

## **Written evidence submitted by Active Building Centre (REW0024)**

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### **A submission to the WAC Inquiry - Renewable Energy in Wales**

From the Active Building Centre (ABC), a UK national centre developing modern methods of design, manufacturing and deployment for flexible renewable energy systems in buildings and communities. ABC emerged from the work of the SPECIFIC research programme at Swansea University.

ABC leads on the integration of energy technologies, to optimise the renewable / low-carbon energy a building can capture, manage, store and use efficiently from day-to-day, week-to-week, season-to-season; including the integration of EV technology where appropriate.

As such we would reinforce the fact that renewables technologies come in many sizes. Early research has shown home and building based technologies can lead to significant benefits, to the householder and to the energy system, including the potential for scalable deployment of Active Buildings (ABs) in support of greater renewable deployment on the system (as active storage helps capture and manage their output). Please see research paper links below.

Given the UK's commitment to move to a net zero world, free of fossil fuels, the potential of each and every technology that can capture and store renewable energy must be explored, developed and as we learn more about their capabilities, many should be supported to maximise their deployment and export potential.

This means exploring a range of building-based technologies that capture, store and redeploy energy from varied sources and in various manners. For ABC that involves:

- Optimising how a building's design can capture the energy on or around it, using sensors and controls to manage energy use effectively; while ensuring efficiency is in large part addressed by building to high fabric standards. Together these help reduce overall energy demand from buildings.
- Designing and building in, as well as integrating the operation of, storage technologies to provide warmth, power and mobility at the times they are needed.
- Connecting the resulting nano-grid (in and on the AB) to the local electricity grid which allows the AB to contribute to meeting the demand placed on that local grid; helping to manage, reduce or shift peak demand, by providing electricity to the local grid when appropriate.

The initial concept and programme of work of ABC is focused on developing and deploying the Active approach on new buildings of all typologies, both domestic and non-domestic; with an Active Office, Classroom, Industrial Building and Active Homes already built and operational (in the Swansea/Neath area). We are now also exploring how 'Activation' would work for the existing stock. It is possible to upgrade buildings to be 'near net neutral' in their energy use.

These and other projects in the market with ABC partners will provide a growing portfolio of data, which in turn will enhance the knowledge base of how all buildings are designed, how they deploy and integrate energy and digital technologies, to give a much higher building performance for their users, be that as a home, office or service providing setting.

Our programmes of work in research, design, development and commercialisation will also, inter alia, explore solutions to the challenge of decarbonising heat. Further information on our programme is here – [www.activebuildingcentre.com](http://www.activebuildingcentre.com).

In advance of that there are already lessons from the existing demonstrators, and the development of the Active Building principles that are relevant to your consultation, including:

- Renewable energy can be effectively captured at building scale, offering the opportunity to smartly integrate it with storage, EVs and managed time of use
- Renewable energy capture and generation exist at building scale; this can be supported by building standards, building control and assurance, as well as a fair return from the energy system for building based energy and energy services – e.g. Active Buildings can reduce peak demand, supply renewable electricity, support the adoption of EVs, take up the electricity from larger scale renewable energy ‘farms’ at times of excess supply.
- In the Welsh context where there is a particular focus on the ownership of renewable generation, clearly it is more accessible for the majority to play their ownership part through home and building based renewables.
- While some of the supportive measures for renewables do lie within the domain of Welsh Government powers, e.g. building regulations, even these, along with those that are reserved (e.g. the energy legislation governing the work of Ofgem), would benefit from joint UK – Welsh Government action – to further recognise\* the contribution buildings can make to the transition to renewable energy.  
[\* ABC is initially funded through the Construction Sector Deal, part of the UK Industrial Strategy 2016]
- ABC will be working with other partners to ensure there is an Active presence at COP26, physically if that is the case, or virtually as seems increasingly likely.
- Finally, in terms of post pandemic recovery, applying the Principles of Active Buildings (see below) can offer a direct and meaningful route to recovery for all communities of Wales, given the ubiquitous nature of renewable energy.

This ubiquity should mean there is a renewable opportunity for every community in Wales. The key issue is for each to get a fair share of that opportunity and not see a partial approach dominated by one technology or another. Clearly measures to ‘activate homes in every community, from new or as Upgrades, would mean every home would be highly efficient AND able to produce some of its own energy; some could be net energy producers, many could integrate an associated EV.

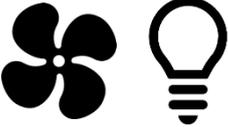
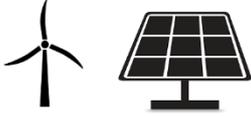
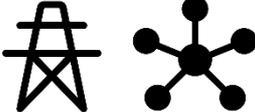
This would provide work in every community, help retain the wealth created by building based renewables in Wales, and optimise the local (DNO) grid for best advantage of those communities.

Early research for the Active Building programme suggests significant bill savings are possible, circa £600 per household, see more [here](#).

In addition the following links will take you to additional evidence on the form, function and potential of Active Buildings including two recent papers from the ABC Research Programme:

- [Active-Building-Centre-Research-Programme-White-Paper-The-role-of-active-buildings-in-the-transition-to-a-net-zero-energy-system.pdf \(abc-rp.com\)](#)
- [Active-Building-Centre-Research-Programme-White-Paper-Can-you-make-money-from-active-buildings.pdf \(abc-rp.com\)](#)
- <https://www.ukgbc.org/ukgbc-work/case-study-active-office-and-active-classroom/>

## Active Building General Principles [New Build]

1.  **Building fabric and passive design** – integrated engineering and architectural design approach including consideration of orientation and massing, fabric efficiency, natural day-lighting and natural ventilation. Designed for occupant comfort and low energy by following passive design principles
2.  **Energy efficient systems** - intelligently controlled & energy efficient systems to minimise loads - HVAC, lighting, vertical transportation. Data capture via inbuilt monitoring & standard naming schemas to enable optimisation and refinement of predictive control strategies
3.  **On-site renewable energy generation** - renewable energy generation be incorporated where appropriate. Renewable technologies should be selected holistically, given site conditions and building load profiles
4.  **Energy storage** - thermal and electrical storage should be considered to mitigate peak demand, reduce the requirement to oversize systems, and enable greater control
5.  **Electric vehicle integration** - where appropriate Active Buildings integrate electric vehicle charging. As technology develops, bi-directional charging will allow electric vehicles to deliver energy to buildings as required
6.  **Intelligently manage integration with micro-grids & national energy network** – in addition to intelligent control of building systems, Active Buildings manage their interaction with wider energy networks, e.g. demand side response, load shifting & predictive control methods