The Passivhaus Equivalent Standard

Design Calculations, Compliance Methodologies and the Performance Gap

Workshop 4 Notes

Built Environment
—
Smarter
Transformation

WORKSHOP 4 - DESIGN CALCULATIONS, COMPLIANCE METHODOLOGIES AND THE PERFORMANCE GAP

WORKSHOP BREAKOUT 1

<u>Workshop Feedback</u>

4.1 To discuss the comparative benefits and risks of the various design and compliance tools used and in particular how the choice of particular design metrics may support an appropriate design response.

All compliance methods/tools risk the use of that tool as a design tool despite them generally stating they shouldn't be used as such

Move towards a qualified Engineer/Architect only approach to sign off calculations rather than the very variable levels of competence within Assessors to improve the accuracy of all modelling tools.

Supply chain. Do the manufacturers understand the metrics required for the energy calculations

SAP doesn't give a reliable prediction of overheating

Psi values, how and where do we get an in-situ Psi value calculated. Who, when & how

Modelling self-consumption of onsite generation should be a priority

Checking as built meets the design intent would help with reducing the performance gap

The discussion of a need for onsite checking is being conflated with PH. PH provides excellent evidence that checking is essential - regardless of modelling tools that are used

In-use performance - can monitoring in-use performance of a sample of developers' homes be built into the Regs? Initially for information; eventually as a compliance requirement

Current knowledge gap to achieve .6 need to do a huge upskilling piece to achieve this. Need to look to achieve 3 across the sector first and make this a base line

Architects/ engineers/ wider design team don't have the knowledge yet-upskilling needed

There is still a discussion around do we have complete airtight buildings. still a reluctance around installation of MVPH

Metrics: I'm aware Scottish Government have recently finished consulting on revisions to EPC metrics (also due to do this soon in England) - consistency of messaging across new build and EPCs should be considered

Citizen engagement is key. a lack of information around how we live and maintain homes. how do we bring citizens onto this journey

To state the obvious, the Passivhaus std is more than the metrics and the PHPP model - it is a quality control process which is fairly resource intensive and adopted by those who voluntarily submit themselves to that intensive process. Moving from a voluntary std to a mandatory one will produce bad faith attempts which the std needs to be robust to. The quality control is essentially model-independent, and it is vital to the standard working

As well as training energy modellers on the design side, planning enforcement staff need to be trained so they can competently check energy calculations. Need to consider this in discussions around upskilling

Currently, information on the type of system installed and on how to operate it effectively should be provided, written in non-technical language, in a section on ventilation within the Quick Start Guide required under building standard 6.8.

More clarity required sooner rather than later

Training required in building physics – quality, design & construction

Tool support required for designers

Can we use more than one tool – EPC generation, tie into current consultation.

4.2 What are the differences in conventions and input assumptions that result in the variations in output between the various design and compliance tools?

Very important to note that the Home Energy Model does not make a single set of fixed assumptions - these can be modified, and we/someone could produce a version of HEM which is bespoke to Scottish passive-equivalent standard

Need to have onsite evaluation. need to move forward with a model that has good heating and cooling

Need to ask the question what are going to be the best thing to come forward for households

Part of the strength of PHPP is that you have a Passive House Designer on the team responsible for the performance of the building, the detailing and the evidence

So many health benefits and other things to go down this PS route- it just makes sense

HEM to be published open source before the end of 2023 (hopefully imminently)

All models have inherent errors, it's just the level of errors deemed acceptable by the assumptions made within the model

If all tools used the same set of assumptions they should come out with similar answers, that was the original idea of having the AM11 approved tools process developed by CIBSE. Does PHPP meet these requirements?

Dynamic tools can if you choose to model right down to HVAC component level including controls and control philosophies which can be useful in very complex buildings such as Hospitals, etc

Competency of modelling users has been an issue for many years, being accredited for providing an EPC does not make you a good designer regardless of tool used, yet this would be an issue for the large number of existing assessors and their livelihoods.

Giving the performance gap which has several factors what would be an acceptable gap?

Most non-domestic tools are graphically input rather than purely database or spreadsheet so major efficiency gains in developing models as well as capable of carrying out other studies such as accurate daylight analysis, etc.

Need to streamline design assumptions (interna/external dimensions)

Divergence from rest of the UK a potential issue

4.3 To discuss the differences in relevant design assumptions and boundary conditions.

Internal temp of the dwelling and how it varies throughout the year (heating setpoints Internal temp of the dwelling and how it varies throughout the year (heating setpoints)

Occupancy is different for each house. Some four bed homes use less than 2 bed

How do we deal with number of occupants when dealing with new build. A. need to make an assumption based on floor dwelling and other characteristic's

Infiltration rates and how user behaviour could affect them

Should we assume average or baseline user behaviours for estimating energy consumption?

PHPP vs home energy model is where we need to focus

PHPP is a single zone model, it assumed 20C throughout

The relationship between occupancy and energy performance isn't straightforward e.g. appliance use and heating demand

SAP is limited to regulated loads; PHPP is intended to include building-specific appliance and other unregulated loads

Based on non-biased samples we need a standard set of customer inputs around a normal distribution. e.g. dwelling temp, energy usage for cooking, lighting, etc. There are Monte-Carlo statistical analyses that will give estimates of accuracy that can be compared to real world measurements

Design assumptions are very different to compliance assumptions!

Control boundary conditions for compliance (locked assumptions), but more options useful for design (unlocked)

4.4 Particular focus on the differences in methodologies for calculating space heating demand and total energy use (EUI/BDER/DDER)

Build physic methodology isn't much between SAP10 and PHPP both works. issue is the data collection and riches are where the differences come from. There isn't a huge amount to say one is better than another.

Don't have a huge amount of evidence to suggest any of them are perfect- comparison of co heating test/ smart metre derived HAC estimate and an SAP 10 HAC estimate- they don't all agree but there isn't enough evidence to suggest one is better than another

We can't let space heating demand to be offset by renewables- needs to be a fabric first approach

Passivhuas methodology, doesn't have to offset, it's a fabric first approach. can't let the space heading demand offset this

Dynamic calculations have potential for more detailed assessment of solar self-consumption and dynamic electricity tariffs

Training assessor – SAP10 and new HEM system comes in that all assessors will want to be trained on HEM but if gov said we are changing to PHPP wouldn't be the up take

What are we hoping to achieve – PVs why can't they been added onto all eligible buildings, Scotland very behind. SAP make the decision that 40% of the roof is covered in PV. Need to consider usable roof space instead. Need to encourage better roof design. Need to be careful design vs energy performance

Metrics – it would be helpful to align everyone, and all buildings are measured the same. It doesn't have to be to the same standard but on the same metric.

Thermal bridging methodology is different between SAP and PHPP (internal vs external dimensions)

For a new build, if appliances are efficient then we shouldn't have a problem and everyone coming out the same

Several local authority policies already require enough PVs to achieve a net zero energy balance on site

How do we include the equipment of non-PH approved certified equipment, which are much less common in the general supply chain and probably cheaper which is particularly important in affordable housing provision without adding significant additional costs to manufacturers

Whatever method you use to develop a building if you use a design tool rather than a purely compliance tool then you should be able to come up with similar results if you make the same assumptions.

SAP 11 timescales an issue, concerns around training for both SAP 11 and PHPP

General Comments

Some key differences in assumptions between SAP and PHPP that lead to differences in calculated energy use:
1. Internal temperature profiles
2. Internal heat gains
3. Infiltration loss calculation and assumptions around user behaviour of things that affect infiltration (eg vents)
4. Ventilation rate assumptions for different ventilation systems
5. Appliance energy use
6. Heat pump efficiency

I think we can agree that if we have on-site inspections will give a better build

Is there sufficient focus upon limiting moisture production and removal from buildings? Ventilation is not the only way of addressing the dangers of moisture in homes.

Does having a comparison of two existing software approaches limit our ambition for what good could look like.

90% of industry organisations is less than 10 people, the challenge in these smaller projects is ensuring that the design is what is constructed.

Regardless of methods the operational energy use will always far outweigh design and construction energy and that will always massively vary by occupant use of the building no matter how well designed - look at the Portcullis House, which was designed as A rated etc, but in use was dreadful performance.

Design and compliance need to be combined; design is so important.

SAP 11 timescale is an issue can we use SAP10 with PHPP as a supplement.