The Passivhaus Equivalent Standard

WG 02B WORKSHOP – Primary Energy Demand/
Energy Use Intensity Workshop

Workshop 3 Notes

Built
Environment
—
Smarter
Transformation

24th October 2023

WORKSHOP BREAKOUT 1 – TARGET SETTING	
	1.1 Identify the levels of delivered energy by end use that are currently being achieved across domestic and non-domestic buildings: heating, cooling, auxiliary, lighting, hot water and equipment 1.2 Discuss how the delivered energy targets identified compare to Passivhaus requirements 1.3 Indicate where could reasonable and scalable progress be made over the period 2025/26 to reduce the delivered energy of dwellings and buildings 1.4 Identify the benefits of assigning a specific delivered energy target for a given situation or a PER limit for new buildings as an absolute target 1.5Identify any risks and opportunities associated with targeting certain levels of energy consumption via such an approach 1.6 Identify any unintended consequences of including all energy uses within a target energy consumption i.e. certain buildings may differ in the level of energy intensity needed to function
	Workshop Feedback **1.1 Identify the levels of delivered energy by end use that are currently being achieved across domestic and non-domestic buildings: heating, cooling, auxiliary, lighting, hot water and equipment** I have a number of 2021 regs compliant classrooms and school buildings that are achieving BDER's anywhere between 40 kwh/m2 to 60 kwh/m2 according to those calculations Retrofit for Future on domestic and Architype monitoring of schools informed SFT performance standards - which are driving Industry to use PH for Public Realm More discussion needed around lifestyle and how people use their homes/occupant behaviour Difficult to work to benchmark figures of Passivhaus, can there be a focus on just lower benchmark on a mas scale Networks can't take PV capacity, problem of leading to developing one form of house type. can there be more of a range on targets Relationship between the size of the house and energy use. Also, consideration of domestic hot water, these needs covered Cost is an issue, don't want to reduce quality. need to find a cost-effective way to do on mass Metric needed for non-domestic and domestic building Based on latest Section 6 regulations the total DDER for a 2.5 Mid is about 48 and for a Bungalow Semi 62. Previous cost research by the Passivhaus Trust was done in 2019.

	Their data suggested that the Passivhaus uplift was 8% from the building regulations. Noted that an experienced contractor and experienced local authority on their third project had managed to get uplift down to 4% from Building regulation cost. Collecting sources of data: Non- domestic - CIBSE publish data monitoring. This information is maybe two-year out of date, it is based on average population and typical build. CIBSE have a database of best practice with building performance awards. Case study - Monitoring domestic properties student flats, mixed-use development with a common heat source. Bell curve graphs on average energy uses. Regardless of build type the curve is consistent between high and low users. Form factor makes a building more cost-effective, so the cost comparison is not direct. Designed decisions influenced by orientation influence of form factor, as such the uplift may not be as much as a direct comparison with a non-Passivhaus scheme. **1.2 Discuss how the delivered energy targets identified compare to Passivhaus requirements** Passivhaus does tend to achieve and often exceed the designed energy targets, whereas building regulations that isn't always the case, hence the performance gap The DDER of a building regulation 2030 house is over 50% lower than that equivalent to Passivhaus Need to consider the product we are delivering and how we can get closer to targets Fabric standards are very close to Passivhaus standards and in some cases e.g. roof and floors its lower. Need to compare is this is a better way rather than having every house the same Passivhaus. understanding that Passivhaus have an almost checklist style and could we support lower standards that may not be Passivhaus but lower energy costs We need to anticipant disruption, it's inevitable. Step change - need to make the change in which we measure and present energy consumption for this to be meaningful Running cost analysis, thermal imaging and trying to meet design standards. PAS 30 / PAS 35 domestic space heating 20 kW be sitting demand studies. Al MC 420 houses, Stuart Milne code for sustainable homes. Edinburgh homes demonstrated as 0.1 3U value. The other data challenging to monitor – Partnerships with providers to read those meters. Non-domestic CIBSE - benchmarks studies of space, heating, hot water, water, energy-efficient. Ofgem reporting real heat pump electrics uses total energy 2023 standards comparison to SAP infiltration rate 4.5% delivered energy, 27 or 47 kWh through a heat pump.

	1.3 Indicate where could reasonable and scalable progress be made over the period 2025/26 to reduce the delivered energy of dwellings and buildings The QA requirements would deliver improvements in performance, but there is a steep learning curve and systems need to be implemented and monitored by developers and that will increase costs until such time that this becomes the norm Training and Knowledge of designers/installers and end users is critical over the next few years Training required for designers to ensure common pitfalls are avoided. Low targets on their own won't solve the problem Airtightness and improved workmanship Push fabric first principles and adjust the energy performance, demand measurement of data monitoring, as we don't know where the performance gap New standards, factory close panel systems, reduced thermal bridging. Buidling regs are ready pushing in this direction so PH isn't too big a step now. MVHR mix-up energy Heat pumps require storage water and storage tanks. Redesign required & people lose a cupboard. Is there an approach to finding moisture sources, dehumidification, and ventilation how much water has been generated within a facility and directly counter that. Lower temperature of appliances such as dishwashers and washing machines will have a positive effect. **1.4 Identify the benefits of assigning a specific delivered energy target for a given situation or a PER limit for new buildings as an absolute target** Using energy at the source to reduce bills for tenants, in social housing Housing for varying needs. Need more information as currently conflicting areas across different areas of Scotland. How does this link to Passivhaus standards Worries the disruption is coming at an already challenging time with cost-of-living crisis. How can we implement standards while not affecting those in already vulnerable situations Conflicting arguments of cost - need better indication of what these are going to be MVHR in comparison to intermittent fans Benefits of MVHR is the heating energy although household must be realistic about living with that technology and changing shape of their lifestyle. Previously ignored portion of energy requirements has become bigger in a proportion, in Passivhaus significant portion of an energy balance.

	1.5 Identify any risks and opportunities associated with targeting certain levels of energy consumption via such an approach Affordable housing- grid capacity and electricity. need to think what is scalable in certain areas. issue with grids and Passivhaus standards not lining up. need better alignment Service infrastructure is behind where it needs to be. Who can install? The workforce currently doesn't exist? concerns about maintenance of MVHR? Cost and capacity- we are trying to get people of gas and on to electricity, but infrastructure isn't there for a scalable move Risk- difficult to talk about targets without ending up talking about cost of living, rural, EPC. Any target that gets set might work in isolation, but does it work in the real world? Currently no clarity as working on hypothetical assumptions Energy consumption - should there be a set target for each house, this might not work with different numbers of people in each home with different needs e.g. health issues Non- domestic types, how many different archetypes? more electric as key source of energy? Government will need to state the balance between gas and electric supply increased airtightness. MVHR is switched off unintended consequences Like for like is not a direct comparison, not apples with apples. Need more of an average, some will perform better than others. if we work to one figure this would be possible for vulnerable households Do tenants/homeowners have the knowledge on how to manage their home. We need better education for the public. this could be an opportunity for first instance I would argue that we need to better understand how people use their homes now - and what they need from them before telling them how to use their homes Need consumers to understand what is currently available to support their homes just now Typologies of building types need to be considered when setting targets for energy consumption. perhaps a metric on m2 output? the benefits are clear in terms of quality buildings that perform as designed. However, this could be achieved potentially following other design methods Opportunity to drive down costs of MVHR systems, ASHP. Manufacturers will invest in PH certified components if there is a large market to serve. Need to have BSD involved in this and an almost passport for each building Need a change in culture for how we use our homes Need to understand how we sell this to consumers. the more benefits we add the better it will be received

	Need to make sure people have the right training and accreditations EPC on non-domestic based on system of theoretical. Can we build good practice into the regulations and forecast a percentage accurately with PHPP Early design software assumptions and PPHP monitoring of actual building are often accurate. Design stage as close as possible to the SER certification. Achievable with PHPP. **1.6 Identify any unintended consequences of including all energy uses within a target energy consumption i.e. certain buildings may differ in the level of energy intensity needed to function** Need also to think about the potential unintended consequences of airtightness and upgraded insulation on fabric Anything outside the norm needs approval by the PHI in Germany, which can add delay or risk if PHPP is adopted Some end use energy demand can't be reduced so bespoke targets would need to reflect certain building types Volumes of houses delivered privately risk not being operated properly as they won't have a site maintenance manager like social housing landlords for example Volume of houses required might not be achieved if the tight QA requirements are set QA important - coheating, therography, other QA points plus monitoring over time to be included - smart metering? Flexibility of approach is lost when setting definitive targets and will change the way building regulations have been implemented to-date, with alternative means of compliance.

General Comments:

Passivhaus tools. Will we ever get detail on the actual EO Costs for PassivHaus? Surely someone has the BoQ comparison (like-for-like). PHT had previously said its somewhere between 0 and 8% but nobody seems able to back it up.

In PHPP solar thermal is more effective if small roof space used/available but if a HP and divert to HW then above about 4m2 (depends on storage size etc) the PV is more effective for HW and also has exports that avoid 'saturation' of solar thermal system.

PV performance metering much easier - actual performance and fault detection on solar thermal much less easy to monitor and keep on top of - also many more potential faults seen on POE - solar thermal has a potential impact on summer overheating due to internal gains in a well-insulated building - 150C pipes often not insulated with correct temp pipe insulation etc. Solar thermal can be done correctly of course but still not sure summer gains inside a well-insulated envelope

What about the whole house costs to customers, additional electric for MVHR systems, additional cost for passive house can equate to an additional mortgage payment etc.

When presenting cost comparisons, we should reference the baseline, house type and m2.

Lifecycle costs and payback period needs to be considered.

Is this about carbon reduction, if so, what is the £ cost per carbon unit saved as a metric?

SAP is not accurate, therefore data and evidence not reliable.

WORKSHOP BREAKOUT 2 – QUALITY ASSURANCE AND CERTIFICATION	
	2.1 A defined performance target has to be verified, either theoretically or by measurement. Both the Passivhaus standard and Building Regulations are theoretical i.e. a design stage calculation alongside assurance processes to support an effective outcome. 2.2 The focus of this workshop breakout session will be to identify the key aspects within the design and construction of low energy buildings that result in a defined energy target i.e. the Passivhaus PER, being achieved at completion certificate stage. 2.3 Additionally, being cognisant of the current Compliance Plan workstream, the Passivhaus Quality Assurance Requirements at Annex A and the PHI Building Certification Guide at Annex B, what could an energy standards 'plug-in' to the Compliance Plan include on the key practical actions to manage risk in the delivery of a defined delivered energy target?
	Workshop Feedback **2.1 A defined performance target has to be verified, either theoretically or by measurement. Both the Passivhaus standard and Building Regulations are theoretical i.e. a design stage calculation alongside assurance processes to support an effective outcome.** Elephant in the room is whether Scottish Government will agree/ decide to certify - this doesn't need to be formally done through Passivhaus Institue Need to decide what and how we monitor Clearly defined Q&A process, verified and documented QA in terms of Fire safety has improved recently so the direction of travel for improved QA is already there so this can be utilised Need more monitoring and post occupancy evaluation to understand how people use their homes to avoid unintended consequence Having these standards would help Scottish Government in the long term as wouldn't need to keep revisiting Need to have people trained in house with the verification. However still needs control around it Do we go from Passivhaus user software or something that sits alongside it we want to avoid having organisations profiting off this training. would it be better to have controlled by government. The process already exists for structural certification within the building control process Noted that the aspiration is to add Passivhous to the existing system and not reinvent the whole Building control system. It could work as an approved certifier of design, a bit like application process. Questions, around expertise, speed, and capacity.

	What RIBA stage that this would have to be introduced? Passivhaus input required early on and the design process prior to BW submission, so specialist would have to be in place prior to Warrant application. **2.2 The focus of this workshop breakout session will be to identify the key aspects within the design and construction of low energy buildings that result in a defined energy target i.e. the Passivhaus PER, being achieved at completion certificate stage**. Tendency to think industry isn't ready but they are, need more of a decision around the pathway we are moving towards Suggests that is we don't go down the Passivhaus route then could we achieve something similar with key checks Whole new compliance aspect. Sitting in government e.g. airtightness testing and thermal graphic testing At what point are we going to run into a skills shortage? The Colleges are keen to support Passivhaus but want to know there is a supply chain is there to invest Need to prepare for current skills shortages and future. currently in a cycle which we need to break out of Need to structure differently from training for occupancy and rather competency The QA does focus minds on site to ensure that what you have designed is what is delivered Could this be tied in with the new Compliance Plan Manager role? PHI approved components not always available that suit non-domestic design requirements, and this puts an increased burden on designers Air tightness testing 2. Performance monitoring 3. IAQ monitoring 4. Thermographic surveys 5. System efficiency. Structural, certifiers are certified by the same company often. The current process for Passivhaus to hire another professional (the certifier) separate to the designer working on behalf of ideally working on behalf of the client. PH won't work without that third-party certifier. The point that PHPP and Passivhaus closes the performance gap. **2.3 Additionally, being cognisant of the current Compliance Plan workstream, the Passivhaus Quality Assurance Requirements at Annex A and the PHI Building Certification Guide at Annex B, what could an energy standards 'plug-in' to the Compliance Plan include on the key practical actions to manage risk in the delivery of a defined delivered energy target?** Post occupancy monitoring and calibration of models - which is the case in Portugal for example, where their version of the EPC for non-domestic buildings needs to be within +/- 5% of measured values Initial financial incentive for meeting targets. Industry must upskill quickly but shouldn't be punished for not meeting v. high standards immediately

	Make performance targets clear to users and provide measurement methods they can use to monitor and see if problems IOT sensors and monitoring incorporated to ensure the long term performance Move to measured EPCs Detail would be required to be collected exactly what photographic evidence, and which details or junctions require to be recorded with examples of scale and good practice. Like a compliance manager or Clark of works, similar to a traditional process.

General Comments:

Reinforcing again, there is a gap in current expertise the expert resource of a certifier allows mentoring and upscaling of the current design workforce.

We need accurate and correct software

The compliance plan should be orientated towards the Passivhaus certification process

Different standards in Glasgow and Edinburgh etc. when are we going to get a regional approach which will have a knock-on effect in skills shortages.

There are already check processes in place, but it would be helpful to have a building compliance check process in place. or a completion check process and providing certification with this.