ANGLESEY & GWYNEDD JLDP (2011 – 2026)	
PUBLIC EXAMINATION: **Hearing Session 8 –** **RENEWABLE ENERGY**	

1. Action Point 1 (S8/PG1) – Table 13 Wind Turbine Typology

Introduce a Matters Arising Change to clarify that the typology is based on the height of the turbine and not its indicative output.

2. Councils' Response

2.1 Agree to undertake the changes to clarify that the typology is base don the height or scale of the development rather than the indicative output. See Appendix 2 for the suggested amendment shown as a Matters Arising Changes to the Plan.

3. Action Point 2 (S8/PG2) – 7.2.24

Introduce a Matters Arising Change to describe the figure for the area's heat and energy demands, and identify what percentage could be set as a target to be met by renewable energy technologies under the Plan's policies.

4. Councils' Response

4.1 The Councils commissioned work to update information about the Potential Opportunities of Renewable Energy within the Plan area. A copy of the report by ARUP and an associated addendum is included in Appendix 1 to this paper.

4.2 This work considers a number of factors related to different renewable energy technologies (see section 4.2 of the report) in order to create 3 different potential growth level which is:

- High – set out the total possible resources that are available;
- Medium – realistic situation based on existing constraints;

- Low – considers further deterioration in the commitment to renewable energy.

4.3 Tables 19 and 20 within the ARUP report sets out the possible opportunities for electricity and heat. In Appendix 2 to this paper, the tables presented for a summary of the Contribution of Renewable Electricity and Heat combine the sub-categories within the ARUP report and sets out the expected level for opportunities within the Plan area. The opportunities within these tables are on the basis of a Medium figure in the ARUP report.

4.4 Out of the Gwynedd (County) total population 16.5% live within Snowdonia National Park. This equates to 10.4% of the total population in Gwynedd and Isle of Anglesey area. On the basis that the identified Orthios scheme is located on Anglesey, and there are limited opportunities from Tidal due to the environmental designations by the National Park coastline, the identified level of opportunities from these sub-categories should all be counted for the Plan area. For the other categories the figures contained within tables 19 and 20 should be reduced by 10.4% to take into account the proportion of the projected demand and opportunities that may lie within the Snowdonia National Park planning authority area. In addition the same reduced level for the projected demand has been used.

4.5 In light of this, it is considered that the proportion of the Plan area's energy that can be addressed through renewable energy technology is:

- 271% of the electricity requirement;
- 8.1% of the heat requirements.

4.5 See Appendix 2 for the relevant changes proposed as Matters Arising Changes to the Plan.

5. Action Point 3 (S8/PG3) – Policy ADN 1

Introduce a Matters Arising Change to the Policy as follows:

- **Criteria 2 and 3 - The reference towards setting should be changed to refer to not causing harm to the setting.**
- **Criterion (i) – there is no need to refer to aspects such as number, scale, size, design and siting.**
- **Criterion (ii)– need to be clearer about what type of harm is unacceptable, differentiating between statutory and non-statutory biodiversity, and there is no need to refer to specific types of species in the policy, i.e. bats and birds.**

- **Criterion (vi) - delete the wording "those implemented" to avoid repetition within the policy.**
- **Criterion (vii) – change the criterion to confirm that the restoration and after-care work will be implemented in accordance with a land restoration and after-care plan that will have been agreed upon beforehand and is subject to an appropriate enforcement mechanism.**
- **Amend the final sentence to reflect the required Change that will be following S8/PG1 above.**

6. Councils' Response

6.1 The Councils agree with the changes to Policy ADN 1. See Appendix 2 which highlight these changes as Matters Arising Changes to the Plan.

7. Action Point 4 (S8/PG4) – paragraph 7.2.34

Introduce a Matters Arising Change to omit the reference to "negotiate community benefits" in its current form so as to avoid any misunderstanding

8. Councils' Response

8.1 The Councils agree with the changes to paragraph 7.2.34. See Appendix 2 which highlight these changes as Matters Arising Changes to the Plan.

9. Action Point 5 (S8/PG5) – Policy ADN 1A

Introduce a Matters Arising Change subject to the works associated with:
- **Revision of the policy on possible sites in light of the fact that the Welsh Government's toolkits refers to developments of 5MW and over.**
- **A number of criteria in this policy are similar to the criteria of policy ADN1 - therefore the matters in action point S8/PG2 above are relevant to this policy.**
- **Delete paragraphs 7.2.38C to 7.2.38H**

10. Councils' Response

10.1 Work was commissioned by the Unit on behalf of the Councils to undertake an Assessment of the Potential for Solar PV Farms in Gwynedd and Anglesey (DA.020b). This work was base don Planning for renewable and low carbon energy – manual for Planners by the Welsh Government (2015

10.2 Within project sheet K for solar PV farms in the Manual (September 2015), reference is made in step 1 to sites of more than 3 acres. Additionally, step 5 refers to using a cut off of 0.5 Mw (i.e. 3 acres/ 1.2 Ha) as any site below this threshold isn't viable. It was therefore considered that there was a need to

assess the potential for solar farm development within the Plan area of more than 0.5 Mw.

10.3 It is noted that part P3 of the Manual (September 2015) refers to local authority scale development, which is between 5 and 50 MW for PV solar farms. In light of this and to align with step 5 of project sheet K in order to achieve a minimum of 5MW sites must then be at least 12Ha in size. An addendum to the Potential for Solar PV Farms in the Plan area was prepared by LUC (see copy in Appendix 5).

10.4 The original work identified 36 potential sites for solar PV farms of 0.5 MW or more. This work was recorded in the Councils' statement to Hearing 8 of the Examination. By using the revised threshold of 12Ha and evaluating the current grid capacity and landscape sensitivity of these potential areas 25 of these potential sites would be removed from the list, leaving 11 potential site (9 areas with current grid capacity constraints and 2 with higher landscape sensitivity in relation to 5MW + schemes). Despite these potential 'constraints' the Councils consider it appropriate to refer to them in the Plan in order to try to guide development at the outset to the more appropriate locations within the Plan area. In terms of the potential areas in the proposed Schedule with grid Infrastructure constraints, the situation may change during the Plan period. In terms of the areas with higher landscape sensitivity, the Landscape Sensitivity and Capacity Study (DC.020) identifies an area where there is capacity for small solar PV typology (up to 2.5 MW) or medium ones (up to 5MW). Therefore, based on the size of these areas there could be potential to locate a number of small or medium scale solar farms in them, subject to an assessment of the cumulative visual effect. See Appendix 3 for Matters Arising Changes to Inset Maps for these sites.

10.5 The criteria within Policy ADN1A have been reviewed in accordance with the issues in action point S8/PG2 above, which are also relevant to this policy, and it is agreed that paragraphs 7.2.38C i 7.2.38H should be removed. See Appendix 2 for a copy of Matters Arising Changes that are relevant to Policy ADN1A.

11. Action Point 6 (S8/PG6) – Polisi ADN 1

Introduce a Matters Arising Change to differentiate within the policy between dealing with a development within a national landscape designation compared to a local designation from the perspective of the level of protection.

12. Councils' Response

12.1 The Councils agree with these changes to Policy ADN1. See Appendix 2, which shows these changes as Matters Arising Changes to the Plan.

13. Action Point 7 (S8/PG7) – Policy ADN 2

Introduce a Matters Arising Change in order to provide a more positive framework, in accordance with Policy PS7.

14. Councils' Response

14.1 The Councils agree with these changes to Policy ADN2. See Appendix 2, which shows these changes as Matters Arising Changes to the Plan.

15. Action Point 8 (S8/PG8) – Policy PCYFF 4

Introduce a Matters Arising Change to ensure that it set a more definite direction for developers in relation to the requirements when submitting a planning application.

16. Councils' Response

16.1 The Councils agree with these changes to Policy PCYFF 4. See Appendix 4, which shows these changes as Matters Arising Changes to the Plan.

APPENDIX 1 – Update Potential Renewable Energy Opportunities

Gwynedd and Anglesey Joint Planning Policy Unit

Renewable energy opportunities

Informing renewable energy targets

252149-00

Issue | 28 November 2016

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1 Introduction

1.1 Overview

Ove Arup and Partners Ltd (Arup) was commissioned by Gwynedd Council and Isle of Anglesey County Council's Joint Planning Policy Unit to provide an overview of energy demand and potential renewable energy supply opportunities across Gwynedd and the Isle of Anglesey. This report was completed in October/November 2016 and is intended to support the Anglesey and Gwynedd Joint Local Development Plan.

The Plan area excludes the area covered by Snowdonia National Park. However, given that data is available at a local authority level, for simplicity, our approach covers the whole of the two Counties.

1.2 Background

In 2012, Arup was commissioned by Gwynedd Council, on behalf of Gwynedd Werdd to scope the renewable energy opportunities for Gwynedd. This included a review of existing energy demand and existing installed renewable energy and an assessment of the technically available renewable resource across the County. In 2013, Arup was commissioned by Isle of Anglesey County Council to carry out a similar assessment.

Both studies used the Welsh Government Practice Guidance: *Planning for Renewable and Low Carbon Energy – A Toolkit for Planners* (June 2010). In addition, where appropriate it also used DECC/SQW Energy Guidance, *Renewable and Low-carbon Energy Capacity Methodology: Methodology for the English Regions* (Jan 2010)[1].

Further work was carried out directly by the Joint Planning Policy Unit to consider the landscape impacts of wind clusters identified by these assessments[2].

The Welsh Government Practice Guidance (referred to hereon in as the Welsh Government Toolkit 2015) was updated in 2015 to include a new section to assess the potential for solar farm developments[3]. LUC and Carbon Smart undertook this assessment for Gwynedd and Anglesey in July 2016[4].

[1] Available at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/226175/renewable_and_low_carbon_energy_capacity_methodology_jan2010.pdf. Whilst this was written as guidance for English Regions, some of the methodology was transferrable at a local scale and was applicable in Wales

[2] Appendix A – *Potential Areas of Search for Wind Farm Developments,* July 2016 https://www.gwynedd.llyw.cymru/en/Council/Documents---Council/Strategies-and-policies/Environment-and-planning/Planning-policy/Examination-Documents/DA020a.pdf

[3] Welsh Government, *Planning for Renewable and Low Carbon Energy - A Toolkit for Planners,* September 2015 http://gov.wales/docs/desh/publications/151021renewable-energy-toolkit-en.pdf

[4] LUC, in association with Carbon Smart, *Assessment of the potential for solar PV farms in Gwynedd and Ynys Môn*, July 2016

Gwynedd and Anglesey have reached the Public Examination stage for the Joint Local Development Plan (JLDP). One Action Point from the Examination is in relation to Renewable Energy and setting targets as can be seen below:

Action Point S8/PG2 - Introduce a Matters Arising Change to describe the figure for the area's heat and energy demands, and identify what percentage could be set as a target to be met by renewable energy technologies under the Plan's policies.

This report is intended to directly respond to this Action Point by developing possible targets for renewable energy across the two Counties.

1.3 Method

Existing reports have been used to provide data wherever possible. However, given the time elapsed since the 2012 and 2013 reports, baseline data has been updated where appropriate. The guidance set out in the Welsh Government Toolkit 2015 was followed, and all of the existing evidence brought together.

The remainder of this report is structured as follows:

- **Section 2** provides the **legislation and policy context**. This has been updated since the 2012/13 reports.
- **Section 3** sets out the **energy supply and demand baseline**; addressing the most recent energy demand and renewable energy supplied within the two counties, as well as demand projected to 2026 in line with the JLDP. This has been updated since the 2012/13 reports.
- **Section 4** sets out the **renewable resource potential;** this is based on the four previous studies set out in section 1.2 above.
- **Section 5** explores the **factors affecting deployment potential.**
- **Section 6** moves **towards renewable energy targets** for Gwynedd and Anglesey; providing **conclusions** to the study.

https://www.gwynedd.llyw.cymru/en/Council/Documents---Council/Strategies-and-policies/Environment-and-planning/Planning-policy/Examination-Documents/DA020b.pdf

2 Legislation and policy context

2.1 Overview

Whilst some of the legislation and policy context remains the same since 2012/13, new legislation and policy in Wales in particular, has strengthened the requirements on local planning authorities with respect to renewable energy. For completeness, a review of policy since 2008 is set out below, structured from international to local policy:

EU Renewable Energy Directive (2009)

Wales, as part of the UK, is subject to the requirements of the EU Renewables Energy Directive[5], including a UK target of 15% of energy generation from renewables by 2020.

Climate Change Act (2008)

The Climate Change Act 2008[6] received Royal Assent on 26th November 2008. Wales is a partner in the delivery of the UK emissions reduction target set out in the Act.

The Act established a UK-first legally-binding framework for tackling climate change. Legally-binding requirements for the UK to reduce carbon dioxide emissions by at least 80% by 2050 (relative to 1990 levels). Renewable energy was identified as a key component in the response to reducing carbon emissions and the fight against climate change.

The Planning and Energy Act (2008)

The Planning and Energy Act 2008[7] received Royal Assent on 13th November 2008. The Act provides a mechanism local planning authorities in Wales and England to set requirements for energy use and energy efficiency in their development plans.

Relating to renewable energy, Article 1 (1) of the Act states that a local planning authority in Wales may in their Local Development Plan (LDP) impose reasonable requirements for renewable energy, including:

- A proportion of energy used in development in their area to be energy from renewable sources in the locality of the development; and
- A proportion of energy used in development in their area to be low carbon energy from sources in the locality of the development.

[5] Directive 2009/28/EC of the European Parliament and of the Council on 23 April 2009 on the promotion of the use of energy from renewable resources and amending and subsequently repealing Directives 2001/77/EX (European Parliament, 2009) Available at: http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:32009L0028 (Accessed 18/10/2016)
[6] Climate Change Act 2008
[7] Planning and Energy Act 2008

UK Renewable Energy Road Map (2013)

The UK Renewable Energy Road Map establishes a plan to expedite renewable energy development to enable the UK to meet its 2020 target, whilst reducing the costs of renewable energy development over time through financial support mechanisms. All four UK Governments, including Wales, signed up to the Road map in July 2011. An annual monitoring report of the Road Map is published, which states that the UK is on course to meet the target of sourcing 15% of all energy from renewable sources by 2017.

Well-being of Future Generations (Wales) Act 2015

The Well-being of Future Generations (Wales) Act 2015[8] places a duty on public bodies (including local authorities) to carry out sustainable development. The Act establishes seven well-being goals to ensure that public bodies work towards one vision of a sustainable Wales:

- A globally responsible Wales;
- A prosperous Wales;
- A resilient Wales;
- A healthier Wales;
- A more equal Wales;
- A Wales of cohesive communities; and
- A Wales of vibrant culture and thriving Welsh language.

In carrying out the Act's duty to carry out sustainable development, the Act requires for all public bodies to:

- Set and publish well-being objectives designed to maximise a public body's contribution to achieve each of the well-being goals; and
- Take reasonable steps, whilst undertaking its functions, to meet the well-being objectives.

Planning (Wales) Act 2015

The Planning (Wales) Act 2015[9] gained Royal Assent on 6 July 2015. The Act legislates for changes to deliver reform to the planning system in Wales. The Act sets five objectives to achieve a fair and resilient planning system that enables development:

- A modernised framework for the delivery of planning services, including the ability to make certain types of 'nationally significant' applications direct to Welsh Ministers;
- Strengthening the plan-led approach via the introduction of a National Development Framework for land use (to replace the Wales Spatial Plan) and Strategic Development Plans;
- Improved resilience via powers to enable LPA's to work more closely together or even merge;

[8] Well-being of Future Generations (Wales) Act 2015
[9] Planning (Wales) Act 2015

- Improvements to the Development Management process including the introduction of a statutory pre-application procedure for certain applications; and
- Changes to the enforcement and appeals systems.

The Act is supported by secondary legislation, including the Developments of National Significance (Specified Criteria and Prescribed Secondary Consents) (Amendments) (Wales) Regulations 2016[10]. The Regulations require all renewable energy planning applications in Wales between 10MW and 50MW generating capacity to be treated as DNS, and therefore determined by Welsh Ministers.

Environment (Wales) Act 2016

The Environment (Wales) Act 2016[11] received Royal Assent in 2016. The Act legislates for the management of Wales' natural resources in a proactive, sustainable and joined-up way.

The Act provides the Welsh Ministers with powers to put in place statutory emission reduction targets including at least an 80% reduction in emissions by 2050.

Climate Change Strategy for Wales (2010)

The Climate Change Strategy for Wales[12] and associated Delivery Plans on Emission Reduction and Adaptation set out how the Welsh Government intends to limit greenhouse gas emissions and adjust to changes in climate. The Strategy includes an action to ensure that land use and spatial planning promote sustainable development and ensure a move towards a low carbon economy, including a target to achieve an annual 3% emission reduction.

The Strategy identifies key areas which were important to achieving these targets, including maximising energy generation, reducing energy consumption, improving energy efficiency, buildings, and innovation and skills.

Energy Wales: A Low carbon Transition (2012)

Energy Wales: A Low Carbon Transition[13] details the importance of making a transition to a low carbon economy for Wales. The document outlines three key objectives: providing leadership on energy in Wales (including improving the planning and consenting regime to create a 21st Century energy infrastructure), maximising the benefit that energy can deliver (including for communities), and the need to act now for the long term future.

[10] Developments of National Significance (Specified Criteria and Prescribed Secondary Consents) (Wales) (Amendment) Regulations 2016
[11] Environment (Wales) Act 2016
[12] Climate Change Strategy for Wales (Welsh Government, 2010)
[13] Energy Wales: A Low Carbon Transition (Welsh Government, 2012)

Wales Spatial Plan Update (2008 update)

The Wales Spatial Plan[14] (WSP) sets out the broad strategic direction for national planning policy in Wales. The main principle of the WSP is that development should be sustainable, by improving the wellbeing and quality of life in Wales.

Gwynedd and Anglesey are predominantly situated in the North West Wales Eryri a Môn strategy area, with a small part of Gwynedd situated within the Central Wales Area. The WSP states development of renewable energy as a priority for both strategy areas.

The WSP identifies significant opportunities within Wales for both wind and tidal sources of renewable energy.

Planning Policy Wales: Edition 8 (January 2016)

Planning Policy Wales[15] (PPW) sets out the land use planning policies of the Welsh Government. Planning Policy Wales provides advice on a wide range of issues and is supported by a number of Technical Advice Notes (TANs). The Welsh Government is committed to sustainable development and PPW confirms that the planning system provides a presumption in favour of sustainable development to ensure that social, economic and environmental issues are balanced and integrated (Paragraph 4.2.2).

Section 12.8 of PPW affirms the Welsh Government's commitment to use the planning system to:

- Optimise renewable energy generation;
- Optimise low carbon energy generation;
- Facilitate combined heat and power systems (and combined cooling, heat and power) where feasible; and
- Recognise that the benefits of renewable energy are part of the overall commitment to tackle climate change by reducing greenhouse gas emissions as well as increasing energy security.

Section 12.9 of PPW requires local planning authorities to plan positively (in Local Development Plans) for all forms of renewable and low carbon energy development using an up to date and appropriate evidence base.

Paragraph 12.9.3 states that local planning authorities should establish an evidence base which:

- Takes into account the contribution that can be made by their local area towards carbon emission reduction and renewable and low carbon energy production;
- Recognises that approaches for the deployment of renewable and low carbon energy technologies will vary;

[14] People, Places, Future: The Wales Spatial Plan 2008 Update (Welsh Government, 2008)
[15] Planning Policy Wales: Edition 8 (Welsh Government, 2016)

- Identifies the accessible deliverable renewable energy resource potential (including heat) for their area and considers the likely utilisation of this resource over the plan period;
- Takes into account the environmental, social and economic impacts and opportunities from renewable and low carbon energy development;
- Takes into account the cumulative effects of renewable and low carbon energy development;
- Takes into account the likely mechanisms for determining applications for sites based on their potential and actual output; and
- Takes into account issues associated with grid connection and the transportation network.

TAN 8: Renewable Energy (2005)

Renewable energy requirements for Wales are set out in TAN 8: Renewable Energy[16].

The TAN establishes the Welsh Government's target of 4TWh of electricity per annum to be produced by renewable energy by 2010 and 7TWh by 2020. In order to meet these targets, it is concluded that 800MW of additional installed capacity is required from onshore wind sources and a further 200MW of installed capacity is required from offshore wind and other renewable technologies.

Dear Chief Planning Officers Letter (March 2016)

On 16 March 2016 the Minister for Natural Resources wrote to local planning authorities regarding the assessment of proposed renewable and low carbon energy projects[17].

The Minister stated that in making decisions on local planning policies and on individual development management applications, consideration should be given to the overall context of helping to tackle climate change and delivering the sustainable development duty placed on all public bodies by the Well-being of Future Generations (Wales) Act 2015. The letter states that this should happen for proposed renewable energy and low carbon technology developments at all scales.

Anglesey Energy Island

The Anglesey Energy Island Programme™ is a collective effort between several stakeholders within the public and private sector working in partnership to put Anglesey at the forefront of energy research and development, production and servicing, bringing with it potentially huge economic rewards[18]. Through the programme, there is support for mix of energy streams, including nuclear, wind, tidal, biomass and solar.

[16] Technical Advice Note 8: Renewable Energy (Welsh Government, 2005)
[17] Renewable Energy Projects (Minister for Natural Resources Welsh Government, 2016)
[18] http://www.anglesey.gov.uk/business/energy-island/

3 Energy supply and demand baseline

3.1 Introduction

Electricity and heat demand in Gwynedd and Anglesey has been estimated using actual energy consumption data from National statistics. This estimation has then been used to identify future energy demands projected to 2026. Existing energy supply networks and major power generation sites have been identified.

Energy systems must be continually balanced to match supply and demand. Balancing has traditionally been achieved by varying the output of generation to meet indicated demands for electricity. This has been available through the flexibility of coal and gas fired generating stations.

However, as the market makes the necessary transition to decarbonise energy generation by using new energy sources and technologies, this brings with it significant demand and supply challenges. Firstly, some renewable sources have variable outputs (e.g. onshore wind energy generation is variable depending upon wind speed), and secondly low carbon sources set to be deployed may be inherently less flexible than traditional generation plants e.g. decentralised energy systems and district heating etc.

3.2 Current energy demand

3.2.1 Electricity

The principal information repository for current and historical electricity consumption is GOV.UK. The base electrical consumption data for Gwynedd and Anglesey is provided to GOV.UK at Meter Point Administration Number (MPAN) level by the data aggregators, agents of the electricity suppliers. These agents collate and aggregate electricity consumption levels for each MPAN[19].

Table 1 Gwynedd and Anglesey Combined electricity consumption for the years 2005–2014 shows past domestic and non-domestic electricity consumption within Gwynedd and Anglesey. These figures do not include energy use for transport.

Table 1 Gwynedd and Anglesey Combined electricity consumption for the years 2005–2014

Year	Domestic Electricity Customers		Commercial and Industrial (C&I) Customers		Sales per Customers	
	Sales (GWh)	MPANs (Thousands)	Sales (GWh)	MPANs (Thousands)	Average Domestic Consumption (kWh)	Average C&I Consumption (kWh)

[19] Sub-National Electricity Consumption Data (GOV.UK, 2015). Available from: https://www.gov.uk/government/collections/sub-national-electricity-consumption-data (Accessed 12/10/2016)

2005	496	92.2	511	13	10,791	81,010
2006	480	92.5	520	12.8	10,420	83,394
2007	483.9	93.3	507	12.9	10,395	79,582
2008	449.7	89.8	479.8	11.8	10,030	83,572
2009	452.7	94.5	456.9	12.2	9,610	77,194
2010	454.3	95	452.1	12.2	9,597	77,164
2011	442	95.3	440.6	11.9	9,335	76,606
2012	438.3	95.6	459.8	11.9	9,222	80,565
2013	418.3	95.8	446.7	12.1	8,779	77,314
2014	418.3	95.4	549.7	12.5	8,818	92,338

It is important to note that changes in data collection methods and variation in data quality means that caution should be taken when comparing differences in electricity consumption using this data. However, it can be used to give an indication of the trend of electricity consumption.

3.2.2 Gas

As with electricity, the principal information repository for current and historical gas consumption is GOV.UK website. GOV.UK hold this gas consumption information at Meter Point Reference Number (MPRN) level, together with associated information on the location of the meters.

Table 2 shows past domestic and non-domestic gas consumption within Gwynedd and Anglesey for the years 2005-2014 correspondingly.

Table 2 Gwynedd and Anglesey Combined gas consumption for the years 2005-2014

Year	Domestic Electricity Customers		Commercial and Industrial (C&I) Customers		Sales per Customers	
	Sales (GWh)	No. of Customers (Thousands)	Sales (GWh)	No. of Customers (Thousands)	Average Domestic Consumption (kWh)	Average C&I Consumption (kWh)
2005	688	41.8	583	0.8	34,600	2,050,508
2006	692	42.2	572	0.8	32,955	2,051,351
2007	668.5	42.9	547.9	0.8	31,338	2,082,825
2008	651.8	43.4	509	0.7	30,160	2,050,718
2009	593.9	43.8	452.7	0.7	27,181	2,041,999
2010	576.6	44.2	445.1	0.7	26,099	1,913,120
2011	542.8	44.5	428.4	0.7	24,487	1,879,283
2012	537	44.8	371.8	0.7	24,046	1,580,330
2013	533	45.4	384.3	0.6	23,515	1,635,993
2014	509.70	45.5	269.2	0.50	22,448	1,214,549

3.2.3 Total Energy Demand

The total energy demand in GWh for Gwynedd and Anglesey for 2005 - 2014 is set out in **Table 3** below. This includes all non-transport energy for the Counties, and demonstrates how only 54% of the current energy demand is met by electricity and gas described above. Of particular note is the 830.7 GWh currently provided by petroleum products, such as oil for individual boilers for domestic or commercial use to meet heating demands, which corresponds to a 26% of the annual demand, and demonstrates the number of off grid properties in Gwynedd and Anglesey. Given the predictions of peak oil made by many, this provides a real imperative for action in Gwynedd and Anglesey.

Table 3 Total Non-Transport energy Demand in Gwynedd and Anglesey, 2005-2014 (GWh)

Year	Coal	Manufactured fuels	Petroleum products	Gas	Electricity	Bioenergy & Waste	Total (non-transport energy)
2005	104.2	26.8	972.2	1300.9	1007.3	211.8	3623.3
2006	117.5	25.0	974.2	1264.1	1000.1	220.4	3601.2
2007	132.5	21.5	896.7	1216.4	990.9	226.5	3484.5
2008	158.6	17.5	891.5	1160.8	929.5	268.2	3426.2
2009	159.1	5.9	866.7	1046.6	909.7	291.7	3279.6
2010	170.1	5.1	969.9	1021.7	906.4	376.2	3449.3
2011	171.9	5.8	789.1	971.2	882.8	330.1	3150.9
2012	175.0	8.3	769.3	908.9	898.2	424.7	3184.3
2013	174.5	5.9	781.7	917.4	865.0	502.0	3246.5
2014	162.1	8.7	830.7	779.0	968.0	490.7	3239.1
2014 (%)	**5%**	**0.3%**	**26%**	**24%**	**30%**	**15%**	**100%**

3.3 Future energy demand

Forecast of electricity and gas demand for Great Britain (GB) 2016-2026 are contained within the National Grid's Future Energy Scenarios[20] (FES). In order to forecast demand it has been assumed that Gwynedd's and Anglesey's proportion of electricity and gas demand will follow the same rate as that for GB to 2026. The Scenarios within the FES are detailed below:

- Slow Progression Scenario is taking into account forecasts of fuel prices, the economy, the impact of government energy policy and other relevant indicators.
- Gone Green is a scenario that depicts National Grid's views on the plausible energy mix under the assumption that the 2020 environmental targets are met. This scenario takes into account the same drivers as Slow Progression. However, the fundamental aim is to meet the 2020 environmental targets and

[20] National Grid Future Energy Scenarios (National Grid, July 2016)

the unilateral UK GHG emissions target (34% reduction by 2020). It takes a holistic approach to the meeting of the targets i.e. assumes that heat and transport will contribute towards the environmental target of 15% of UK's energy to come from renewable sources by 2020. It therefore reflects the approach taken by the UK Renewable Energy Strategy.

3.3.1 Future Electricity Demand

Future Energy Scenarios Document presents scenarios of varying annual electricity requirements as **Table 4** shows.

Table 4 Great Britain annual electricity requirement forecasts

Year	Gone Green (TWh)	Yr/Change	Slow Progression (TWh)	Yr/Change	No Progression (TWh)	Yr/Change
2016	331	-0.67%	330	-0.83%	332	-0.42%
2017	328	-1.07%	328	-0.72%	332	-0.20%
2018	326	-0.43%	327	-0.33%	331	-0.24%
2019	324	-0.71%	325	-0.41%	331	-0.11%
2020	322	-0.68%	324	-0.48%	330	-0.22%
2021	321	-0.18%	322	-0.49%	329	-0.27%
2022	322	0.16%	320	-0.63%	328	-0.34%
2023	323	0.22%	320	-0.13%	327	-0.38%
2024	325	0.63%	319	-0.09%	326	-0.27%
2025	327	0.71%	319	-0.11%	325	-0.23%
2026	330	0.98%	319	-0.15%	324	-0.32%

Each scenario presents a percentage change in electricity demand over a year period, of the following; Gone Green Scenario, Slow Progression Scenario, and No Progression Scenario. According to the FES document Electricity consumption in 2014 and 2015 remained in the same levels for GB, so the same is going to be assumed for Gwynedd and Anglesey; gas consumption is shown to have increase in line with GB estimates. **Table 5** shows electricity and gas consumption for 2014/15 for Gwynedd and Anglesey.

Table 5 Gwynedd and Anglesey's Combined Energy Demand for 2015

	Domestic Electricity (GWh)	Non-Domestic Electricity (GWh)	Domestic Gas (GWh)	Non-Domestic Gas (GWh)	Total (GWh)
Consumption 2015	418.3	549.7	526.1	278.2	1772.26

Table 6 converts the predicted electrical demand for Gwynedd and Anglesey based on each scenario to 2026 for domestic and non-domestic consumption

Table 6 Gwynedd and Anglesey's Combined Electricity Demand Forecasts 2016-2026

Year	Gone Green (GWh)	Slow Progression (GWh)	No Progression (GWh)

	Domestic	Non-Domestic	Domestic	Non-Domestic	Domestic	Non-Domestic
2016	415.5	546.02	414.82	545.12	416.54	547.39
2017	411.04	540.16	411.81	541.18	415.72	546.31
2018	409.26	537.82	410.44	539.37	414.71	544.98
2019	406.35	533.99	408.75	537.15	414.26	544.39
2020	403.59	530.36	406.78	534.55	413.32	543.16
2021	402.88	529.44	404.78	531.94	412.2	541.68
2022	403.54	530.31	402.23	528.58	410.81	539.85
2023	404.43	531.47	401.7	527.9	409.25	537.8
2024	407	534.85	401.35	527.42	408.14	536.34
2025	409.87	538.62	400.89	526.82	407.2	535.12
2026	413.87	543.87	400.27	526.01	405.91	533.42
2026 Total	**957.74**		**926.28**		**939.33**	

3.3.2 Future Gas Demand

As National Grid only provides future gas forecasts rather than forecasts for heat demand as a whole, this has been used to provide future baseline for the JLDP.

As mentioned in the previous paragraph, GB's yearly percentage demand change will be applied to forecast Gwynedd's and Anglesey's gas demand till 2026. **Table 7** shows varying annual gas requirements for the different scenarios for GB.

Table 7 Great Britain annual gas requirement forecasts

Year	Gone Green (TWh)	Yr/Change	Slow Progression (TWh)	Yr/Change	No Progression (TWh)	Yr/Change
2016	926	5.23%	924	5.04%	933	6.03%
2017	859	-7.20%	855	-7.51%	880	-5.66%
2018	826	-3.94%	836	-2.27%	859	-2.40%
2019	786	-4.73%	816	-2.32%	842	-1.95%
2020	746	-5.10%	804	-1.52%	848	0.72%
2021	704	-5.72%	788	-1.93%	841	-0.90%
2022	684	-2.86%	778	-1.25%	834	-0.84%
2023	685	0.17%	756	-2.91%	834	0.00%
2024	679	-0.86%	736	-2.64%	828	-0.64%
2025	665	-2.07%	715	-2.79%	838	1.11%
2026	647	-2.70%	708	-1.01%	823	-1.74%

The percentage change for each scenario up to 2026 based on GB statistics have been calculated and incorporated into the gas demand figures for Gwynedd and Anglesey in

Table 8.

Table 8 Gwynedd and Anglesey's Combined Gas Demand Forecast, 2016 – 2026

Year	Gone Green (GWh)		Slow Progression (GWh)		No Progression (GWh)	
	Domestic	Non-Domestic	Domestic	Non-Domestic	Domestic	Non-Domestic
2016	553.58	292.78	552.57	292.24	557.74	294.98
2017	513.7	271.69	511.07	270.3	526.19	278.29
2018	493.45	260.98	499.5	264.18	513.54	271.6
2019	470.1	248.63	487.93	258.06	503.54	266.31
2020	446.12	235.95	480.5	254.12	507.15	268.22
2021	420.62	222.45	471.23	249.22	502.57	265.8
2022	408.59	216.1	465.35	246.12	498.33	263.56
2023	409.28	216.46	451.8	238.95	498.34	263.56
2024	405.75	214.6	439.85	232.63	495.14	261.87
2025	397.36	210.15	427.61	226.15	500.64	264.77
2026	386.63	204.48	423.29	223.87	491.94	260.17
2026 Total	**591.11**		**647.16**		**752.11**	

3.3.3 Comparison between Future Energy Demand and Current Energy Demand

Table 9 compares the Slow Progression and the Gone Green case future energy demand scenarios and provides electricity and gas forecasts for Gwynedd and Anglesey in 2026. In line with the Welsh Government Toolkit, rather than being based on the specific growth projected in Gwynedd and Anglesey, this uses National projections to anticipate future demand.

Table 9 Combined Forecast Energy Demand per Scenario

Demand scenario	GWh		GWh	Total GWh
Gas Scenario		Electricity Scenario		
Slow Progression	647.2	Slow Progression	926.3	1,573.4
Gone Green	591.1	Gone Green	957.7	1,548.9

Assessing the future demand against current demand for Gwynedd and Anglesey reveals that the Slow Progression scenario energy demand is projected to decrease by 11.2% on 2014 levels. Projections under Gone Green scenario also reveal a greater potential energy demand decrease of 12.6% on 2014 levels.

3.4 Current energy supply

3.4.1 Introduction

When considering renewable energy schemes, it should be noted that the installed generating capacity of a renewable energy scheme is not the same as the actual amount of energy generated. Some renewable technologies (e.g. wind power) are intermittent due to the natural fluctuations of wind speed and are not in operation and therefore not generating energy all of the time. In order to calculate the actual amount of energy produced during a given period, a Capacity Factor is usually applied.

The capacity factor is the ratio of the energy generated over an extended period, (typically a year to take account of seasonal effects), compared to the energy that could have been generated if the plant had operated at full capacity all of the time. The capacity factor is normally applied to wind farm developments on a regional scale rather than an individual site basis. The calculation for the Capacity Factor:

Capacity Factor	Electricity generated during the period [kWh] ÷ (Installed Capacity [kW] x Number of hours in the period [hours])[21]

The Welsh Government derived a series of capacity factors which reflect the amount of electrical/heat output from each of the different technologies across Wales[22]. A summary of different capacity factors for different technologies is given in **Table 10** and

[21] DTI, (March 2006) *Energy Trends* [online]. (pg. 28-32), [Accessed July 2012].
[22] Welsh Assembly Government, (2015) *Practice Guidance: Planning for Renewables and Low Carbon Energy - A Toolkit for Planners*. Cardiff

Table 11. Most energy generating plants operate at a capacity factor of less than 100%. For conventional plant this may include requirements for maintenance periods, faults or variations in consumer demand.

Table 10 Renewable electricity generation capacity factors

Technology	Capacity factor	Comments and source
Onshore wind	0.27	DUKES 2009, figure for 2008
Biomass (animal and plant matter)[23]	0.9	Typical for gas and coal fired power stations
Hydropower	0.37	DUKES 2009, figure for 2008
Energy from Waste	0.9	Typical for gas and coal fired power stations
Landfill gas	0.60	DUKES 2009, figure for 2008
Sewage gas	0.42	DUKES 2009, figure for 2008
Microgeneration	0.1	This is an average for PV and micro and small wind
Solar Farm	0.1	Regen SW

[23] i.e. This should be applied to both generation from energy crops, as well as generation from AD of animal slurry and/or food waste

Table 11 Renewable heat generation capacity factors

Technology	Capacity factor	Comments and source
Heat from CHP (from biomass or energy from waste, or from large scale heat only biomass or energy from waste)	0.5	This allows for the fact that not all of the waste heat can be usefully used 100% of the time.
BIR heat (solar water heating, heat pumps, biomass boilers)	0.2	This is an average across a range of technologies, covering heat pumps, wood chip and pellet boilers and solar water heating.

3.4.2 Existing Renewable Electricity Generation

Information regarding the existing renewable energy applications for both Gwynedd and Anglesey was issued in previous Arup reports for each County. It is assumed in the scope of this report that these developments are still operational and are presented again below in **Table 12** and **Table 13**. The projects highlighted in light orange are within Snowdonia National Park.

Table 12 Gwynedd's installed capacity as of 2012

Scheme	Technology	Installed Capacity (MWe)	Status	Source
Afon Tyn y Cornel Hydro Scheme	Hydropower	0.12	Operational	DECC[24]
Maentwrog	Hydropower	30	Operational	DECC
Cwm Croesor	Hydropower	0.5	Operational	NFPA[25]
Cwm Dyli, nr Beddgelert	Hydropower	9.8	Operational	RWE[26]
Twrch, Pandy	Hydropower	0.475	Operational	NFPA
Afon Ysgethin, nr Harlech	Hydropower	0.86	Operational	NFPA
Harnog, nr Rhyd y Main	Hydropower	0.45	Operational	NFPA
Afon Ty Cerig, Rhyd y Main	Hydropower	0.195	Operational	NFPA
Cwm Llan, Nant Gwynant	Hydropower	0.44	Operational	NFPA
Gain, nr Ganllwyd	Hydropower	0.55	Operational	NFPA
Coed, nr Bala	Hydropower	0.45	Operational	NFPA
Cwmorthin, Tan y Grisiau	Hydropower	0.415	Operational	NFPA
Dolgoch, nr Tywyn	Hydropower	0.30	Operational	DECC
Pant yr Afon, Llechwedd	Hydropower	0.4	Operational	DECC
Maenofferen, Blaenau Ffestiniog	Hydropower	0.2	Operational	DECC
Bryn Fedw Hydro, Rhyd Ddu	Hydropower	0.7	Operational	DECC
Braich Ddu, Y Bala	Onshore Wind	4.0	Operational	NFPA
Crugeran Farm, Sarn	Onshore Wind	0.05	Operational	Gwynedd

[24] Renewable Energy Planning Data (Department of Energy and Climate Chang, September 2014) Available at: https://restats.decc.gov.uk/cms/planning-database/, (Accessed 19/10/2016)
[25] Non-Fossil Fuel Orders (Non-Fossil Purchasing Agency Limited, October 2016) Available at: http://www.nfpa.co.uk/nffo4.html (Accessed 19/10/2016)
[26] RWE http://www.rwe.com/web/cms/en/312586/rwe-innogy/sites/hydroelectric-power-station/united-kingdom/sites-in-operation/cwm-dyli/, [Accessed 23 April 2012]

Scheme	Technology	Installed Capacity (MWe)	Status	Source
Mellteyrn				
Cilgwyn RO Generation	Landfill Gas	2.13	Operational	ROG[27]
Domestic Onshore Wind	Microgeneration	0.016	Operational	Ofgem[28]
Non-domestic Onshore Wind	Microgeneration	0.006	Operational	Ofgem
Domestic Hydropower	Microgeneration	0.051	Operational	Ofgem
Non-domestic Hydropower	Microgeneration	0.229	Operational	Ofgem
Domestic PV	Microgeneration	2.4	Operational	Ofgem
Non-domestic PV	Microgeneration	0.094	Operational	Ofgem
Total	-	**54.9MWe**	-	-

Table 13 Anglesey's installed capacity as of 2010

Scheme	Technology	Installed Capacity (MWe)	Status	Source
Trysglwyn Wind Farm	Onshore Wind	5.6	Operational	DECC [29]
Llanbabo Wind Farm	Onshore Wind	20.4	Operational	DECC
Rhyd-y-Groes Wind Farm	Onshore Wind	7.2	Operational	E.ON
Domestic Onshore Wind	Microgeneration	0.028	Operational	IACC
Non-domestic Onshore Wind	Microgeneration	0.025	Operational	IACC
Domestic PV	Microgeneration	1.498	Operational	Ofgem[30]
Non-domestic PV	Microgeneration	0.096	Operational	Ofgem
Total	-	**34.85**	-	-

Table 14 presents the list of post 2012 renewable energy developments in the operational phase for both Counties. It should be mentioned that Cwn Dyli hydropower development in **Table 14** is under Snowdonia's planning authority, but is mentioned here to provide a more comprehensive picture of the installed capacity within Gwynedd.

Table 14 Gwynedd and Anglesey's renewable capacity installed between 2012 and September 2016

Scheme	Technology	Installed Capacity (MWe)	Status	County	Source

[27] Renewable Obligation Generators (ROG), Renewable Obligation Generators, http://www.ref.org.uk/roc-generators/index.php?start=2600&order=AvAnnMWh&dir=desc , [Accessed 24 April 2012]
[28] Ofgem, Feed-in-Tariff Installation Report 31 March 2012, http://www.ofgem.gov.uk/Pages/MoreInformation.aspx?docid=33&refer=Sustainability/Environment/fits, [Accessed 10 May 2012]
[29] Department of Energy and Climate Change (DECC) https://restats.decc.gov.uk/cms/planning-database/, [Accessed July 2012]
[30] Ofgem, Feed-in-Tariff Installation Report 31 March 2012, http://www.ofgem.gov.uk/Pages/MoreInformation.aspx?docid=33&refer=Sustainability/Environment/fits, [Accessed 10 May 2012]

Parciau Farm Solar Park	Solar Photovoltaics	13.9	Operational	Gwynedd	GOV.UK
Ysgellog Farm Wind Farm	Wind Onshore	4.6	Operational	Isle of Anglesey	Gwynedd Council
Braich Ddu	Wind Onshore	3.9	Operational	Gwynedd	GOV.UK
Tyddyn Cae (Nefyn)	Solar Photovoltaics	4.9	Operational	Gwynedd	GOV.UK
Cwm Dyli	Large Hydro	9.9	Operational	Gwynedd	GOV.UK
Llyn Celyn	Small Hydro	4.5	Operational	Gwynedd	GOV.UK
Fferm Bryn Bachau	Solar Photovoltaics	4.4	Operational	Gwynedd	GOV.UK
Land at Morfa Camp	Solar Photovoltaics	2.8	Operational	Gwynedd	GOV.UK
Bodorgan Solar Farm	Solar Photovoltaics	12.6	Operational	Isle of Anglesey	GOV.UK
Bryn yr Odyn Solar Farm	Solar Photovoltaics	15.0	Operational	Isle of Anglesey	GOV.UK
Total	-	**76.5**	-	-	-

Current renewable energy generation for Gwynedd and Anglesey can be calculated by using renewable energy currently installed in these areas available in **Tables 12 -14** and the capacity factors stated in section 2.4.1. The results are shown in **Table 15**.

Table 15 Total Renewable Energy Generation in Gwynedd and Anglesey (September 2016)

	Onshore Wind	**Hydro**	**Landfill Gas**	**Solar PV**	**Microgeneration**	**Total**
Installed Capacity (MW)	45.7	60.3	2.1	53.6	4.3	166.0
Electrical Generation (GWh)	108.1	195.5	11.2	46.9	3.8	365.5

3.4.3 Existing Renewable Heat Generation

Data on existing renewable heat generation is not readily available at a technology level. However, BEIS reports that there are 121 non-domestic accredited installations claiming the Renewable Heat Incentive (RHI), with a total installed capacity of 12.4MW[31].

[31] BEIS, *RHI deployment data:* October 2016, https://www.gov.uk/government/collections/renewable-heat-incentive-statistics [accessed November 2016]

3.4.4 Permitted Renewable Generation

In order to inform this study a cross check has been made on renewable energy projects in the pipeline. This has confirmed that a number of such schemes have secured planning permission but have not yet been built. Data on these projects, around total capacity to be installed and progress to installation is incomplete, and so has not been included in totality here.

However, from analysis it is possible to confirm that approximately 100 developments were permitted in each local authority area in the last 10 years. Most of these developments are very small scale, with the exception of the 299MW biomass electricity plant planned in Anglesey. This project is being developed by Orthios Power, and work is expected on site in 2017[32]. Whilst this plant is planning to use waste heat to support food growing, this is not based on existing demand and there is no public data on heat output.

Other consented projects of significance include tidal development, in particular, the Holyhead Deep project, which a 10MW marine energy array, which is projected to start construction in 2017[33].

3.5 Summary

Using the available information of current total energy demand (Section 3.2.3 of this report) and current renewable electricity generation **Table 15**, it is estimated that **approximately 37.8% of the total electricity demand is currently provided by renewable electricity.** Renewable heat supply in the area is less significant to date.

[32] As described in an update provide to IACC in 2016; http://www.anglesey.gov.uk/empty-nav/news/press-releases-2016/june-2016/councils-welcome-orthios-update/128953.article [accessed Oct 2016]
[33] http://minesto.com/holyhead-deep/

4 Renewable resource availability

4.1 Gwynedd and Anglesey resource availability

In Arup's "Scoping Renewable Energy Opportunities for Gwynedd"[34] and "Renewable Energy Capacity Assessment for Anglesey"[35] in 2012 and 2013 respectively, nine potential areas for wind developments were identified in Gwynedd and six potential areas for Anglesey.

Following these assessments, further work was carried out directly by the Joint Planning Policy Unit to consider the landscape impacts of wind clusters identified[36]. This work determined that these areas would not suitable to be allocated as areas of search for wind cluster development in the JLDP. This analysis has been carried forward as an assumption in this report; that no additional areas are available for wind cluster development. Regarding solar farm development, four areas were identified by the LUC report[37]as top rated opportunity areas, after having considered various constraining factors involved, such as grid capabilities and landscape sensitivity issues. These four areas could have a total maximum capacity of 8.1MW. Thirty two further areas were identified for solar development with a range of sizes between 2.5–5MW and different land demands and landscape sensitivity. These thirty-two areas were identified as having significant constraints, and therefore have not been included on our assumptions for this report.

Error! Reference source not found. shows the summary of Gwynedd and Anglesey's renewable resource potential; combining the information presented in Arup's 2012 and 2013 reports, the JPPU's analysis on wind farms[38] and the top rated opportunities areas for solar farm development as identified in LUC's 2016 report[39].

[34] Arup for Gwynedd Council, on behalf of Gwynedd Werdd, *Scoping Renewable Energy Opportunities for Gwyendd*, 2012
[35] Arup for Isle of Anglesey Council, *Renewable Energy Capacity Assessment for Anglesey*, 2013
[36] Appendix A – *Potential Areas of Search for Wind Farm Developments*, July 2016 https://www.gwynedd.llyw.cymru/en/Council/Documents---Council/Strategies-and-policies/Environment-and-planning/Planning-policy/Examination-Documents/DA020a.pdf
[37] LUC, in association with Carbon Smart, *Assessment of the potential for solar PV farms in Gwynedd and Ynys Môn*, July 2016 https://www.gwynedd.llyw.cymru/en/Council/Documents---Council/Strategies-and-policies/Environment-and-planning/Planning-policy/Examination-Documents/DA020b.pdf
[38] Appendix A – *Potential Areas of Search for Wind Farm Developments*, July 2016 https://www.gwynedd.llyw.cymru/en/Council/Documents---Council/Strategies-and-policies/Environment-and-planning/Planning-policy/Examination-Documents/DA020a.pdf
[39] LUC and Carbon Smart for Joint Local Development Plan Anglesey & Gwynedd (2016), *Appendix B- assessment of the potential for Solar PV farms in Gwynedd and Ynys Mon* Available from: https://www.gwynedd.llyw.cymru/en/Council/Strategies-and-policies/Environment-and-planning/Planning-policy/Joint-Local-Development-Plan/Examination-Documents.aspx [Accessed 17 October 2016]

Table 16 Summary of Gwynedd and Anglesey renewable resource potential

Category	Sub-Category	Potential Capacity (MWe) [Electricity]	Potential Generation (GWh) [Electricity]	Potential Capacity (MWt) [Heat]	Potential Generation (GWh) [Heat]
Wind Onshore	Micro-wind	119.5	104.6	-	-
Hydropower	Small Scale Hydropower	1.2	3.9	-	-
Microgeneration	Solar	66.5	57.4	28.0	23.6
	Heat Pumps[40]	-	-	441.0	772.6
Solar Farms	Photovoltaics	8.1	7.1	-	-
Anaerobic Digestion	Sewage Sludge	0.5	4.0	0.8	3.3
	Animal Manure	1.3	10.3	2.5	10.7
	Poultry Litter	6.9	54.4	0.2	0.7
	Food Waste	2.3	18.1	3.4	12.7
Energy from Waste (EfW)	MSW and C&IW	4.6	36.4	9.3	40.7
Biomass	Waste Wood	0.5	4.3	1.1	4.8
	Managed Woodland	4.0	31.3	10.6	46.1
	Energy Crops	24.5	193.4	48.8	213.8
Tidal	Tidal	220.0	481.8	-	-
Total	-	**459.9**	**1007.0**	**545.7**	**1129.0**

As set out in **Table 16** above, the greatest potential for renewable energy associated with the Counties is Tidal; this can be seen through the effort being given to realising this resource through Energy Island. However, as this is an offshore technology, the local planning authorities have less direct influence over the ability to realise this resource through the JLDP.

4.2 Summary

Although potential sites for wind farm development have been identified as not suitable for development, based on landscape sensitivity[41], **Error! Reference source not found.** shows that micro-wind development can contribute

[40] Heat pumps use a small amount of electricity to run the pumps to generate electricity. This is generally a third or quarter of the energy produced and is described as a coefficient of performance (CoP). The Heat Pump Association assume a CoP of 4 to 1; generating 4kW for every 1kW used. This is therefore used to calculate the renewable energy element of this technology. However, this will vary between GSHP and ASHP, the type of system used and environmental conditions. There have been various studies into why the CoP is so variable in recent years (e.g. DECC and EST, Detailed analysis from the first phase of the Energy Saving Trust's heat pump field trial. 2012). Whilst certainty about the CoP is improving, uncertainty remains.

[41] *Appendix A – Potential Areas of Search for Wind Farm Developments*, July 2016 https://www.gwynedd.llyw.cymru/en/Council/Documents---Council/Strategies-and-policies/Environment-and-planning/Planning-policy/Examination-Documents/DA020a.pdf

significantly both to Gwynedd's and Anglesey's electricity generation. Harvesting of tidal energy also seems to point towards the same direction; for example the West Anglesey Demonstration Zone is one of several around the United Kingdom which have been leased out by The Crown Estate in a bid to encourage and accelerate technology development. This could provide about 100MW of tidal energy resource[42].

[42] http://morlaisenergy.com/en/

5 Deployment potential

5.1 Introduction and overview

This section contains information on potential deployment constraints and analysis for each of the technologies presented in chapter 3. Forecasting deployment rates can be extremely difficult and needs to consider a much wider range of economic and political factors than this study has been able to explore in any detail. For each technology, consideration of the constraints and a high level forecast of future delivery have been discussed and realistic deployment scenarios extracted over the plan period.

5.2 Overarching Constraints to Deployment

Many of the constraints and opportunities for renewable energy deployment will be linked to individual technologies. However, there are certain overarching constraints that are applicable to many or all technologies. **Table 17** below sets out the constraints related to renewable energy deployment in Gwynedd and Anglesey.

Table 17 Constraints related to renewable energy deployment

Constraint	Description
Consenting	Perceived (and actual) difficulty in obtaining planning permission and environmental consents, particularly in and around the National Park. This is particularly an issue for larger scale developments.
Grid Connections	Perceived (and actual) difficulty and cost constraints of connecting new development to the grid. This is particularly an issue in more rural parts of the county and for smaller scale development. There is limited capacity on both the distribution and transmission network to accommodate new generation, for which projects to increase network capacity are underway.
Public Perception	There remains a lack of urgency around the public's perception on the need to act to tackle climate change. Particularly in relation to larger schemes, negative public perception of renewable energy schemes can lead to a negative response to developments locally, which can add to a delay in the consenting process.
Financial Affordability	This factor is crucial for developments regardless of energy output or deployment size. Should this constraint fail to be overcame there are no further actions to be taken to consider any other of the aforementioned constraints. Financial affordability is included in the Consenting and the Grid Connections constraints as well.

In many circumstances, these overarching constraints are related to perception, rather than being fixed physical or system constraints.

One of the main constraints in the area of Anglesey and Gwynedd is the capacity of the existing distribution and transmission electrical infrastructure. The National Grid is delivering upgrades as part of the North Wales Connections project, with an expected capacity release date of 2019-2025 to facilitate a 2.8GW of additional generation at Wylfa nuclear power station. While this is within the timeframe for

the Plan, new generation projects on that infrastructure are already contracted, would take priority over any new applications identified[43]. As there is no mechanism to 'future proof' the design of grid upgrades for additional capacity to accommodate renewable energy targets or future projects without an existing grid connection agreement, further studies would be required to review the means by which further electricity generation could be accommodated.

Deployment potential by technology in Gwynedd is outlined in Gwynedd's 2012 report by Arup. Much of this potential and context still form the basis for estimates as for deployment potential within the JLDP plan period.

[43] LUC and Carbon Smart for Joint Local Development Plan Anglesey & Gwynedd (2016), *ibid.*

6 Towards renewable energy targets

6.1 Overview

To derive appropriate percentage targets for potential development for each renewable energy technology a variety of factors have been considered. These factors included constraints as detailed in Section 4.2, availability of incentives in the areas examined, costs involved (as far as such information was available), impact implications in Gwynedd and Anglesey, ease of deployment, and research of other targets set at a UK and Wales level (as set out in Section 4.3 of this report) and by drawing lesson from other local authorities.

6.2 Lessons from elsewhere

Consideration has been given to potential renewable resource availability that informs the policy of recently adopted Local Development Plans from authorities across Wales. The review has also considered the appropriateness of drawing lesson from the means that each local authority monitors progress against their target.

Table 18: lessons from other local authorities

Local Authority	Source	Potential Demand Met by Renewable Energy	Monitoring Mechanism
Cardiff Council	Cardiff Local Development Plans 2006 – 2026: Renewable Energy Assessment[44]	**Renewable Electricity –** Maximum (100%): 24.3% High (75%): 18.4% Low (50%): 12.1% **Renewable Heat –** Maximum (100%): 6.3% High (75%): 4.7% Low (50%): 3.1%	Annual Monitoring Report (AMR) of the LDP. The AMR monitoring mechanism is the number and capacity of renewable energy development planning applications approved. Should there be no increase in the number of planning applications approved in two consecutive years, this would trigger an assessment to consider necessary corrective action.
Neath Port Talbot County Borough Council	Neath Port Talbot County Borough Council Local Development Plan 2011 – 2026: LDP Renewable Energy Assessment 2012[45]	**Renewable Electricity –** 308% **Renewable Heat –** 2.39%	AMR of the LDP. The AMR monitoring mechanism is the number and type of renewable energy and low carbon technology planning applications approved.
Newport City	Torfaen County	**Renewable**	AMR of the LDP.

[44] Cardiff Local Development Plan 2006 – 2026: Renewable Energy Assessment (Cardiff Council, September 2013)
[45] Neath Port Talbot County Borough Council Local Development Plan 2011 – 2026: LDP Renewable Energy Assessment (Neath Port Talbot County Borough Council, 2012)

Local Authority	Source	Potential Demand Met by Renewable Energy	Monitoring Mechanism
Council	Borough Council and Newport City Council: Renewable and Low Carbon Energy Assessment[46]	**Electricity -** High: 39% Low: 22% **Renewable Heat –** High: 8% Low: 6%	The AMR monitoring mechanism is the number and type of renewable energy and low carbon technology planning applications approved.
Pembrokeshire County Council	Pembrokeshire County Council Local Development Plan (to 2021): Renewable Energy Study[47]	**Renewable Electricity –** High: 14.4% Low: 10.1% **Renewable Heat –** High: 2.0% Low: 1.3%	AMR of the LDP. The AMR monitoring mechanism is the number and type of renewable energy and low carbon technology planning applications approved.

The research demonstrates the approach taken by local planning authorities to present a high and low percentage for potential demand of energy met by renewable electricity and renewable heat.

The established means of monitoring is through the annual quantification of planning applications approved for renewable energy development. Some local authorities make provision for assessment work to consider necessary corrective action should no scheme be granted planning permission.

6.3 Plausible Scenarios

To derive plausible percentage targets for potential development for each renewable energy technology a variety of factors were considered. These factors included constraints as detailed in Section 4.2; Consenting, Grid Connections, Public Perception and Financial Affordability (including incentives available).

Three sets of scenarios have been developed; high (setting out the total available resource), medium (a realistic scenario based on current constraints), and low (assuming further downturns in commitments to renewable energy).

The percentages presented in **Table 19** and **Error! Reference source not found.20** for each technology represent the potential installed capacity by 2026 for electricity and heating renewable technologies. This includes the locally available renewable resource (according the Welsh Toolkit methodology), the existing installed capacity (where this exceeds this) and in particular, the proposed 299MWe Biomass plant on Anglesey.

[46] Torfaen County Borough Council and Newport City Council: Renewable and Low Carbon Energy Assessment (Verco, May 2013)
[47] Pembrokeshire County Council Local Development Plan (to 2021): Renewable Energy Study (Pembrokeshire County Council, 2010)

Table 19: Renewable electricity scenarios for 2026

Category	Sub-Category	High Scenario (100%)		Medium Scenario		Low Scenario	
		Potential Capacity (MWe) [Electricity]	Potential Generation (GWh) [Electricity]	Percentage By 2026	Generation (GWh) By 2026	Percentage By 2026	Generation (GWh) By 2026
Wind Onshore	Micro-wind	119.5	104.6	0.50%[48]	0.5	0.10%	0.1
	Existing installed capacity[49]	*45.7*	*108.1*	*100%*	*108.1*	*100%*	*108*
Hydropower	Small Scale Hydropower	1.2	3.9	100%	3.9	50%	2
	Existing capacity	*60.3*	*195.5*	*100%*	*195.5*	*100%*	*196*
Solar	Rooftop PV	66.5	57.4	20%	11.5	10%	6
	PV farms	8.1	7.1	50%	3.5	25%	2
	Existing capacity	*53.6*	*46.9*	*100%*	*46.9*	*100%*	*47*
Anaerobic Digestion	Sewage Sludge	0.5	3.9	50%	2	25%	1
	Animal Manure	1.3	10.2	25%	2.6	10%	1
	Poultry Litter	6.9	54.4	25%	13.6	10%	5
	Food Waste	2.3	12.1	10%[50]	1.8	5%	0.9
	Existing capacity	*0.5*	*3.9*	*22%*	*3.9*	*22%*	*3.9*

[48] Microwind is inefficient and reliant on individual landowners to progress and therefore achieving more than a very small percentage of the total available capacity is highly unlikely.
[49] Significant existing installed capacity has been included to provide a baseline through all three scenarios
[50] An anaerobic digester at Llwyn Isaf former waste landfill site has been operational since 2014, dealing with much of the areas municipal solid waste. It is unlikely that much of the remaining commercial and industrial waste will be accessed in the current regulatory and commercial system.

Category	Sub-Category	High Scenario (100%)		Medium Scenario		Low Scenario	
		Potential Capacity (MWe) [Electricity]	Potential Generation (GWh) [Electricity]	Percentage By 2026	Generation (GWh) By 2026	Percentage By 2026	Generation (GWh) By 2026
Energy from Waste (EfW)	MSW and C&IW	4.6	36.4	0%[51]	0.0	0%	0
Biomass	Waste Wood	0.5	4.3	75%	3.2	25%	1
	Managed Woodland	4	31.3	25%	7.8	10%	3
	Energy Crops	24.5	193.4	10%	19.3	5%	10
	Proposed Orthios plant	299	2357	80%	1886	0%	0
Tidal	Tidal	220	481.8	60%	289	10%	48
Total	**-**	**758.9**	**3364.2**	**-**	**2196.5**		**79.1**
Projected Electricity Demand (2026)		**926.3**					
Renewable Energy contribution % of electricity demand			**363%**	**237%**		**9%**	

[51] The North Wales Residual Waste Treatment Project has identified Parc Adfer in Flintshire for an energy-from-waste plant (http://parcadfer.com/). This means that despite the fact that the resource is produced within Gwynedd and Anglesey, there will be no opportunity to use this resource within plan area in the medium to long-term.

Table 20: Renewable heat scenarios for 2026

Category	Sub-Category	High Scenario (100%)		Medium Scenario		Low Scenario	
		Potential Capacity (MWt) [Heat]	**Potential Generation (GWh)** [Heat]	**Percentage By 2026**	**Generation (GWh) By 2026**	**Percentage By 2026**	**Generation (GWh) By 2026**
Microgeneration	Solar Thermal	28	23.6	20%	4.7	10%	2.7
	Heat Pumps	441	772.6	0.5%	3.9	0.1%	0.8
Anaerobic Digestion	Sewage Sludge	0.8	3.3	50%	1.7	25%	0.8
	Animal Manure	2.5	10.7	25%	2.7	10%	1.1
	Poultry Litter	0.2	0.7	25%	0.2	10%	0.1
	Food Waste	3.4	12.7	10%	1.3	0%	0.0
Energy from Waste (EfW)	MSW and C&IW	9.3	40.7	0%	0.0	0%	0.0
Biomass	Waste Wood	1.1	4.8	75%	3.6	25%	1.2
	Managed Woodland	10.6	46.1	25%	11.52	10%	4.6
	Energy Crops	48.8	213.8	10%	21.4	5%	10.7
Total	**-**	**545.7**	**1129.0**	**-**	**50.9**		**21.6**
Projected Gas Demand (2026)		**647.2**					
Renewable Energy contribution % of heat demand (currently supplied by gas)			**174%**	**8%**		**3%**	

6.4 Conclusions and Recommendations

There are a range of plausible scenarios for renewable energy generation in Gwynedd and Anglesey between 2016 and 2026. The largest likely development is the 299MWe Biomass plant planned in Anglesey. This is very likely to proceed, and would, on its own produce more than double the projected electricity demand for the area in 2026. Based on current projections, renewable heat is less likely to produce such a significant part of the area's supply. There may be opportunities for planning policy to encourage heat offtake from new generation plant, as proposed with the Biomass plant above.

It is noted that supply and demand has been calculated across Gwynedd, and so co-ordination and co-operation with Snowdonia National Park Authority may be necessary to achieve the full potential.

The central scenarios are of 237% of electricity demand and 10% heat demand by 2026 being met by renewable energy generated within the local authority boundaries. **Table 21** below provides a summary of the full set of scenarios.

Table 21 Percentage demand met by renewable energy by 2026

	High Scenario	**Medium Scenario**	**Low Scenario**
Electricity	363%	237%	9%
Heat	174%	10%	4%

It is recommended that monitoring of targets be undertaken through the Annual Monitoring Report process, by an annual quantification of planning applications approved for renewable energy development. It is recommended that a trigger point be applied to the monitoring process, to require corrective action should a limited number of applications be received or approved in the JLDP area in any year.

Not all small scale renewables will be picked up through the planning system and monitoring data may also need to be collected through additional sources, such as Ofgem's Feed-in-Tariffs (FiTs) installation data[52], the Department for Business, Energy and Industrial Strategy Renewable Heat Incentives (RHI) data on deployment[53], and Ofgem's renewable and CHP register[54].

[52] Data available at https://www.ofgem.gov.uk/environmental-programmes/fit/contacts-guidance-and-resources/public-reports-and-data-fit/installation-reports [accessed Nov 2016]
[53] Data available at https://www.gov.uk/government/collections/renewable-heat-incentive-statistics [accessed Nov 2016]
[54] Data available at https://renewablesandchp.ofgem.gov.uk/, under "View Public Reports" and "Accredited Stations" [accessed Nov 2016]

File Note

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Project title	Renewable Energy Opportunities	Job number	
cc		File reference	
Prepared by	Ann Cousins	Date	15 December 2016
Subject	Report Addendum		

1 Renewable Energy opportunities – Addendum

In light of updated information regarding LUC's Solar PV farms report the following highlight amendments to our October 2016 report:

1.1 Section 4.1

This section should read (note – have not included footnote references – additional text shown in BOLD):

In Arup's "Scoping Renewable Energy Opportunities for Gwynedd" and "Renewable Energy Capacity Assessment for Anglesey" in 2012 and 2013 respectively, nine potential areas for wind developments were identified in Gwynedd and six potential areas for Anglesey.

Following these assessments, further work was carried out directly by the Joint Planning Policy Unit to consider the landscape impacts of wind clusters identified. This work determined that these areas would not suitable to be allocated as areas of search for wind cluster development in the JLDP. This analysis has been carried forward as an assumption in this report; that no additional areas are available for wind cluster development.

~~Regarding solar farm development, four areas were identified by the LUC report as top rated opportunity areas, after having considered various constraining factors involved, such as grid capabilities and landscape sensitivity issues. These four areas could have a total maximum capacity of 8.1MW. Thirty two further areas were identified for solar development with a range of sizes between 2.5–5MW and different land demands and landscape sensitivity. These thirty-two areas were identified as having significant constraints, and therefore have not been included on our assumptions for this report.~~

Following an addendum by LUC, 9 potential areas have been identified which currently have a critical grid constraint but, due to lower landscape sensitivity, could accommodate solar PV farms up to 5MW. In addition there are two opportunity areas that do not have a grid constraint but due to landscape sensitivity are only suitable for installations of up to 2.5MW.

However their size (117.3Ha and 90.9Ha) suggest that they could accommodate schemes that cumulatively could provide over 5MW on the basis of two or more schemes subject to positive cumulative visual impact assessments.

These 11 areas could have a maximum capacity of 264.6MW, based upon all of these areas being developed. This is unlikely to be acceptable from a landscape impact perspective. Due to the level of constraints in terms of grid connection capacity and the landscape sensitivity a medium scenario of 8.8 (GWh) generation level by 2026 has been used.

Table 16 shows the summary of Gwynedd and Anglesey's renewable resource potential; combining the information presented in Arup's 2012 and 2013 reports, the JPPU's analysis on wind farms and the ~~top rated~~ opportunities areas for solar farm development as identified in LUC's 2016 report **addendum.**

1.2 Table 16

Amend the Solar Farms photovoltaics figures to read Potential capacity (MWe) from 8.1 to 264.6 and potential generation (GWh) from 7.1 to 231.8.

1.3 Table 19

Amend the row for Solar PV Farms as follows:

Category	**High Scenario**		**Medium Scenario**		**Low Scenario**	
	Potential capacity (MWe)	Potential Generation (GWh)	Percentage by 2026	Generation (GWh) by 2026	Percentage by 2026	Generation (GWh) by 2026
PV Farms	264.6	231.8	3.8%	8.8	1.1%	2.5

With the total figures amended as following:

Category	**High Scenario**		**Medium Scenario**		**Low Scenario**	
	Potential capacity (MWe)	Potential Generation (GWh)	Percentage by 2026	Generation (GWh) by 2026	Percentage by 2026	Generation (GWh) by 2026
Total	476.5	3,933.7	-	2,612.3	-	435.5
Projected Electricity Demand (2026)						926.3
Renewable Energy contribution % of electricity demand		425%	282%		47%	

1.4 Plan area

It should be noted that these figures include all of the demand and opportunities within Gwynedd (County) as a whole and not the Gwynedd Planning Area. Out of the Gwynedd (County) total population 16.5% live within Snowdonia National Park. This equates to 10.4% of the total population in Gwynedd and Isle of Anglesey area.

For the identified Orthios scheme, located on Anglesey, and the opportunities from tidal, located outside the National Park boundaries, the opportunities from these sub-categories should be counted 100% for the Plan area.

For the other categories the figures contained within tables 19 and 20 could be reduced by 10.4% as a proxy for the proportion of the projected demand and opportunities that may lie within the Snowdonia National Park planning authority area.

DOCUMENT CHECKING (not mandatory for File Note)

	Prepared by	Checked by	Approved by
Name	Ann Cousins		
Signature			

APPENDIX 2 – Matters Arising Changes to the Renewable Energy section within the Plan (changes shown in **Red** or with a ~~strikethrough~~):

RENEWABLE ENERGY

7.2.23 **Context**

- The UK Government has set a target to supply 15% of the UK's energy from renewable energy by 2020. Planning policy at all levels should facilitate delivery of both the Welsh Government's overall Energy Policy Statement, and UK and European targets on renewable energy.
- The ~~Welsh Government's Energy Policy Statement (2010)~~ **Energy Wales: A Low Carbon Transition (2012)** identifies the sustainable renewable energy potential for a variety of different technologies as well as establishing a commitment to energy efficiency.
- One way local planning authorities can help to achieve this is by including positive planning policies for renewable energy.
- There are no Strategic Search Areas for commercial wind farms within the Plan area.
- Outside Strategic Search Areas smaller community based wind farm schemes (generally less than 5MW) are encouraged.
- Both Councils through the Anglesey Energy Island Programme and the Green Gwynedd Project support community, rural and larger scale ventures, where appropriate.

Introduction

7.2.24 In 2012 Renewable Energy Capacity Studies were prepared for Gwynedd (county) and Anglesey to assess the potential capacity for renewable sources of energy. The purpose of the Studies was to help each Council understand the potential resources from each renewable energy technology. The Studies considered a number of on-shore technologies, e.g. onshore wind, hydropower, biomass. Off-shore resources were acknowledged in the Studies but they do not contribute to the renewable energy capacity figures of the Plan area. **The Studies were updated during 2016 (Potential Renewable Energy Study – towards renewable energy targets".** ~~**In September 2015 the Welsh Government provided an updated 'Practice Guidance: Planning for Renewable and Low Carbon Energy – A Toolkit for Planners'. This had an additional section on how to assess the potential for solar farm developments. A letter dated the 10 December 2015 by the Minister for Natural Resources stated his expectations for energy policies in LDPs. He expects allocations or identification of areas of search for local authority scale (5MW to 25MW) renewable energy schemes or other low carbon technologies. In light of this the Councils have commissioned additional work to ascertain any potential areas for solar farm development. In addition an assessment against the areas Landscape Sensitivity and Capacity Study will ascertain whether any local authority scale areas of search should be identified in the Plan.**~~ **The Studies estimate that approximately 37.8% of the total electricity demand is currently provided by renewable electricity. However, although heat demand is significant, there is no evidence of any renewable heat supply in the area to date.**

7.2.24A **A combination of Renewable Energy Capacity Study (2016) Renewable Energy Study (2016) and the Landscape Sensitivity and Capacity Study Landscapes (2014) have shown, at a high level, places within the Plan area where there are areas of opportunities for Solar PV Farms. These areas will assist developers when searching for sites. In relation to wind farms, due to capacity issues and the sensitivity of the landscape, it was concluded that it is not possible to identify any opportunity areas. The Renewable Energy Opportunities Study also noted Gwynedd (the county) and Anglesey's potential contributions towards meeting national targets through onshore wind (further opportunities through micro generation), hydropower, solar, energy from waste, biomass, tidal. This table provides details of the potential opportunities:** ~~The Studies found that while the Plan area had a high natural resource for renewable energy, it also has a large number of high quality landscapes that reduces what is deployable. The following Strategic Policy provides a positive framework to deliver energy from renewable energy resources.~~

Table 1 – Renewable Electricity Potential for 2026

Energy Technology	**Existing Installed Capacity (MWe)**	**Potential Capacity (MWe)**	**Existing Energy Generated (GWh)**	**Additional Potential for Energy Generated (GWh)**	**Percentage Delivered by 2026**	**Total Additional Potential for Renewable Energy Delivered by 2026 (GWh)**
Wind Onshore	45.7	119.5	108	104.6	0.5%	0.5
Hydropower	60.3	3.9	195.5	3.9	100%	3.9
Solar	53.6	331.1	46.9	289.2	7%	20.3
Anaerobic Digestion	0	11	0	80.6	24.8%	20
Energy from Waste (MSW) & (C&IW)	0	4.6	0	36.4	0%	0
Biomass	0	328	0	2,586	74%	1,913
Tidal	0	220	0	481.8	60%	289
TOTAL	159.6	1,018.1	350.4	3,582.5	62.7%	**2,246.7**
Projected Electricity Demand (2026)						**923.6**
Renewable Energy contribution % of electricity demand						**243%**

Table 2 – Renewable Heat for 2026

Energy Technology	**Existing Installed Capacity (MWt)**	**Potential Capacity (MWt)**	**Existing Energy Generated (GWh)**	**Additional Potential for Energy Generated (GWh)**	**Percentage Delivered by 2026**	**Total Additional Potential for Renewable Energy Delivered by 2026 (GWh)**
Microgeneration	Information not readily available at individual Technology Level	469	Information not readily available at individual Technology Level	796.2	1.08%	8.62
Anaerobic Digestion		6.9		27.4	28%	7.675
Energy from Waste		9.3		40.7	0%	0
Biomass		60.5		264.7	13.8%	36.5
Total	12.4	545.7	Unknown	1,129	4.67%	**52.795**
Projected Gas Demand (2026)						**647.2**
Renewable Energy contribution % of heat demand (currently supplied by Gas)						**8.2%**

7.2.24B The above tables contain both demand and opportunity figures for the whole of the County of Gwynedd. To provide a Plan area figure, the type and location of the Technologies have been considered. The figures in the tables have been adjusted to reflect the fact that a large biomas scheme (i.e. the Orthios scheme) is located in Holyhead Anglesey, and there are limited Tidal opportunities along the coastline of the Snowdonia National Park. On this basis the identified level of opportunities from these Technologies are recorded for the Plan area. In relation to the other techologies, it is considered reasonable to take account of the fact that a proportion of the Plan area's population (10.4%) reside within the National Park. This level of reduction is als oapplied to the projected demand figures. On this basis the Plan therefore aims to facilitate renewable energy development to address 271% of the electricity needs and 8.1% of the heating needs of the Plan area by 2026.

7.2.24C All the resources and opportunities were considered together in order to gain an understanding of the renewable energy potential in the Plan area. All in all Policy PS 7, Policy ADN 1, Policy ADN 1, Policy ADN 2 as well Policy PCYFF 4 provide a framework to promote the use of renewable energy or low carbon technology as part of individual developments or through provision of stand alone equipment. Monitoring these policies will show how the Plan will contribute to meet national requirements. It will be necessary to keep in mind that how much can be achieved ultimately depends on external factors, e.g. national policy, household behaviour change.

STRATEGIC POLICY PS7: RENEWABLE ENERGY TECHNOLOGY

The Councils will seek to ensure that the Plan area wherever feasible and viable realises its potential as a leading area for initiatives based on renewable or low carbon energy technologies by promoting:

1. **renewable energy technologies within development proposals which support energy generation from a variety of sources which include biomass, marine, waste, water, ground, solar and wind, including micro generation;**
2. **free-standing renewable energy technology development**

This will be achieved by:

i) **ensuring that installations in areas covered by international or national landscape designations and visible beyond their boundaries, or areas of local landscape value, in accordance with Strategic Policy PS16 do not individually or cumulatively compromise the objectives of the designations especially with regard to landscape**

character, and visual impact ~~and residential amenity and amenity of housing used by visitors on holiday~~;

ii) ensuring that installations in accordance with PS16 do not individually or cumulatively compromise the objectives of international, national and local nature conservation designations;

iii) supporting installations outside designated areas provided that the installation would not cause significant demonstrable harm to landscape character, biodiversity, or amenity of residential or holiday accommodation ~~amenity~~, ~~amenity of housing used by visitors on holiday,~~ either individually or cumulatively.

To lessen the visual impact of new overhead lines associated with such installations, especially in sensitive locations, the lines should be placed underground unless this causes significant harm to other acknowledged interests or the viability of the scheme, which cannot be negated or mitigated.

POLICY ADN1: ON-SHORE WIND ENERGY

No Large-Scale or Very Large-Scale wind farms / wind turbines will be permitted in the Plan area.

Other on shore wind turbine proposals will be permitted subject to an assessment of their environmental and sustainability impacts:

1. Medium-Scale wind farms / wind turbines will only be granted on urban / industrial brownfield sites or when the proposal involves the repowering of existing wind farms / wind turbines.

2. Micro-Scale and Small-Scale wind turbine proposals will be granted outside the AONB, SLA ~~and~~ provided they don't have a significant detrimental effect on the setting of the AONB, ~~SLA,~~ National Park and World Heritage Site.

3. In the AONB and the SLA and sites that affect the setting of the AONB, ~~SLA,~~ National Park and World Heritage Site only Domestic-Scale wind turbine proposals well related to existing settlements / buildings will be granted.

All proposals should conform to the following criteria:

~~i. the proposal will not have an unacceptable impact upon visual amenity or landscape character through: the number, scale, size, design and siting of turbines and associated infrastructure especially in areas designated for their historic or landscape value;~~

ii. ~~the proposal will not result in demonstrable harm to biodiversity including statutorily protected sites and species in particular bats and birds~~ all impacts on landscape character, heritage assets and natural resources have been adequately mitigated, ensuring that the special qualities of all locally, nationally and internationally important landscape, biodiversity and heritage designations,

including, where appropriate, their settings are conserved or enhanced;

iii. the proposal will not result in significant harm to the safety or amenity of sensitive receptors including effect from noise, shadow flicker and impact on public health, and will not have an unacceptable impact on roads, rail or aviation safety;

iv. the proposal will not result in significant harm to the residential visual amenities of nearby residents;

v. the proposal will not result in unacceptable electromagnetic interference to communications installations, radar or air traffic control systems, emergency services communications, or other telecommunication systems;

vi. the proposal will not have unacceptable cumulative impacts in relation to existing wind turbines, ~~those implemented~~ and those which have permission, and other prominent landscape features;

vii. turbines and associated infrastructure will, at the end of the operational life of the facility, be removed in accordance with a restoration and aftercare scheme submitted to the Local Planning Authority ~~and an appropriate land restoration and aftercare scheme agreed~~.

Where required, the proposal should be informed by a Landscape and Visual Impact Assessment

A proposal will be considered as falling within the typology ~~category~~ that represents the biggest type (height and scale) for which it qualifies.

Explanation:

7.2.25 The greatest potential in terms of generating energy from large scale on-shore wind turbines are the Strategic Search Areas identified in TAN 8. No Strategic Search Area exists within the Môn and Gwynedd Plan area

7.2.26 The number of environmental designations throughout the Plan area together with the dispersed nature of the local population means careful consideration needs to be given towards the potential unacceptable impact of on-shore wind energy proposals..

7.2.27 The key objective is to ensure that development is proportionate and appropriately located in the landscape. The Isle of Anglesey, Gwynedd and Snowdonia National Park Landscape Sensitivity and Capacity Study was commissioned to guide development such as on-shore wind energy to appropriate locations by identifying and protecting sensitive and distinct areas from inappropriate development.

7.2.28 The indicative landscape capacity within the Sensitivity and Capacity Study, helps to identify the type of developments which could be potentially accommodated,

however, this does not in itself suggest that planning applications for development in these areas will be appropriate. Other variables such as environmental designations and technical constraints, site specific siting, layout and design will need to be considered on a case by case basis.

7.2.29 The Sensitivity and Capacity Study produces specific guidance notes for each type of development to help direct any proposed development to the most appropriate location in landscape and visual terms within each Landscape Character Area (LCA).

~~7.2.30 The study concluded that in both the AONB and SLA and areas contributing to their setting, there is no capacity for wind energy development with the exception of very infrequent domestic scale development which should relate well to existing settlements/buildings. The setting of the National Park and World Heritage Site limits the capacity/scale of developments in such locations.~~

~~7.2.31 For areas outside the AONB, SLA or the setting of a sensitive location there is potential for either Micro or Small scale developments as defined in the table below.~~

~~7.2.32 Medium scale wind farms / turbines will be limited to development on suitable urban / industrial brownfield sites or subject to suitable justification as a repowering scheme for an existing wind farm / turbine.~~

~~7.2.33 Since no Strategic Search Area has been identified within the area no Large or Very Large scale wind farms / turbines will be supported.~~

7.2.33A **The following table identifies the wind turbine typology used to categorise the size (height and scale) of the development in terms of its potential to be acceptable within the landscape. For information purposes, details of the indicative output for each category.**

Table 13: wind turbine typology used in Policy ADN1

Wind Energy Typology	**Indicative Output (broad output category)**	**Supplementary Criteria** (to be read in conjunction with Policy ADN 1) **(meets one or more of the criteria) (determines whether this typology applies**
DOMESTIC	Under 10kW	• Single turbine applications • Turbine up to 15m to blade tip • Turbine may be roof-mounted or pole-

MICRO	under 50kW	• Single or twin turbine applications • Turbine up to 20m to blade tip
SMALL	under 5MW	• Turbines up to 3 in number • Turbines up to 50m to blade tip • Viewed as a small group
MEDIUM	over 5MW and up to 25MW	• Turbines up to 9 in number • Turbines up to 80 metres to blade tip • Viewed as a large group
LARGE	over 25MW	• Turbines over and including 10 in number • Turbines up to 110 metres to blade tip • Viewed as a large scale wind farm
VERY LARGE	Over 25MW	• ~~Turbines over and including 10 in number~~ • Turbines over 110 metres to blade tip • Viewed as a very large scale wind farm

~~7.2.34 Encouragement is given towards community based projects in appropriate locations. The LPA will seek to negotiate Community Benefits in respect of wind farms / turbine development as a means to off-set or compensate for community impacts.~~

7.2.35 An important consideration is the potential cumulative effect of wind farms / turbines, both implemented and those permitted, together with prominent landscape features. This could involve cumulative impact in relation to noise, visual, design, ecology, social, ground and surface water.

7.2.36 ~~Regard should be given to other policies within the Plan especially those in relation to the natural and historic environment. Supplementary Planning Guidance will be prepared to provide advice on the mater.~~

7.2.37 Guidance on the Application of Separation Distances from Residential Properties Study was commissioned by the Isle of Anglesey, Gwynedd and Snowdonia National Park to consider development such as on-shore wind energy by evaluating the suitability of introducing minimum separation distances..

7.2.38 The report concluded that minimum separation distances were not appropriate; however indicative residential visual amenity assessment trigger distances were appropriate. This means that for development within these distances to a residential property (other than the applicants/application sites own property) a residential visual amenity assessment should support the application.

Table 14: Residential visual amenity assessment trigger distance

Height of Proposed Wind Farm / Turbine (to blade tip)	Residential Visual Amenity Assessment Trigger Distance (Potential 'Very Large' Scale of Visual Impact)
Up to 25m	Within 200m
25.01 to 50m	Within 400m
50.01 to 75m	Within 600m
75.01 to 100m	Within 800m
Over 100.01m to 150m	Within 1.22km

7.2.38A **Experience has shown that there area possibile opportunities to achieve community benefit through wind turbine development. Some benefits can be justified as being mitigation measures through the planning process, e.g. improvements to the highway infrastructure and the creation or management of wildlife habitats. Development can also lead to benefits that aren't directly related to the planning process, e.g. annual financial payment to the community or from the developer's commitment to use local labour wherever possible.**

7.2.38B **Consideration should be given to other policies within the Plan particularly those in relation to the natural and historic environment. Supplementary planning guidance provides guidance on the placement of separate development of renewable energy.**

POLICY ADN 1A: PV SOLAR ENERGY

Proposals for Solar PV Farms of 5MW or more should be directed to the potential search areas shown on the Proposals Map. Proposals of this scale will only be permitted in other locations in exceptional circumstances when the need for a scheme can be justified and there are specific locational circumstances.

Proposals for Solar PV Farms of 5MW or more and other solar schemes of up to 5MW will be permitted provided that the proposal conforms to the following criteria:

1. **All impacts on landscape character, heritage assets and natural resources have been adequately mitigated, ensuring that the special qualities of all locally, nationally and internationally important landscape, biodiversity and heritage designations, including, where appropriate, their settings are conserved or**

enhanced;

2. The proposal will not result in significant harm to the safety or amenity of sensitive receptors including effect from glint and glare and will not have an unacceptable impact on roads, rail or aviation safety;
3. The proposal will not result in significant harm to the residential visual amenities of nearby residents;
4. The proposal will not have unacceptable cumulative impacts in relation to existing solar PV farms and those which have permission and other prominent landscape features;
5. The panels and associated infrastructure will, at the end of the operational life of the facility, be removed in accordance with a restoration and aftercare scheme submitted to the Local Planning Authority.
6. That a Construction Environmental Management Plan (CEMP) is provided to demonstrate that any potential negative effects arising during construction and decommissioning phases are avoided.

Explanation:

7.2.38A An assessment of the potential for solar PV farms in the Gwynedd Planning Authority area and Ynys Môn was commissioned to identify potential areas of search for solar farm development. It was based upon the methodology outlined within Planning for Renewable and Low Carbon Energy – A Toolkit for Planners (2015) by the Welsh Government.

7.2.38B Based upon a strategic level assessment it identified potential opportunity areas that could deliver schemes of 5MW or more. As search areas, the identified areas provide an indication of solar energy resources within the Plan area as oppossed to specific safeguarded areas. The search areas have been identified by mapping solar energy resources (based on slope and orientation) and by removing significant constraints to solar energy development. The Study identified 11 possible areas. Due to landscape sensitivity and capacity issues some of these potential areas may only be able to achieve 5MW or more through 2 or more separate schemes subject to consideration of any potential cumulative impact. The following table identifies areas shown on the Proposals Maps.

Table 14 : Potential Search Areas

Potential Search Area Number	Location of Site (Nearest Settlement)	Total Site Area (Ha)
S1	Rhoslan	117.3
S2	Rhoslan	90.9
S3	Llangefni	14.4
S4	Pentraeth	13.2
S5	Pentraeth	27.0
S6	Gwalchmai	54.9
S7	Gwalchmai	44.1
S8	Llanddeusant	126.7

S9	Llanddeusant	19.3
S10	Caergeiliog	115.0
S11	Caergeiliog	12.3

7.2.38C Within the potential search areas applicants will be required to undertake further refinement to identify specific opportunities for detailed development proposals and to consider their suitability and capacity for renewable energy production. Detailed proposals within the potential search areas and on any other site in the Plan area will be required to demonstrate compliance with the criteria in this Policy and other relevant policies.

POLICY ADN2: OTHER RENEWABLE ENERGY AND LOW CARBON TECHNOLOGIES

Proposals for ~~non-wind~~ renewable and low carbon energy Technologies, other than wind or solar, which contribute a low carbon future will be permitted provided that the proposal conforms to the following criteria:

1. **all impacts on landscape character, heritage assets and natural resources have been adequately mitigated, ensuring that the special qualities of all locally, nationally and internationally important landscape, biodiversity and heritage designations, including, where appropriate, their settings are conserved or enhanced;**
2. **that the proposal does not have a significant unacceptable effect on visual amenities;**
3. **that the proposal is mitigated to ensure that there aren't any significant unaceptable effects on sensitive uses located nearby;**
4. **where appropriate, that the proposal does not have a significant unacceptable effect on the quality and supply of water;**
5. **where appropriate, existing buildings or previously developed land is used;**
6. **that the development does not have cumulative unacceptable effect with any prominent features in the landscape or townscape;**
7. **where required, that the Equipment and associated infrastructure are removed from the site in accordance with a restoration and aftercare scheme submitted to the Local Planning Authority.**

Where necessary, proposals should be informed by the landscape and visual impact assessment.

~~within development boundaries provided they do not cause unacceptable impact to the character or amenity of the area.~~

~~Small scale proposals located outside development boundaries are required to justify the need to be sited in such a location.~~

~~Large scale proposals located outside development boundaries will be permitted in exceptional circumstances where there is an overriding need for the scheme which can be satisfactorily justified or there are specific locational circumstances for the siting of the development.~~

~~In all cases proposals should not cause an unacceptable harm to the landscape, biodiversity, archaeology and areas of historic value or their settings. In addition the potential effect of cumulative impact of renewable energy technologies should be considered.~~

Explanation:

7.2.39 This policy covers a range of renewable energy technologies including ~~solar,~~ biomass, heat pumps, hydro power, Combined Heat and Power (CHP). This policy does not cover on-shore wind farms / turbines which are covered by policy ADN1 **or solar energy that is covered in Policy ADN 1A.**

7.2.40 TAN 8 and Practice Guidance – Planning Implications of Renewable and Low Carbon Energy Development provide technical detail and definitions for understanding the characteristics of these technologies to aid assessment of proposals.

7.2.41 **Whatever the scale, careful consideration will need to be given to the likely adverse effects that could arise from the proposal. In terms of mitigation, schemes need to be well planned, reflect local circumstances and show how any environmental, social plans, resources and economic impacts have been minimised by careful site selection, design, construction, operation and other measures. In this regard, in considering the impact on other features and designations, proposals need to have due regard to the requirements of other policies in the Plan, where applicable. Further guidance is provided regarding the identification and assessment of schemes in the Supplementary Planning Guidance on siting standalone renewable energy infrastructure.** ~~In considering proposals within development boundaries, consideration will be given towards the potential impact upon the amenity of adjacent land, properties, residents and the community. Proposals will not be permitted if they have an unacceptable impact upon archaeology, conservation area or the setting of a conservation area, listed buildings or other features or areas of historical value.~~ ~~**In line with criterion 3 of policy PS5 Sustainable Development, priority will be given towards the use of previously developed land and buildings for renewable energy technologies.**~~

7.2.42 ~~Small scale developments outside development boundaries should be located in close proximity to existing buildings and structures and will not cause unacceptable harm to the landscape, biodiversity, archaeology and areas of historic value or their setting.~~

7.2.43 ~~Large scale developments outside development boundaries should provide justification over the need to locate the development in the open countryside as well as not cause an unacceptable harm to the landscape, biodiversity, archaeology and areas of historic value or their setting.~~

7.2.44 The potential cumulative impact of renewable energy technologies should consider unacceptable harm in relation to landscape, visual impact, noise, ecology and ground and surface water.

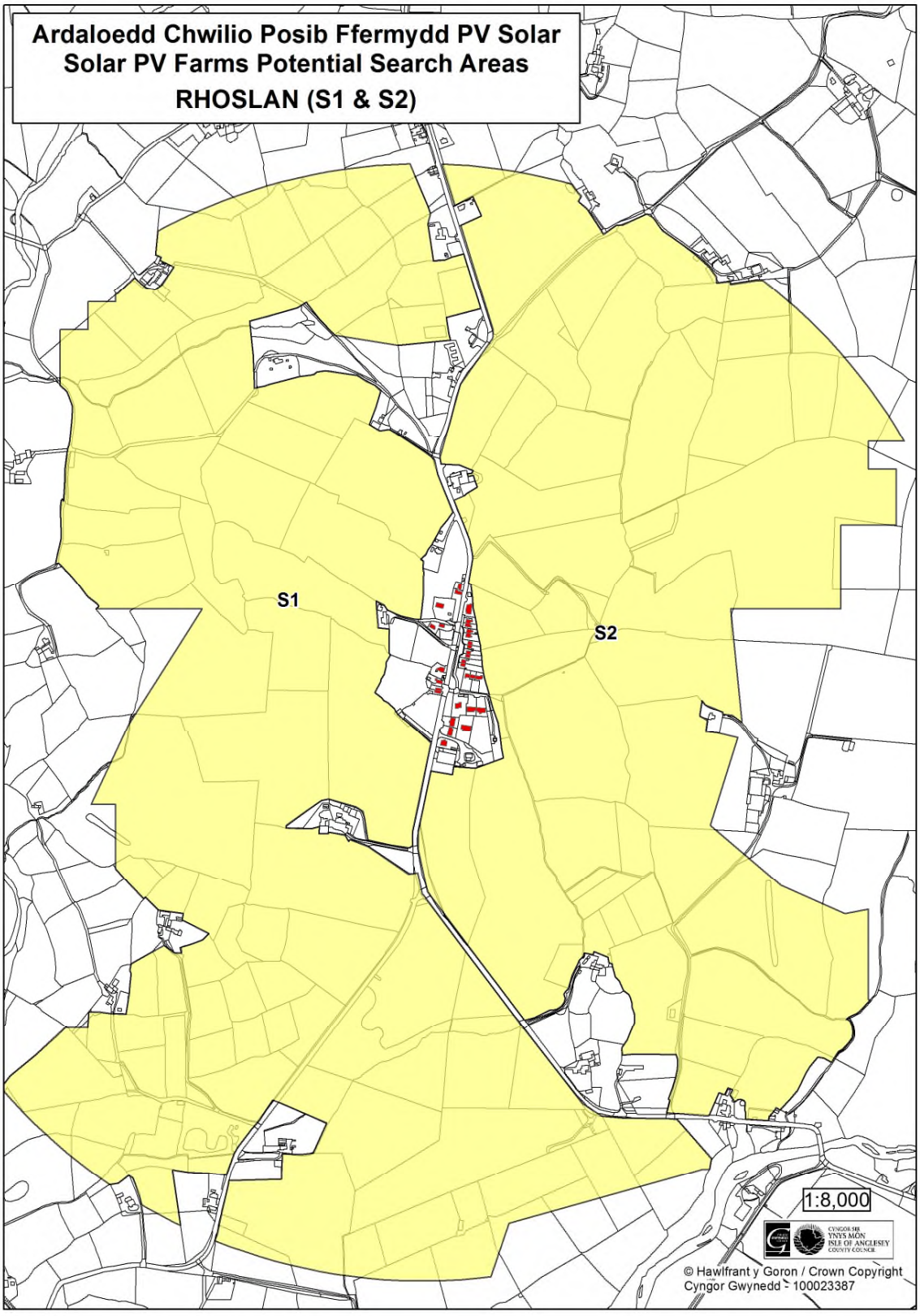
7.2.45 ~~The Isle of Anglesey, Gwynedd and Snowdonia National Park Landscape Sensitivity and Capacity Study was commissioned to manage development such as field scale solar PV energy development by identifying and protecting sensitive and distinct areas from inappropriate development.~~

7.2.46 ~~The indicative landscape capacity within the Sensitivity and Capacity Study, helps to identify the type of developments which could be potentially accommodated, however, this does not in itself suggest that planning applications for development in these areas will be appropriate. Other variables such as environmental designations and technical constraints, site specific siting, layout and design will need to be considered on a case by case basis.~~

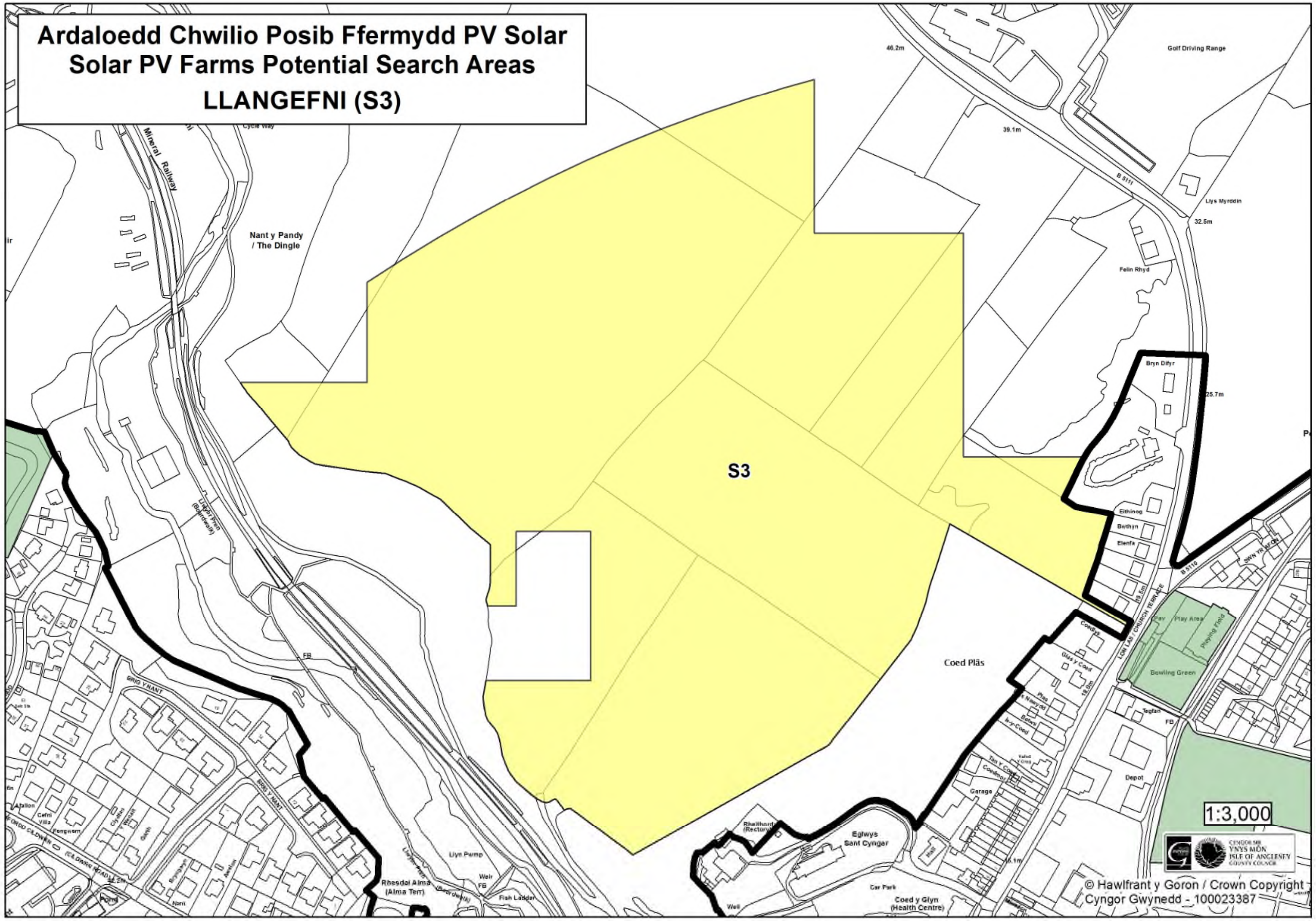
7.2.47 ~~The Sensitivity and Capacity Study produces specific guidance notes for each type of development to help direct any proposed development to the most appropriate location in landscape and visual terms within each Landscape Character Area (LCA).~~

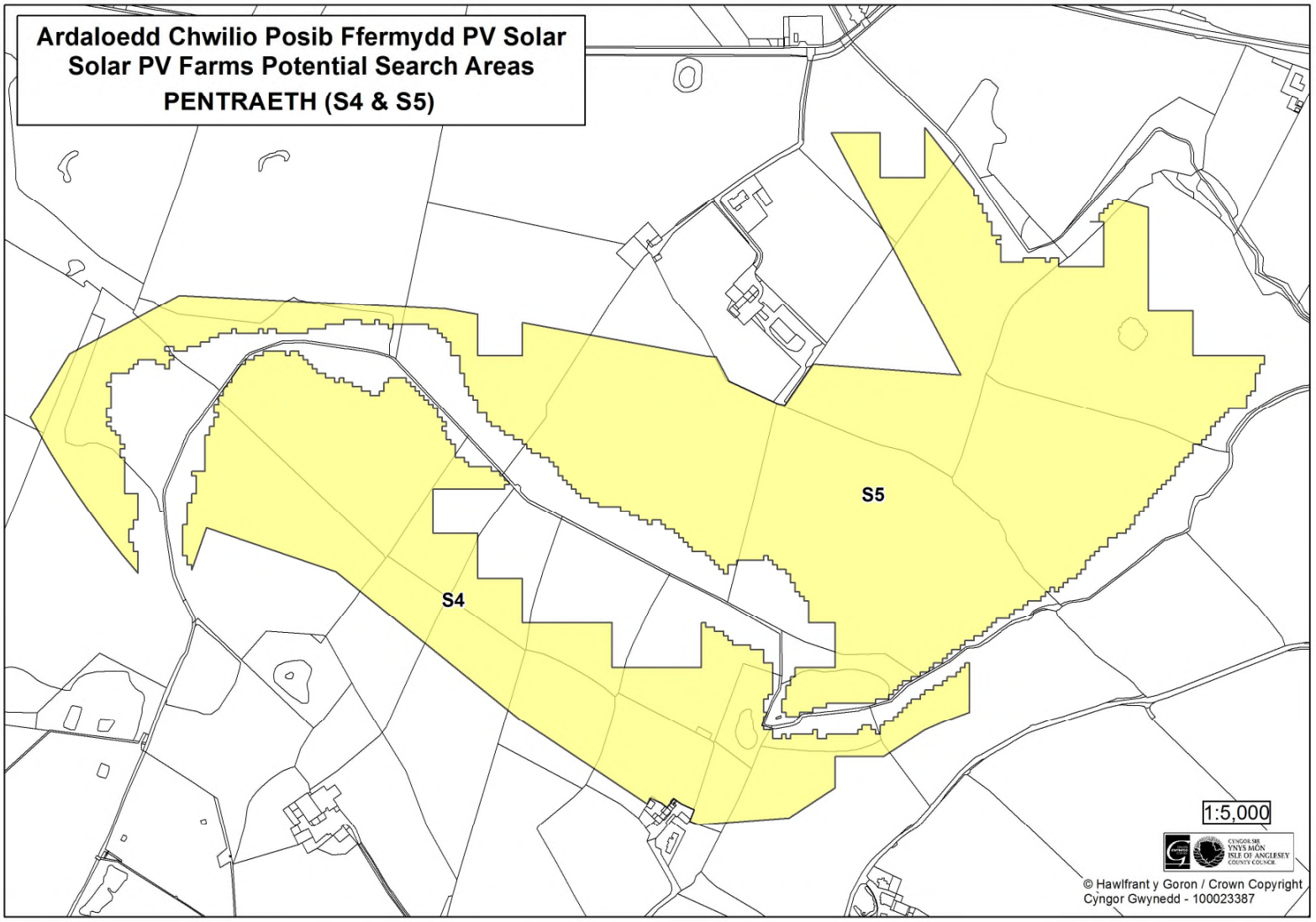
7.2.48 ~~Regard should be given towards the Sensitivity and Capacity Study in relation to the potential scale of development that could be accommodated in the different LCA.~~

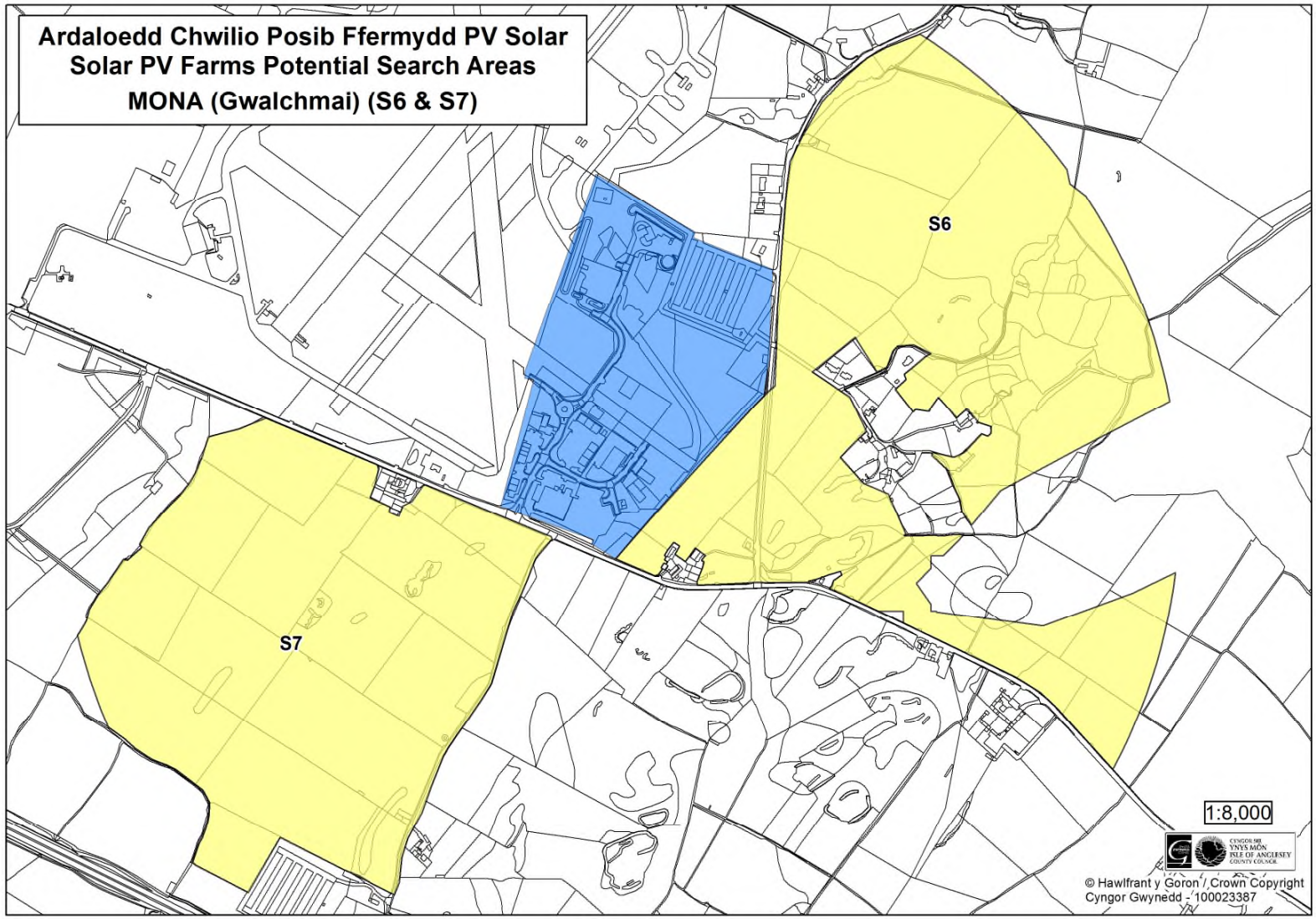
APPENDIX 3 – Matters Arising Changes Maps showing Potential Sites for PV Solar Farms

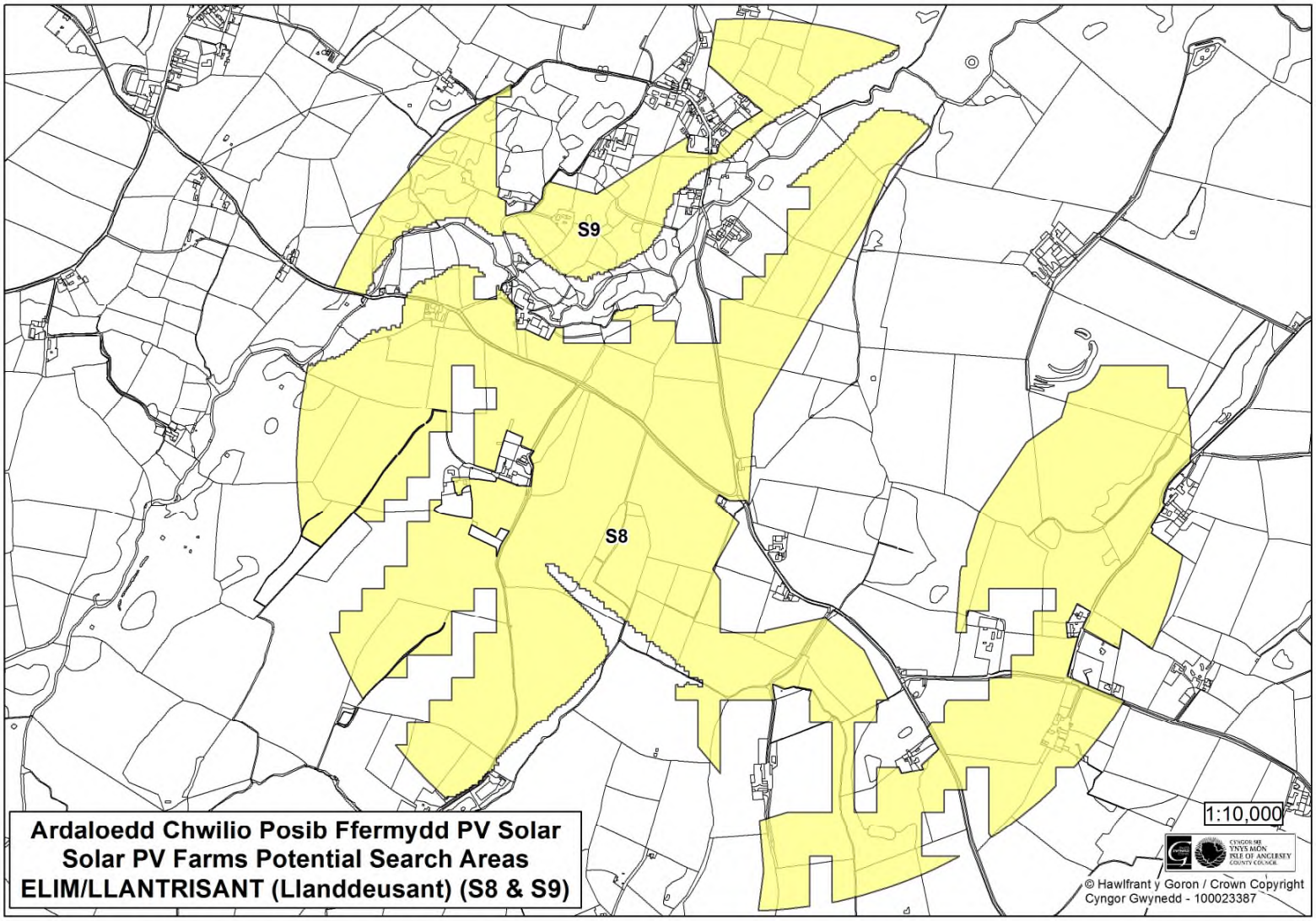


Ardaloedd Chwilio Posib Ffermydd PV Solar
Solar PV Farms Potential Search Areas
LLANGEFNI (S3)

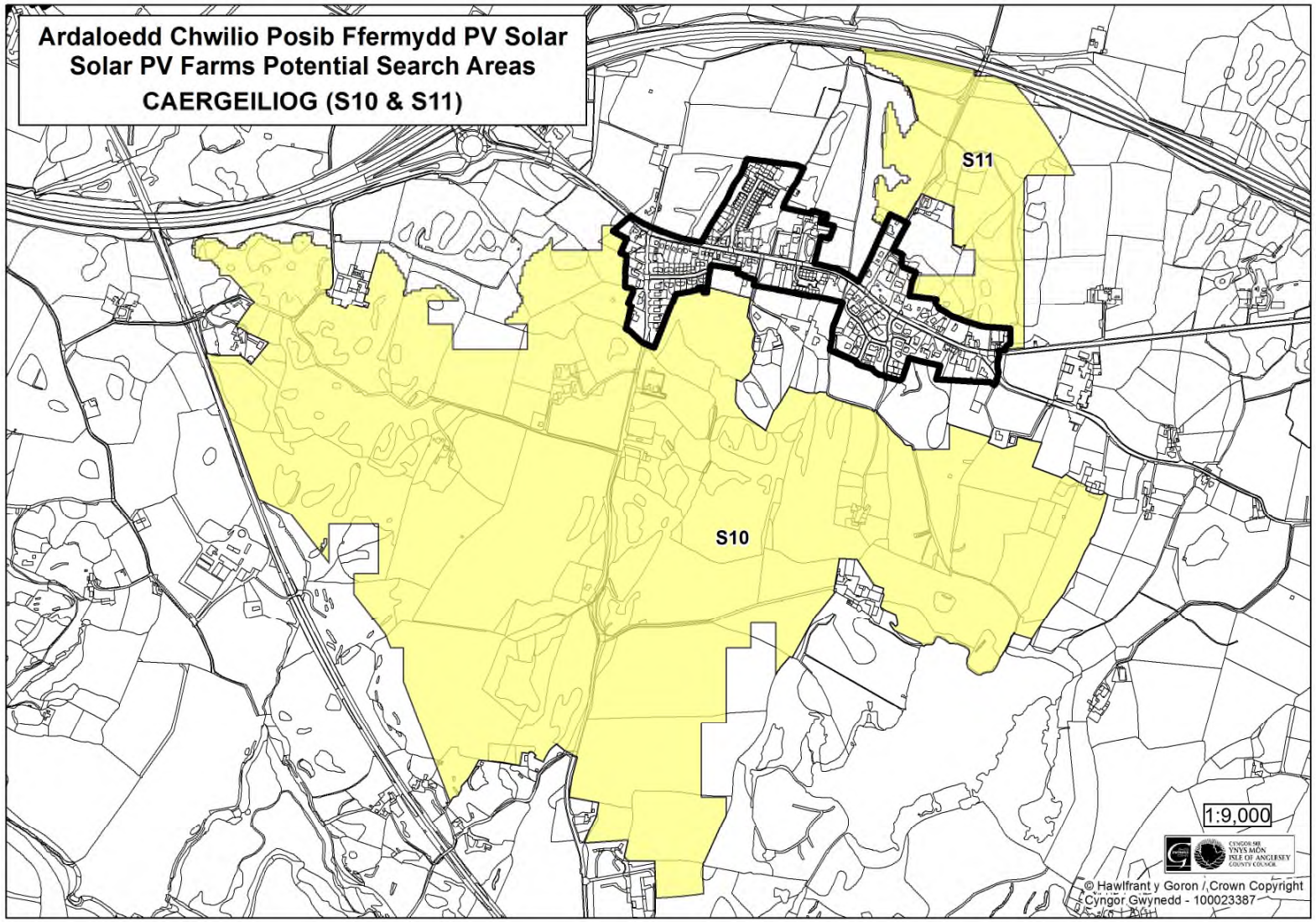



Ardaloedd Chwilio Posib Ffermydd PV Solar
Solar PV Farms Potential Search Areas
PENTRAETH (S4 & S5)
S5
S4
1:5,000
CYNGOR SIR
YNYS MÔN
ISLE OF ANGLESEY
COUNTY COUNCIL
© Hawlfrant y Goron / Crown Copyright
Cyngor Gwynedd - 100023387


Ardaloedd Chwilio Posib Ffermydd PV Solar
Solar PV Farms Potential Search Areas
MONA (Gwalchmai) (S6 & S7)
S6
S7
1:8,000
CYNGOR SIR YNYS MÔN ISLE OF ANGLESEY COUNTY COUNCIL
© Hawlfraint y Goron / Crown Copyright
Cyngor Gwynedd - 100023387



Ardaloedd Chwilio Posib Ffermydd PV Solar
Solar PV Farms Potential Search Areas
ELIM/LLANTRISANT (Llanddeusant) (S8 & S9)


Ardaloedd Chwilio Posib Ffermydd PV Solar
Solar PV Farms Potential Search Areas
CAERGEILIOG (S10 & S11)
S11
S10
1:9,000
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Cyngor Gwynedd - 100023387

APPENDIX 4 – Matters Arising Changes to Policy PCYFF 4 (amendments shown in **Red** or by ~~strikethrough~~):

Policy PCYFF 4 and its explanatory text (paragraphs 7.2.14 i 7.2.20), which were submitted to the Examination is deleted and replaced by the following:

Policy PCYFF 4

Proposals will need to demonstrate how the energy hierarchy set out in Policy PS 6 has been applied and how the contribution from renewable or low carbon energy to satisfy the proposals need for energy and waste has been maximised.

Where appropriate, the co-location of development in order to optimise opportunities to connect to renewable or low carbon energy technology will be supported.

Residential development on sites for 100 housing units or more, and non-residential development of 100 sq metres or more, will be required to submit a comprehensive Renewable Energy Assessment to determine the feasibility, including viability issues, of incorporating renewable or low carbon technology and/ or, where appropriate, connect to renewable or low carbon technology. The Assessment will be expected to address the following matters:

1. **Energy efficient design – development should maximise energy efficiency though design, layout, orientation, and use of other techniques to incorporate energy efficiency methods; and**
2. **Renewable energy feasibility – full assessment of the feasibility of all on site renewable energy technologies. The response should provide details of :**
    - i. **The energy generated and the CO^2 savings;**
    - ii. **The proposed technology's capacity and size;**
    - iii. **Location of the technology plotted on site plans.**

Explanation

7.2.14A **It is important that new development responds to the challenges arising from climate change. Part of this response should include consideration of carbon management in applications for new buildings, including energy efficiency**

measures and renewable energy. Existing buildings also have a role to play and the inclusion of appropriate carbon management measures is encouraged in existing buildings.

7.2.15B The "Renewable Energy Opportunities Study - towards renewable energy targets" (2016) has assessed the capacity for renewable energy and low carbon technologies in the Plan area. Developers are encouraged to look into all aspects of the Plan area's ability to contribute to reducing the country's carbon emissions. Planning permission is not required for some micro-generation technologies under the General Permitted Development Order. It is suggested that an applicant looks at sections 40 and part 43 of the Order and take advantage of the pre-application advice service provided by the Councils before submitting a planning application.

APPENDIX 5 – Addendum to Assessment of the Potential for solar PV farms

Addendum – Assessment of the potential for solar PV farms in Gwynedd and Ynys Môn

1 Following completion of the Assessment of the potential for solar PV farms in Gwynedd and Ynys Môn in July 2016, LUC was asked to further assess the resultant 'Opportunity Areas' to identify areas that could potentially accommodate 'local authority-wide scale installations' (5MW and larger as defined by the Welsh Government[1]).

2 For solar PV farms, a minimum of 12ha is generally required to accommodate such an installation. As such, the Opportunity Areas in **Tables 3.1** and **3.2** of the report were further evaluated in terms of their land area. Applying an area constraint of 12ha results in the removal of:

- Two top rated Opportunity Areas (Site IDs 35 and 84)
- Three Opportunity Areas ≤12ha within lower landscape sensitivity (Site IDs 34, 37, 39)
- 15 Opportunity Areas ≤6ha (Site IDs 32, 42, 45, 47, 50, 51, 52, 53, 56, 57, 58, 59, 60, 61, 62)

3 16 Opportunity Areas remain as a result. Of these 16 Opportunity Areas, information from the Landscape Sensitivity Assessment and the review of grid infrastructure indicate that five of these sites are critically constrained in terms of grid infrastructure and would likely only accommodate installations of ≤2.5MW as result of landscape sensitivity. These Opportunity Areas are therefore unlikely to be able to accommodate 'local authority-wide scale installations'. These Opportunity Areas area shown in **Table 1.**

[1] http://gov.wales/docs/desh/publications/151021renewable-energy-toolkit-en.pdf

Table 1 Opportunity Areas over 12ha with critical grid constraints and higher landscape sensitivity

Site ID	Location of Site (Nearest Settlement)	Total Site Area (ha)
9	Llanddona	72.0
20	Llandegfan	22.3
22	Llanfairpwll	14.7
23	Bangor	16.3
2	Gaerwen	137.6

4 Of the remaining Opportunity Areas over 12ha, nine Opportunity Areas are currently critically constrained in terms of grid infrastructure, but have lower landscape sensitivity and could potentially accommodate installations of 2.5MW-5MW. These areas are shown in **Table 2.**

Table 2 Opportunity Areas over 12ha with critical grid constraints and lower landscape sensitivity

Site ID	Location of Site (Nearest Settlement)	Total Site Area (ha)
26	Llangefni	14.4
28	Pentraeth	13.2
16	Pentraeth	27.0
4	Gwalchmai	54.9
10	Gwalchmai	44.1
6	Llanddeusant	126.7
19	Llanddeusant	19.3
3	Caergeiliog	115.0
27	Caergeiliog	12.3

5 The two remaining Opportunity Areas are identified as top rated opportunities in the original study and are **over 12ha in size and within areas that are without critical grid constraint for generation connections**. However the landscape Sensitivity Assessment indicates that these areas are only suitable for installations ≤ 2.5MW. These two Opportunity Areas are shown in **Table 3.**

Table 3 Opportunity Areas over 12ha without critical grid constraints

Site ID	Location of Site (Nearest Settlement)	Total Site Area (ha)
5	Rhoslan	117.3
7	Rhoslan	90.9

6 Whilst the landscape sensitivity assessment indicates that these two 'opportunity areas' are not suitable for installations over 2.5MW, they are located in areas without critical grid constraints and therefore the Council may wish to consider how the Joint Local Development Plan can provide positive support for the development of large scale solar within these areas (notwithstanding the need for site specific assessments and design and that all applications would be assessed on their individual merits).