those policies have started to deliver both on a national and local basis, however, more is needed

- WDC must consider the development of low-carbon generation facilities to help increase the proportion of local energy supplied by green electricity, thus enabling local decarbonisation
- Due to the interaction of available space and available grid capacity in Wakefield, it is my opinion, based on the evidence available to me, that without considering the sensitive development of Green Belt land for the production of low-carbon electricity from within its administrative area, WDC seriously risks a shortfall against its vision for Wakefield to become carbon neutral by 2038
- The implication, if many councils do not strive to generate as much green electricity as they can from their own administrative areas, is that there will be a real risk of a shortfall at the national level, against required progress towards a national net zero target in 2050

2.18 Chapter 6 concludes that solar generation is already a critical part of the UK electricity generation mix, and its deployment to date has had a significant beneficial impact on decarbonisation of the energy sector. Further that:

- The national pipeline of consented solar developments is not of a sufficient scale nor certainty to keep pace with even the lowest of the most recent projections of future solar generation capacity and timings required to meet Net-Zero
- Therefore, there is the need for a very substantial increase in the deployment of solar generating capacity nationally to meet the national Net-Zero target by 2050
- To generate, in Wakefield, the same amount of low-carbon electricity as is consumed annually in Wakefield District, the equivalent of 63 solar farms of the same size as the Proposed Development would be required between now and 2038 (WDC's target for district-wide decarbonisation)
- However, if Wakefield's entire energy demand was to be met through electricity, the equivalent of 381 solar farms of the same size as the Proposed Development (circa 10GW of capacity) would be required between now and 2038
- This number illustrates the enormous scale of the decarbonisation challenge in the UK, and it therefore follows that every development which will deliver a decarbonisation benefit should be accorded significant weight in the overall assessment of the planning balance
- The benefit brought forward by consenting the Proposed Development could constitute very special circumstances justifying development in the Green Belt
- By contrast, WDC's current Adopted Core Strategy, which defines the spatial vision for Wakefield District to 2026, does not yet fully incorporate the scale of low-carbon generation capacity required to make meaningful decarbonisation progress in Wakefield
- In order to achieve "*the indicative renewable energy generation target for the district of 11 mega watts by 2010 and 41 mega watts by 2021 and to contribute to sub-regional and regional targets*", WDC will "*encourage the development of new sources of renewable energy generation where there is no adverse environmental impact on nearby communities*" (Ref 38, Policy CS 13 2 (a))
- The implications of not meeting net zero targets and therefore not adequately addressing the Climate Emergency are potentially catastrophic for local and global residents alike. It is therefore my opinion that the ambition set out in the current Adopted Core Strategy needs to be extended to encourage and urgently deliver significantly more local decarbonisation actions than it currently targets to minimise the adverse environmental effects of climate change on society

2.19 Chapter 7 concludes that as well as its important contribution to decarbonisation, solar energy has an important role to play in reducing the UK's over-reliance on foreign energy sources and volatile international energy markets.

- Solar is also one of the lowest cost sources of electricity generation in the UK, and has an important role to play in managing the affordability of electricity
- Solar plays an important role in enhancing GB electricity system security and complements GB's existing and growing wind generation capacity
- Developments which can be delivered against short timescales are incredibly beneficial to the achievement of decarbonisation, security of supply, and affordability targets at both a national and local level

3 Legal and policy background

National context

3.1 In preparing this Statement of Need I have reviewed relevant national and local policy and strategy documents.

3.2 It is Government's view that renewable electricity generation is a critical enabler of decarbonisation, and there are many measures it has place to support its deployment. Government:

- Has been progressively increasing its commitment towards the ultimate legally binding requirement for Net-Zero and emphasis on doing so through renewables, particularly offshore wind and solar
- Has increasingly focused on the energy security benefits of renewables, as well as the carbon benefits
- Emphasises the importance of maximising the use of non-protected land for solar where possible
- Is clear on the scale of change needed to meet the legal binding Net-Zero commitments, which includes an ambition for a five-fold increase in solar capacity
- Is increasingly focused on the role of renewables in reducing energy bills

3.3 The National Policy Statements (NPSs) are important documents which set out national policy for energy infrastructure in England and Wales. They were established against obligations made as part of the Climate Change Act 2008 (CCA2008). NPPF Para 5 confirms that National Policy Statements for major infrastructure may be a material consideration in preparing plans and making decisions on planning applications.

3.4 Overarching National Policy Statement for Energy (NPS) EN-1 (Ref 13) set out a case for the need and urgency for new energy infrastructure (Ref 13, Paras 3.3.1 & 3.3.15). The urgency of the need requires actions to be taken in the near-term in order for that need to be met and therefore the urgent need for the Proposed Development goes towards meeting the urgent need for new energy infrastructure as set out in NPS EN-1.

3.5 The NPSs also set out a case for new energy infrastructure to be consented and built with the objective of supporting the government's policies on sustainable development, by:

- Mitigating and adapting to climate change
- Contributing to a secure, diverse, and affordable energy supply (Ref 5, Para 1.3.1)

3.6 The 2011 NPSs recognised that moving to a secure, low carbon energy system to enable the UK to meet its legally binding target to cut greenhouse gas emissions would require major investment in new technologies to electrify heating, industry and transport, and cleaner power generation (Ref 13, Para 2.2.1).

3.7 The NPSs conclude that the UK urgently needs sufficient electricity capacity from a diverse mix of technologies and fuels (Ref 13, Para 2.2.20), in order to achieve energy security at the same time as dramatically reducing greenhouse gas emissions (Ref 13, Para 3.1.1).

3.8 Government issued draft revisions of NPS EN-1 and NPS EN-3 (Renewable Energy Infrastructure) for consultation in March 2023 (Ref 23, 28). These revisions include updated policy on the development of low-carbon infrastructure.

3.9 The draft revised NPS states that:

> *"Using electrification to reduce emissions in large parts of transport, heating and industry could lead to more than half of final energy demand being met by electricity in 2050, up from 17 per cent in 2019, representing a doubling in demand for electricity"* (Ref 23, Para 2.3.7).

3.10 Section 3.3 of draft Revised NPS EN-1 explains that large capacities of low-carbon generation will be required to:

- Ensure that there is sufficient electricity to meet increased demand
- Replace output from retiring plants
- Ensure there is sufficient margin in our supply to accommodate unexpectedly high demand
- Mitigate risks such as unexpected plant closures and extreme weather events

3.11 Draft Revised NPS EN-1 articulates the prudence of planning infrastructure development on a conservative basis, including for scenarios in which the future use of hydrogen is limited (Ref 23, Para 3.4.28), and concludes that "*a secure, reliable, affordable, Net Zero consistent system in 2050 is likely to be composed predominantly of wind and solar*" (Ref 23, Para 3.3.20).

3.12 The NPS re-iterates that:

> *"Solar farms are one of the most established renewable electricity technologies in the UK and the cheapest form of electricity generation."*
>
> *"Solar farms can be built quickly and, coupled with consistent reductions in the cost of materials and improvements in the efficiency of panels, large-scale solar is now viable in some cases to deploy subsidy-free"* (Ref 28, Para 3.10.4 – 3.10.5)

3.13 Government therefore "*has committed to sustained growth in solar capacity to ensure that we are on a pathway that allows us to meet net zero emissions. As such solar is a key part of the government's strategy for low-cost decarbonisation of the energy sector*" (Ref 28, Para 3.10.1).

3.14 In January 2023, *Mission Zero* was published by Rt Hon Chris Skidmore MP, Chair of government's Independent Review of Net Zero (Ref 40). The report was commissioned to ask how the UK might deliver its own net zero targets in a manner that was more affordable, more efficient, and in a pro-business and pro-enterprise way.

3.15 Mission Zero recognises the importance of taking action on net zero. It also recognises the fact that the energy transition is a new economic reality, particularly amid the global reality of the energy security crisis and rising gas and fossil fuel prices in 2022. 2022 has demonstrated the importance of delivering future energy security through the greater use of domestically generated renewable and clean sources of power, while also seeking to better reduce energy demand.

3.16 Mission Zero reconfirms the global importance of the UK's commitment to achieve Net Zero and makes recommendations which should be taken forwards now, alongside other wider recommendations. It states that the UK should be proud of the steps it has taken so far to achieve net zero, and that climate change and the economy are intertwined. The UK must however move quickly, not only to protect and secure delivery of our national climate commitments but also deliver the economic benefits of moving away from a carbon economy. The review finds that "*The benefits of net zero will outweigh the costs*" and believes that "*This is too important to get wrong*" (Ref 40).

3.17 Mission Zero makes the following recommendations which are relevant to the Applicant's case for the Proposed Development:

- Priority Mission no. 2 is "*Full-scale deployment of solar including a rooftop revolution to harness one of the cheapest forms of energy, increase our energy independence and deliver up to 70GW of British solar generation by 2035*"
- Priority Mission no. 8 is "*Working towards gas free homes by 2035* [or earlier]" and Recommendation 1 is to set a legislative target for gas-free homes and appliances. The implications of this Priority Mission are discussed in Chapter 5 of this Statement of Need
- Priority Mission no. 9 is to "*Embed nature and habitat restoration … maximising co-benefits for climate and nature wherever possible*." I have read the *Planning, Design and Access Statement* for the Proposed Development and note that it includes conclusions on the impacts of the Proposed Development on biodiversity and the anticipated resulting biodiversity net gain outcome
- Recommendation 11 is to "*Set up taskforce and deployment roadmaps in 2023 for solar to reach up to 70GW by 2035*" – an aim established in the British Energy Security Strategy of 2021 (Ref 22)
- Recommendation 15 is the swift delivery of Zero Emissions Vehicles and the ZEV mandate to apply from 2024. The implication of this recommendation is discussed in Chapter 5 of this Statement of Need
- The Review recognises the importance of local action and local plans to the achievement of Net Zero. "People and places" must be empowered to deliver Net Zero through a full alignment on a local level with a Net Zero future through the introduction of a "net zero test"

3.18 In March 2023, Government published Powering Up Britain which explains "*how the government will enhance our country's energy security, seize the economic opportunities of the transition, and deliver on our net zero commitments*." (Ref 42(1), p6).

3.19 The paper goes on to conclude that "*We need investment at scale … to rapidly rollout existing technologies … at pace to meet our ambitions for decarbonising power and* [lower] *wholesale UK electricity prices.*" (Ref 42(1), p9).

3.20 The paper also observes that "*a significant proportion of technologies we will need for 2050 are currently at the demonstration or prototype phase*" (Ref 42(1), p9). This implies that while we should continue to strive for innovation, waiting for novel technologies to deliver comes with risk (as some technologies may not deliver) and therefore that government's strategy to deliver a rapid rollout of existing technologies while continuing to invest in new technologies, is of critical importance in the fight against climate change.

3.21 Powering Up Britain observes that "*The* [Mission Zero] *Review was unequivocal in its assessment that the plan set out in the Net Zero Strategy was the right one, whilst providing recommendations to strengthen delivery.*" (Ref 42(1), p16).

3.22 Government has published a response to each recommendation made in Mission Zero, but in summary, Government "*Agree[s] with the Review's conclusion that net zero is the growth opportunity of the 21st century and could offer major economic opportunities to the UK – but that decisive action is needed to seize these*" (Powering Up Britain, Responding to the Independent Review of Net Zero's Recommendations, Ref 42(2), p3) and confirms that Government are "*partly or fully acting upon 23 recommendations from the Independent Review of Net Zero report's 25 recommendations for 2025*" (Ref 42(4), p23.

3.23 The critical elements of the national policy level evidence are summarised below and inform subsequent chapters of this Statement of Need.

- There is a legal obligation to achieve Net-Zero by 2050 and there are interim targets, also binding in law (Carbon Budgets)
- The Net-Zero obligation is the UK's contribution to meeting the 2015 Paris Agreement on Climate Change and there is a duty on government to ensure that these targets are met
- The UK's 2030 Nationally Determined Contribution supersedes the Fifth Carbon Budget as the appropriate level of reduction on the way to Net Zero and the Sixth carbon Budget (2033-2037) requires the UK to reduce GHG emissions by 78 per cent by 2035 compared to 1990 levels
- National security of supply and affordability of energy is sharply in focus and must be delivered hand-in-hand with decarbonisation
- The government's objectives for the energy system are to ensure our supply of energy always remains secure, reliable, affordable, and consistent with net zero emissions in 2050 for a wide range of future scenarios, including through delivery of our carbon budgets and NDC
- That government's approach is to decarbonise the electricity sector first and introduce "whole-systems thinking" which means enabling low-carbon electricity to be used to decarbonise other sectors which have not traditionally used electricity, such as heat, industry, commerce, and transport

- The role of the Climate Change Committee (CCC) is to make recommendations and provide independent oversight and assurance to government's plans

Solar Task Force

3.24 Government established a Solar Taskforce to drive forward the actions needed by government and industry to meet the solar deployment ambition of 70 gigawatts by 2035.

3.25 The taskforce will run up to February 2024, and its key objectives (Ref 37) are to:

- Secure cross government and industry buy in to a UK roadmap for solar to achieve up to 70GW of solar by 2035
- Take action to identify and drive forward processes and measures to unlock deployment
- Secure investment and value for money through continued progress on cost reduction and sustainable investment in UK supply chains, jobs, skills, innovation, and infrastructure

3.26 By establishing the Solar Taskforce, Government has recognised that solar is a critical element of its plan to deliver decarbonisation, energy security, and affordability, but that enabling actions need to be completed in order to facilitate deployment at the pace and level required to meet government's targets.

Local context

3.27 Wakefield District Council declared a Climate Emergency in May 2019 and has "*pledged to Make Wakefield Council a carbon neutral organisation by 2030*" and "*Support and work with all other relevant agencies and stakeholders to try to make the entire district net zero for carbon emissions within a similar timescale*". Climate Change is recognised by WDC as a global problem and "*As a district we had a part to play in creating the problem*" (Ref 1, p3). Reassuringly, WDC also recognises that Wakefield District "*can also take action to change the current system and create an environmental revolution for the benefit of generations to come*" (Ref 1, p3).

3.28 On p15 of Wakefield Climate Emergency – Climate Change Action Plan (CCAP) (Ref 1), WDC quantifies the "*similar timescale*" (as above) for whole-District decarbonisation as occurring between 2030 and 2038, this Statement therefore interprets 2038 as the latest delivery date targeted by WDC to achieve total state-wide decarbonisation.

3.29 WDC defines Net Zero to mean that "*Any emissions of greenhouse gases are balanced by removal of an equivalent amount of CO2 from the atmosphere (sequestration) and/or by preventing emissions that otherwise would have occurred elsewhere (offsetting)"* however, WDC also states that "*offsetting is likely to be limited and costly, and it is not a sustainable long-term strategy as eventually emissions will be need to be prevented rather than offset.*" (Ref 2, p3).

3.30 WDC's CCAP sets out how WDC will go about achieving their ambition over the period to 2030 and beyond, and establishes workstreams covering low carbon estate, low carbon fleet, renewable energy, and other topics (Ref 1, p4).

3.31 WDC holds an ambition to "*Self-generate our own renewable clean energy and embrace technologies to store and utilise any excess power that is generated*." (Ref 1, p22). The ambition to self-generate low-carbon electricity from Wakefield District itself to support District-wide decarbonisation aims has not explicitly been documented within the CCAP but it is a logical extension of WDC's plan of action to achieve corporate decarbonisation by (among other actions) deploying renewable electricity generation, to recognise that locally sited low-carbon generation would help deliver District-wide decarbonisation.

3.32 However, WDC's Pathway to Net Zero report (Ref 2) describes a vision for Wakefield in 2038, of increased local renewable generation using over 1,000ha of land (approximately 2,500 acres) and local generation providing 79% of total electricity demand. The same document states that currently 76% of local electricity demand is produced locally, but from waste or fossil fuels. WDC's vision is that "*Most energy from waste (EfW) emissions are captured by carbon capture technology meaning local electricity generation has negative emissions by 2035*" (Ref 2, p8).

3.33 Chapter 6 following analyses these visions in relation to future installed renewable generation technology and current projections for the development of Carbon Capture technology nationally.

3.34 Although the majority of local councils have declared Climate Emergencies, local council commitments to generate renewable electricity from their own administrative areas are not as developed as their commitments to achieve District-wide carbon neutral status at or before the county-wide and national legal obligation of 2050. It is therefore relevant, within the context of supporting the planning application made for the Proposed Development, to consider if WDC and other local councils are to strive for carbon neutrality for their whole council areas, where the low-carbon energy to enable that transition will come from?

3.35 Further, some councils in Great Britain will have the ambition and the facilities to generate all the energy that they require in order to achieve Net Zero, but others do not. Fewer still are actively considering the need and their ability to generate more low-carbon energy than their own needs require in order to enable other council areas to achieve carbon neutrality.

3.36 The Proposed Development aims to produce local renewable energy from within WDC's administrative area and therefore is directly consistent the direction set out in WDC's Climate Change Action Plan. The Applicant's planning application makes the case that the Proposed Development is consistent with WDC's vision and targets, therefore the significant benefit the Proposed Development provides to meeting both the national

and local urgent need for low-carbon generation should be accorded very significant weight when assessing the planning balance.

3.37 Without adequate sources of locally produced renewable electricity, WDC – and the homes, businesses, and operations within its administrative area would need to rely on excess low-carbon electricity, produced in other areas, being consumed in Wakefield. This may not be achievable and may not therefore be consistent with WDC's ambition to achieve a net-zero Wakefield District by 2038 (because not all of the "imported" electricity may itself be low-carbon). This outcome could also therefore increase the risk of the UK missing its national Net Zero target of 2050.

3.38 In summary, the obligation that the UK as a whole must achieve Net Zero by 2050, requires that all opportunities are taken by all related parties to drive towards Net Zero. Local communities, delivering only to the needs of their own areas and local plans, or relying on other areas to generate excesses of low-carbon energy and make those available for national use, simply put, will not be enough.

3.39 WDC agrees:

> *"The climate emergency presents pressing issues for us all, and the actions of every resident, every community group and every business, however large or small, can collectively make a difference"* (Ref 1, p2).

3.40 To achieve the level of decarbonisation required to meet WDC's vision for Wakefield to be Net-Zero by 2038, and the UK's 2050 target, WDC must maximise all opportunities to generate local renewable energy. Granting planning permission for such developments is directly within their power. The significant benefit the Proposed Development provides to meeting both the national and local urgent need for low-carbon generation should be accorded very significant weight when assessing the planning balance.

3.41 Chapter 4 following describes the urgency of decarbonisation actions and quantifies the need for low-carbon generation in Wakefield.

Policy Summary

3.42 In summary, the relevance of this section to the case for the Proposed Development is that, on a national needs basis:

- The legal obligations which government has to ensure the UK meets on climate change require large capacities of renewable energy to be developed
- The risks of remaining reliant on volatile international energy markets sets a policy direction for the UK to develop non-fossil fuel, UK-based electricity generation, such as solar generation
- The British Energy Security Strategy (BESS) (Ref 22) includes ambitions across a wide range of low-carbon generation technologies, however, many of these (including nuclear, hydrogen and CCUS) are not yet consented and therefore may deliver later than current plans suggest. Mission Zero therefore recommends

"*Accelerating the implementation of the British Energy Security Strategy to … accelerate the connection of our cheap renewable generation …* [and] *unleashing solar and developing onshore wind, the cheapest forms of generation, to be rapidly deployed in communities across the country and enable local people to reap the benefits of local, low carbon generation*" (Ref 40, para 19)

- Government has consistently expected and continues to expect the UK's future electricity system to consist predominantly of offshore wind and solar
- Government policy recognises the importance of near-term actions

3.43 These are relevant points because the Proposed Development:

- Is for the installation of solar generation which is not reliant on international energy commodities and therefore helps shield the UK consumer from those volatile costs
- Supports the delivery of the ambition set out in the BESS (Ref 22) for up to 70GW of solar operational in the UK by 2035 (note that 1GW = 1,000MW)
- Will support the development of a GB electricity system which is consistent with government's view

3.44 Other similarly sized solar developments are capable of achieving single-year construction durations (Ref 6). The Proposed Development is therefore likely capable of delivering against a similar timeframe, subject to consent and connection enablers being completed.

3.45 WDC's Pathway to Net Zero report (Ref 2) sets out a vision for 2038 of local low-carbon electricity generation, using over 1,000ha of land, producing 79% of grid electricity used in Wakefield while delivering negative emissions by 2035.

3.46 Page 10 of the same report describes the actions WDC needs of others to achieve its vision, including the deployment of "*CCUS infrastructure in Yorkshire & Humber,*" a solution for "*fuel switching for industry*" and "*policy that provides significant support to deliver on commitments of climate action.*"

3.47 By approving plans for renewable electricity generation developments within its area, WDC would be using its powers to deliver on commitments of climate action in the critical 2020s, while waiting for significant technology and infrastructure CCUS developments to mature and deliver towards or beyond the end of this decade.

3.48 Chapter 4 following demonstrates that a significant capacity of renewable electricity generation capacity will be required in order to meet even 79% of Wakefield's district-wide electricity demand.

3.49 It is my view that at least a significant proportion of this capacity will need to be renewable developments and will need to be delivered in the soonest possible timeframes, in order to "move the dial" on decarbonisation in Wakefield.

3.50 Simply put, waiting for national-decarbonisation enablers in the hope that they can solve the problem in the 2030s, is incongruent with the urgency of the requirement to

keep excess carbon from being emitted in industry, transport, homes, and power generation.

3.51 The local level of need for the urgent development of renewable generation should therefore be accorded very significant weight when assessing the planning balance and could constitute very special circumstances justifying development in the Green Belt.

3.52 By bringing forwards up to 27.4MW of low-carbon solar generation capacity, where installed low-carbon generation capacity in Wakefield listed on DESNZ's Regional Renewable-Statistics (Ref 12) as of December 2021 was 220MW, the Proposed Development delivers significant benefits to Wakefield's decarbonisation aspirations.

4 The urgency for actions to deliver decarbonisation is increasing

4.1 This chapter describes the global context of international climate change aims and actions and the impact they are expected to have on global temperature rises. Whilst I would not expect this section of my evidence to be controversial, it is important that I emphasise the urgency of the need to decarbonise UK energy generation in order to meet the UK's climate charge target and budgets.

4.2 The CCC's annual Progress Report to Parliament, which reviews UK emissions and the delivery of plans to reduce emissions in the future, provides the context against which this Statement argues that UK decarbonisation plans must be strengthened, and actions against those plans delivered with urgency.

4.3 Other similarly sized solar developments are capable of achieving single-year construction durations (Ref 6). The Proposed Development is therefore likely capable of delivering against a similar timeframe, subject to consent and connection enablers being completed.

4.4 The Proposed Development is therefore being brought forwards to be consistent with global and national needs for urgent delivery of actions to deliver decarbonisation. This has to be contrasted with the much longer lead-times for some other low carbon generation technologies.

Global context

4.5 The urgency required of actions to further decarbonise the UK is increasing. Carbon has a cumulative warming effect, and it is well understood that progress to date must accelerate in order for the UK to keep on track with meeting its five-yearly carbon budgets and indeed the UK's 2030 NDC and the Net-Zero target in 2050 (CCC's Progress Report to Parliament, Ref 7(2022)).

4.6 One year on, and CCC's 2023 Progress Report explains that the UK's decarbonisation progress has a "*lack of urgency*" and urges government to stay firm on its commitments and "*move to delivery*" (CCC's Progress Report to Parliament, Ref 7(2023), p14). UK emissions rose 0.8% in 2022 compared with those in 2021 and were 9% below pre-pandemic 2019 levels, Ref 7(2023), p75.

4.7 At p13 of their 2023 report, the CCC state that "*To achieve the NDC* [2030] *goal of at least a 68% fall in territorial emissions from 1990 levels, the rate of emissions reduction outside the power sector must almost quadruple*" … but "*Some of the key planks of the UK Net Zero Strategy have substantial lead-times.*"

4.8 Additionally, at p28 of their 2023 report, the CCC state that "*There is an immediate need for policy to move ahead with ensuring adequate network capacity and connections*"

because such network capacity and connections is currently not sufficient to enable UK net zero plans, and as such presents a real risk to delivery.

4.9 Chapter 6 of this Statement of Need provides additional evidence to support the CCC's assertions.

4.10 The Intergovernmental Panel on Climate Change Working Group III (IPCC WG3) published its Summary of Climate Change as part of the IPCC's Sixth Assessment Report in April 2022, Ref 8. The IPCC WG3 report notes that although the rate of growth of average annual greenhouse gas (GHG) emissions was lower between 2010 and 2019 than in the previous decade, average annual GHG emissions during the last decade were higher than in any previous decade on record. The IPCC WG3's global greenhouse gas emissions for four modelled scenarios are included in Figure 1 below, which illustrates that:

- Global climate change commitments are not yet sufficient to meet nor sustain a (likely) successful track towards containing global temperature rise below 1.5°C
- Policies implemented to date fall short even of those commitments

4.11 The IPCC WG3 report findings therefore imply that mitigation after 2030 can no longer establish a pathway which will likely not exceed 1.5°C global temperature increase vs. 1990, during the 21st Century.

4.12 The cumulative warming effect of carbon means that not delivering against plans set out for the 2020s will lead to a greater scale and urgency to future plans and their delivery in order to meet the temperature increase limit set by the Paris Agreement. Delaying decarbonisation actions increases the risk of losing the fight against climate change, whilst in the meantime ongoing climate change events and impacts are unlikely to slow or decrease, putting lives and livelihoods at risk.

4.13 The compelling need for global action to decarbonise continues to be reinforced. On 20th March 2023, the IPCC published its 2023 assessment of global climate change. The report concludes that the world is likely to pass a dangerous temperature threshold within the next 10 years, pushing the planet past the point of catastrophic warming — unless nations drastically transform their economies and immediately transition away from fossil fuels (Ref 43).

4.14 In the April 2023 press release which accompanied his State of the Global Climate 2022 report, the World Meteorological Organisation's (WMO) secretary general stated firstly that there is a 98% likelihood that at least one of the next 5 years (2023 – 2027) and the five year period as a whole will be the warmest on record, and secondly that we will breach the 1.5°C level on a temporary basis with increasing frequency. "*WMO is sounding the alarm that we will breach the 1.5°C level on a temporary basis with increasing frequency*" (Ref 44), implying that sufficient progress on fighting climate change has not yet been made and that more needs to be done in both mitigation and adaption.

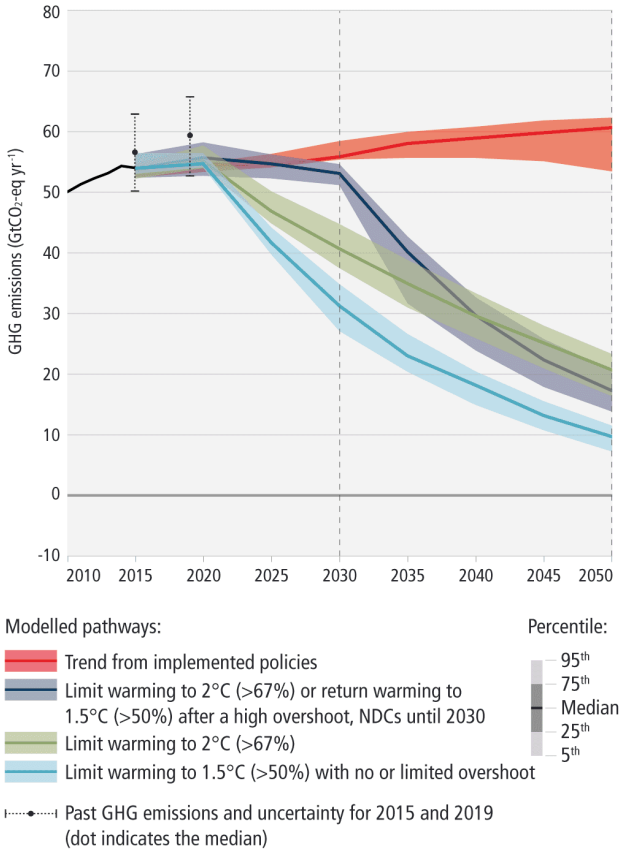

Figure 1. Representation of global GHG emissions of modelled pathways
IPCC's Sixth Assessment Report (Ref 8, p19)

UK actions context

4.15 Year-on-year emissions increases occurred primarily in the surface transport, electricity generation, and manufacturing sectors, highlighting the importance of urgent deployment of low-carbon generation assets to keep generation emissions under control while providing more low-carbon power to decarbonise other sectors.

4.16 The 2022 CCC report stated that the UK's emissions targets are compliant with the Paris Agreement and the Net-Zero strategy (and supporting strategies) to reach them are credible, however policies "*are not yet in place to drive the large programme of delivery required this decade*" – implying that further development (and completion) of associated policy frameworks should be completed with urgency. The CCC reported insufficient progress during 2022, in their 2023 Progress Report.

4.17 Further, the CCC continue to echo the findings of the IPCC WG3 report in that tangible progress is lagging the policy ambition, again implying that more needs to be done in the delivery of actions to decarbonise, as well as in policy and strategy. Without a greater emphasis and focus on delivery, the CCC warn that the UK's climate ambitions may not be credible and that the UK is losing its position of international leadership. These are important points which cannot be overstressed.

4.18 The CCC assesses that the take-up of renewable electricity and of electric vehicles is very positive and therefore attract confidence that the necessary progress will be made in deployment, although delivery risk requires active management and the implementation of contingency plans.

4.19 It therefore follows that the renewable electricity developments are critical enablers of decarbonisation, and they must continue to be developed with pace to achieve the policy objectives associated with the Net-Zero strategy. In other words, the decarbonisation of other sectors, such as surface transport and domestic heating, very largely relies on the ability to decarbonise electricity generation.

4.20 The most recent update on policy aims for offshore wind and solar are discussed in Chapter 5 following. In their 2022 report, the CCC assessed that approximately 80% of the carbon reductions to be achieved through plans to decarbonise electricity supply were credible, with significant risks associated with the remaining approximately 20% (Ref 7(2022), Figure 6). The CCC assess that significant risks are associated with timelines for delivery (Ref 7(2022), Table 2), and the 2023 report also identifies risks associated with longer-term planks of the UK's decarbonisation strategy.

4.21 These points all add weight to the benefit associated with developments (such as the Proposed Development) which, if consented, are capable of being delivered sooner rather than later.

4.22 The CCC recommended that Department for Energy Security and Net Zero (DESNZ, formerly BEIS) should continue to plan for full decarbonisation of electricity supply by 2035, plans which were unveiled in 2021 and will be achieved by "*building a secure, home-grown energy sector that reduces reliance on fossil fuels and exposure to volatile global wholesale energy prices*" (National Grid's Future Energy Scenarios, Ref 9(2021)).

4.23 In order to support progress to Net-Zero 2050, a program of grid investment and operational development by National Grid Electricity System Operator (NGESO), regulated by Ofgem, is aiming for safe and secure operation of the National Electricity Transmission System at zero-carbon by 2025 (National Grid's Future Energy Scenarios, Ref 9(2021)) and for full decarbonisation of the electricity system by 2035 (UK Government's press release, Ref 10).

4.24 The CCC also recommend that DESNZ should develop contingency plans around the current reliance on unproven carbon removal technologies (CCC's Progress Report, Ref 7(2022), p32 & Table 3)), implying again that there is a greater need for the near-term delivery of proven technologies to provide that contingency.

4.25 As part of its Powering Up Britain report of March 2023, Government responded to each of the recommendations made by the CCC in their 2022 Progress Report. In summary Government have assessed the CCC's recommendations and report as validation that the UK's current decarbonisation strategy as described throughout this report is the right approach. (Powering Up Britain, Ref 42(1), p16). However, Government also

observed that "*Incorporating recommendations proposed by the CCC … will turbocharge delivery [and] many of the policy announcements have been informed by the CCC analysis of government's progress*." (Ref 42(4), p23).

4.26 Action during the 2020s will be critical to meet the UK's 2050 Net-Zero target. GB Power sector emissions, which were 182KgCO_2/MWh in 2022 (National Grid's Britain's Electricity Explained 2022 Review, Ref 11) will need to reduce to negative in the early 2030s to meet Net-Zero 2050 obligations. Note that 1MWh (megawatt hour) is the energy delivered by a power supply of capacity 1MW for the period of 1hr.

4.27 The urgent deployment of large capacities of new low-carbon generation is a critical part of enabling power sector emissions to fall. There is, therefore, a new and emerging urgency to the decade-long consistent story of the need for decarbonisation to prevent harmful global warming. It is important that this urgency of need is properly and fully reflected in decision-making in relation to renewable energy developments.

Local context

4.28 Government regional and local authority level energy use statistics (Ref 12) inform that in 2019 Wakefield District consumed 1,636GWh of electricity, which represented 18% of total final energy demand. 2019 is taken as a reference year for demand to avoid possible anomalies associated with economic restrictions brought about by Covid-19 lockdowns in 2020 and 2021. 2022 data is not yet available.

4.29 Note that 1GWh = 1,000MWh and is the energy provided by a power supply of capacity 1MW for 1,000hrs, *or* 1,000MW for 1hr.

4.30 However, DESNZ's data suggests that Wakefield is home to 220MW of low-carbon generation capacity, 29.3MW of which is solar, which generated 119GWh of electricity (23.5GWh from solar) in 2021 (the most recent year of available data). Government data includes solar installations of all capacities, including for example domestic and rooftop installations, as well as larger installations such as the Proposed Development.

4.31 I judge that a reasonable estimate of annual output from the Proposed Development (up to 27.4MW solar scheme), would be in the region of 24GWh.

4.32 In order to meet Wakefield Districts annual electricity demand (2019) of 1,636GWh entirely from within its boundaries, the Council would need to approve approximately 63 such solar farms to complement its existing low-carbon generation fleet.

4.33 However, in order for Wakefield District to move towards carbon neutrality, it must develop plans to swap out fossil fuels, and use clean electricity in its place. It is therefore relevant to calculate that if Wakefield's total energy demand of 9.1TWh/year was to be met through electricity, the equivalent of nearly 400 solar farms of the same capacity as the Proposed Development would be required.

4.34 Note that 1TWh = 1,000GWh, or 1,000,000MWh

4.35 These statistics demonstrate the enormous scale of the challenge to decarbonise not only Wakefield, but by extension, the whole of the UK. This analysis contrasts with experience in the deployment of renewable generation in Wakefield, which has grown in capacity by 111.4MW over the last six years.

4.36 It is also relevant to note that approximately 40GWh of Wakefield's low-carbon electricity is generated by Anaerobic Digestion, landfill gas, and Energy from Waste (EfW), which are all classified as low carbon energy. Landfill gas sites decline in output over time as the gas resource diminishes, and in the future, the carbon emitted from such low-carbon, non-renewable generation operations may need to be captured or offset in order to achieve carbon neutrality.

4.37 It is therefore a key conclusion of this Statement of Need, that a step-change increase in renewable energy deployment will be required within the administrative area of Wakefield District Council, if the District is to achieve carbon neutrality by 2038, in line with WDC's low-carbon framework vision.

Conclusions

4.38 It is essential, therefore, that the following points are recognised:

- The urgency for decarbonisation actions to progress decarbonisation on a national, and indeed an international, scale is increasing
- The UK is an international leader in the fight against climate change but faster delivery of decarbonisation actions is required to secure the delivery of its climate change target and budgets
- Because some complementary low-carbon technologies, for example carbon removal technologies or nuclear power, have long delivery timeframes and are not yet consented, it is essential that urgent action is taken to rapidly develop low-carbon technologies such as solar which have a track record of achieving consent and being delivered in relatively short timescales

4.39 It is my opinion that all local authorities will be required to play their part in achieving carbon neutrality in the future. WDC's Wakefield Council Pathway to Net Zero (Ref 2) recognises that locally produced renewable generation is a key enabler to achieve net zero in Wakefield. Achieving carbon neutrality requires a significant increase in the use of electricity as a source of energy, and therefore securing low-carbon sources of generation capacity is an essential step to achieving carbon neutrality.

4.40 This Proposed Development is for the installation of low-carbon solar electricity generation capacity, which is a proven technology and can be deployed quickly following the grant of planning permission.

4.41 Other similarly sized solar developments are capable of achieving single-year construction durations (Ref 6). The Proposed Development is also likely to be capable of delivering against a similar timeframe, subject to consent and connection enablers being completed.

5 Future demand for electricity is growing

Introduction

5.1 In the 1990s and early 2000s, GB electricity demand grew only slowly, but from 2005 electricity demand has fallen year-on-year due to:

- A decline in economic growth rate (particularly with the recession of 2009)
- A reduction in the level of electricity intensity as the economy has shifted to less energy-intensive activities
- The introduction of energy efficiency measures, especially more efficient lighting within the last seven years, but also technology development more generally. (BEIS's UK Energy in Brief 2021, p28, and The UK's Contribution to Stopping Global Warming, p48)

5.2 Today's view of future GB electricity demand is, however, one of returning growth, for the same reasons as those stated in the 2011 National Policy Statement for Energy (EN-1), Ref 13:

- The switching of sources of final-use power for heating and transport from carbon-intensive sources to electricity, the generation of which can be decarbonised using technologies already available today, will put upward pressure on demand
- The least-cost energy efficiency measures, such as introduction of low-voltage LEDs for lighting have now been implemented across business and domestic sectors
- Economic restructuring in GB away from manufacturing to a service-based economy has largely occurred, however, the growth of new high-technology and highly skilled manufacturing, both contributing to national economic growth and prosperity, is likely to place additional pressures on the electricity sector

5.3 This Chapter provides evidence to support a projected increase in future electricity demand by describing some of the important policies which will drive demand up from the middle of this decade onwards. This is the first step in demonstrating that there is an urgent need for the Proposed Development to be consented. This issue is important not only in relation to the decarbonisation of UK energy generation, but also to the important issue of UK energy security of supply.

Transport policies underpin a growth in future electricity demand

5.4 Surface transport is currently the largest source of UK greenhouse gas emissions (surface transport accounted for 23% of the UK's 2019 emissions, Innovating to Net-Zero, p115, Ref 14). A rapid shift to low emission vehicles will give a significant boost to UK decarbonisation.

5.5 Growth in the use of electric vehicles (EVs) is expected to create significant new demands on the electricity network. Government proposed a ban on the sale of all new petrol and diesel vehicles to be effective from 2030 (Ten Point Plan, Ref 15) alongside a ban on sales of new hybrid vehicles by 2035, although the Energy White Paper, Ref 16,

p92, proposed to bring the date for phasing out petrol and diesel cars and vans (including hybrids) forwards to no later than 2032. The aims included in Powering Up Britain are less explicit but remain ambitious and forward-thinking as well as being compatible (from a supply chain / industry change perspective) with the wider European position: "*Between 2030 and 2035, new cars and vans will only be able to be sold if they offer significant zero emission capability*" (Ref 42(1), p27).

5.6 Nevertheless, the UK has put leadership of a low-carbon transport revolution at the heart of its Industrial and Clean Growth strategies and regards EVs as a critical new technology which will be vital in the fight against climate change. Government's commitments to invest in "gigafactories" for the mass production of batteries and EV supply chain, Refs 17-19 provide evidence that there is strong political support for the rapid development and rollout of EVs, with which will come significant additional electricity demand; indeed, the rollout of EVs has already begun.

5.7 The Society of Motor Manufacturers and Traders reported a 31.1% increase in Battery Electric Vehicle (BEV) sales in the UK in the year-to-date (as at May-23) versus the same period the previous year, and 15.7% of all new vehicle purchases in the UK in January – May 2023 were BEV (Society of Motor Manufacturers and Traders, Ref 20).

5.8 Government is facilitating the adoption of electricity into transport through its Electric Vehicle Infrastructure Strategy (March 22), Ref 21 which sets out the expectation, by 2030, of there being around 300,000 public charge points as a minimum in the UK, up from just 30,000 in the first quarter of 2022. NGESO's Future Energy Scenarios (FES) suggests that EVs will increase annual electricity demand by between 16TWh and 38TWh in 2030 and by between 90TWh and 123TWh by 2050 (Future Energy Scenarios, Table ED1, Ref 9(2023)).

5.9 To support efforts in the decarbonisation of heavier transport (e.g., road freight, rail and air) government pledged to invest £140 million in 2021/22 across hydrogen-powered freight trials and the delivery of 4,000 zero emission buses (Energy White Paper, Ref 16, p94). The application of hydrogen as a fuel for flight and rail, and in industrial energy-intensive processes is also progressing.

5.10 Transport is one of the biggest contributors to annual CO_2 emissions in Wakefield (Ref 12), as Figure 5 following also shows. WDC's vision for transport in the district in 2038 includes the electrification of rail services, an expansion of the electric charging network, and an increased take-up of electric vehicles (Ref 2, p6). At its time of writing, Wakefield's Electric Vehicle Infrastructure Strategy stated that "*Wakefield District is behind compared to the average for England and across West Yorkshire*" in relation to the numbers of publicly available EV chargers per 100,000 population (Ref 46, p4), although the strategy also notes that Wakefield is ahead of other local districts within West Yorkshire. The strategy estimates that the number of public chargers in Wakefield may need to increase between three and five-fold by 2030 in order to provide a broad enough network of chargers to enable WDC's vision of an increased take up of electric vehicles.

5.11 These actions will increase demand for electricity but also reduce carbon emissions for the district if they are taken up.

Energy policies for homes underpin a growth in future electricity demand

5.12 The Energy White Paper sets out government's aim to increase the rate of installation of home electric heat pumps from 30,000 per year to 600,000 per year by 2028, and how they committed to consult on whether it is appropriate to end gas grid connections to new homes from 2025, to open the market of homes not on the gas grid to heat pumps, or other clean energy alternatives (Energy White Paper, Ref 16, p110). The consultation ran from October 2021 to January 2022. The British Energy Security Strategy, Ref 22, aims to ensure that by 2050 all UK buildings will have low-carbon heating, and reconfirms on p12, Government's intent to phase out the sale of new and replacement gas boilers by 2035 – an intent which is replicated in Powering Up Britain.

5.13 The domestic use of gas for heating and cooking is a key contributor to Wakefield's annual carbon emissions, as Figure 5 following illustrates. WDC's vision for the district in 2038 includes diverse heating systems pushing towards electrification, the use of hydrogen (although some applications are recognised as carrying high uncertainty) and deployment of solar panels on 20% of local roofs (Ref 2, p7). Decarbonisation of heating across the district will need to draw on either heat pumps, full electrical central heating systems, or hydrogen. All measures would increase local demand for electricity and supports the need for increased local renewable generation to meet that demand.

Future peak electricity demand is also expected to grow

5.14 Figure 2 illustrates National Grid ESO's forecast of peak GB power demand out to 2050. In the four scenarios, peak demand is anticipated to range between 63GW and 69GW by 2030 (for comparison, 2022: 58GW), between 86GW and 107GW in 2040, and between 98GW and 113GW in 2050 (National Grid Future Energy Scenarios, Table ED1, Ref 9(2023)).

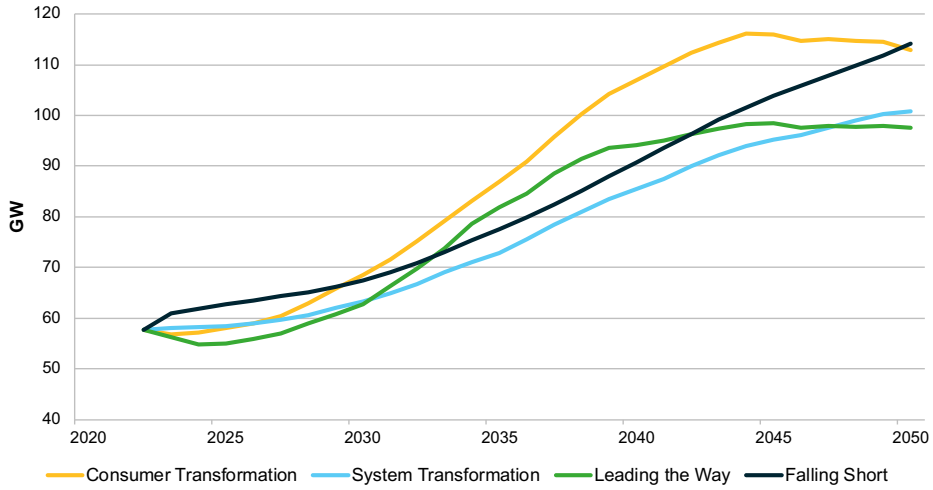

Figure 2: Future net peak electricity demand
Future Energy Scenarios (Ref 9(2023), Figure ES.03)

5.15 Despite peak demand being anticipated to drop between now and 2025 in some scenarios, all scenarios show an increase in peak demand thereafter, driven by underlying industrial and commercial demand growth (through substitution of other energy sources) and the electrification of heating and transport.

5.16 Sufficient electricity generation capacity will need to be deployed to be able to meet forecast peak load, as well as forecast annual demand.

Projections of future electricity demand

5.17 Government expects the UK's national annual demand for electricity to double over the period to 2050. The majority of other projections of electricity demand in 2050 are for demand to increase (from today's level of circa 300TWh) by an amount which varies according to the level of decarbonisation of non-energy sector demand, and the source for that decarbonisation. For example, hydrogen is a product which may be able to help decarbonise hard to reach sectors of transport, space heating, and heavy industry, however, hydrogen production requires energy input, which must be from a low-carbon source (or the carbon must be captured and stored) for the hydrogen to deliver a climate change benefit. Other projections of 2050 annual electricity demand include:

- The NPSs foresaw a doubling of current UK demand, i.e., to circa 600TWh, (2011 Overarching National Policy Statement for Energy, EN-1, Para 2.2.22 Ref 13)
- The Draft Revised NPSs foresee UK demand increasing to an illustrative range of 610-800TWh in 2050 (2023 Draft Overarching National Policy Statement for Energy, EN-1, Para 3.3.3 Ref 23)
- National Grid Electricity System Operator (NGESO) presents a range of GB total electricity system demand from 671 – 726TWh (Future Energy Scenarios, Ref 9(2023), Table ED1)
- The National Infrastructure Commission forecasts UK demand from 465 – 595TWh (Opportunities for the Power Sector, Ref 24, p35)
- The Energy Systems Catapult forecasts UK demand from 525 – 700TWh (Innovating to Net-Zero, Ref 14, pp23 & 27)
- The Q4 2020 EY Power Price Outlook for GB forecasts 445 – 670TWh (EY Consulting Forecast, Ref 25)
- The CCC's sixth carbon budget presents a range for the UK from 550 – 680TWh (The Sixth Carbon Budget, Ref 26, Table 3.4.a)
- The BEIS impact assessment for the Sixth Carbon Budget (CB6), p29, presents a range for the UK from 610 – 900TWh, Ref 27
- The 2020 Energy White Paper, Ref 16, p42) presents a range for the UK from 575 – 665TWh

5.18 Figure 3 following shows how NGESO's forecasts for electricity demand in Great Britain have developed over the last 11 years. Each annual forecast is represented as a shaded area ranging from the lowest forecast demand scenario to the highest scenario per delivery year. Historical demand is shown as purple columns. As GB electricity demand reduced year-on-year, so too did future demand forecasts prior to the UK's 2019 commitment to Net-Zero. Forecast GB electricity demand in 2050 converged towards a range from 350 – 400TWh.

5.19 Since the Net-Zero commitment was made, forecasts for future GB electricity demand have increased significantly. To highlight this NGESO's forecasts dated 2020 to 2023 have been shown in blue, with the 2023 forecast bordered in dark blue for emphasis. Increased electrification of transport, heat, and industrial demand is essential for the achievement of Net-Zero and is a key driver for the increase in future electricity demand.

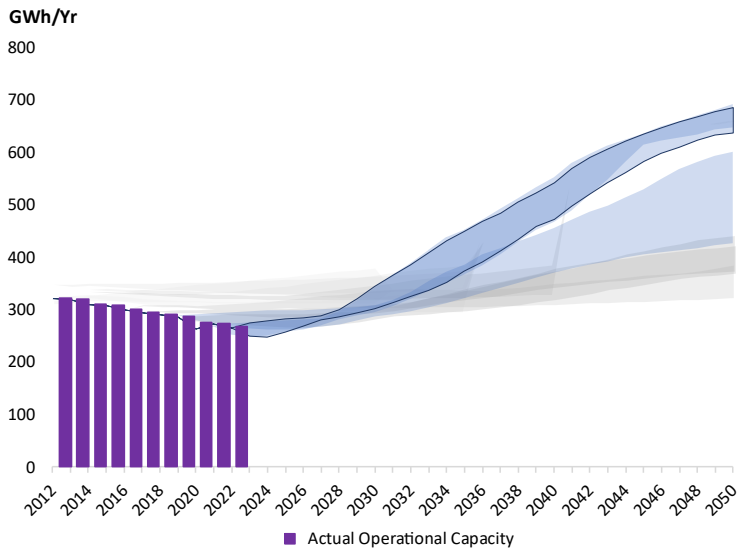

Figure 3: Evolution of UK electricity demand projections (2012 – 2023)
Future Energy Scenarios (Ref 9) and Author Analysis

5.20 The range of demand provided by recent sources shows a shallow increase in forecast GB electricity demand over the coming ~5 years as the aforementioned policies start to take hold. The forecasts then ramp up significantly around the end of the 2020s and thereafter.

5.21 Since the UK made it's 2019 commitment to Net-Zero, forecast GB electricity demand in 2050 has converged towards a range from 650 – 700TWh.

5.22 It is implicit in the trajectories shown in Figure 3, that they can only be met (and therefore Net-Zero achieved) if there is sufficient low-carbon electricity generation capacity operational to generate the power demanded by lower emissions consumers.

Local electricity demand trends

5.23 Figure 4 following provides a context for the historical trends in local energy demand and electricity demand in relation to national trends.

5.24 Government energy use statistics have been used to show the annual evolution of each measure relative to a 2005 baseline. Energy demand covers all sectors (domestic, commercial and land transport) and all end-use fuels (including gas, oil and petrol, solid fuels like coal or wood, and electricity) and is shown by the columns.

5.25 The figure shows that Wakefield's total energy demand was at a similar level in 2019 than it was in 2005. This can be seen by observing that the orange (Wakefield District's) columns to the right of the figure (excluding Covid-affected 2020) are at the same level as the columns to the left of the chart.

5.26 In contrast, the yellow columns represent the same metric but on a national basis. Energy consumption has reduced nationally, and in 2019 was 87% of its 2005 value.

5.27 There are many possible reasons why this may have occurred, for example differences between local and national economic growth, local population growth, or domestic or commercial property stock increases or decreases. However, it is also possible that energy efficiency interventions have been less effective in Wakefield than in other parts of the country.

5.28 The lines in the figure show that electricity demand in Wakefield was tracking a similar rate to Wakefield's energy reduction until 2015. Since then, electricity demand has plateaued at approximately 94% of its 2005 consumption level, whereas national electricity demand has continued to reduce and in 2019 was at 87% of its 2005 level.

5.29 From the data, I observe that energy demand reduction initiatives have been less impactful in the late 2010s than they were in the 2000s in Wakefield. However, energy demand cannot reduce completely to zero and the electrification of transport and the substitution of gas out of Wakefield's homes will increase electricity demand in the District. The development of local low-carbon electricity generation assets will support Wakefield's progress towards its 2038 net-zero vision and help it play its part in contributing to the national net-zero target by 2050. The Proposed Development will support Wakefield in achieving the required contribution.

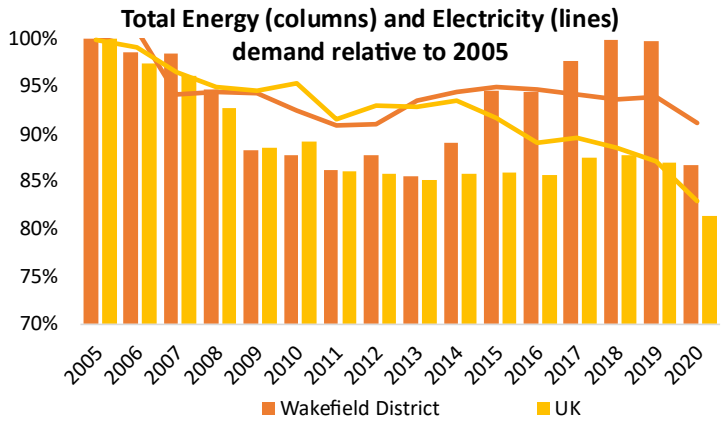

Figure 4: Historical trends in energy demand
Government energy use statistics at regional and local authority level (Ref 12) and Author Analysis

5.30 Net Zero requires that all carbon emissions are either avoided or offset. Therefore, it is relevant to analyse the sources and potential remedies for Wakefield's current greenhouse gas emissions, and the effect of those remedies on the electricity network.

5.31 Figure 5 following shows the annual greenhouse gas emissions from Wakefield from 2005 to 2020. The data was sourced from DESNZ's UK Local Authority GHG Emissions data set, last updated to include 2020 information (Ref 12).

5.32 The data shows that emissions reductions in Wakefield reduced by 38% between 2005 and 2020 (27% between 2005 and 2019). Emissions from electricity reduced by 67% over the same period (62% between 2005 and 2019) but emissions from non-electrical sources reduced by only 25% between 2005 and 2020 (10% between 2005 and 2019).

5.33 The largest greenhouse gas emissions are now non-electricity emissions from the domestic sector, from motorway travel, and minor road transport. Together, these three uses contribute 45% of Wakefield's emissions, but they reduced by just 4% over the period 2007 to 2019. A significant reduction in emissions from these sectors was realised in 2020, reflecting the impact of lockdown on transport and travel in that year.

5.34 As I have previously shown, the remedies for these emissions include electrifying home heating and cooking, for example by installing heat pumps and moving from gas to electric stoves, and decarbonising travel by encouraging a move away from petrol and diesel, towards electric and, in time, hydrogen powered vehicles.

5.35 The decarbonisation of motorway travel will require actions over a broad geography and EV charging networks will be required throughout the country – including in the District – to encourage EVs to be used for longer journeys. The decarbonisation of Minor Road travel (accounting for 32% of road transport emissions in the District) and home heating by contrast will directly increase the local demand for electricity and therefore – at the least – require local actions, for example local renewable electricity generation developments to ensure that local carbon neutrality is achieved.

5.36 In order to take control of its strategy to make Wakefield District carbon neutral by 2038, WDC will need to encourage the growth of local low-carbon electricity generation, ultimately aiming to generate a sufficient quantity to supply a significant proportion of local energy needs.

5.37 If WDC relied solely on "imported" electricity from the National Electricity Transmission System to power local homes, local travel, and other local consumption, WDC would be significantly less able to influence its decarbonisation performance if it was falling behind its target.

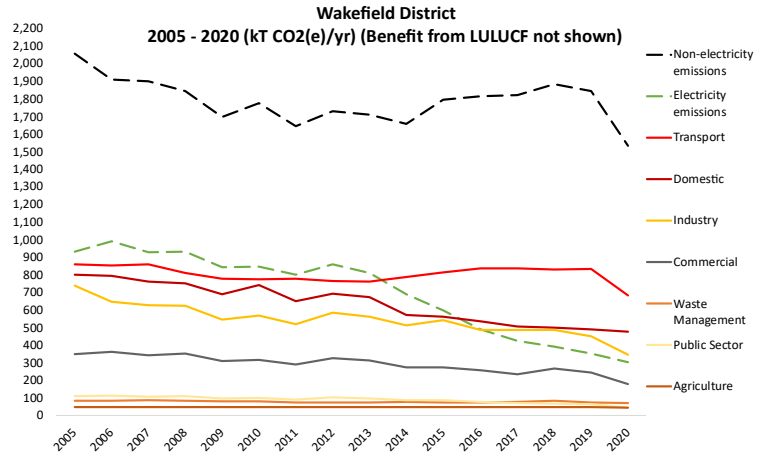

Figure 5: Historical trends in greenhouse gas emissions
Government greenhouse gas emissions at regional and local authority level (Ref 12) and Author Analysis

Conclusions

5.38 The following conclusions can be drawn from this Chapter and support the urgent need for the Proposed Development.

5.39 GB electricity demand will start to increase during the 2020s through the take-up of electricity as a substitute in sectors which are currently using carbon-intensive fuels as a source of energy.

5.40 Policies are already in place to substitute electricity for fossil fuel as a source of energy in non-traditional sectors and many of those policies have started to deliver both on a national and local basis.

5.41 If Wakefield is to move towards carbon neutrality, WDC must consider the development of additional low-carbon generation facilities to help increase the proportion of local energy supplied by green electricity, thus enabling local decarbonisation.

5.42 Without significant effort to source additional low-carbon electricity from within its area, WDC risks falling short of its vision to be carbon-neutral by 2038. The implication, if many councils do not strive to generate as much green electricity as they can from their own areas, is that there will be a real risk of a shortfall at the national level, against required progress towards a national net zero target in 2050.

6 Implications for future electricity supply needs

Introduction

6.1 This chapter describes how the GB electricity generation mix has evolved over the last decade and highlights the large capacities of generation which have already and are still due to retire in the coming decade.

6.2 An analysis of existing generation capacity which is due to close in the coming decade will show that new capacity must be delivered urgently to replace lost capacity, in addition to the capacity required to meet higher future demand as was described in Chapter 5.

6.3 This chapter explains that because of the urgent need to decarbonise the electricity system to support wider decarbonisation, low-carbon electricity technologies must be deployed, including solar generation as an essential and economic part of the future generation mix.

6.4 Therefore, developing and operating new low-carbon electricity generation capacity, as would be delivered by this Proposed Development, is essential for meeting future demand while continuing to reduce carbon emissions, and therefore supporting the UK to achieve its Net-Zero target.

GB electricity generation trends since the 2010s

6.5 In 2008, approximately 75% of GB's electricity came from carbon-based fuels and the electricity sector contributed approximately one third of total UK greenhouse gas emissions (Author Analysis of UK Greenhouse Gas Emissions 2020, Ref 29). Since then, carbon emissions from electricity have reduced and further significant and sustainable reductions within the 2030 timeframe must be delivered through the deployment of large capacities of renewable electricity generation.

6.6 Figure 6 following shows the installed capacity of the UK's major generation technologies by season from Winter 2014 to Winter 2022.

6.7 Seasons in the GB power sector are divided into Winters (October to the following March) and Summers (April to September), and these are named, as in Figure 6, by the initial and the year in which the first month of the season lies, for example S-15 (for the summer season starting in April 2015).

6.8 Figure 6 uses this terminology, but it should be noted that the horizontal-axis categories labelled W14* represents the period January 2015 to March 2015, rather than the whole electricity trading season.

6.9 While Combined Cycle Gas Turbine (CCGT) capacity has remained relatively stable over the time period shown, wind and solar capacity have grown significantly, and coal capacity has fallen. Nuclear capacity also started to reduce in 2021. These have been

the major changes in electricity generation mix leading to the decarbonisation of the GB grid to date.

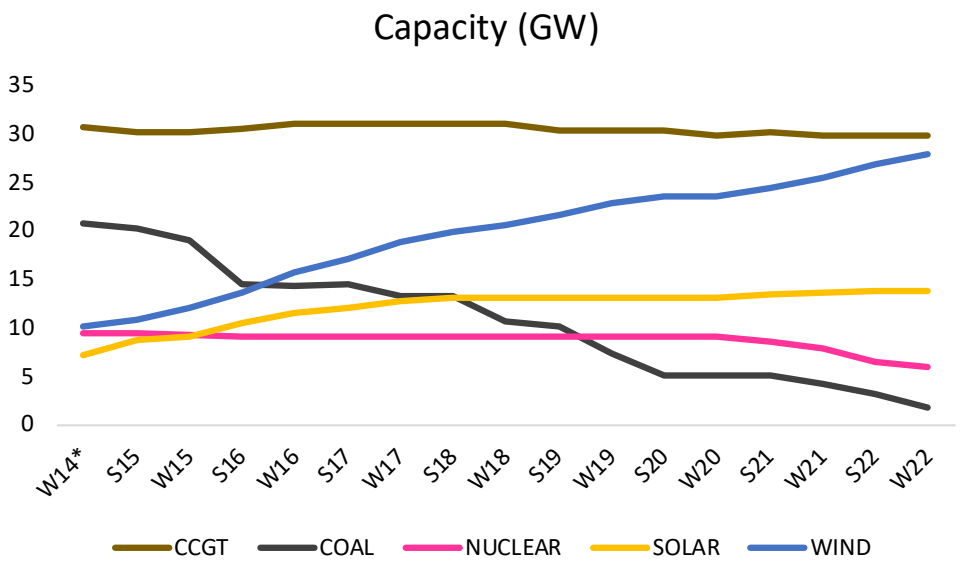

Figure 6: Available capacity of UK power generation by technology, Jan 2015 – Mar 2023
Author Analysis of National Grid Operational Data

6.10 The second-generation GB nuclear generation fleet (9GW) which has operational plants sited in England and Scotland is now significantly past its original decommissioning dates. Nuclear provided 15.5% of electricity demand in 2022 with low carbon emissions, after the decommissioning of existing plants commenced in 2021. Since early summer 2022, the UK has been operating just five nuclear stations (5.9GW). A further 2.3GW was scheduled to close by summer 2024 but has recently won a reprieve, now signalling closure in summer 2026 with a range of +/- 1 year. All existing UK nuclear power stations other than Sizewell B (1.2GW) will be closed by 2028 (World Nuclear News, Ref 30).

6.11 Advances in new nuclear plants to replace the existing fleet have been slower than was originally envisioned, with Hinkley Point C now forecast to start generating in summer 2027, but developers EDF have indicated that their construction schedule has a 15-month schedule risk to it – potentially pushing Hinkley Point C's start date back to late 2028 (World Nuclear News, Ref 31).

6.12 It is no longer possible for new nuclear to be built out at the necessary rate and scale so to allow it to continue to contribute a one-fifth share of meeting GB demand through the 2020s and into the 2030s. The scale of nuclear's contribution to decarbonisation beyond the 2030s can also not yet be relied upon, because currently only Hinkley Point C is a consented and funded development.

6.13 Government is in conversation with large reactor developments and developers of Small Modular Reactors (SMRs). Government's Industrial Decarbonisation Strategy (Ref 32) aspires (p73) to have the first SMRs commercially deployed in the UK in the early 2030s, but project development and construction timescales are long, especially for

novel designs such as SMRs. Government has set up a new vehicle, Great British Nuclear (GBN), to support the UK's nuclear industry by providing better opportunities to build and invest.

6.14 The first priority of GBN is to launch a competitive process to select the best SMR technologies with an ambition to select technologies and take two Final Investment Decisions (not necessarily both SMRs) next parliament.

6.15 Sizewell C, which after Hinkley Point C is the most advanced new nuclear development in the UK, could get to Final Investment Decision "by the end of this Parliament" [i.e. no later than May 2024], subject to clear value for money and all relevant approvals" (Energy White Paper, Ref 16, p16). EDF has stated that the development will take "9-12 years to build" once funding arrangements had been secured (Guardian article, Ref 33). Government's late 2022 stake in Sizewell C removed Chinese investment, but also kept the development alive in difficult economic climes. Private investors are also required to come forwards to secure total funding, so achieving a Final Investment Decision is likely still a long way away even with a 50% government stake.

6.16 Figure 6 also shows that over the last seven years, coal generation capacity has reduced from c.20GW to c.4GW. UK Coal fired power generation is required by law to close by 2024 and West Burton A and Drax (both c.1GW) were due to close in September 2022 along with one quarter of the c.2GW Ratcliffe power station.

6.17 During the summer of 2022, government asked coal operators to postpone closures to remain open for Winter 2022 in order to provide security of supply to the UK in the event of insufficient gas supplies or highly volatile energy markets, and West Burton A and Drax agreed arrangements to be available to operate for the period October 2022 to March 2023. At the time of writing this report, all coal-fired units at West Burton A and Drax have now closed.

6.18 Government's call for continued operation over the winter of 2022/23 at 2.5GW of coal-fired generating capacity which was otherwise scheduled to close, shows how highly all indigenous GB generation is valued from a security of supply perspective.

6.19 Renewable generation has however continued to grow over the last decade. In 2010, the UK had 5.4GW of installed wind capacity and just 100MW of solar capacity installed. By 2021, wind capacity had grown to 25.7GW and solar capacity to 14GW (UK Energy Trends Table 6.1, Ref 34). Continued deployment in 2022 have increased capacities of both wind and solar further.

6.20 Figure 7 following shows the average actual GW contribution made by the same technology and over the same time periods as shown in Figure 6.

6.21 Over the last two winters, and over the last six summers, GB solar output has exceeded GB coal output. Within the context described above, the benefits associated with any proposals to develop GB-based generation and especially renewable generation, may

justifiably be accorded substantial weight in the planning balance, and could constitute very special circumstances justifying development in the Green Belt.

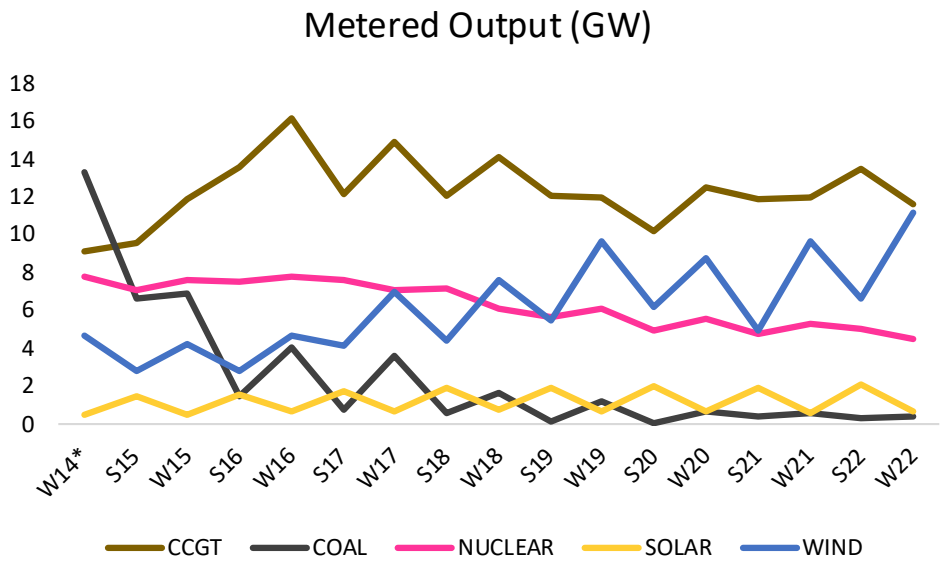

Figure 7: Average output of UK power generation by technology, Jan 2015 – Mar 2023
Author Analysis of National Grid Operational Data

Carbon Capture, Usage and Storage (CCUS) and hydrogen

6.22 The continued operation of GB's CCGT fleet is dependent on measures either to decarbonise its input fuel, or to capture the carbon it emits and store it away from the atmosphere, possibly for later use.

6.23 Decarbonisation of the fuel used to generate electricity in the CCGT fleet can be achieved by burning hydrogen. Capturing carbon emissions and storing them away from the atmosphere is dependent upon Carbon Capture Usage and Storage (CCUS).

6.24 Government has adopted a target for CCUS to remove 10 million tonnes of carbon dioxide by 2030 (Now is the time for our green recovery, Ref 35) although its ambition is higher (20-30mtpa of carbon storage and four operational CCUS clusters by 2030, Powering Up Britain, p21 (Ref 42(1)). Recent progress has been made in developing a commercial framework to support the technology. CCUS is a prominent feature of the National Infrastructure Strategy (Ref 36), Energy White Paper (Ref 16) and Industrial Decarbonisation Strategy (Ref 32), however, Government recognises that "*the technology has not been delivered at scale and significant risks remain*" (National Infrastructure Strategy, Ref 24, p53).

6.25 Government's 2021 UK Hydrogen Strategy (Ref 39, p2) explains that hydrogen has "*the potential to overcome some of the trickiest decarbonisation challenges facing our economy*" especially in enabling the decarbonisation of industry and land transport, and as a potential substitute for current carbon-intensive marine and aviation fuels.

6.26 Currently most hydrogen is produced by converting methane to hydrogen and carbon dioxide (this is known as "blue hydrogen"). As blue hydrogen production emits carbon as a by-product, the development of blue hydrogen facilities will require CCUS capability to achieve Net-Zero carbon. CCUS clusters with hydrogen and carbon dioxide pipelines are hoped to become operational in the second half of the 2020s.

6.27 Hydrogen can also be produced through the electrolysis of water (this is known as "green hydrogen"). The "green" label for electrolysed hydrogen presumes that the input electricity used in the hydrogen production process is itself low-carbon, therefore there are no carbon emissions associated with the process.

6.28 Green hydrogen production therefore relies on considerable amounts of renewable energy to electrolyse water. Electrolysis currently accounts for approximately 1% of global hydrogen production, however a growth in electrolysis capability and capacity opens out the prospect of using renewable generation to produce hydrogen, in potentially significant quantities.

6.29 Once hydrogen has been produced, it can be stored, transported, and used in a range of applications as a substitute for natural gas or other carbon intensive fuels.

6.30 NGESO's Future Energy Scenarios 2022 estimates that between 127 and 213TWh of electrical energy will be required annually in the UK by 2050 to produce hydrogen through electrolysis to meet its many potential end-uses (Ref 9(2023), Table ES.B). The wide range of future demand estimates is due to different Net-Zero compatible scenarios producing hydrogen in different ways. The Energy System Catapult foresee the need for "*a new low carbon hydrogen economy … delivering up to 300TWh per annum, roughly equivalent to electricity generation today*" and concluding that "*electricity generation itself may have to double, or even treble if most hydrogen is to be produced by electrolysis*" (Innovating to Net-Zero, Ref 14, pp6 & 36).

6.31 Powering Up Britain confirms government's ambition of up to 1 GW of electrolytic hydrogen and up to 1GW of CCUS-enabled hydrogen in operation or construction by the end of 2025, subject to affordability and value for money. (Ref 42(1), p22).

6.32 Government's Hydrogen Allocation Round (HAR) 1 closed in 2022 and 20 projects totalling 408MW were shortlisted (Ref 47). Of these projects, Government anticipates awarding contracts by the end of 2023 for up to 250MW of capacity subject to affordability and value for money. Successful projects will be targeting operations in 2025. Two projects currently shortlisted are located in Yorkshire (although not in Wakefield District).

6.33 The consultation document related to market engagement for HAR 2 (Ref 48) describes that, despite Government's aim to deliver 1GE by 2025, projects will be able "*to select a delivery year between March 2026 until March 2029*" (Ref 48, p8) suggesting that government's Hydrogen capacity aims will not be met and delaying the potential for demonstration Hydrogen projects and those fully commercial projects which will follow

to secure benefits for the UK in terms of decarbonisation, energy security, and cost certainty for consumers.

Managing future electricity generation uncertainties

6.34 The previous section described the uncertainties associated with future GB electricity generation plans.

6.35 All but 1.2GW of the UK's existing low-carbon nuclear power, and all coal stations, will be closed by the end of the 2020s.

6.36 3.2GW of new nuclear at Hinkley Point C is currently scheduled to operate from 2027 but developer EDF has signalled that further delays could be possible. Sizewell C has been granted development consent (although that is currently subject to legal challenge) but, assuming Final Investment Decision in 2024, would only likely come into operation in the mid-2030s. No other long-lead time new nuclear developments have yet been consented.

6.37 Further, unless the existing CCGT fleet can be decarbonised, their continued operation will not support government's ambition to deliver a pathway to Net-Zero by operating the electricity system with zero carbon emissions by 2035.

6.38 Outside of the deployment of proven renewable electricity generation technology such as solar, the pathway to decarbonisation would be challenging due to its reliance on three technologies. Firstly, long-lead time (and apart from Hinkley Point C) uncommitted new nuclear. Secondly, as yet unconsented and unproven at scale CCUS, and thirdly, as yet unconsented and also unproven at scale large-scale hydrogen production.

6.39 However, the pathway to decarbonisation also relies upon proven renewable electricity generation, which has successfully grown in capacity over the last decade and renewable energy accounted for nearly 40% of all electricity generated in the UK in 2021 (UK Energy Trends, Ref 34).

6.40 By contrast, DESNZ's local authority electricity generation and consumption data (Ref 12) shows that only 7.6% of Wakefield's electricity demand is currently generated by locally-based renewable generation.

6.41 NGESO's FES 2022 projects that between 120GW and 167GW of low-carbon generation capacity (including between 25GW and 42GW of solar generation capacity) will be required to meet electricity demand before 2030, as well as offset retirements of old (low-carbon and carbon-intensive) plant.

6.42 NGESO's projections continue to indicate that 382GW – 605GW of low-carbon generation capacity (including a total of between 57GW and 91GW of solar generation capacity) will then be required to meet Net-Zero in 2050. (Future Energy Scenarios, Ref 9(2023), Tables ES.10).

6.43 Given the urgency of the important task of decarbonisation, and the potential delivery risk associated with unconsented emerging technologies to combat climate change Government considers that it remains prudent to plan on a conservative basis to ensure that there is sufficient supply of electricity to meet demand across a wide range of future scenarios, including for example where the use of hydrogen is limited or delayed.

Renewables are the future of UK electricity generation

6.44 To enable the Net-Zero transition, the power generation sector must both increase in capacity and reduce in carbon intensity on an unprecedented scale.

6.45 In the context of Net-Zero, NGESO's FES are a recognised suite of documents which indicate whether particular future pathways for electricity generation can be successful against a current national policy perspective.

6.46 Trends in the data help identify which pathways are more likely to be successful than others in achieving Net-Zero, and this includes indications of the relative contribution of (and so related to the need for) different generation technologies. While the need for more generation capacity to be built has been a consistent theme since the first FES was published in 2012.

6.47 The FES are an important point of view, which contributes to an objective assessment of the need for and scale of low-carbon solar generation developments under different future scenarios of demand and government policy, particularly within the context of Net-Zero.

6.48 Each year the FES has projected that consistently higher capacities of solar generation will connect to the national transmission system, based on an objective economic assessment of current and future costs and/or market drivers.

6.49 NGESO's Future Energy Scenarios, Ref 9(2023), concludes that installed electrical generation capacity in GB needs to increase from today's ~112GW to between 172GW and 205GW to meet anticipated demand in 2030 and stay on track to meet Net-Zero.

6.50 This projection represents a 70 to 109GW increase on existing generation capacity following the decommissioning of all but 1GW of existing nuclear generation and the closure of all remaining coal generation before that date.

6.51 By 2030, NGESO project that over 70% of installed generation capacity must be low carbon in order to meet Net-Zero targets, pointing to a significant growth in low carbon generation in the coming decade.

6.52 Further, NGESO projects that between 318 and 368GW of generation capacity will be required to meet demand by 2050 (continuing the increasing trend from previous forecasts), and 100% of operational generation must be zero-carbon by 2050. (Future Energy Scenarios, Table ES.10, Ref 9(2023)).

6.53 Solar is ideally placed to make up a large share of the required capacity of new low-carbon capacity required in the UK because:

- It is a low-carbon source of power
- It is a reliable and deliverable form of generation, evidenced by the fact that over 14GW of solar power is already operational in GB
- The cost of electricity generated by solar technology is independent of volatile international energy market prices because it has no input fuel costs
- On a lifetime cost of generation basis, solar is already the lowest cost electricity generation technology in the UK and globally (see Figure 10 below)
- Developments which are comparable to the Proposed Development in technology and scale are capable of achieving single-year post-consent construction durations (Electricity Generation Costs, Ref 6) therefore the Proposed Development is highly likely to deliver against the urgent requirement of decarbonisation actions (see Chapter 7)
- Its generation profile is complementary to that of other forms of low-carbon generation (see Figure 11 and Figure 12 below)
- The environmental impacts of solar generation are felt on a significantly more local basis than other onshore forms of low-carbon generation, for example onshore wind or biogas/biofuel generation

6.54 Developers use a process to select sites for solar generation. Not all locations are technically suitable, and the UK's needs for additional solar generation are large. Therefore, any technically suitable locations are valuable assets in order to meet Net-Zero.

6.55 The significant benefit the development of a low-carbon generation asset in a technically suitable location would make to meeting both the national and local urgent need for low-carbon generation should be accorded very significant weight when assessing the planning balance and could be considered to constitute very special circumstances justifying development in the Green Belt.

6.56 The contribution of solar to the security of the GB electricity system is addressed in the following chapter.

Quantifying the capacity of GB solar generation needed to meet Net-Zero

6.57 Para 3.10.4 of Draft NPS EN-3, Ref 28, explains that solar farms are one of the most established renewable electricity technologies in the UK are the cheapest form of electricity generation. Solar farms can be built quickly, and cost reductions and efficiency improvements are expected to reduce solar costs further. As such solar is a key part of the government's strategy for low-cost decarbonisation of the energy sector (Para 3.10.1).

6.58 The FES scenarios which achieve Net-Zero include solar capacities of 25 – 41GW in 2030, and 57 – 91GW in 2050 (Future Energy Scenarios, Ref 9(2023), Table ES.10). In every FES scenario, a pathway to Net-Zero includes a significant future increase in solar capacity beyond that which is installed or in development today.

6.59 Figure 8 superimposes GB solar capacity projections made in NGESO's FES 2012 to FES 2023, each projection is represented as a shaded area ranging from the lowest forecast capacity scenario to the highest scenario in each year. Actual historical growth in installed (and operational) capacity is shown as brown columns.

6.60 Since the Net-Zero commitment, forecasts for future solar capacity have increased significantly. To highlight this the FES forecasts from 2020 to 2023 have been shown in yellow and include only those scenarios which NGESO state are capable of achieving the UK's Net-Zero 2050 target.

6.61 The 2023 forecast shows the greatest installed capacity and is bordered in brown.

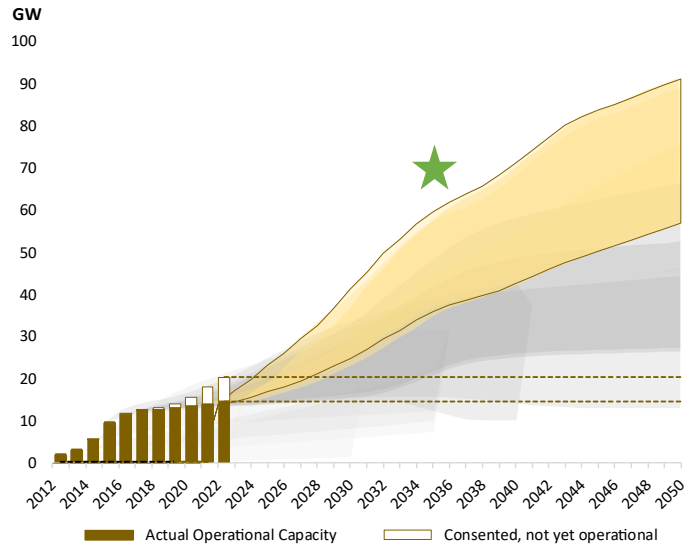

Figure 8: Evolution of future solar capacity projections in the UK, 2012 – 2023
Future Energy Scenarios (Ref 9) and Author Analysis

6.62 The green star on the chart, represents the BESS ambitions of 70GW of installed solar capacity by 2035. The white columns show the capacity of solar developments listed in DESNZ's online Renewable Energy Planning Database (REPD, Ref 3) which are currently consented but not yet operational, against the year in which they received consent.

6.63 Figure 8 shows the significant gap between currently delivered, or consented but not yet delivered developments, and the Net-Zero 2050 capable FES projections. Neither the FES projections nor the BESS ambitions – which are for up to 70GW of installed solar capacity by 2035 – will be met by the current pipeline of consented developments.

6.64 Based on experience, it is my opinion that the existence of an entry in a register does not guarantee the delivery of the development to which it relates, nor to the timeframes or capacity listed on that register, therefore my analysis should be considered as a maximum projection of the capacity of currently consented developments.

6.65 Developments may deliver a lower capacity than that consented, or at a later date, or not at all. Consent for some developments expires before they have been built – and the REPD lists 900MW of such developments nationally.

Local contributions to the national supply of low carbon electricity

6.66 Chapter 3 describes climate change action plans local to the Proposed Development; Chapter 4 described that approximately 63 developments of a comparable size to the Proposed Development (up to 27.4MW) would be needed to meet Wakefield's 2019 annual electricity demand; and that nearly 400 similar developments would be needed to meet Wakefield's 2019 annual energy demand.

6.67 It is clear from Chapter 5 that low-carbon generation capacity will need to be built out in WDC's administrative area so that the community itself increases the contribution it makes to meeting its final end use needs.

6.68 The Draft Revised NPS EN-3 (Ref 28) suggests an average expected ratio of 2-4 acres per MW of solar capacity, suggesting that developments similar in size to the Proposed Development should occupy from 55 acres to 110 acres each. To meet local electricity needs through solar alone, 3,500 – 7,000 acres would need to be developed. That range would rise to 20,900 – 41,800 acres to meet the District's total energy demand.

6.69 There is naturally some uncertainty inherent in projections of future electricity demand and the acreage required on different locations to place similar capacities of generation asset. These manifest as ranges in the need for solar generation presented in this Statement of Need and other analyses may differ slightly. However, the commonality is that each projection points to a significant step change being required in solar generation capacity in Wakefield in order to increase the share of energy demand supplied by local low carbon supplies.

6.70 If WDC is to support its residents and businesses to achieve its vision of being a carbon-neutral district by 2038, the development of local solar generation facilities, such as the Proposed Development, must be considered.

6.71 Wakefield District covers c.83,700 acres. To illustrate the scale of effort required to achieve net zero, Wakefield would need to put between 4.1% and 8.3% of its total land area to solar if it was aiming to generate its 2019 electricity demand from locally generated solar power. To meet its 2019 energy demand, that land share range would need to rise to between 25% and 50%.

6.72 However, much land has constraints of some form or another, ranging from being already developed and occupied (e.g., homes), to being susceptible to flooding, of unsuitable topography, or being too far away from grid to connect economically. Clearly therefore, as the percentage metrics in the previous paragraphs increase, the likelihood of achieving the required installed capacity will decrease.

6.73 Against the context of such a significant task to decarbonise our society, it is clear that every council, and every geography, must play as large a part as it is able in order to increase our chances of beating climate change, and in order not to increase the burden on others to deliver progress. WDC describes that:

> *"Many of our local communities were built on coal mining, which powered the industrial revolution and laid the foundation for the relative prosperity which we benefit from today …* [and therefore the district] *had a part to play in creating the problem, but … can also take action to change the current system and create an environmental revolution for the benefit of generations to come"* (Ref 1, p2)

6.74 I therefore consider that the significant need for many more low-carbon generation facilities in the district to be very important factors which could constitute very special circumstances justifying development in the Green Belt.

6.75 The REPD (Ref 3) and the Embedded Capacity Registers (ECR) (Ref 4, and available online from the UK's Distribution Network Operators) include details on operational developments and those which are at earlier stages of development.

6.76 The REPD pipeline includes one large-scale (49.9MW) solar PV development in WDC's planning pipeline and five other smaller developments (totalling 4.6MW) either under construction or awaiting construction, although the Proposed Development is not yet listed in the REPD.

6.77 The REPD also suggests that just 9.8MW of solar capacity is operational in the District. This is lower than DESNZ's figure of 29.3MW, implying that a significant portion of installed solar capacity in Wakefield could be small-scale roof top development and therefore less likely to be included in the REPD.

6.78 Northern Powergrid's ECR should also provide insight into the capacity of operational generation capacity in the District, and the capacity of developments which have grid connection agreements but which are not yet operational. The ECR presents data which is consistent with REPD data but is not consistent with DESNZ's data, both in terms of the capacity of installed and operational solar facilities as well as those in the pipeline for development. This Statement of Need therefore does not rely on ECR data to make its case in relation to future pipeline of solar capacity within the district.

6.79 The ECR also does not include any other low-carbon energy developments with post codes in Wakefield.

6.80 The UK's National Electricity Transmission System (NETS) passes through Wakefield and one postcode shared by the District's administrative area is home to an existing NETS substation, at Ferrybridge.

6.81 New connection points may be proposed in the future but cannot be assumed to be available for future developments to connect to until such time as proposals come forwards and are consented and funded. National Grid's Transmission Entry Capacity

Register (Ref 41) lists one large-scale renewable generation development comprising 100MW of solar and storage capacity which proposes to connect to the National Electricity Transmission System at Ferrybridge, with a current connection date of October 2035.

6.82 However, because of the cumulative warming effect of atmospheric carbon, developments which can be consented, funded, constructed, and connected sooner are significantly more valuable in the fight against climate change than developments which have longer development timescales.

6.83 It is my opinion that the Proposed Development and other solar developments will be needed in Wakefield to contribute to WDC's vision of achieving net zero by 2038, especially in the case that other proposed projects located within the District's administrative area do not deliver to their current plans.

6.84 However, the options available to WDC to consent solar developments within its administrative area are limited, and as such it is important that developments which come forward and are able to demonstrate their compatibility with planning requirements should be fully considered and consented wherever possible.

6.85 Given the significant and urgent need for many more low-carbon generation facilities in Wakefield, the scarce pipeline of potential low-carbon generation developments could constitute very special circumstances justifying development in the Green Belt.

6.86 The following section discusses the particular aspect of proximity of suitable land parcels to grid infrastructure in Wakefield.

Grid infrastructure and availability in Wakefield

6.87 The UK's grid infrastructure operates at different levels. The National Electricity Transmission System (NETS) operates across the country at up to 400kV. In their 2023 Future Energy Scenarios publication, National Grid stated that sufficient electricity connection capacity is vital to support solar capacity projections (p132, Ref 9(2023)), Implying that available connection capacity is currently not yet sufficient to meet those projections and therefore those projections are at risk of being missed.

6.88 Outside of the NETS, distribution networks connect consumers with supply and different parts of the distribution grid operate at different voltages.

6.89 Closer to consumers, grids operate up to 11kV. Other distribution lines operate at 33kV and closer to the NETS, distribution systems can operate at 66kV or up to 132kV.

6.90 Northern Powergrid provide an on-line tool to map availability in their distribution system for generators to connect (Ref 45). Figure 9 below shows a simplified view of network connection points in Wakefield District.

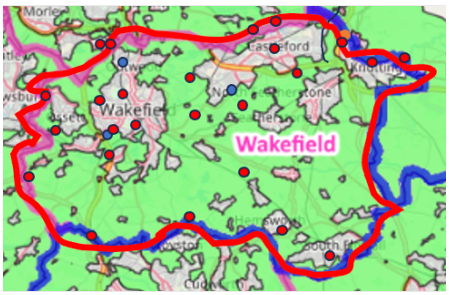

Figure 9 Grid infrastructure in Wakefield District
Author Adaption of Northern Powergrid Generation Heat Map (Ref 45)

6.91 This diagram shows the approximate locations, overlayed on a map of Wakefield, of: the Green belt designated land (green shading), Primary substations (red circles), and Bulk substations (blue circles).

6.92 The significance of the Primary and Bulk substations is that Bulk substations have the capability to connect higher capacity generators (subject to that capacity being available at the substation). I use a rule of thumb, which is that Primary Substations can connect generators with generation capacities of up to circa 10MW and Bulk substations can connect generators with generation capacities of towards 50MW. Local conditions may cause exceptions to my rule in some locations.

6.93 Primary substations are designed to step voltages down to safer levels close to points of final demand, it is therefore not surprising that the primary substations in Wakefield are located in areas of domestic and commercial development, with very few large green areas available to locate large-scale renewable generators (e.g., onshore wind or solar)

6.94 Bulk substations are intermediary substations, which are fed by the high voltage national transmission systems (via Grid substations – one of the closest of these to Wakefield is located at Ferrybridge) and step power down to feel the Primary substation network.

6.95 Generators need to connect to existing substations, or the distribution lines which in turn connect them. Generators which are close to existing lines or substations generally cause lower harm (including disruption) than generators located further away, due to shorter cabling distances involved.

6.96 Northern Powergrid's network mapping tool shows only three Bulk substations in Wakefield District, at Wakefield North, Wakefield Monckton Road, and Featherstone (all at 33kV), implying a limited opportunity to connect large scale renewable generators to the existing distribution grid. Large-scale renewable generators will be required in Wakefield to increase the level of local renewable generation to achieve WDC's vision for Wakefield to become carbon neutral by 2038, but it appears that there is currently no "easy solution" available to Wakefield to deliver and connect sufficient capacities of renewable generation.

6.97 A news article from July 2023 poignantly illustrates the challenges of connecting renewable electricity generation facilities in Yorkshire. Ref 50 cites a report which states that due to no grid capacity being available in the area, any hopes of the council developing a proposed solar site in a particular identified area before 2030 were deemed no longer feasible and plans have therefore been abandoned.

6.98 Importantly, Chapter 4 showed that the equivalent of nearly 400 solar developments similar to the Proposed Development would be required to connect in Wakefield to produce enough electricity locally to meet local energy demand. Given the enormous need for low-carbon electricity generation infrastructure in Wakefield, every opportunity to connect a generator should be taken or else local and national net zero targets may be at a significant risk of delivery.

6.99 On reviewing this data, it is my professional opinion that WDC will be highly unlikely to meet its net-zero targets without developing renewable generation on Green Belt land.

6.100 This is firstly because interconnected parcels of land of sufficient scale are required on which to locate renewable generation, and land which is not designated as Green Belt is unlikely to have sufficient availability of such land.

6.101 Secondly, in the interests of efficiency, existing network infrastructure should be used to connect new generation assets, and the location of Wakefield's higher-voltage networks close to Green Belt land means that in order to minimise the distance between the asset and its point of connection, Green Belt land is likely to be required in some if not many cases.

6.102 The significant benefit the Proposed Development provides to meeting both the national and local urgent need for low-carbon generation and energy storage should be accorded very significant weight when assessing the planning balance and could constitute very special circumstances justifying development in the Green Belt.

Conclusion

6.103 Based on the above analysis, it is my opinion that solar generation is already a critical part of the UK electricity generation mix, and its deployment to date has had a significant beneficial impact on decarbonisation of the energy sector.

6.104 It is also my opinion that the above analysis supports the case for the UK to continue to deliver new solar generation capacity as a measure which is already proven in delivery, to drive further decarbonisation, and as a measure to mitigate the risk that either CCUS, new nuclear, hydrogen, or novel offshore wind technologies do not deliver at the scale or pace required to contribute to decarbonisation in the 2030s or beyond.

6.105 Whilst potential CCUS and hydrogen developments may contribute to the need to decarbonise UK energy production, such technologies have not yet been consented for development at scale. In any event, such developments cannot be used as a reason not

to consent renewable wind and solar developments as these will be required as well and have the potential for earlier deployment.

6.106 From the evidence provided it is also my opinion that the national pipeline of consented solar developments is not of a sufficient scale nor certainty to keep pace with even the lowest of the most recent projections of future solar generation capacity and timings required to meet Net-Zero. This implies that much more solar capacity must be consented in the UK in order to deliver the UK's Net-Zero target.

6.107 Further, and consistent with the trends shown in Figure 8, it is likely that future projections for the required capacity of solar generation to be delivered to meet net zero will increase as further decarbonisation opportunities outside of the electricity sector are identified and required to meet Net-Zero and Government's five-yearly Carbon Budgets.

6.108 It is my view that the preceding analysis supports the need for a very substantial increase in the deployment of solar generating capacity nationally in order to meet the national Net-Zero target.

6.109 It is also my view that the preceding analysis supports the need for a very substantial increase in the deployment of solar generating capacity in Wakefield in order to achieve WDC's vision of becoming carbon-neutral by 2038. Actions delivered in Wakefield will clearly also contribute towards the national Net-Zero target. In this context, any other potential solar developments in Wakefield, or nationally, should not be seen as *alternatives* to the Proposed Development, because those other developments will *also* be required.

6.110 The Proposed Development relies on proven technology and meets the urgent need for further development of UK renewable energy and, in my view, should be regarded as an important part of the overall effort to meet the UK's carbon targets.

6.111 It is my opinion, therefore, that the benefits associated with solar generation at the Proposed Development should be accorded very substantial weight in the overall planning balance and could constitute very special circumstances justifying development in the Green Belt.

7 The contribution of solar to system security and affordability

Introduction

7.1 Chapter 6 previous provides evidence to support the need for solar generation capacity to decarbonise the GB electricity system and support the UK to achieve its Net-Zero target.

7.2 National energy policy also seeks to ensure system security and affordability of supplies while delivering decarbonisation.

7.3 This chapter provides evidence of the contribution solar generation makes to national electricity system security of supply, especially when delivered as part of an energy system with diverse low-carbon supplies, including onshore and offshore wind.

7.4 This chapter also provides evidence to demonstrate that solar power is already among the lowest cost forms of power generation and therefore contributes to achieving affordable electricity for the UK.

7.5 This chapter therefore supports the fact that the development of solar power is consistent with all three elements of national energy policy.

7.6 In doing so, this chapter concludes that the need for the Proposed Development is significant because of the important and timely contribution it will make to decarbonisation, energy security and affordability.

Reducing reliance on fossil fuels

7.7 The 2022 UK electricity market demonstrated how the UK is exposed to volatile energy prices through international energy markets in coal, gas, and oil. Price rises in 2022 have and will continue to filter through to consumer bills for as long as gas prices remain elevated. While the UK was once energy independent, it now is dependent on imports (in particular) of gas and electricity.

7.8 Security of Supply, alongside affordability and decarbonisation, is an important pillar of UK energy policy. The Energy Act 2013, for example, made provision for a decarbonisation target range and duties as well as "*reforming the electricity market for purposes of encouraging low carbon electricity generation or ensuring security of supply*" (Ref 49, Introduction).

7.9 More recently, the 2020 Energy White Paper states that: "*The government works in partnership with the ESO and Ofgem to ensure the reliable operation of the system and the security of electricity supplies. Security of supply will always be a priority, but our approach must also adapt to reduce carbon emission and costs.*" (Energy White Paper, Ref 16, p74).

7.10 The British Energy Security Strategy, Ref 22, was published in April 2022, following growing disturbances through 2021 and early 2022 in European energy markets. The strategy states that:

> *If we're going to get prices down and keep them there for the long term, we need a flow of energy that is affordable, clean and above all, secure. We need a power supply that's made in Britain, for Britain*. British Energy Security Strategy (Ref 22, p3)

7.11 The British Energy Security Strategy (p6) sets out the long-term goal of "address[ing] our underlying vulnerability to international oil and gas prices by reducing our dependence on imported oil and gas". In particular, the Strategy aims to:

- Cut planning consent process time by over half through, among other measures, strengthening the Renewable Energy National Policy Statement (EN-3) to reflect the importance of energy security and Net-Zero
- Increase the pace of deployment of Offshore Wind
- Support a 5-fold increase in deployment of solar technology by 2035, recognising the abundant source of solar energy in the UK and an 85% reduction in cost over the last ten years of solar power

7.12 Mission Zero (Ref 40) includes as one of its recommendations the establishment of taskforce and deployment roadmaps in 2023, for solar to reach up to 70GW by 2035 – the aim established in the British Energy Security Strategy.

Solar power is already one of the UK's lowest cost generation technologies

7.13 DESNZ regularly publish an Electricity Cost of Generation report. The most recent publication (at the time of writing) was made in 2020 (Ref 6).

7.14 The analysis provides standard assumptions which can be used to benchmark the operational characteristics associated with different technologies and scale of installation, and then to evaluate, by means of a standardised methodology, the levelised costs of each generation technology (and for different scales of installation) and compare between them. DESNZ's analysis also incorporates "learning rates" which inform a future projection for lifetime costs for different technologies.

7.15 Levelised costs, which are a measure of the average cost per MWh generated over the full lifetime of a plant, provide a straightforward way of consistently comparing the costs of different generating technologies with different characteristics, focusing on the costs incurred by the generator over the lifetime of the plant (Cost of Generation, p5).

7.16 Figure 10 following illustrates a "triple" of columns for each technology, each column within the triple represents the levelised cost for the technology calculated by the analysis undertaken in 2020 for assets commissioning in 2025, 2030 and 2035 respectively. The left-hand column of the triple is the projection for developments delivering in 2025, the middle shows a projection for developments delivering in 2030, and the right-hand column is for developments delivering in 2035.

7.17 The blue bars represent the range of levelised costs given different input assumptions of capital and operating costs. The red columns represent the range of levelised costs under different projections for input fuel costs (where appropriate).

7.18 The levelised cost ranges of large-scale solar (defined in the DESNZ reports as installations over 5MW in capacity) are shown on the chart in yellow.

7.19 Figure 10 shows that renewable generation technologies hold a significant levelised cost benefit when compared to technologies which are reliant on fossil fuels.

7.20 Further, Figure 10 shows that the levelised cost of solar delivered in 2025 is comparable to the levelised cost of onshore wind, however it is anticipated that solar generation delivered in future years is likely to be cheaper than both onshore and offshore wind on a levelised cost basis.

7.21 A development with a lower levelised cost is more likely to be developed because of the higher financial returns it may be able to provide to its investor, versus a development with higher levelised costs.

7.22 This is important because renewable power has a very low marginal cost of generation, reflecting the fact that there are no input fuel costs for renewable assets. Therefore, because the GB electricity market dispatches generators on a marginal cost basis, the cost of electricity when renewable generation is high, will be lower (all other inputs being equal) than the cost of electricity when renewable generation is low.

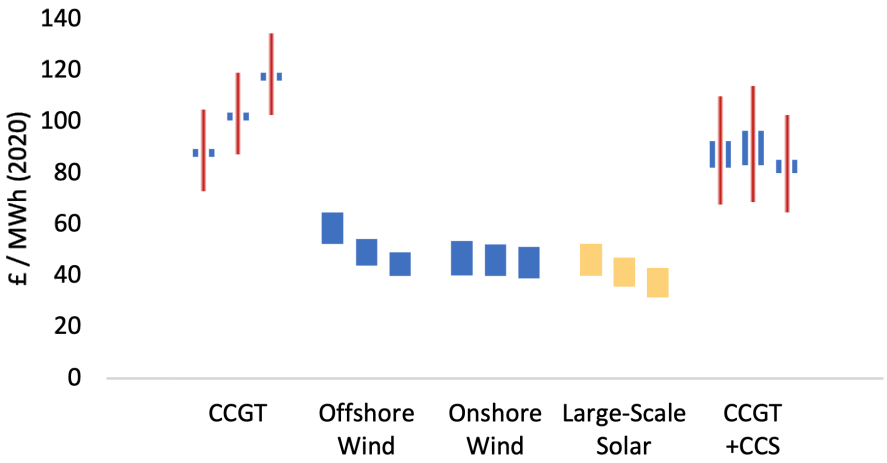

Figure 10 illustrates the relative levelised costs of major generation technologies in the UK. Author Adaption of Cost of Generation Report (Ref 6)

7.23 The market mechanism described above also provides the explanation as to why the British Energy Security Strategy increases the UK's ambition for renewable generation to reduce our dependency on volatile international energy markets.

7.24 The key inputs to the levelised cost analysis are projected operational lifetime, load factor (a measure of the output of the plant per year versus its theoretical maximum if availability is unconstrained), capital cost, and development duration.

7.25 I have not seen a detailed financial model for the Proposed Development, but based on my professional experience, I have not identified any reasons why the Proposed Development should not be able to achieve a levelised cost which is consistent with those presented by DESNZ in their most recent Electricity Cost Generation Report (2020).

The system adequacy of solar generation

7.26 NPS EN-1 (Ref 13) states at Para 3.3.31 that "*a secure, reliable, affordable, Net-Zero consistent system in 2050 is likely to be composed predominantly of wind and solar*". This is because a single renewable electricity generation technology is not able to provide the required system security during periods where, for example, the wind does not blow, or when the sun does not shine.

7.27 Figure 11 following shows that a generation portfolio consisting of a combination of solar and wind generation provides a more dependable level of generation than does a portfolio of either solar or wind generation alone.

7.28 The yellow bars in Figure 11 present, over a focus period of two years, the difference between NGESO's estimated actual solar generation and their long-run average expected estimate of solar generation, adjusted to maintain a constant installed capacity through the focus period.

7.29 Where the yellow column extends above the x-axis, estimated solar generation was higher than expected, and where the yellow column extends below the axis, estimated solar generation was lower than expected.

7.30 The blue bars in Figure 11 present the same data but for wind generation.

7.31 The blue and yellow bars therefore represent a generation dependability metric for each technology. The further the bars extend away from the x-axis, the greater the risk associated with the technology not delivering its expected generation. This is an intrinsic characteristic of renewable technologies.

7.32 However, by combining wind and solar generation capacities (in proportion to current levels of installed capacity for each technology) this analysis shows that the generation dependability of a fleet of more than one different technology has a greater generation dependability than each of its different parts.

7.33 The green dashed line, representing the combined portfolio, lies within the extent of both the blue and yellow columns, and is flatter than both across the 2-year period.

7.34 A solar generation portfolio would therefore complement the existing and growing GB wind portfolio to deliver a combination of low-carbon generation with a generation dependability which is higher than that of the separate technologies. This in turn will help reduce (but not fully remove) the costs associated with managing variable generation to meet consumer demand.

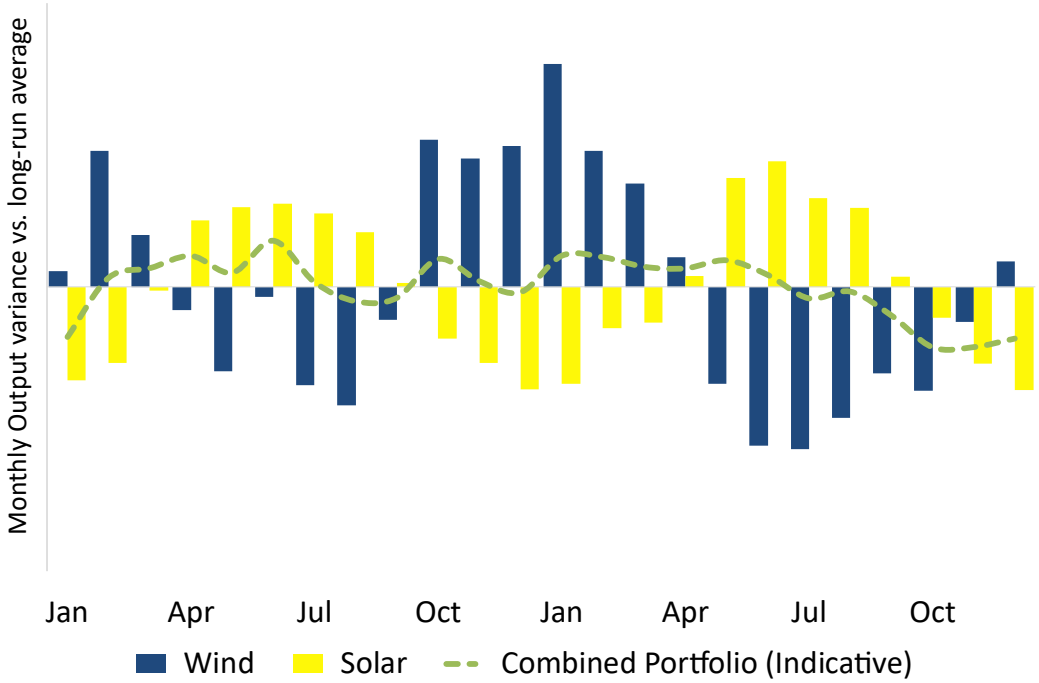

Figure 11: Illustrative dependability for a combined portfolio of solar and wind in GB
Author Analysis of National Grid Operational Data

7.35 Figure 12 following illustrates the same point by stacking anticipated output from a portfolio of onshore and offshore wind, solar, and low-carbon baseload generators against anticipated demand, using National Grid's Future Energy Scenarios and National Grid Operational Data as sources for each datapoint.

7.36 Figure 12 uses NGESO Industry data to derive an average load factor by month for each generation technology. Onshore and offshore wind tend to have different output profiles and blade-tip efficiencies therefore they have been modelled separately. Solar too has a different generation profile. "Zero Carbon BLD" represents baseload generation, such as large-scale nuclear power, which can be assumed not to fluctuate significantly from month-to-month.

7.37 Future monthly demand has also been modelled to take into effect seasonal swings in underlying demand as well as a projected take-up of home heating and transportation.

7.38 Figure 12 shows that a combination of renewable generation technologies, weighed to mirror those technologies projected for a net-zero compatible strategy in the 2021 FES, is able – on a month-average basis – to track projected national demand with very small levels of over-delivery (requiring constraints) or under-delivery (requiring power cuts or scarcity pricing) experienced. Note that this analysis specifically excludes the

potential impacts of either short-term or longer-term electricity storage, which could help balance supply with demand under different installed capacities of each technology.

7.39 Figure 12 shows that the seasonality of wind and solar complement each other in GB; and a portfolio of both, with a "foot" of low-carbon baseload generation, will naturally meet seasonal demand (red dashed line) against a 2030 scenario of each dataset.

7.40 Solar is an essential asset class which is needed to support a high level of generation adequacy and output dependability within the GB electricity system without incurring excessive capital spend, nor causing significant system integration costs or inefficiencies.

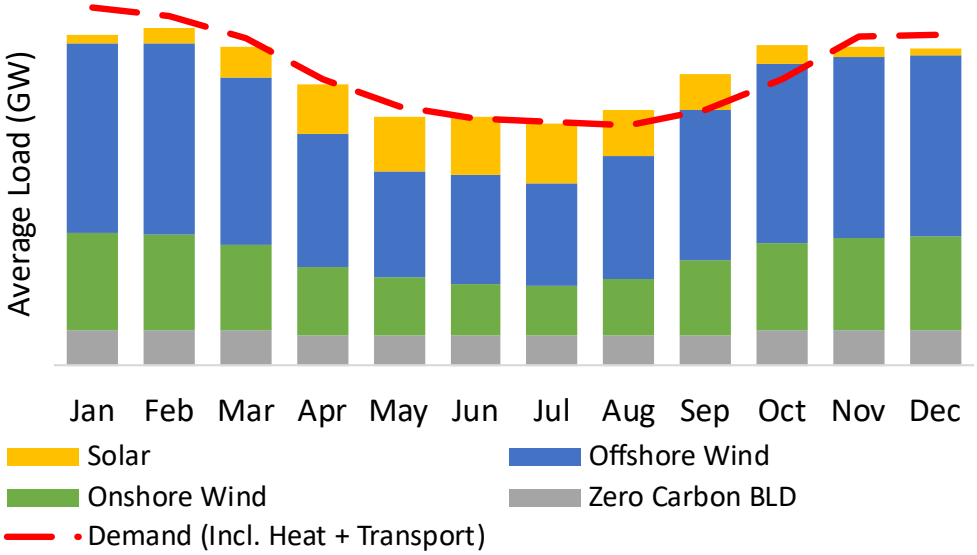

Figure 12: Deploying large-scale solar alongside offshore wind meets anticipated seasonal demand levels
Author Analysis of National Grid Operational Data

Conclusions

7.41 The most important conclusions arising from this Chapter are summarised below.

7.42 As well as its important contribution to decarbonisation, solar energy has an important role to play in reducing the UK's over-reliance on foreign energy sources and volatile international energy markets.

7.43 Solar is also one of the lowest cost sources of electricity generation in the UK, and as such also has an important role to play in managing the affordability of electricity, both by displacing volatile gas from the electricity generation system and by reducing the overall cost of electricity generated in the UK.

7.44 Solar plays an important role in enhancing GB electricity system security, and complements GB's existing and growing wind generation capacity. An energy system with diverse supply technologies achieves higher security of supply than a system which relies on just one technology.

7.45 Developments which can be delivered against short timescales are incredibly beneficial to the achievement of decarbonisation, security of supply, and affordability targets at both a national and local level.

7.46 The close proximity of the Proposed Development to a point of connection on an existing local electricity network asset reduces the likelihood of any delays in development due to grid connection once construction has commenced.

7.47 The Proposed Development, which could be delivered within some 12-15 months following consent, will deliver both near-term and enduring benefits to GB security of supply, decarbonisation, and affordability of energy and is therefore an important development in relation to meeting the urgent need for low-carbon, secure and affordable electricity.

8 Conclusions

8.1 The UK's energy trilemma is currently at a critical point with urgent actions required to maintain progress against targets and ambitions set out in current policies across all three pillars: decarbonisation, security of supply, and affordability.

8.2 In this Statement of Need I have shown that on both a local and national level the scale of new low-carbon electricity generation in GB required to keep the UK on track with its Net-Zero commitments is unprecedented.

8.3 The pipeline of consented developments of all low-carbon technologies is, however, currently significantly below the level needed to meet even the most achievable of the Net-Zero compliant forecast projections.

8.4 Because of the scale of deployment projections for renewable electricity generation capacity, all communities in the UK will be required to play their part. Local ambitions or policies to generate enough renewable electricity to meet local demand are therefore very important in order to underpin delivery of the national strategy.

8.5 New solar developments are ideally suited to address the energy trilemma because they produce low-carbon, reliable, and low-cost electricity. It is my opinion that the urgent deployment of new solar capacity is critical to achieving the UK's Net-Zero targets and to deliver secure and affordable electricity supplies for now and the future.

8.6 All solar generation developments that come forwards will deliver very significant benefits to the UK's current energy policy aims. It is my opinion that these benefits would contribute significantly to the weight in favour of consenting their development.

8.7 Further, because of the sheer scale of capacity required, it is clear that other technically feasible solar generation developments should be consented "as well as", rather than "instead of", the proposals at the Proposed Site.

8.8 In order for Wakefield to move towards carbon neutrality in accordance with its vision of becoming a carbon neutral district by 2038, it will need to consent a significant capacity of local renewable generation capacity to contribute towards meeting its own annual energy consumption.

8.9 The evidence I have provided in this Statement of Need provides the context against which it is clear that, due to its achievable delivery timescales and proposed MW capacity, the Proposed Development:

- Provides a critical near-term decarbonisation opportunity for the UK
- Is a hugely important step for Wakefield District Council to take towards to achieving its own climate change vision
- Presents an essential diversification of UK and local low-carbon electricity supply
- Would contribute to shielding UK consumers from volatile energy markets

8.10 The proposed solar development is a: highly suitable generation technology for development at the scale proposed (up to 27.4MW grid installed capacity) which is significant in terms of the benefits it would bring to both national and local decarbonisation objectives.

8.11 The Proposed Development is an important opportunity to deliver the benefits of decarbonisation, energy security, and affordability within a critically short timeframe (especially compared to other decarbonisation actions).

8.12 Significant capacities of low-carbon solar generation are urgently needed in the UK. The Proposed Development will be an essential near-term step in meeting government objectives of delivering sustainable development to enable decarbonisation and by doing so, will address the climate change emergency that affects everyone's lives and the environment, by ensuring our energy supply is secure, low-carbon, and low-cost.

8.13 I believe that the need for the Proposed Development and its important and relevant benefits should be fully reflected in the overall planning balance in the planning process, and I believe that the following points could constitute very special circumstances justifying development in the Green Belt:

- Generating low-carbon electricity locally is a critical step towards local and national decarbonisation. By approving plans for renewable electricity developments within its administrative area, WDC would be using its powers to support the delivery of up to 27.4MW of low-carbon generation and progressing towards WDC achieving its vision for Wakefield to become a carbon neutral district by 2038
- For the UK to achieve Net Zero by 2050, all opportunities must be taken by all parties to drive towards Net Zero. Local communities, delivering only to the needs of their own areas and local plans, or relying on other areas to generate excesses of low-carbon energy and make those available for national use, simply put, will not be enough
- The equivalent of 63 Proposed Developments would need to be consented and delivered to generate enough low-carbon electricity to meet Wakefield-wide electricity demand. Achieving carbon neutrality across *all* energy use would need the equivalent of circa six times more developments in Wakefield
- Not all locations are technically suitable, and the UK's needs for additional solar generation are large. Therefore, any technically suitable locations are valuable assets in order to meet Net-Zero
- Due to the interaction of available space and available grid capacity in Wakefield, established opportunities for Wakefield to generate low-carbon energy will not deliver sufficient generation capacity. Without considering other options to produce additional low-carbon electricity from within its administrative area, for example by sensitive development of Green Belt land, WDC risks delivering a shortfall against its vision for Wakefield to become carbon neutral by 2038
- The pipeline of proposals to develop low-carbon generation in Wakefield is scarce compared to the scale required, and the therefore options available to WDC to consent local low-carbon generation are limited. As such it is important that developments which come forwards and are able to demonstrate their compatibility with planning requirements should be fully considered and consented wherever possible

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