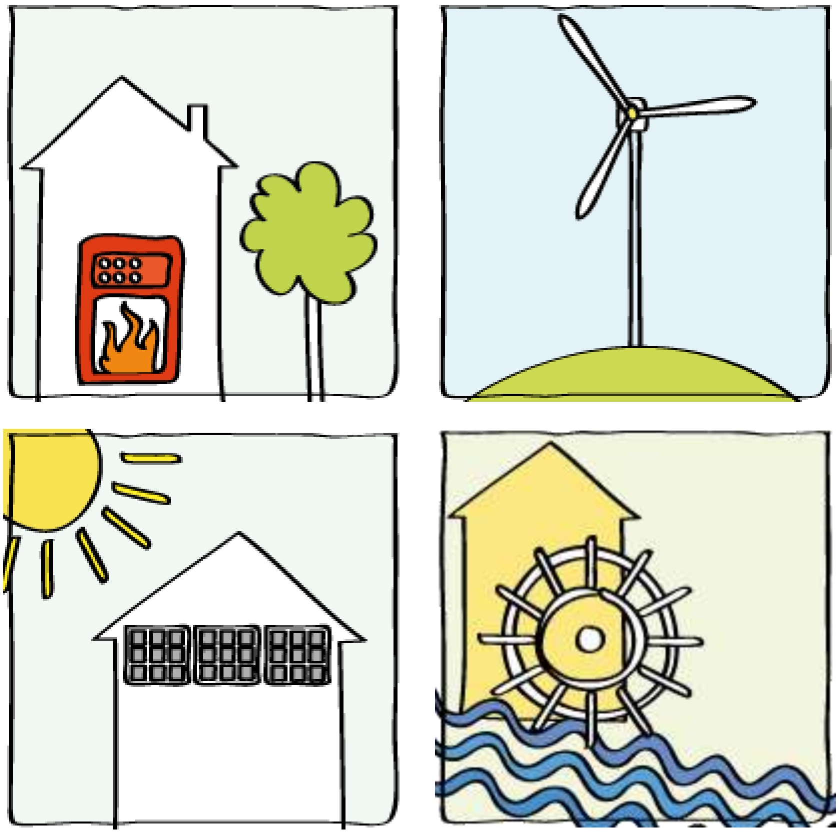
Update to the Bath and North East Somerset renewable energy resource evidence base

Bath and North East Somerset Council

October 2018



This report was produced for	Bath and North East Somerset Council
Issue date	October 2018
Version	Technical work
Written by:	Joel Venn and Hazel Williams
Approved by:	

Regen, The Innovation Centre, Rennes Drive, Exeter, EX4 4RN
T +44 (0)1392 494399 F +44 (0)1392 420111 E
admin@regen.co.uk www.regen.co.uk

Registered in England No: 04554636

1. Executive summary

1.1 Aim of the assessment

Bath and North East Somerset Council commissioned Regen to update the evidence base underpinning the renewable energy targets in its Core Strategy. The targets are set out in Core Strategy Policy CP3: Renewable Energy, which states:

Development should contribute to achieving the following minimum level of Renewable Electricity and Heat generation by 2026:

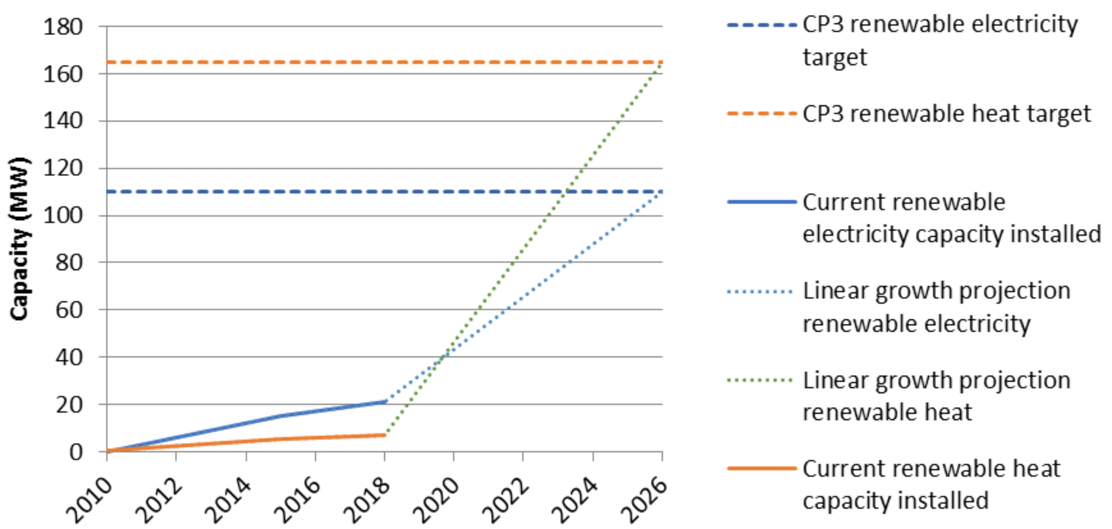
- *Electricity: 110 MWe*
- *Heat: 165 MWth*

Regen reviewed current renewable deployment in the area and predicted growth factors. The original target is based on a 2010 resource assessment by Camco. Regen reviewed this, updating it to include an assessment of ground-mounted solar.

1.2 Meeting the 2026 targets

Deployment to date has been limited in B&NES, with the area's heritage and landscape assets slowing deployment. In addition, changes to national policy and subsidies have stalled the renewable energy market. The renewable energy targets are unlikely to be met by 2026. However, in the medium-term deployment rates are expected to increase in the UK due to a range of factors including falling technology costs and the UK's commitment to decarbonisation. It is therefore reasonable to roll the targets forward to 2036.

Figure 1: 2018 renewable energy capacity in B&NES and linear growth required to meet 2026 targets



1.3 Resource assessment update

Regen reviewed Camco's 2010 resource assessment, finding that the 2026 practical potential should be rolled forwards to 2036, with the addition of 65.6 MW of ground-mounted solar potential. This additional potential gives some flexibility in how the renewable electricity target is achieved. Heat pumps, solar thermal and biomass boiler potential have been combined into a building integrated heating and hot water category.

Table 1: Updated 2036 practical potential including ground-mounted solar

Technology type	Mwe	MWth
Wind	44.9	
Roof-mounted solar	76.6	
Ground-mounted solar	65.6	
Hydro	0.3	
Biomass CHP	1.6	3
Building integrated heating and hot water		163
Geothermal		0.1
Total	189	166.1

1.4 Recommendations

The report makes the following recommendations:

- Based on the updated resource assessment, the renewable energy targets should be kept at the same capacity in the Local Plan and not revised downwards. It is still the case that the Council wishes to maximise the use of local renewable energy and the Camco study sets out a realistic benchmark by which to judge whether this has been accomplished, based on actual resource. It might be the case that one technology forms a larger portion of the target than Camco suggested, e.g. solar than wind. A stretching but achievable target should have a positive effect on deployment in the area.
- The renewable energy targets date should be rolled forward to 2036, taking into account the limited progress to date, the current hiatus in deployment and the medium-term growth that is predicted within the Plan period. Progress should be reviewed every 5 years in line with the planning cycle and the targets should be adjusted as necessary to take into account technology and policy changes.
- Delivery of the targets will need to be underpinned by a programme of action led by B&NES Council, including current planned policies and additional action.

2. Introduction

Bath and North East Somerset Council commissioned Regen to update the evidence base underpinning the renewable energy target in its Core Strategy. The target is set out in Core Strategy Policy CP3: Renewable Energy, which states:

Development should contribute to achieving the following minimum level of Renewable Electricity and Heat generation by 2026:

- *Electricity: 110 MWe*
- *Heat: 165 MWth*

In order to make recommendations on the suitability of the targets, this report reviews:

- renewable energy deployment to date in the area
- factors affecting deployment in the short to medium term
- Camco's resource assessment which the original target was based on.

3. Progress against the targets to date

Regen's analysis of the publicly available datasets[1] shows that to date there is 21 MW of renewable electricity in the area and 7.5 MW of renewable heat. This compares with 15.3 MW of renewable electricity and 5.35 MW of renewable heat in 2015.

To date, there are no large-scale storage projects with a connection agreement in the area. There are no public datasets that record small-scale storage projects so the number of these is unknown.

Table 2: Number of projects and total capacity of renewable energy technologies in B&NES area as of August 2018

	Number of projects	Sum of capacity (MWe)	Sum of capacity (MWth)
Onshore wind	4	0.1	-
Roof-mounted solar PV	2277	10.6	-
Ground-mounted solar PV	3	7.6	-
Hydro	5	0.1	-
Biomass CHP	0	-	-
Biomass	65	-	6.3
Solar thermal	51	-	0.0
Geothermal	0	-	-
Heat pumps	124	-	1.1
Anaerobic digestion	2	2.5	-
Grand total	2531	20.9	7.4

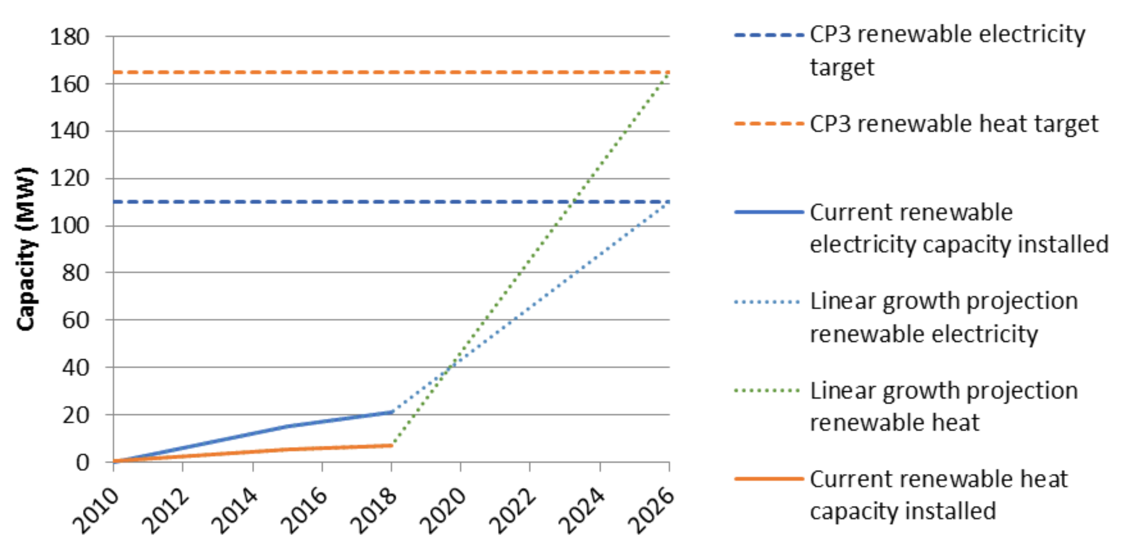
The current installed capacity amounts to just 19% of the electricity target and 4% of the heat target. Growth of capacity to date has been slow. This is in part due to the unique features of the B&NES area, including:

- The World Heritage Site status of Bath
- The large proportion of B&NES that is a designated landscape and/or within the Green Belt
- The age and nature of a large proportion of the area's housing stock

The growth rate would need to ramp up considerably in the next 8 years if the target were to be achieved by 2026. Figure 2 shows the linear growth rate that would need to be achieved to meet the 2026 target for heat and electricity. The growth rate is in reality unlikely to be linear, with deployment likely to ramp up over time, as technology costs fall, technology evolves and the need to meet decarbonisation targets drives government policy more strongly.

[1] Feed-in Tariff, Renewables Obligation, Renewable Heat Incentive

Figure 2: 2018 renewable energy capacity in B&NES and linear growth required to meet 2026 target



Source: Regen analysis of Feed-in Tariff, Renewables Obligation and Renewable Heat Incentive databases

4. Factors affecting renewable energy deployment

4.1 Current hiatus in renewable energy deployment in the UK

From 2009 to 2015, there was a substantial increase in the deployment of renewable eneryg across the UK, as a result of the introduction of the Feed-in Tariff, the Renewable Heat Incentive and falling technology costs.

However, since 2015, the deployment rate has slowed drastically due to a number of factors relating to both subsidies and planning for renewable energy:

- major reductions to the Feed-in Tariff;
- the early closure of the Renewables Obligation for wind and large scale PV.
- changes to the terms of Contracts for Difference meaning that there has been no support onshore solar or wind renewable electricity projects
- changes made to the Renewable Heat Incentive
- the 2015 issuing of a Written Ministerial Statement limiting the deployment of onshore wind
- the scrapping of the 2016 zero carbon homes requirement
- changes to embedded benefits
- grid/network constraints increasingly becoming an issue

Despite the current hiatus, Regen's assessment is that renewable energy deployment across the UK is likely to see strong growth from the medium term to 2036 and beyond, thanks to a rapidly changing technical and policy landscape.

Some of the relevant growth factors are discussed below.

4.2 Factors leading to predicted medium-term rapid growth of renewables

4.2.1 Continued growth in the global renewables market

The global renewables market continues to grow, with the International Renewable Energy Agency (IRENA) recording annual growth in global reneawble energy capacity of 8.3% in 2017, with solar PV capacity showing a 32% increase[2]. Bloomberg New Energy Finance predicts that by 2050, wind and solar technology will provide almost 50% of total electricity globally – "50 by 50" – with hydro, nuclear and other renewables taking total low carbon electricity generation up to 71%[3].

This critical mass in the global market means that technology prices are falling rapidly, particularly for solar PV and wind; the levelised cost of energy for both technologies fell by 18% between 2017 and 2018[4]. Onshore wind can now provide the cheapest electricity available. In the UK, Regen's market intelligence has identified subsidy free projects under development in Scotland and Wales.

---

[2] IRENA (2018), *Renewable Capacity Statistics 2018,* http://irena.org/publications/2018/Mar/Renewable-Capacity-Statistics-2018

[3] Bloomberg New Energy Finance (2018) *New Energy Outlook 2018,* https://bnef.turtl.co/story/neo2018?teaser=true

[4] Bloomberg New Energy Finance (2018) *New Energy Outlook 2018,* https://bnef.turtl.co/story/neo2018?teaser=true

In the UK, Regen expects grid parity[5] to be achieved by the early 2020s for large scale solar PV, with other technologies and scales following. The achievement of grid parity means that decisions about investing in renewables will no longer be based on the availability of a government subsidy, leading to growth in deployment levels.

4.2.2 The need to meet long term UK carbon targets

There are a number of long term drivers on the UK to decarbonise our energy consumption. The UK is commited to producing 15% of its total energy consumption from renewable energy by 2020 under the EU Renewable Energy Directive. The Climate Change Act established a target for the UK to reduce its emissions by at least 80% from 1990 levels by 2050 – and the government has set out an intention to achieve a 100% reduction, following on from the Paris climate deal. This legal framework to deliver reductions in carbon emissions will require a continued commitment towards renewable energy growth over the medium term. Publicity around scientific publications such as the Intergovernmental Panel on Climate Change report on Global Warming of 1.5°C[6] is likely to increase the pressure on government to support the deployment of renewables through market mechanisms and planning support.

4.2.3 Growth of storage and flexibility

The UK government and Ofgem are committed to supporting a “smart power revolution” that involves more flexible use of power, storage and interconnection, as set out by the 2017 Upgrading our energy system: smart systems and flexibility plan[7]. The UK’s transformation to a smart energy system is enabling many of the barriers to greater renewable energy deployment to be overcome – in particular the limitations of the grid and the need for fossil fuel ‘baseload’ power. Regen’s 2017 research on storage, for example, found that the dramatic decrease in battery storage costs are likely to lead to a sharp rise in the co-location of storage with solar PV and onshore wind projects in the medium term[8].

4.2.4 Updates to national and local low carbon buildings policy driving renewable deployment linked to new developments

Changes to Part L, the government’s new commitment to half carbon emissions from new buildings by 2030[9] and local low carbon requirements in B&NES and across the West of England will increase the uptake of renewables in and linked to new developments. For example, the new Standard Assessment Procedure 10 (SAP 10) for calculating carbon emissions from buildings assumes that gas is only slightly lower carbon than electricity, and as the grid continues to decarbonise, air source heat pumps will become a substantially less carbon intensive means of heating than a highly efficient

---

[5] The term “grid parity” describes the point in time, at which a developing technology will produce electricity for the same cost to taxpayers as conventional technologies.

[6] IPCC (2018), Global Warming of 1.5°C, http://www.ipcc.ch/report/sr15/

[7] BEIS and Ofgem (2017) *Upgrading our energy system* https://www.gov.uk/government/publications/upgrading-our-energy-system-smart-systems-and-flexibility-plan

[8] Regen (2017) *Energy storage; the next wave,* https://www.regen.co.uk/wp-content/uploads/REGEN_Energy_Storage-web_Final.pdf

[9] Speech by Prime Minister, May 2018 https://www.gov.uk/government/speeches/pm-speech-on-science-and-modern-industrial-strategy-21-may-2018

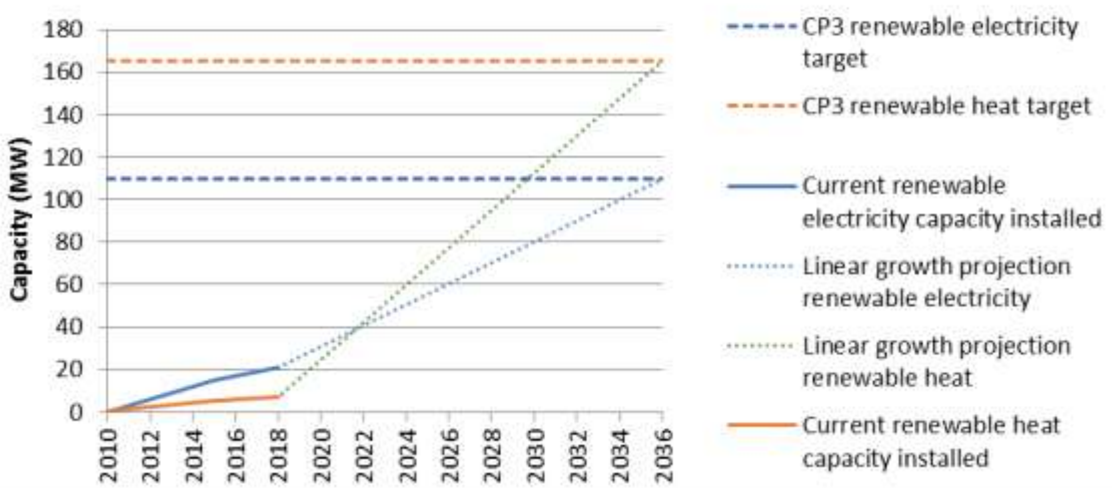
gas boiler[10]. As a result, heat pumps may become developers' heating of choice in order to comply with national and local low carbon requirements as these are tightened.

4.3 Moving the target date to 2036

Since only limited progress has been made towards the 2026 target and given the current hiatus in deployment, it seems likely that the 2026 target will be missed. However, the renewables market in the UK is expected to grow again in the early to mid-2020s due to the factors discussed above. It therefore seems reasonable to move the target date to be in line with the new Local Plan, 2036. In order to keep the target in line with growth in the market, it should be reviewed every five years against deployment and expected market trends and adjusted as necessary.

Figure 3 shows the linear growth trajectory that would be required to meet the target by 2036. As mentioned above, the trajectory is unlikely to be linear; growth is expected to ramp up over time.

Figure 3: 2018 renewable energy capacity in B&NES and linear growth required to meet targets by 2036



Source: Regen analysis of Feed-in Tariff, Renewables Obligation and Renewable Heat Incentive databases

[10] Standard Assessment Procedure (SAP) is a procedure by which the energy performance of a home is assessed. It is the typical method used for the purposes of assessing compliance with the energy requirement for new homes, as set out in Building Regulations Part L1a. In 2018, BRE published a new version, SAP10. This has not yet been adopted for use in assessing Part L1a compliance but it is likely to be introduced

5. Resource assessment update to support 2036 target

The technology mix required to meet the targets is not specified within the target wording. However, the targets' development was based on a resource assessment produced by Camco in 2010: Renewable Energy and Planning Research Update (referred to here as Camco's resource assessment)[11].

Camco's resource assessment set out the technical potential for renewable energy technologies in B&NES. The technical potential is the amount of renewable energy that would be installed if every possible site were exploited to its maximum, not taking into account factors such as planning decisions, cumulative impact and market conditions. An assessment of the practical potential, that is how much deployment could practically be installed by 2026, was then made. The practical potential was challenging but deemed to be possible to develop by 2026.

Table 3: Practical potential of each technology by 2026 as assessed in Camco 2010 resource assessment

Technology type	MWe	MWth
Onshore wind	44.9	
Roof-mounted PV	76.6	
Hydro	0.3	
Biomass CHP	0.9	3
Biomass heating		67
Solar thermal hot water		49
Geothermal heat		0.1
Heat pumps	-13	47
Total	110	165

This assessment by Regen briefly updates the Camco resource assessment, taking into account whether the practical potential should be revised given:

- a 2036 timeframe
- changes in the current market/political environment
- technology developments.

5.1 Onshore wind

To date only four medium/small scale wind turbines have been deployed in the area, totalling only 100 kW. To date the area has not attracted any large scale wind planning applications; there are no failed or current planning applications for onshore wind in the BEIS Renewable Energy Planning Database (projects over 1MW).

The technical resource assessment for onshore wind in the Camco study does not need updating; it remains an accurate assessment of the potential for onshore wind in the area.

[11] Camco (2010) *Renewable Energy and Planning Research Update* http://www.bathnes.gov.uk/sites/default/files/sitedocuments/Planning-and-Building-Control/Planning-Policy/Evidence-Base/Sustainability/renewable_energy_and_planning_research_-_november_2010.pdf

The June 2015 Written Ministerial Statement on wind sets out a requirement for wind applications to only be approved where "*the development site is in an area identified as suitable for wind energy development in a local or neighbourhood plan*", and where the scheme has local community backing[12]. In 2018, the WMS was transferred into the revised National Planning Policy Framework, clarifying its status.

This policy (together with subsidy cuts) has reduced new wind development across England to almost zero and could be argued to reduce the practical potential of wind deployment in the area.

However, the WMS is not an absolute block on the development of onshore wind, though it does pose an additional policy obstacle. The pratical resource potential for 2036 should not be revised downwards as a result of this policy, for the following reasons:

- The WMS could be revoked at any stage by the current or future governments without the need for legislation.
- B&NES Council is consulting on an option in the Local Plan to allocate areas for wind, which would then meet the requirement of the WMS and potentially attract development. Hull City Council have successfully included wind allocations in their Local Plan, which has been approved by the Planning Inspector.
- B&NES Council already have the necessary GIS analysis in the Camco report to identify suitable areas for wind. Identifying areas in local policy would send a positive message to developers and community groups about wind in the area. The Written Ministerial Statement's requirement is not limited to large scale wind; it is aimed at all scales of turbine (with the exception of re-powers). Therefore, any identification of suitable areas should consider areas for small scale turbines as well as larger scale turbines.

5.2 Solar PV

5.2.1 Update to ground-mounted solar resource assessment

Camco's assessment did not include an assessment of the potential for ground-mounted solar, as this type of installation was yet to take off in the UK. In 2010, ground-mounted solar farms became economically viable in the UK, thanks to falling prices and the availability of subsidies. A wave of installations followed, including three projects in Bath & North East Somerset. Since 2017, development slowed dramatically due to the government's withdrawal of the FiT and the Renewables Obligation from large scale solar projects. However, PV prices have now fallen to the extent that ground-mounted solar is likely to be viable without subsidy within the medium term.

Regen used its in-house methodology to assess the technical and practical resource potential in the area for ground-mounted solar PV. The methodology is set out in Appendix A.

The results are shown in

[12] http://www.publications.parliament.uk/pa/cm201516/cmhansrd/cm150618/wmstext/150618m0001.htm

Table 4. The middle estimate has been taken as the practical potential that could be achieved by 2036.

Table 4: Results of ground-mounted solar PV resource assessment for B&NES area

	Capacity (MW)	Generation (MWh)	Carbon saving (tonnes)
Upper estimate (2.5 percent unconstrained area)	109.3	114,940	53,124
Middle estimate (1.5 percent unconstrained area)	65.6	68,964	31,874
Lower estimate (0.75 percent unconstrained area)	32.8	34,482	15,937

5.2.2 Roof-mounted solar PV

Current roof-mounted capacity in B&NES is 10.6 MW, with an estimated 3% of homes having PV totalling 8 MW of domestic capacity and around 81 roof-mounted commercial and industrial projects, totalling 2.5 MW of capacity. The Camco assessment set a practical potential for 2026 of 76.6 MW. It assumed that 50 percent of new homes would have solar PV installed, resulting in 26.35 MW of solar on new homes by 2026. The CAMCO estimate also included an additional 37.5 MW on existing domestic properties (equivalent to 2 kW on 25% of homes), 7.9 MW on commercial properties and 12.7 MW on industrial properties.

Regen's assessment is that 76.6 MW remains a practical potential for roof-mounted PV in the area for 2036 due to a number of factors:

- There has been a slowdown in the deployment of PV from 2015 to 2018. However, falling costs, technology improvement and the development of smart systems integrating solar PV, electric vehicle charging, heat pumps and battery storage are likely to lead to high uptake in the late 2020s and early 2030s.
- The capacity used by Camco was 2 kW for a domestic system. In B&NES to date, the average capacity for a domestic system is 3.6 kW. Deployment could therefore meet the target without needing to be on 25% of domestic roofs. Mid Devon, one of the leading areas in the UK for rooftop solar, has already exceeded 10% of domestic roofs with solar, thanks to a sustained programme of investment on social housing.
- Similarly, the Camco study assumed a capacity of 5 kW for a non-domestic system. In B&NES to date the average capacity is 32 kW for a roof-mounted non-domestic system. The target could be met with fewer larger non-domestic systems.
- Changes to Part L and the introduction of low carbon homes requirements (whether through a local policy or nationally in 2030) are likely to lead to more than 50% of new build homes installing PV to comply with decarbonisation requirements. There are 14,500 new homes planned by 2036 in the area in the proposed Joint Spatial Plan. This is an increase of around 2,700 against the previous 2026 target, increasing the availability of new roof space for solar PV.

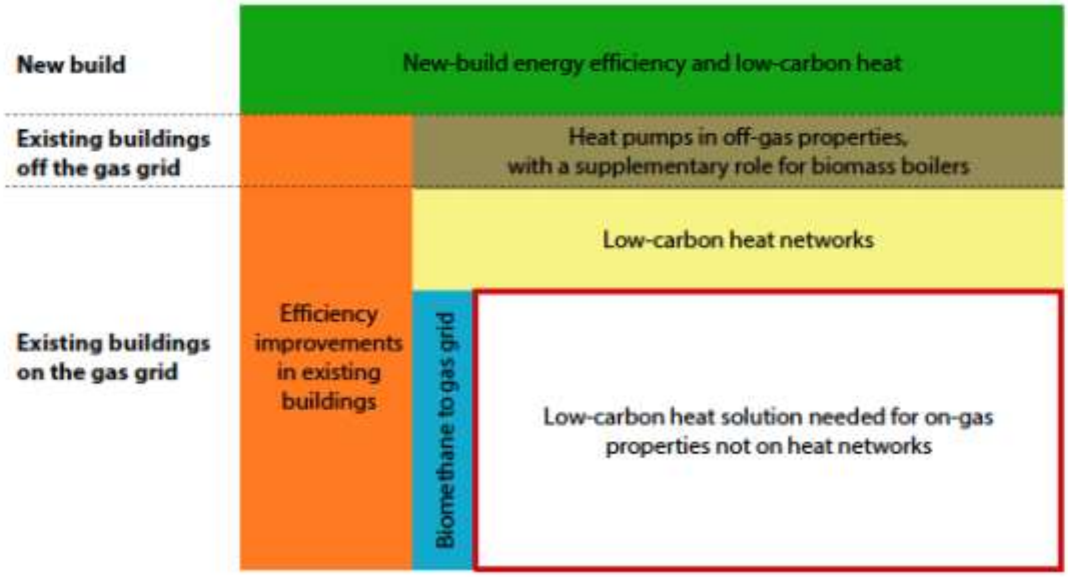
5.3 Renewable heat

5.3.1 Uncertainty over how to decarbonise heat

A full update of the practical potential for renewable heat technologies has not been completed. At present there is no nationally agreed route to achieving the decarbonisation of the UK's heat demand. The government issued a call for evidence on the decarbonistion of heat in early 2018[13] but is yet to publish an update to its 2013 "The future of heating" strategy[14].

Figure 4 sets out the low regrets measures that Imperial College have identified to achieve heat decarbonisation and highlights the scale of the remaining challenge for on-gas properties not suitable for heat networks.

Figure 4: Imperial college analysis of heat decarbonisation



Source: Imperial College London for IPCC (2018) *Analysis of alternative UK heat decarbonisation pathways*

5.3.2 Review of assumptions used in Camco resource assessment

Given this uncertainty over the national strategy, Regen has undertaken a headline only review of Camco's original resource assessment. The assessment found the assumptions to be reasonable for the 2036 total practical potential.

Camco's analysis of the practical potential for renewable heat in B&NES has the following criteria sitting behind the MW totals for each technology:

- Biomass heating – 8% on existing stock, remainder (unspecified percentage) on new development

[13] BEIS (2018) *Future framework for heat in buildings, Call for Evidence* https://beisgovuk.citizenspace.com/heat/future-framework-heat-in-buildings/supporting_documents/Future%20framework%20for%20heat%20in%20buildings%20call%20for%20evidence.pdf
[14] DECC (2013) *The Future of Heating: meeting the challenge* https://www.gov.uk/government/publications/the-future-of-heating-meeting-the-challenge

- Heat pumps – 10% on existing stock, around 10% on new stock
- Solar thermal – 35% on existing stock, 30 to 40% on new development
- Biomass CHP – 3 MWth assumed to be supplying a small number of new development heat networks

Assuming that solar thermal is an additional technology (i.e. it may be installed alongside biomass boilers or heat pumps), it can be estimated that to achieve the renewable heat target around 18% of existing and new domestic households have either a biomass boiler or heat pump. The proportion of biomas boilers versus heat pumps is relatively unimportant, as the final technology mix is not specified in the target. In addition, 2018 evidence from Element Energy and E4Tech for the National Infrastructure Comission found that there was little variation between the cost of different heat decarbonisation pathways[15].

The figure of 18% of homes with a freestanding renewable heat installation is in line with recent analysis by Regen with the Institute of Welsh Affairs for the Swansea Bay City Region[16]. The analysis modelled a stretching but achieveable target for 2035 of a 40% reduction in carbon emissions from heat in the area against 2017. It estimated around 14% of homes could use a heat pump and for remaining carbon savings to be met through a mixture of decarbonising the gas network; biomass in off-gas properties and district heat networks. Similarly, recent work by Regen applying National Grid's Future Energy Scenarios to the Western Power Distribution south west licence area estimated that under a high growth scenario, 12.2 % of south west homes could use a heat pump by 2032[17].

5.3.3 Increased renewable heat potential from new build

Recent work by Currie & Brown to evidence zero carbon requirements in the West of England's Joint Spatial Plan shows that revisions to the grid electricity emission factors published in SAP10 mean that air source heat pumps now achieve around a third of the emissions per unit of heat output compared to a highly efficient gas boiler[18]. Currie & Brown's evidence shows that housing developers looking to meet onsite carbon reduction requirements are likely to install heat pumps, rather than using either a heat network or connecting to the gas network. As a result, it can be assumed that a high proportion of the area's 14,500 new homes by 2036 could include heat pumps, making a potentially signficant contribution to the renewable heat target.

In addition a number of heat network priority areas are identified in the Core Strategy. If a heat network were to be developed in one of these areas, it would make a significant contribution to the renewable heat target. Large scale district heat networks tend to have installed peak capacities around 25 MWth.

---

[15] Element Energy and E4Tech for National Infrastructure Commission (2018), *Cost analysis of future heat infrastructure options*, https://www.nic.org.uk/wp-content/uploads/Element-Energy-and-E4techCost-analysis-of-future-heat-infrastructure-Final.pdf

[16] Regen with the Institute of Welsh Affairs (2018) *Swansea Bay City Region : A Renewable Energy Future Energy system vision for 2035* https://www.regen.co.uk/wp-content/uploads/Swansea-Bay-City-Region-A-Renewable-Future-report-Final-v1.pdf

[17] Regen for Western Power Distribution (2018) *Distribution Future Energy Scenarios: A generation and demand study, Technology growth scenarios to 2032*, https://www.regen.co.uk/wp-content/uploads/Distributed-generation-demand-and-storage-study-South-West-2018.pdf

[18] Currie & Brown (2018) *Cost of carbon reductions in new buildings (Published as part of evidence base for the B&NES Local Plan Preferred Options Consultation)*

5.3.4 Achieving the renewable heat target will require significant local effort, as well as clarity on the national strategy

However, achieving the area's 2036 renewable heat target will be stretching and will require significant local drive. As well as carbon reduction policies for new developments, there will need to be a sustained programme to encourage uptake of renewable heat technologies in existing stock, something made more difficult by the heritage status of many of the area's buildings.

Ideally, B&NES Council should commission its own low/zero carbon heat study, as Bristol City Council has, to understand the appropriate technologies for the area to achieve its decarbonisation aims and use the results to reassess its reneawble heat target.

5.4 Summary of 2036 potential resource assessment

Table 5

For renewable heat, biomass boilers, heat pumps and solar thermal hot water have been grouped together into the category building integrated heating and hot water. This reflects the fact that the choice between technologies is not important for the target. shows the revised practical potential for 2036. The ground-mounted solar potential is a new figure based on Regen's analysis above. The negative impact of heat pumps on the renewable electricity potential has been removed; previously -14 MW were included to account for the electricity used by heat pumps. With the decarbonisation of the grid, the impact of electrifying heat supply will be lower. When measuring progress against the target, it does not seem reasonable to remove installed renewable electricity capacity to account for heat pump installations.

For renewable heat, biomass boilers, heat pumps and solar thermal hot water have been grouped together into the category building integrated heating and hot water. This reflects the fact that the choice between technologies is not important for the target.

Table 5: Updated 2036 practical potential including ground-mounted solar

	Mwe	MWth
Wind	44.9	
Roof-mounted solar	76.6	
Ground-mounted solar	65.6	
Hydro	0.3	
Biomass CHP	1.6	3
Building integrated heating and hot water		163
Geothermal		0.1
Total	189	166.1

For renewable heat, biomass boilers, heat pumps and solar thermal hot water have been grouped together into the category building integrated heating and hot water. This reflects the fact that the choice between technologies is not important for the target. shows that there is adequate practical potential for both renewable heat and electricity technologies to meet the 110 MWe and 165 MWth targets. The additon of the ground-mounted solar resource means that there is now more flexibility about how the renewable electricity target is delivered, with a lower need to deliver onshore wind in the area. Achieving the renewable heat potential would mean maximising the delivery of the estimated practical potential.

However, it should be remembered that “practical potential” is an artificial construct setting out a prediction of what could reasonably be delivered by 2036. In reality, the actual technical resource is far higher; the practical potential limits delivery of renewables based on the local level of ambition, planning considerations and market constraints. For example, all of the area’s heat demand could realistically be delivered from renewable sources if there was sufficient local ambition and funding.

6. Recommendations

6.1 Keep the renewable energy targets in the Local Plan

Given that there is adequate practical potential to meet both the renewable electricity and renewable heat targets, they should be kept in place and not revised downwards. The Council remains committed to decarbonising energy production in the area and a stretching target for B&NES is useful to show the area's ambition for renewable energy. By including this ambitious target in planning policy, it helps to send a signal to renewable energy developers and community energy groups that the area is a positive planning environment for renewables, encouraging them to develop projects in the locality. It also sends a useful signal to planning officers, councillors and, if necessary, planning inspectors to consider renewable energy applications in light of their contribution to the local target.

6.2 Roll the target date forward to 2036

Since only limited progress has been made towards the 2026 target and given the current hiatus in deployment, it seems highly likely that the 2026 target will be missed. However, the renewables market in the UK is expected to grow again in the early to mid-2020s due to the factors discussed above. It, therefore, seems reasonable to move the target date to be in line with the new Local Plan, 2036. In order to keep the target in line with growth in the market, it should be reviewed every five years (in line with the planning cycle) against deployment and expected market trends and adjusted as necessary.

6.3 Support the delivery of the targets

If the targets are to be achieved, there is a need for movement in the national renewables markets as described in this report. However, more importantly facilitative action in the local area is needed to ensure that when the predicted national renewables market takes off, deployment takes place in the B&NES area. B&NES is typically viewed as a more difficult area to deploy renewable energy, given the World Heritage Status of Bath and the large proportion of the area that is covered by landscape designations and green belt.

The Council has already taken a number of measures to support deployment, such as the guidance note on renewables in the Green Belt, the Sustainable Construction Checklsist Supplementary Planning Document and the Sustainable Construction and Retrofitting Supplementary Planning Document which includes an annex on on retrofitting Bath's heritage stock[19]. Of key importance to achieving the target going forwards, B&NES Council is considering/should consider:

- Allocating areas for the development of onshore wind in the Local Plan
- Zero carbon development requirements in the Joint Spatial Plan
- Continuing to work with and support Bath & West Community Energy and other community energy organisations to deploy projects
- Developing a low carbon heat strategy for the area
- Developing a local development order for ground-mounted solar

[19] These documents can be found on this page: http://www.bathnes.gov.uk/services/planning-and-building-control/planning-policy/supplementary-planning-documents-spds/sustain

7. Appendix A: Solar resource assessment

The technical and practical potential for ground-mounted solar in the B&NES area were assessed using GIS. The method used was developed by Regen through discussion with solar developers and grid operators and has been used for resource assessments across the south west and beyond.

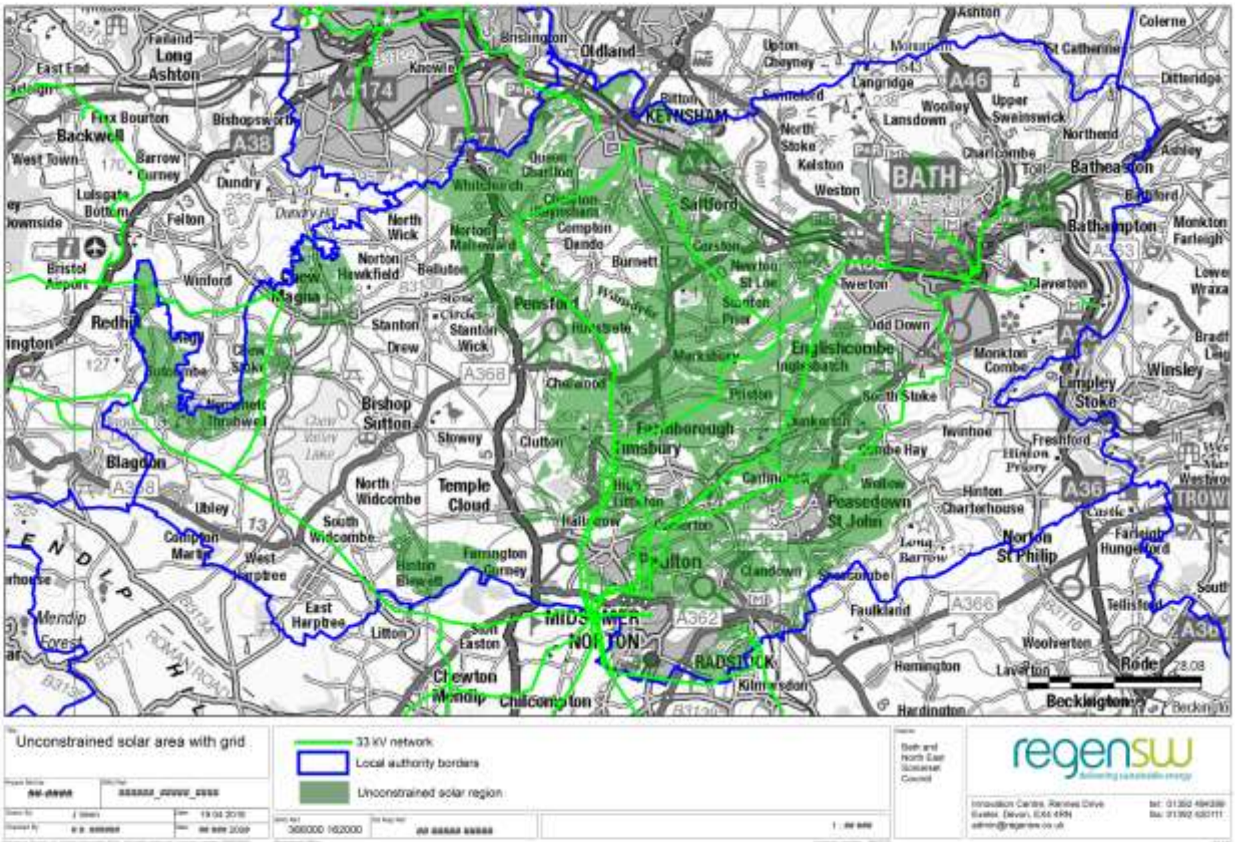
7.1 Calculating the unconstrained area

The following constraints were applied to the B&NES area:

- Grid access is one of the main constraints for solar development. To be economic, most projects are within 1.5 km of the grid. Areas that are more than 2 km from the 33 kV grid were excluded.
- Environmental constraints, such as excluding the Mendip Hills AONB and agricultural land above grade 3b.
- Technical and human constraints such as a 50m buffer to housing and the exclusion of other infrastructure such as roads and railways.

Topography has not been considered in assessing the unconstrained area.

Map 1: Area of B&NES unconstrained for ground-mounted solar



The unconstrained area in B&NES for solar development is focussed on a central strip that correlates with the 33 kV network lines.

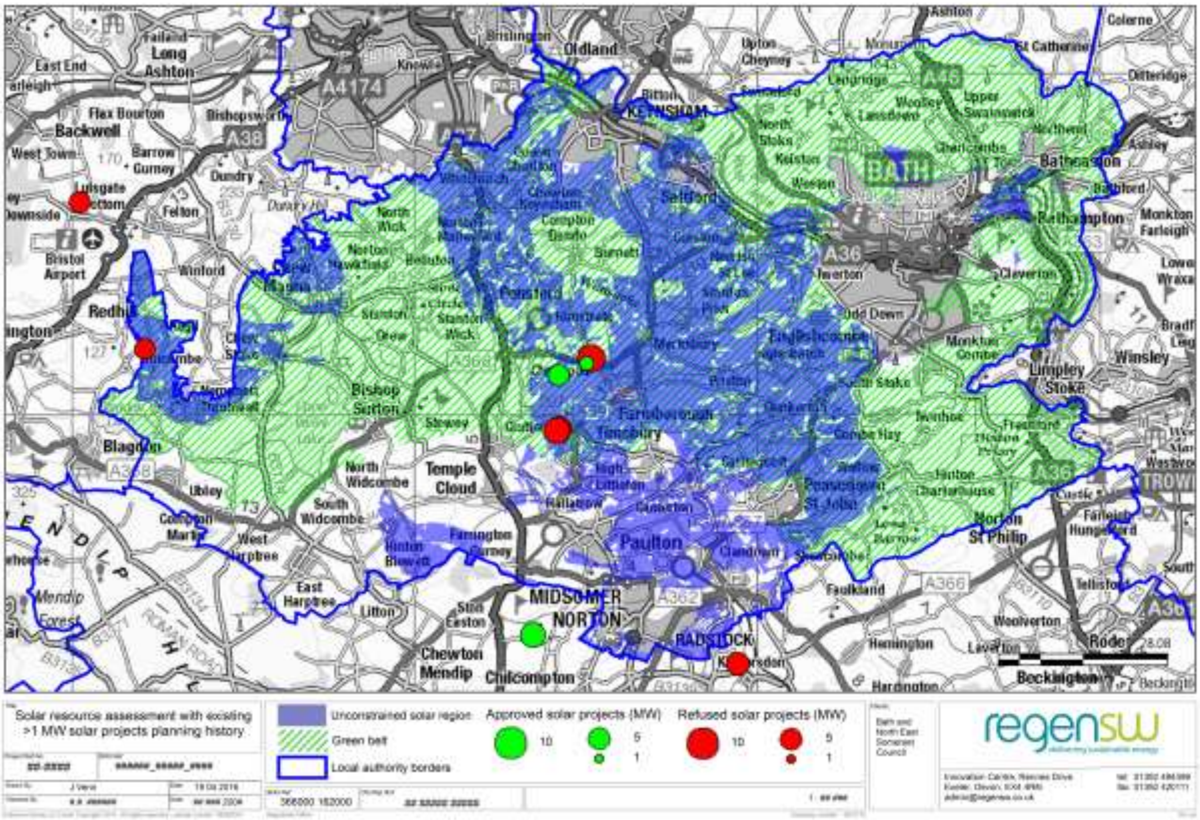
The unconstrained area is not definitive; it is possible that sites could come forward outside of this area. However, this method is the most accurate one available to give an indication of the area within B&NES in which it is possible to build large scale ground-mounted solar. In other areas where Regen has undertaken this same assessment and where there are higher levels of current installed solar, 95 percent of installed solar farms were found to be within the area shown as unconstrained.

7.2 Consideration of the Green Belt

The Green Belt covers 70 percent of the local authority area and the remaining 30 percent is largely unsuitable for large scale solar due to being urban areas or not having access to the electricity grid.

As shown by Map 2, all applications to date for solar farms in the area have been within the Green Belt. Of these, there are currently two large scale solar projects that have been approved - a 2.3 MW and a 5 MW project[20].

Map 2: Green belt and current ground-mounted solar PV applications (all scales)



The Council produced informal guidance on developing renewable energy in the Green Belt with

[20] This analysis was carried out in 2016 and has not been updated. Only 3 of the solar farms with planning permission have been built to date in the area, but the location of approved sites still demonstrates the point made here.

support from Regen[21]. The guidance sets out what "very special circumstances" and other conditions need to be in place to enable renewable energy projects to be approved within the Green Belt, in line with the National Planning Policy Framework. As a result, this assessment assumes that there is resource potential for ground-mounted solar farms within the Green Belt, assuming that they are well sited within the landscape and do not lead to a significant cumulative impact.

7.3 Impact of network constraints

Network constraints are currently having an impact on the viability of solar farms across the UK, with costly grid upgrades or alternative connections needed in many areas to enable projects to afford to connect to the network. However, current constraints in B&NES are limited.

Map 3: Extracted from WPD's network capacity map, showing network constraints in B&NES[22]

Network constraints can change over time as new demand and generation connect to the network. Upgrades and alternative management options can overcome network constraints. The government is currently consulting on changes to the network charging regime that will affect how necessary upgrades are paid for. This assessment does not consider the impact of network constraints on solar deployment, but recognises they could have a limiting effect if deployment increases.

[21] http://www.bathnes.gov.uk/sites/default/files/sitedocuments/Planning-and-Building-Control/Planning-Policy/Sustainable-and-Retrofitting/regb_advice_note_april_2013.pdf

[22] WPD Network Capacity Map, https://www.westernpower.co.uk/network-capacity-map

7.4 Estimating the potential for ground-mounted solar PV within the unconstrained area

There are currently 3 solar farms in B&NES totalling 7.6 MW. These sites cover approximately 46 acres, equating to approximately 0.05 percent of the total land area of B&NES or 0.17 percent of the calculated unconstrained area.

The total area of B&NES is 86,534 acres or 350 km^2. The estimated unconstrained area is 30 percent of the total area – 26,242 acres or 106.2 km^2. It is assumed that 40 percent of that area would have suitable topography to host a solar farm, totalling 10,497 acres or 42.5 km^2. This figure is based on analysis developed by Regen about the percentage of land without obstacles and with the right orientation and topography to host a solar farm.

As the best performing local authority for solar in the UK, Cornwall is a good benchmark to calculate a stretching figure for the potential for solar in B&NES. Around 1.5 percent of Cornwall's unconstrained area is occupied by solar farms[23]. This is equivalent to 0.6 percent of Cornwall's total area. Including current installed projects and planned projects in the pipeline, solar could occupy up to 2.5 percent of Cornwall's unconstrained area at present.

This figure - 2.5 percent of the unconstrained area – is used to calculate an upper potential for solar in B&NES by 2036. The rationale is that Cornwall is an area with an encouraging planning environment for solar with good infrastructure. For B&NES to achieve a similar level of deployment to Cornwall's current level would be stretching, based on its low historic installation rates. However, 2.5 percent of the unconstrained area could be exceeded in the future.

If 2.5 percent of B&NES's unconstrained area is occupied by solar (equivalent to 0.76 percent of all of B&NES), there could be approximately 109 MW of solar. This is equivalent to 20 additional medium scale solar farms (5-6 MW), or two large scale 25 MW farms and 10 medium scale farms.

A middle estimate and a lower figure have also been produced in the table below. The middle figure is an estimate for if 1.5 % of the unconstrained area were to be developed. This is equivalent to the current level of development in Cornwall's unconstrained area. This middle estimate is used as an estimate of the practical potential in B&NEs in 2036 (66 MW).

The lower limit is half of this figure. The resulting resource potential figures are summarised in

[23] This analysis was undertaken in 2016 and has not been updated. It is still deemed to be a valid approach.

Table 6. Figures for energy generation and carbon savings for each estimate have been calculated and are presented in Table 7.

Table 6: Calculations for ground-mounted solar potential

	Area		Estimated capacity
	Sq km	acres	MW
Current solar (estimate)	0.2	43.80	7
Total area of B&NES	350.2	86,534	N/A
Total area of unconstrained area	106.2	26,242	N/A
Accounting for slope of land	42.5	10,497	N/A
Upper estimate (2.5 percent unconstrained area)	2.7	656	109
Middle estimate (1.5 percent unconstrained area)	1.6	394	66
Lower estimate (0.75 percent unconstrained area)	0.8	197	32.8

Table 7: Energy generation potential and carbon savings from potential ground-mounted solar

	Capacity (MW)	Generation (MWh)	Carbon saving (tonnes)
Upper estimate (2.5 percent unconstrained area)	109.3	114,940	53,124
Middle estimate (1.5 percent unconstrained area)	65.6	68,964	31,874
Lower estimate (0.75 percent unconstrained area)	32.8	34,482	15,937