Representor name: Rosemary Watton 29.05.17
Representor ID: **6639**

Response for Hearing Session 15: RENEWABLE ENERGY

ADDITIONAL COMMENTS REGARDING REVISED RE POLICY ISSUED MAY 2017

Dear Ms Gulley,

The following additional comments relate specifically to the revised Renewable Energy Policy issued May 2017. I have enclosed separately comments that relate to FFC 79 RE1 – November 2016.

Qu3. In respect of renewable energy policies and proposals, has the Plan been prepared in accordance with the necessary procedural requirements?

3b) Has the Plan been subject to a robust Sustainability Appraisal, Strategic Environmental Assessment and Habitats Regulations Assessment/Appropriate Assessment?

2.2 Sustainability Appraisal page A10

Table 2.3 Questions Used in the Assessment of Policy RE1

Question Ref. No.	Sustainability Topic	Prompting Questions
Environmental Capital		
2.	**Energy**	How can this policy/objective reduce the demand for energy? (For example, through measures to use less and innovative solutions in energy supply, demand, **storage** and distribution). How can it encourage energy to be produced from renewable sources?

Although consideration of energy *storage* is only listed above as an example, it is something that is rapidly becoming of increasing significance

The recent **Green Alliance Report** (April 2017) – **How Consumer Choice is Changing the UK Energy System** states on p2:

"Within the next three years, it will make economic sense for commercial buildings to install their own solar and defect from the grid. Low cost batteries, including those in EVs, mean many individual households and commercial buildings could operate off grid for months at a time by 2025."

The report further states on p5:

"Within the next few years, small scale technologies will begin to fundamentally reshape the power market and, in doing so, they will completely change the government's role in the energy system."

This accelerated uptake in BIR's is reflected in the AECOM Renewable Energy and Low Carbon Assessment (p50) which highlights the significant increase in the uptake of BIR Renewable Electricity

in Powys. The BIR Renewable Electricity uptake is stated as 10.1MW up to the end of March 2016 compared with 1.3MW previously predicted for the end of 2015).

The Committee on Climate Change in their 2013 report (*Pathways to high penetration of electric vehicles)* estimates that by 2030, 37% of the UK's vehicle fleet will be plug-in hybrid electric vehicles (PHEV).

We are therefore approaching a situation that will cause stresses on the National Grid. On the one hand the grid will be unable to accept all the electricity generated at peak times by BIR's and Solar PV and on the other hand the impact of a large number of households recharging cars at the same time (typically at night) could lead to a situation where supply cannot cope with demand. The role of battery storage to even out the over-supply and over-demand will become increasingly important.

The Green Alliance Report discusses several cases in the UK, wider Europe and the US where this situation has been dealt with in an innovative, progressive and positive manner and others where the approach has been regressive and negative.

The full report can be found under the following link:

http://www.green-alliance.org.uk/resources/People_power_how_consumer_choice_is_changing_UK_energy_system.pdf

For more information on the Green Alliance and the above report please see **Appendix A.**

I can find little consideration given to energy *storage* solutions in the Renewable Energy Position Statement May 2017. In the light of the above discussion, is this omission perhaps something that should be recognised in the SA assessment that currently states "very positive" under impact?

With regard to the **Soundness** of the plan, does the lack of consideration of over-supply and over-demand raise questions as to whether the plan will be able to deliver?

See also 3c below for consideration of *storage* and one example from the Green Alliance Report.

*3c) Has the Plan been informed by a robust consideration of reasonable alternatives**?***

1. Powys has a significantly high proportion of homes not connected to Mains Gas and also significant restraints with regard to the grid network. The Powys **PSB Well Being Assessment 2017** states on p8:

Approximately 53% (31,000) properties in Powys are not connected to the gas network, this is greater than the figure for Wales (15%). Properties that are not connected to the gas network are likely to rely on alternative, more carbon intensive forms of heating, such as oil, LPG and night time storage heaters.

Many of these properties will be isolated rural properties or in rural villages. In the light of this has sufficient weight been given to micro technologies and battery storage?

I. **Building Integrated Solar PV and Battery Storage**

With regard to solar power could the emphasis move from LSA's to the promotion of installations on all types of roof tops, including residential housing, public buildings and commercial buildings? Given the advancement in battery technology could a partnership be set up with a battery manufacturer so that this energy can be stored for use when it is needed rather than being transported to a grid structure which at the moment is inadequate to deal with the additional potential energy generated. A recent article in the Guardian outlined a trial in South Yorkshire where 30 homes will have energy storage batteries fitted free to see if they can make solar power more valuable to homeowners whilst reducing the amount of energy exported to the grid. Given the lack of adequate grid infrastructure could this form part of an alternative, positive, and forward-looking vision for renewable energy in Powys? – a vison that would be far more likely to gain widespread public support.

It is also the case that with the development of electric cars home battery storage will become increasingly important.

The following links give more details of the above trial:

http://www.moixa.com/press-release/home-battery-trial-aims-increase-electricity-network-capacity-enable-solar-homes-save-millions-customers/

https://www.theguardian.com/business/2017/jan/21/batteries-included-yorkshire-village-seeks-to-solve-riddle-of-too-much-sun

See Appendix B for a full paper copy of the first link above.

II. **Green Alliance Report: People power - How consumer choice is changing the UK energy system** (April 2017)

A recent Green Alliance Report stresses the importance of the rapidly growing micro-generation market as **primary** source of renewable energy (p3):

*Rather than intervening to restrict popular, small- scale energy in favour of large generators, the state can govern intelligently and actively, and enable large and small to work together**. Doing so would mean seeing consumer led, market driven, small scale energy as primary**, even if it is not the largest source of power. Large scale energy would need a new, more explicit governance framework to enable it to support small scale energy, particularly in the winter time, allowing the whole system to decarbonise at least cost while keeping the lights on.*

Active energy governance in the UK requires four main interventions:

*i. An independent system designer should provide robust technical analysis and option testing of the best ways to **integrate small energy** into the overall system.*

*iii. The capacity market should **value small scale energy technologies**, so underutilised, distributed, flexible sources can help to balance the grid, rather than undermining it.*

The following article is taken from p19 of the report and it highlights a progressive approach to evening out supply and demand.

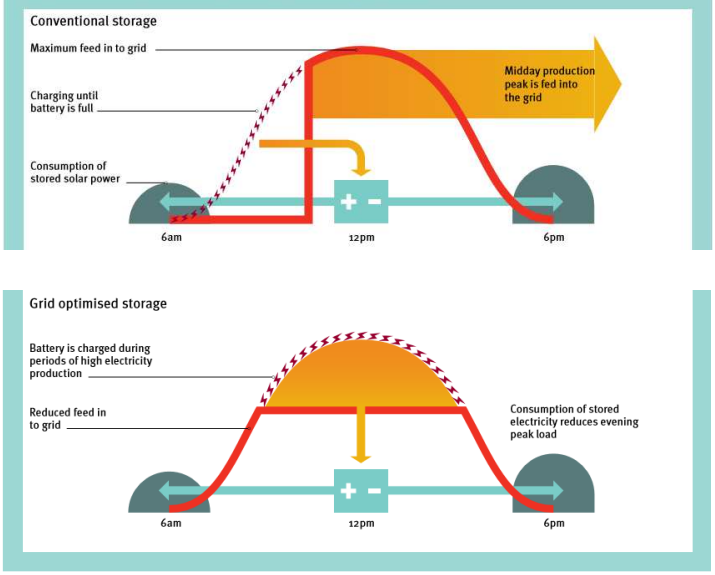
Germany: giving consumers freedom to take control

The German government has taken steps to encourage the coupling of residential storage and solar PV, to prevent overloading the grid during periods of peak production (see below).[40] In the absence of storage, feeding surplus power back into the grid can lead to grid congestion, if it takes place during the midday production peak. This requires costly network upgrades to handle the inflow of electricity or it can lead to curtailment of renewable generation.

To ensure the optimal integration of small to medium solar PV, the government has set targets for self-consumption and has subsidised the installation of residential battery systems to reduce PV maximum feed-in to 50 per cent.[41] These limits enable 66 per cent greater penetration of PV, giving households and businesses the freedom to take control over their energy without disrupting the grid.[42]

Nearly one in two new solar installations in 2015 included battery storage, and the programme has been extended to 2018, aiming to reach 100,000 installations by the time of completion.[43]

Conventional and optimised use of solar PV and storage systems[44]



III. Micro Hydro Power

Micro hydro is typically defined as the generation of electricity from a few hundred watts up to 100kW.It is a technology that lends itself particularly to rural villages and rural properties**.** Has sufficient consideration been given to the development of this technology in areas with low and medium sensitivity?

The following statement is taken from the TGV Hydro website:

"Hydro power is a reliable and proven technology with minimal environmental impact, no major planning obstacles, and is well suited to the topography and climate of Wales. ***We have developed a highly efficient micro-hydro system suited to small sites. If you have access to a fast running stream that drops more than 20m, you could soon be generating your own electricity and making money."***

http://www.tgvhydro.co.uk/overview/guide-to-microhydro/

See Appendix C for a copy of the article in the above link

2. The Effect of the Development of Tidal and Wave Power.

Wind power (at 27% efficiency) and solar PV farms at (at 10% efficiency) are inefficient renewable technologies. Wales, with its long coastline, is surrounded by water and has a significant capacity for off shore wind, and wave and tidal power generation (Severn Barrage and Swansea tidal lagoon to name just two under consideration). In the longer term, as these technologies develop they will have

the capacity to deliver a very significant proportion of Wales electricity far more efficiently. As such the demand for large scale less efficient land-based technologies is likely to reduce.

Has the effect of these developing water based technologies been given sufficient consideration in the long-term planning for renewable energy?

Qu4. Does the Policy RE1 provide an appropriate policy framework for realising the area's potential for renewable energy generation?

4a) Is the policy consistent with the requirements of other legislation and national planning policy?

TAN 8 is clear in its recommendations regarding the development of Wind Power outside SSA's:

> **2.13** Most areas outside SSAs should remain free of large wind power schemes. Local planning authorities may wish to consider the cumulative impact of small schemes in areas outside of the SSAs and establish suitable criteria for separation distances from each other and from the perimeter of existing wind power schemes or the SSAs. In these areas, there is a balance to be struck between the desirability of renewable energy and landscape protection. Whilst that balance should not result in severe restriction on the development of wind power capacity, there is a case for avoiding a situation where wind turbines are spread across the whole of a county. As a result, the Assembly Government would support local planning authorities in introducing local policies in their development plans that restrict almost all wind energy developments, larger than 5MW, to within SSAs and urban/industrial brownfield sites. It is acceptable in such circumstances that planning permission for developments over 5MW outside SSAs and urban/industrial brownfield sites may be refused.
>
> **2.14** There will also be opportunities to re-power and/or extend existing wind-farms which may be located outside SSAs and these should be encouraged provided that the environmental and landscape impacts are acceptable.

This emphasis is further strengthened in TAN 8 statement 8.4 on p63 where the second statement strengthens the protection awarded to landscape character outside SSA's:

> 8.4: In the rest of Wales outside the SSA's, **the implicit objective is to maintain the landscape character ie no significant change in landscape character from wind turbine** (*and in this case solar pv*) **development.**

AECOM is a global company with a vested interest in large infrastructure projects including wind and solar farm developments. In the AECOM Renewable Energy and Low Carbon Energy Assessment I feel that a different slant is given on the above advice in TAN8 by the following statement that appears on p18:

"However, it is also clarified in TAN8 that it is referring only to "most areas" and elaborates that, whilst a whole county should not be covered with wind turbines, a balance is required between the desirability of renewable energy and landscape protection that should not result in severe restriction on the development of wind power capacity. LPAs should consider the evidence as it relates to their localities and particularly where there is potential nearby to SSA boundary lines. "

I feel that this *interpretation* of TAN 8 statements 2.13 and 2.14 *tilts* the meaning of the original statements in TAN 8 towards a position in favour of development.

This *tilt* is apparent in the numerous statements in the LDP Renewable Energy Position Statement that allow for the development of wind and solar farms both inside and **outside** SSA's and LSA's. This is a matter of significant concern and I have addressed it more fully under Agenda Question 5.

4b) Has the policy been informed by robust and credible evidence, particularly in relation to the defined local search areas (wind and solar) and the renewable electricity contribution (Table RE1)?

In FFC79 RE1 November 2016 a target was set of 600MW additional installed capacity from Renewable Energy sources.

In the revised Renewable Energy policy May 2017 this target has been reduced to an additional installed capacity of 61.7MW, the majority met by the equivalent of nine 5MW solar PV farm developments. This represents a welcome reduction of almost 90% on the initial target of 600MW additional installed capacity.

However, the AECOM report which provides the database for the LDP Policy is a cause of significant concern. There are errors in the data in several sections.

1. The **Building Integrated Renewables** (BIR) section is so full of errors that it becomes **impossible to read with any meaning**. I have dealt in detail with the errors in the BIR Section in **Appendix D**.

2. In Section 4 on the **Wind Energy Resource**, Table 7 (p25) gives a maximum potential wind resource for the Powys LPA of **4 MW *excluding*** the SSA's (which are counted as "existing generation").

Table 7: *Theoretical maximum potential wind resource (km²) for the Powys LPA area excluding SSAs.*

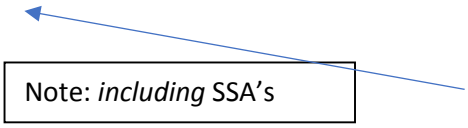
Wind Resource	
Area (km²)	0.40
Capacity (MW)	4
Generating Time (hours /year)	8,760
Capacity Factor (%)	27
Potential Energy Generated (GWh)	**9,461**

Note: *excluding* SSA's

However, in Table 25 on p51 the same 4MW capacity appears to ***include*** applications consented as of 31/03/2017 within the SSA plus the resource in the wider county.

Table 25: *Potential renewable energy resource in the Powys LPA area in 2026*

Resource	Electricity (MWe)	Thermal (MWt)
Biomass (CHP)	39.8	79.6
Biomass Boilers	-	57.6
Energy from Waste with CHP (includes poultry litter)	7.8	15.5
Hydropower	10.3	-
Landfill Gas	-	-
Wind (including SSAs)[65]	4.0	-
Solar PV Farms	220.0	-
Other (including sewage gas and AD with CHP)	1.6	2.3
Building Integrated	4.8	14.0
Total	**288.3**	**169.0**



There may be a reason for the above apparent difference but it is not obvious from the explanation given in the document.

3. Given the limited time available I have been unable to go through all the other sections in detail but I am aware of further errors.

If the errors are in fact as numerous as they appear to be, then it must call into question the validity of the database that underpins the AECOM report and the subsequent LDP Renewable Energy Policy on which it is based.

AECOM was responsible for producing the original report which underpinned the Renewable Energy Policy November 2016. The AECOM report (Aug 2016):

- Had significant shortcomings in methodology
- Relied on a significantly flawed dataset that underpinned the policy
- Resulted in a totally disproportionate Renewable Energy Target for Powys.

It is therefore a matter of concern that despite the above shortcomings AECOM was again appointed to review the Renewable Energy Policy.

Qu5. Does the Plan provide an appropriate balance between realising the area's potential for renewable energy production and the protection of the landscape, natural and historic environment of Powys?

6. Proposed Revised Renewable Energy Policy p12

4.10 Sustainable Energy

Policy RE1 – Renewable Energy ® 39.91

Proposals for renewable and low carbon energy development will be permitted subject to the following criteria. Appropriate locations will be defined by demonstrating compliance with Criterion 3.

1. *Proposals for wind energy development greater than 5 MW:*

i. *Wind energy proposals (greater than 25MW) will be directed to appropriate locations within the boundaries of the Strategic Search Areas (SSAs).*
ii. *Wind energy proposals (10 – 25 MW) will only be permitted in* ***appropriate locations and where they are in the national interest for meeting energy contributions.***
iii. *Wind energy proposals (5 – 10 MW) will only be permitted in* ***appropriate locations.***

2. *Proposals for Solar PV energy development greater than 5 MW:*

i. *Solar PV proposals (5 – 50MW) will be directed to appropriate locations within the boundaries of Local Search Areas (Solar LSAs).*
ii. *Outside Solar LSAs, solar PV proposals will only be permitted for:*
a) ***10 – 50MW in appropriate locations and where they are in the national interest for meeting energy contributions.***
b) ***5 – 10 MW in appropriate locations.***

3. *Proposals for all types of renewable and low carbon energy development and associated infrastructure either on their own, cumulatively or in combination with existing and or approved development, must comply with all other relevant policies in the LDP but in particular shall not have an unacceptable impact on:*

i. *The landscape including visual amenity in accordance with Policy DM3 – Landscape;*
ii. *The natural and historic environment in accordance with Policy DM2 – The Natural Environment and Strategic Policy SP7 – Safeguarding Strategic Resources and Assets;*
iii. *Residential amenity, groundwater quality, and highway safety, including during construction, in accordance with Policy DM15 – Design and Resources; and*
iv. *Radar, air traffic control systems, telecommunications links, television reception, radio communication and emergency services communications.*

4. *There are satisfactory proposals in place for site restoration and aftercare.*

1. The reduction from 600MW to 61.7MW additional installed capacity is to be welcomed. However, the Policy Document contains numerous vague statements that despite the designation of LSA's for Solar Power and the removal of LSA's for Wind Power would allow for the development of Wind and Solar Farms almost anywhere.

Despite the removal of LSA's for **Wind Farm** developments the above policy allows for developments of (10-25) MW and (5-10) MW in *appropriate* locations subject to the constraints of Criterion 3 above.

With regard to **Solar Farm** developments, Section 2ii above appears to allow for Solar PV farms in the range (**5 -50**) MW to be sited **outside** LSA's in *appropriate* locations subject to the constraints of Criterion 3 above

Concern has to be raised about this in the light of the recent Hendy Wind Farm application. The Hendy Wind Farm application was refused at the Planning Committee meeting on 27/4/17. However, it is of concern that despite numerous objections from environmental organisations and warnings of significant landscape impact by ENPLAN (the council's own consultants) the recommendation of the planning officer concerned was for *acceptance* of the application as it was considered that the need for Renewable Energy generation outweighed all other considerations.

This raises questions as to whether sufficient weight will be given by Planning Officers to the policies in DM3, DM2 and DM15.

In order to ensure sufficient protection is given to our vulnerable uplands there is clearly a need for the designation of:

I. **Special Landscape Area (SLA's) and**
II. **A dedicated Landscape Officer**

It is of significant concern that there are many other statements in the Position Document that suggest that Wind and Solar Farms could be considered almost anywhere outside LSA's. I have listed these statements in **Appendix E.**

2. It is also of concern that statements in the Position document suggest that **constraints could be loosened** to allow development of Wind and Solar Farms in areas that have been classified as **sensitive** to development.

I refer to the following section on p6 of the Position Document:

4.3 Additional Work Outcomes p6

4.3.2.2. From this additional work, least constrained land parcels could be identified for both solar PV farms and onshore wind technologies which were both above and below the thresholds as described in Section 4.1. above.

Outcomes for Onshore Wind Technology at End of Stage 2 (Map W4)

For onshore wind, based on the assumptions applied in the REA and including the additional constraints, a total of four unconstrained parcels of land were identified at Y Gigyn west of Welshpool and on ***Aberedw Hill east of Builth Wells****. However, no single parcel of land exceeded the threshold of 0.5 sq km and the three parcels of land on Aberedw Hill if combined totalled 0.36 sq km, again below the assumed threshold required to achieve 5MW.*

As a consequence, it has not been possible to define Local Search Areas for onshore wind technologies in the range 5-25MW for Local Authority-wide scale developments, ***although the Council recognise that varying the assumptions could increase or decrease the availability of least constrained land parcels.***

Outcomes for Solar PV Farm Technology at End of Stage 2 (Map S4)

As the Toolkit provides no guidance on the defining of LSAs, a set of guidelines was applied to the remaining least constrained solar resource land parcels to enable the initial solar LSAs to be identified, these being:

- *Boundaries have been drawn "tight" to clusters of least constrained land parcels so some "outliers" have been excluded but it may be possible to draw them into refined LSA* ***boundaries provided constraints are not included or the other criteria above broken.***

The reference to Aberedw Hill in the context of the above statement is of particular concern. The REA May 2017 states with respect to Aberedw Hill:

Recommendation: No potential for locating solar development without ***significant landscape and visual harms.***

The same recommendation has to also apply to Wind Farm development.

3. PPW states that consideration must be given to *optimising* the potential of Renewable Energy as the statement below from p9 of the Position Statement confirms:

5. Recommendations p9

5.0.2. To be in alignment with Planning Policy Wales, consideration must be given to ***optimising*** *the potential across all forms of renewable and low carbon energy and* ***any new policy must take into account small schemes for which the Plan would continue to remain generally supportive****, as well as local authority wide schemes of the scales identified in Planning Policy Wales.*

In the above context, it should be noted that "***optimise***" is not the same as *maximise*. The optimum solution is the best solution and it should *provide an appropriate balance between realising the area's potential for renewable energy production and the protection of the landscape, natural and historic environment of Powys.*

With regard to wind power, could it not be argued that the current designation of **SSA's** represents the *optimum* solution for Powys with regard to wind power and that therefore no further proposals for wind farms should be accepted. This would be in complete accord with TAN 8 guidelines which state under 8.4:

> In the rest of Wales outside the SSAs, the implicit objective is to maintain the landscape character i.e. no significant change in landscape character from wind turbine development.

And again under 2.13

> protection. Whilst that balance should not result in severe restriction on the development of wind power capacity, there is a case for avoiding a situation where wind turbines are spread across the whole of a county. As a result, the Assembly Government would support local planning authorities in introducing local policies in their development plans that restrict almost all wind energy developments, larger than 5MW, to within SSAs and urban/industrial brownfield sites. It is acceptable in such circumstances that planning permission for developments over 5MW outside SSAs and urban/industrial brownfield sites may be refused.

4. Table 31 (AECOM May 2017, p56) gives the following data:

Projected electrical demand in 2026 497 000MWh

	Installed Capacity MW	Energy Generated MWh	% of demand met in 2026 by renewables
Existing	336.7	809 557	163%
Additional by 2026	61.7	87 731	18%
TOTAL	398.4	897 288	181%

In other words, with its **existing** Renewable Installed capacity Powys is already generating 63% more electricity than its total requirement for 2026 from renewable sources.

With the additional installed capacity of 61.7MW, Powys will be generating 81% more electricity than its total requirement for 2026 from renewable sources.

Whilst fully accepting that Powys has a role to play in contributing towards National Targets, given the above contribution, why is it felt necessary to extend the potential areas for both wind and solar farms outside LSA's?

5. BIOMASS ENERGY RESOURCE

In the AECOM (May 2017) report it states that the Biomass resource is defined as either:

- Energy Crops (miscanthus & short rotation coppice) or
- Wood Fuel Resource

With regard to Wood Fuel Resource the following data are provided:

Source	Area (km^2)	Potential Installed Capacity (MWt)
NRW Forestry	187.86	17.1
Other Forestry	445.74	40.5
TOTAL	633.6	57.6

My concern is **whether the increased demand for wood fuel as a resource will result in increased coniferous forestry plantations on Powys upland**. This matter links also with the WOODWARM policy that was announced in the January 2017 Cabinet meeting. Unfortunately, this policy was announced in the same meeting as the Cabinet meeting dealing with FFC 79. As such it underwent very little discussion or scrutiny of the implications, one of which was an increase in coniferous forestry plantations in Powys.

(Word Count 2998)

The following appendices are attached to this report:

Appendix	Title	page
A	Green Alliance Report: How Consumer Choice is Changing the UK Energy System	i
B	Solar PV and Battery Storage	ii - iv
C	Micro Hydro Power	v
D	Errors in EACOM BIR report	vi -xi
E	Statements in LDP RE position statement that allow wind and solar development outside LSA's	xii - xiii

Yours sincerely.

Rosemary Watton

Appendix A Green Alliance Report

How Consumer Choice is changing the UK energy system April 2017

The full report runs to 37 pages and it can be found under the following link:

http://www.green-alliance.org.uk/resources/People_power_how_consumer_choice_is_changing_UK_energy_system.pdf

The Green Alliance is a charity and independent think tank focused on ambitious leadership for the environment. Its website states:

Green Alliance was launched in 1979 with the aim 'to ensure that the political priorities of the United Kingdom are determined within an ecological perspective'. Our name originally referred to the large group of eminent individuals from a wide range of professional spheres who were the founding members.

Status and mission

A charity and company limited by guarantee, Green Alliance is now the leading UK think tank working on environmental policy and politics. Always maintaining a non-partisan, pluralist stance, we work across all sectors, in partnership with companies and NGOs and with all the main political parties, to inspire and achieve policy change for a better environment.

Our stated mission is to promote sustainable development by ensuring that the environment is at the heart of decision-making.

Our three core aims are:

- *to make the environment a central political issue;*
- *to integrate the environment into public policy and decision making;*
- *to stimulate new thinking and advance the environmental agenda into new areas.*

Appendix B Solar PV and Battery Storage

The following article is taken from the Moixa Website:

January 19 2017

Moixa, Northern Powergrid and Energise Barnsley have teamed up in a ground-breaking trial to demonstrate how clusters of home batteries can increase capacity on the electricity network and enable more homes to install solar panels.

Moixa Smart Batteries will be installed in 40 homes and linked in a virtual power plant in the first project to study how this solution can reduce peak solar output onto the electricity networks when there is low local demand and save customers millions in the cost of running the UK's power network.

Electricity distributor Northern Powergrid, is funding installation of the batteries in Oxspring, near Barnsley, in properties owned by Barnsley Council and managed by Berneslai Homes. Community energy company Energise Barnsley has rolled out solar to homes in the area but came up against some network constraints in the village which meant that five houses could not be connected within the timescales of the project. The trial will include all 30 homes in the housing estate with solar PV panels plus 10 others without.

Simon Daniel, CEO of Moixa, said: "Batteries will allow the electricity system to support much higher levels of low-carbon renewable power and increase UK energy independence. By managing clusters of home batteries in a virtual power plant and allowing homeowners to use more of their solar energy, thereby exporting less, we believe we can significantly reduce peak solar generation output onto the network. This will allow more homes to go solar without imposing new costs on network operators.

"Solar homes with batteries can halve their electricity bills, and this solution will become increasingly popular as costs of storage and PV fall. We are working closely with Northern Powergrid and this project will deliver insights to develop incentives which we hope will allow us to roll out solar plus storage to tens of thousands of homes in their region, by creating a business case for homeowners to invest and also by increasing the number of solar connections allowed on each substation."

The £250,000 trial will seek to demonstrate that the virtual power plant can reduce peak solar output onto the network sufficiently to enable panels to be installed on more homes using existing substations and cable networks. If successful, Northern Powergrid believes UK network operators could save millions for customers by reducing the need to upgrade infrastructure, which will help ensure network-related charges on customers' electricity bills remain good value. The trial will also feed into national design guidance for low voltage networks supplying housing estates.

Andrew Spencer, System Planning Manager for Northern Powergrid, said: "This partnership is one of a number of ways we're working to explore innovations that can benefit our customers and the communities we serve.

"Batteries will play a key role in the smart energy system of the future, keeping costs down for customers whilst allowing the power network to support greater concentrations of solar power. This innovative project will provide valuable data on how the inclusion of batteries in solar schemes can enable our designers to connect more PV panels before further network reinforcement is required."

The first batteries will be installed at the end of January and will cost residents nothing. Solar panels typically cut electricity bills by up to 30% and batteries can add further savings of up to 20% by allowing residents to use free energy generated during the day at night.

Moixa will manage the cluster of batteries to reduce peak generation output onto Northern Powergrid's local electricity network by storing solar electricity instead of exporting it to the grid. Its software includes 'learning algorithms' which respond to solar generation, electricity network needs and each user's behaviour to maximise the benefits of storage.

By linking the batteries in a virtual power plant Moixa will also be able to provide services that make the wider electricity grid more efficient, greener and cheaper to run, such as maintaining a stable frequency, so reducing the need for back-up power from coal, oil and gas. In the future, residents will also receive a share of income from Moixa for these grid services.

The growth of renewable power has put increasing pressures on the network because it must be able to cope with maximum generation on a windy or sunny day at times when demand is low. This has created constraints in some areas where homes with solar panels are clustered and existing infrastructure cannot cope with more peak generation without costly upgrades. In many parts of the country social landlords wanting to install solar panels on their estates have had to wait to connect the final few properties on their projects until the local electricity network is reinforced to accommodate the full scheme output.

Andy Heald, Director of Energise Barnsley said that they had only been able to install solar PV on two in three homes in the area as planned because of existing grid constraints, while in a project in Carmarthenshire only 37% could connect.

The community energy company works with local authorities around the country to develop rooftop solar energy and owns the panels on Berneslai's homes. "Solar power is a key part of Barnsley council's plan to reduce high levels of fuel poverty in the region. Battery costs are falling rapidly and storage has huge potential to accelerate the national roll-out of solar and improve the lives of vulnerable people," said Mr Heald.

He said solar was of particular benefit to elderly people who are at home and using electricity during the day, like many of the residents in the Oxspring trial. Some people with solar panels were saving up to 50% on their energy bills and he believed batteries could take this as high as 80%.

Stephen Davis, Director of Assets, Regeneration and Construction, for Berneslai Homes, said: "We are keen to explore the savings potential that battery storage can bring to our tenants' energy bills. Our tenants face ever increasing energy costs from the energy suppliers they buy their electricity from and solar panels coupled with battery technology have the potential to ease some of that cost."

ENDS

For more information and to arrange interviews, please contact:

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NOTES TO EDITORS

Moixa Technology (www.moixa.com) is the UK's leading home battery company and the partner of choice for leading installers, housing associations and utility companies. It helps everyone from individual homeowners, to councils and large property companies to manage and cut their electricity

bills by allowing them to use more of their solar energy. It manages clusters of batteries in virtual power plants in order to support the grid and earn money for its customers.

Moixa has an unrivalled track record in the UK home battery market, with over 10 years of research and development, strong international patents and pilots from 2010. It has installed Moixa Smart batteries in more than 650 homes nationwide with a combined capacity of over 1.3MWh and over five million hours of use. It has worked with councils and housing associations, energy utilities and network operators to deliver more than £5 million of projects.

The Moixa Smart Battery is a compact (50cm x 30cm x 20cm), cost-effective, wall-mounted unit that fits easily into homes and is easily installed. It is an all-in-one Lithium FerroPhosphate battery system, requiring no additional equipment, and AC-coupled, so it can take advantage of smart tariffs by importing electricity from the grid when it is cheap. USB ports allow customers to charge mobile phones and other devices and can support efficient LED lighting, providing power even during outages. It has a 20-year lifespan and comes with an extendable ten-year guarantee.

Northern Powergrid is the electricity distributor responsible for safely delivering electricity to 8 million customers across 3.9 million homes and businesses in the North East, Yorkshire and northern Lincolnshire. Its network consists of more than 63,000 substations, 59,000 miles of overhead lines and underground cable, spanning some 10,000 square miles.

Northern Powergrid does not sell electricity. It charges customers' chosen electricity supplier for using Northern Powergrid's network to transport electricity to customers' doors. Its network-related charges equate to around 6% per cent of a typical-dual fuel domestic energy bill.
For more information on Northern Powergrid, visit www.northernpowergrid.com

Energise Barnsley is a Community Benefit Society established in 2015 as an energy company. Since inception it has delivered the largest community energy solar PV project in the UK, by number of roofs installed on – 321 tenanted houses of Berneslai Homes, and 16 Barnsley Metropolitan Borough Council Buildings, including schools and sheltered housing blocks. Details of Energise Barnsley can be found at www.energisebarnsley.co.uk

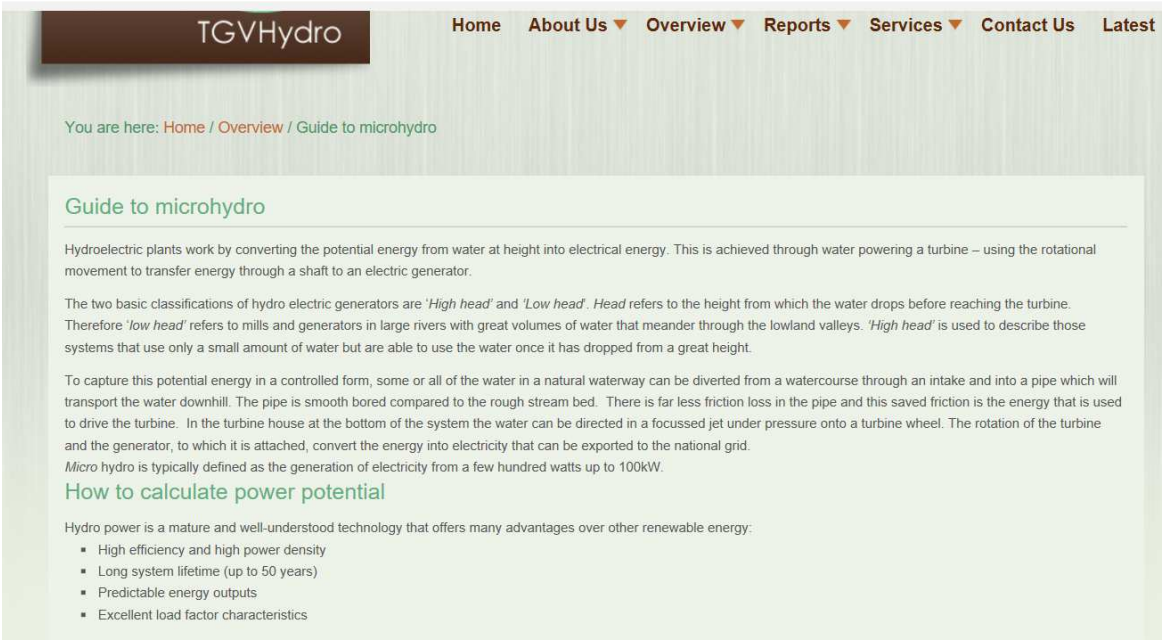
Berneslai Homes is Barnsley Council's managing agent for the management and maintenance of council housing in Barnsley. It manages approximately 18,655 properties and employs just under 500 employees. www.berneslaihomes.co.uk

Moixa is the UK's leading home battery and platform for managing storage services.

Our Smart Battery is British invented and manufactured. We offer full sales and technical support locally in the UK. We're the partner of choice for leading installers, housing associations and utility companies.

Appendix C Micro Hydropower

The following article is taken from the TGV Hydro Website:



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You are here: Home / Overview / Guide to microhydro

Guide to microhydro

Hydroelectric plants work by converting the potential energy from water at height into electrical energy. This is achieved through water powering a turbine – using the rotational movement to transfer energy through a shaft to an electric generator.

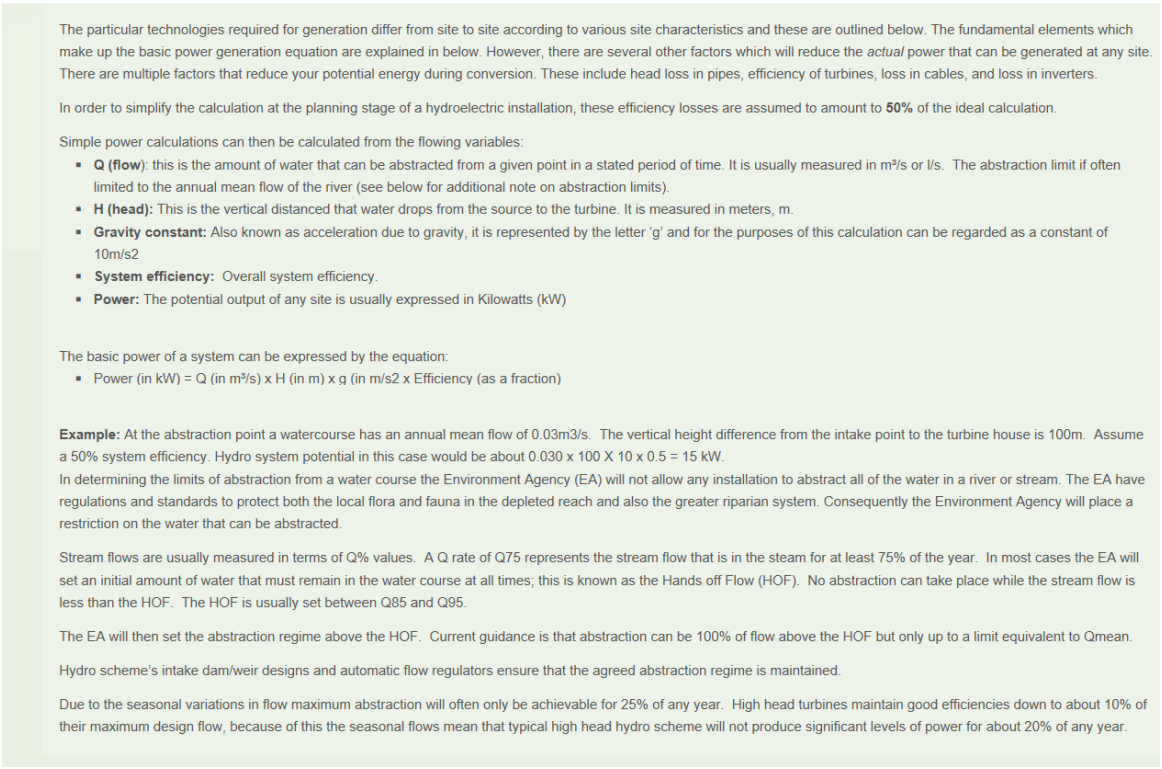
The two basic classifications of hydro electric generators are '*High head*' and *'Low head*'. *Head* refers to the height from which the water drops before reaching the turbine. Therefore '*low head*' refers to mills and generators in large rivers with great volumes of water that meander through the lowland valleys. *'High head'* is used to describe those systems that use only a small amount of water but are able to use the water once it has dropped from a great height.

To capture this potential energy in a controlled form, some or all of the water in a natural waterway can be diverted from a watercourse through an intake and into a pipe which will transport the water downhill. The pipe is smooth bored compared to the rough stream bed. There is far less friction loss in the pipe and this saved friction is the energy that is used to drive the turbine. In the turbine house at the bottom of the system the water can be directed in a focussed jet under pressure onto a turbine wheel. The rotation of the turbine and the generator, to which it is attached, convert the energy into electricity that can be exported to the national grid.
Micro hydro is typically defined as the generation of electricity from a few hundred watts up to 100kW.

How to calculate power potential

Hydro power is a mature and well-understood technology that offers many advantages over other renewable energy:

- High efficiency and high power density
- Long system lifetime (up to 50 years)
- Predictable energy outputs
- Excellent load factor characteristics



The particular technologies required for generation differ from site to site according to various site characteristics and these are outlined below. The fundamental elements which make up the basic power generation equation are explained in below. However, there are several other factors which will reduce the *actual* power that can be generated at any site. There are multiple factors that reduce your potential energy during conversion. These include head loss in pipes, efficiency of turbines, loss in cables, and loss in inverters.

In order to simplify the calculation at the planning stage of a hydroelectric installation, these efficiency losses are assumed to amount to **50%** of the ideal calculation.

Simple power calculations can then be calculated from the flowing variables:

- **Q (flow**): this is the amount of water that can be abstracted from a given point in a stated period of time. It is usually measured in m³/s or l/s. The abstraction limit if often limited to the annual mean flow of the river (see below for additional note on abstraction limits).
- **H (head):** This is the vertical distanced that water drops from the source to the turbine. It is measured in meters, m.
- **Gravity constant:** Also known as acceleration due to gravity, it is represented by the letter 'g' and for the purposes of this calculation can be regarded as a constant of 10m/s2
- **System efficiency:** Overall system efficiency.
- **Power:** The potential output of any site is usually expressed in Kilowatts (kW)

The basic power of a system can be expressed by the equation:

- Power (in kW) = Q (in m³/s) x H (in m) x g (in m/s2 x Efficiency (as a fraction)

Example: At the abstraction point a watercourse has an annual mean flow of 0.03m3/s. The vertical height difference from the intake point to the turbine house is 100m. Assume a 50% system efficiency. Hydro system potential in this case would be about 0.030 x 100 X 10 x 0.5 = 15 kW.
In determining the limits of abstraction from a water course the Environment Agency (EA) will not allow any installation to abstract all of the water in a river or stream. The EA have regulations and standards to protect both the local flora and fauna in the depleted reach and also the greater riparian system. Consequently the Environment Agency will place a restriction on the water that can be abstracted.

Stream flows are usually measured in terms of Q% values. A Q rate of Q75 represents the stream flow that is in the steam for at least 75% of the year. In most cases the EA will set an initial amount of water that must remain in the water course at all times; this is known as the Hands off Flow (HOF). No abstraction can take place while the stream flow is less than the HOF. The HOF is usually set between Q85 and Q95.

The EA will then set the abstraction regime above the HOF. Current guidance is that abstraction can be 100% of flow above the HOF but only up to a limit equivalent to Qmean.

Hydro scheme's intake dam/weir designs and automatic flow regulators ensure that the agreed abstraction regime is maintained.

Due to the seasonal variations in flow maximum abstraction will often only be achievable for 25% of any year. High head turbines maintain good efficiencies down to about 10% of their maximum design flow, because of this the seasonal flows mean that typical high head hydro scheme will not produce significant levels of power for about 20% of any year.

Appendix D

Errors in AECOM report Building Integrated Renewables Section

AECOM Renewable and Low Carbon Energy Assessment - Section 9 Building Integrated Renewable Energy Uptake

1. The report is inconsistent as to whether as to whether it *includes* or *excludes* micro-generation technologies that are *not renewable*. Under 9.2 (p46) it states:

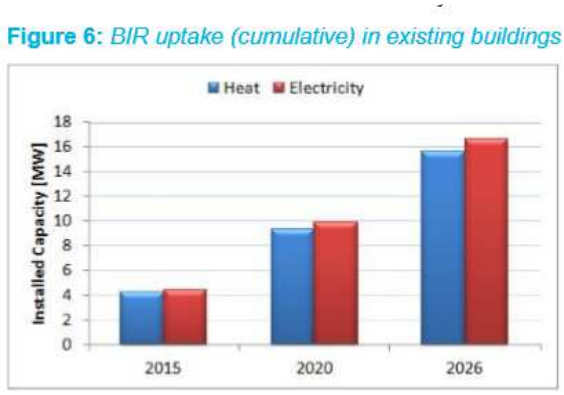
> **9.2 Definition of 'micro-generation' and 'building integrated renewables'**
>
> *The term BIR also **excludes those micro-generation technologies that are not renewable**, such as fuel cells (where the hydrogen is produced from mains gas) and small scale CHP, using mains gas as the fuel source. This is because, for the potential purpose of setting area wide renewable energy contributions, we are only interested in the potential uptake of those microgeneration technologies that are renewable.*

However, under 9.3 the report states:

> **9.3 Calculation method**
>
> *The calculation method **includes** the uptake of non-renewable micro-generation in order to account for those buildings which choose to take a non-renewable option.*

2. In section 9.4 (p47), there appear to be numerous errors and discrepancies in the data:

> **9.4.2 Results: BIR uptake in existing buildings**
>
> *The results show that by 2026, the uptake of BIR in existing buildings in the Powys LPA area would equate to 16.6 MW, which consists of 15.6 MW from renewable heat and 1.0 MW from renewable electricity.*
>
> Figure 6: BIR uptake (cumulative) in existing buildings



If we look at the graph in figure 6 above this shows the following BIR uptake in existing buildings in 2026:

Renewable Heat	15.6 MW
Renewable Electricity	16.6 MW

This is in conflict with the statement directly above the graph which gives the BIR uptake from Renewable Electricity as 1.0 MW.

This confusion between the total BIR uptake and the BIR uptake from Renewable Electricity continues in Table 21 that follows directly on p48:

Table 21: *BIR uptake (cumulative) in existing buildings*

Building	2015	2020	2026
Heat (MW)			
Residential	4.2	9.3	15.6
Non Residential	0.0	0.0	0.0
Sub-total	*4.2*	*9.3*	*15.6*
Electricity (MW)			
Residential	0.2	0.5	0.8
Non Residential	0.0	0.1	0.2
Sub-total	*0.2*	*0.6*	*1.0*
Total	**4.4**	**9.9**	**16.6**

In this table the figures agree with the written statement above figure 6 and consequently disagree with the data represented in figure 6

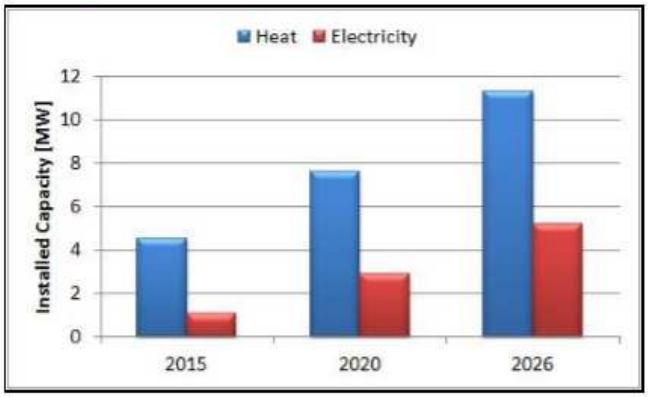
3. In Section 9.5 (p48) there is a similar conflict in the figures:

9.5.1 Results – BIR uptake in future new buildings

The results of the assessment show that by 2026, the uptake of BIR in new buildings in the Powys LPA area could equate to 21.9MW, which consists of 15.8MW from renewable heat and 6.1MW from renewable electricity.

Figure 7 and Table 22 summarise this uptake over the key years of 2020 and 2026 for a build out rate of 364 homes per year.

Figure 7: *BIR uptake (cumulative) in future new buildings*



If we look at the graph in figure 7 above this shows the following BIR uptake in future new buildings in 2026:

Renewable Heat 11.3 MW
Renewable Electricity 5.2 MW

This is in conflict with the statement directly above the graph which gives the BIR uptake from Renewable Heat as 15.8 MW and from Renewable Electricty as 6.1 MW.

The confusion intensifies as Table 23 and Table 22 appear to have incorrect headings and have been interchanged.

If we assume that Table 23 has an incorrect heading and that it actually shows the BIR uptake (cumulative) in Future Buildings and if we consequently assume that it should follow Figure 7 then:

Table 23: *Total potential BIR uptake (cumulative) across the Powys LPA area*

Building	2015	2020	2026
Heat (MW)			
Residential	3.4	5.8	8.6
Non Residential	1.1	1.8	2.7
Sub-total	*4.5*	*7.6*	*11.3*
Electricity (MW)			
Residential	0.5	1.7	3.4
Non Residential	0.6	1.2	1.8
Sub-total	*1.1*	*2.9*	*5.2*
Total	**5.6**	**10.5**	**16.5**

Is this an incorrect heading on table. Should it be ***BIR uptake (cumulative) in Future Buildings*** ?

The figures for the future new buildings (2026) agree with the graph in figure 7 and consequently disagree with the statement directly above figure 7.

This confusion continues in Table 22 (p49), (also possibly mistitled), where there appear to be numerous errors:

Table 22: *BIR uptake (cumulative) in future new buildings*

Building	2015	2020	2026
Heat (MW)			
Existing building	4.2	9.3	4.5
Future new building	4.5	7.6	11.3
Sub-total	*8.7*	*16.9*	*15.8*
Electricity (MW)			
Existing building	0.2	0.6	0.9
Future new building	1.1	2.9	5.2
Sub-total	*1.3*	*3.5*	*6.1*
Total	**10.0**	**20.4**	**21.9**

Is this an incorrect heading on table? Should it be ***Total potential uptake (cumulative) across the Powys LPA area.*** ?

If we look at the figure for the *Existing* Buildings:

In the Heat Section, the figure of 4.5 MW in the top row is clearly wrong as the cumulative figure for 2026 has got to be greater than that for 2020. According to Table 21 this figure should be 15.6 MW.

In the Electricity Section, the figure of 0.9 MW in the top row disagrees with the figure of 1.0 MW in Table 21 which in turn disagrees with the figure in Figure 6.

The confusion appears to continue with the following statement in 9.5.2:

9.5.2 Overall total for BIR uptake

This study has found that there is the potential to exploit a range of micro-generation technologies across the region. Based on the modelling assumptions used, the economically viable capacity for micro-generation technologies in the Powys LPA area is circa 15.8MWt and 6.1MWe.

This statement is based on what appear to be the erroneous figures for existing buildings in Table 22.

4. In Section 9.6 Table 24 provides a revision of the figures based on 2016 FiT and RHI **actual** uptake of renewable electricity and renewable heat up to March 2016 rather than the previously used predicted figures for 2015.

The report states:

*The full analysis has not been re-run but rather the following method applied. The FiT and RHI figures have been used instead of the 2015 'predicted' figure and **then the modelled increases (as per the 2012 assessment)** added to give a revised 2026 prediction. The revised figures are as follows:*

In the light of the above statement and given what appear to be numerous errors in the 2012 assessment what confidence can we have in the revised figures that are presented in Table 24, particularly as they are so significantly different from the figures in Table 22?

Table 24: *2016 Revision of total potential BIR uptake (cumulative) across the Powys LPA area*

Building	2015	2020	2026
Heat (MW)			
Existing building	68.8	73.9	79.1
Future new building	-	2.1	3.7
Sub-total	*68.8*	*76.0*	*82.8*
Electricity (MW)			
Existing building	10.1	10.5	10.8
Future new building	-	1.8	4.1
Sub-total	*10.1*	*12.3*	*14.9*
Total	**78.9**	**88.3**	**97.7**

4. In Section 10 **Table 25**, the *heading* on this table is misleading as the table appears to show the maximum potential renewable energy resource in 2026 **excluding** that which is already installed.

Table 25: *Potential renewable energy resource in the Powys LPA area in 2026*

Resource	Electricity (MWe)	Thermal (MWt)
Biomass (CHP)	39.8	79.6
Biomass Boilers	-	57.6
Energy from Waste with CHP (includes poultry litter)	7.8	15.5
Hydropower	10.3	-
Landfill Gas	-	-
Wind (including SSAs)[65]	4.0	-
Solar PV Farms	220.0	-
Other (including sewage gas and AD with CHP)	1.6	2.3
Building Integrated	4.8	14.0
Total	**288.3**	**169.0**

5. In Section 9.5.1 **BIR uptake in future new buildings** the document states:

*"Figure 7 and Table 22 summarise this uptake over the key years of 2020 and 2026 for a build out rate of **364** homes per year."*

However**, in Appendix E, p119 Micro generation uptake in new development,** in the AECOM document the build out rate changes from 364 homes to 400.

*"We have assumed that **400** homes will be built annually across the Powys, based on the predicted increase over LDP plan period 2011 to 2026 of 9,138 homes".*

Appendix E

Additional Statements in the Position Document that allow for Wind and Solar Farm development outside LSA's

4.2 Additional Constraints p6

4.2.4. The identification of amended LSAs arising from the additional work does not mean an automatic presumption in favour of any renewable or low carbon energy development. LSAs represent the areas for two particular renewable energy technologies which have been identified as least constrained by utilising the Toolkit and as a consequence, ***development proposals could come forward outside LSAs if site specific constraints are mitigated.***

4.2.5. By identifying LSAs for onshore wind and solar PV farm technologies through a series of standardised assumptions as informed by the Toolkit, the Council recognises that ***whilst LSA should be the first place to look for Local Authority-wide scale developments, they need not be the only place to look.***

5. Recommendations p9

5.0.2. To be in alignment with Planning Policy Wales, consideration must be given to ***optimising*** *the potential across all forms of renewable and low carbon energy and* ***any new policy must take into account small schemes for which the Plan would continue to remain generally supportive****, as well as local authority wide schemes of the scales identified in Planning Policy Wales.*

5.0.3. ***Although no onshore wind LSAs were identified, it has been recognised that proposals at the local-authority wide scale may still come forward.*** *Technological advances in turbine technology and* ***varying the assumptions from those used in the Toolkit could identify potential sites*** *provided they were in appropriate locations and identified constraints were mitigated at the site-specific level.*

5.0.4. Similarly, ***it may be possible for solar PV farm proposals to come forward outside of solar LSAs*** *for the same reasons as those identified in paragraph 5.0.3. above, and any policy must be able to address this possibility.*

7. Summary p14

7.0.1. For larger scale electricity generation (solar PV farms), new Local Search Areas (LSAs) are identified in addition to the existing Strategic Search Areas (SSAs) that encourage strategic-scale wind development. LSAs are intended to inform developers to better target their detailed site investigations. ***Solar PV farm LSAs are in essence: the first place to look, but not the only place to look.***

7.0.2 *All applications will be considered on their own merits,* ***inside or outside an LSA****, in accordance with planning policies and other material considerations.*

Appendix 1 page A2

Habitats Regulations Assessment Screening of Changes to Policy RE1 – Renewable Energy (May 2017)

*The identification of Solar LSAs does not provide any guarantee that applications for schemes will be approved within them**, nor do they preclude applications from elsewhere in the county from being considered**. In addition Solar LSAs are not safeguarded. As such they represent the optimum areas of the county where it is thought such schemes would be most viable (in terms of the stated environmental constraints and availability of resource, etc.).*