

# **Institute of Welsh Affairs submission to the Welsh Affairs Committee inquiry into grid capacity in Wales**

**March 2022**

## About the Institute of Welsh Affairs (IWA)

The IWA is an independent think-tank working to make Wales better. We come up with practical ideas to support a thriving democracy and a clean, green and fair economy in Wales.

We are an independent charity, funded by our members and charitable trusts.

In 2019, our three-year project [Re-energising Wales](#) finalised a detailed and practical plan to achieve 100% renewable energy in Wales by 2035. In 2021, our two year follow on, [Renewing the Focus](#), assessed progress towards this goal.

We are responding to this call for evidence based on our significant recent policy research in this area and our mission to support a clean, green and fair economy in Wales.

### 1. What are the current capacity issues facing the National Grid?

In addition to technical and physical capacity issues in terms of transmission and distribution, our work particularly highlights a capacity gap in the nature of the regulatory settlement.

Ofgem regulates the Great Britain energy systems for gas and electricity, it is only now beginning to regulate for heat, and in taking a Great British overview it has been place agnostic. This, however, puts the requirements of the energy system before the changing requirements of consumers in a net zero world and in places where local solutions would give them a better outcome, be that with greater integration, resilience or with lower energy bills.

This is partly the result of the ubiquity of renewables, where any and every community, from a solitary house to an estate, village or town can capture some of the renewable energy available in its own vicinity. It is also the case that only with an overview of local supply and demand, can effective energy system integration take place.

We recognise that current capacity issues will change with future requirements of and from the energy grid, and it is more important to focus on what will be needed than what was needed. In doing so we have encouraged the Welsh Government and others to think of the future grid requirements as ones that support:

- An energy system that reduces wasteful demand, e.g. much more efficient housing, no longer connecting fossil fuelled demand, moving to inherently more efficient EVs over fossil fuel vehicles, heat pumps over inherently inefficient gas and oil boilers;
- The opportunities offered by Welsh Unique Selling Points, which we have identified in our work as Homes As Power Stations (HAPS), energy from biomass, and renewable marine energy (we appreciate other technologies are available). These offer an advantage to Wales, as Welsh based technology or with particular Welsh renewable resources harnessed;
- Greater ownership of energy and energy assets in Wales by the population and institutions of Wales.

All of these potential requirements change the nature of the grid that we will require, e.g. highly energy efficient HAPS will require less energy, and have the capacity to support the local distribution grid. This will have consequences for what, or is not, needed of the transmission (national) grid.

## 2. How are the constraints on Wales' grid likely to be exacerbated as demand for renewable energy surges?

Some have argued that the move to Electric Vehicles (EVs) or heat pumps or other switches from fossil fuels to electricity will create an impending surge in demand for renewable electricity.

While this is true in the 'gross' energy sense, we will be replacing a fossil fuel demand with an electric demand, the nature of that demand is one of much greater efficiency (e.g with heat pumps two or three times more energy efficient than a gas boiler) in these new technologies; while the standards associated with HAPS can mean that the house, or building is inherently low demand. Further, its design will allow it to meet some of its own demand. In some cases HAPS will be net energy self-sufficient even while powering a heat pump and/or an EV.

Essentially, these approaches mean that the growth in domestic net demand as actually seen by the networks need not be as large as the gross demand seen in the simple swap between fossil fuels and electrification (while also noting electric technologies are more efficient).

So a key question for the future of the grid is whether to be planned on predict and provide modelling, or on the principles of optimising the infrastructure we already have. In their 2021 Smart System and Flexibility Plan 2.0 BEIS & Ofgem are very clear that an optimised system is significantly less expensive (to the order of tens of billions) than one that grows and grows inefficiently.

Therefore, the important question to ask of the distribution and transmission companies is how to optimise to make the most of the changing nature of renewable supply and demand – this ought to lead to a question of how they will maximise system efficiency, and locally met demand. In doing so, HAPS and smart flexible

local energy systems of the types being demonstrated by the Prospering from the Energy Revolution (PFER) innovation programme (e.g. Project Leo in Oxfordshire) will come into their own.

3. How can Wales unlock the grid and ensure that it is ready for future demand?

Both Ofgem, National Grid and Welsh Government need to develop a consensus view on what it wants the grid to be capable of.

From a Welsh Government perspective, this was explored in the recent, first phase, of the Welsh Government's Renewables Deep Dive, of which the IWA is a participant. The Deep Dive's work has proposed an ambition of being net 100% renewably fuelled – recognizing there will always be a GB energy system of which Wales is a part, yet one in which Wales can go a long way to net self sufficiency.

In turn we propose that ambition is particularly met by a focus on Welsh USPs, i.e. HAPS, bioenergy and marine energy, because of the wealth retention they offer – partly because of an early mover advantage to Wales, partly the ability they offer to meet local demand with local supply, partly the direct ownership that comes with owning your home that is energy capable, i.e. a 'power station'.

We had not proposed becoming a gross exporter of renewable energy, in part on the ground of the wider impacts on land use, biodiversity and other investment choices Wales might want to make, and partly because there are risks that this greater generating capacity would simply see further benefits accrue beyond Wales.

4. What can be done to incentivise investment in grid flexibility, in particular vehicle to grid technology and 'smart' charging?

The work to develop the right incentive and support environment for flexibility, Vehicle to Grid and smart charging is rapidly accelerating; with early studies and the Smart Systems and Flexibility Plan highlighting the huge scale of the rewards.

Homes As Power Stations (HAPS), one of our proposed Unique Selling Points, is inherently smart and flexible, and could often be described as Building to Grid (B2G) – with a potential to offer greater capacity (bigger batteries in a building than a car, solar and other capture on a building helping top up) as well being located where they are most needed to support the functioning of the local distribution grid. There are indications that at scale an area based HAPS approach could address what would otherwise be an element of the grid that is constrained.

5. What should be done to ensure that the grid, particularly in rural areas, can cope with the extra demand that will be generated from the transition to electric vehicles?

There need not be a significant growth in net demand, as seen by the grid, if we equip buildings and homes with the right combination of integrated energy technologies, using the HAPS and related approaches.

Such approaches would include equipping homes and buildings with EV charge points and battery storage, an appropriate renewable generation technology (to suit building type and location, which could be a heat pump) and smart controls to optimise energy flow.

A targeted approach to such technology deployment could also help ensure what might otherwise be fuel poor households can be flipped to energy wealth.

6. What level of anticipatory investment in grid capacity is required by the UK Government in order to ensure that Wales can deliver its decarbonisation roadmap?

The answer to how much investment is required can only be addressed with a robust sense of the future purpose of the grid – if optimised rather than predict and provide the degree to which a smart, flexible HAPS approach is deployed could mean significantly less grid investment is needed than a predict to gross demand might.

The investment required with a smart, flexible, optimised approach would be much more focused on building and home upgrades, on fabric improvements and energy technologies for buildings. These investments are also more likely to sit with owners in Wales, given most investments made by Distribution Network Operators aren't.

7. How can the UK Government, the Welsh Government and Ofgem work together to improve grid capacity?

Welsh Government can be clearer about the renewable ambition and how it will make the most of Welsh USPs, not least because two of the three we have highlighted emphasise the shift to a decentralised energy system that makes the most of the ubiquity of renewable energy.

The purpose of the net zero transition could just be to decarbonise, or it could be more purposeful for Wales. Making the most of the BEIS/Ofgem ambition for a smart and flexible system, coupled with HAPS and similar approaches, could mean a renewably supplied Welsh grid that is designed and built from the user up.

With this purposeful ambition in mind Welsh Ministers could engage Ofgem, the network operators serving Wales and the UK government in proving how such an approach would reduce costs, retain wealth and provide a platform for an array of energy technologies and services that are eminently exportable, beyond Wales and beyond the UK.

We have proposed that Welsh Ministers create a specific team to take on the opportunity that Welsh USPs and a smart flexible grid will offer, to convene and coordinate with UK Govt, Ofgem, the networks and appropriate independent stakeholders to make the most of the current price control period and set Wales on the road to making the most of what is essentially an economic opportunity for Wales – a smart flexible grid supporting Welsh USPs.