

Comparing and Contrasting BREEAM and Passivhaus to identify differing strengths and weaknesses



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1. Introduction

The purpose of this report is to distinguish the differing strengths and weaknesses between two global leaders of sustainability and energy efficiency in buildings, BREEAM and Passivhaus. Within this report, you will see contrasting and similar areas where both assessments co-align. BREEAM and Passivhaus are two completely different ideology's and both have different core strengths and weaknesses. However, the reports main aim will be to highlight the core areas where both ideas connect and overlap and to identify whether one ideology is greater than the other. The report will first talk about BREEAM, an introduction and its advantages and disadvantages, and then follow on to do the same about Passivhaus.

2. BREEAM

2.1 An Introduction to BREEAM

BREEAM stands for Building Research Establishment Environmental Assessment Methodology (How can a BREEAM assessment benefit you? 2017). BREEAM is the world's leading sustainability assessment method for buildings. Now, there are more than 562,400 BREEAM certified developments globally (What is BREEAM? 2017). It was founded in 1990 and was the world's first sustainability assessment for buildings. Now, in 2017, BREEAM holds 80% of the European market share (BREEAM at a glance, 2017). Since the inception of BREEAM in 1990, BREEAM is now in 76 countries and is the leading method of assessing commercial and residential buildings (Wilding, 2013). There are 9 holistic measurements for assessing a building. These are; energy, health and wellbeing, innovation, land use, materials, management, pollution, transport, waste and water (Category issues and aims, 2017).

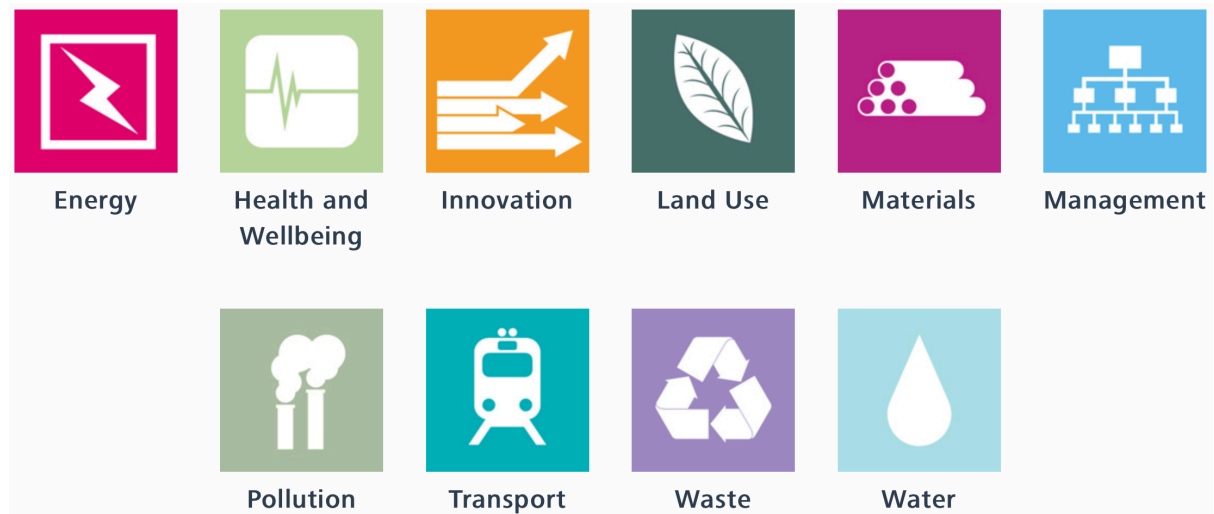


Figure 1: (Breeam.com, 2017)

2.2 Advantages of BREEAM

A BREEAM report is assessed on the 9 criteria points shown in figure 1. All 9 are scrutinised to a set criteria, and at the end of the assessment, a rating will be produced. Each of the 9 measurements will be divided into a range of benchmarks, and once a benchmark is achieved, credits will be awarded by a BREEAM certifier. Once all 9 areas have been assessed, the credits will be totalled up and will create a rating. The rating will either be outstanding, excellent, very good, good or pass depending if your score is high enough to receive the pass (How does BREEAM work? 2011). It can also be unclassified in some cases. BREEAM is a world leader, setting the standard for environmental

buildings, due to its wide-ranging and detailed criteria. This means that many aspects of the building are considered such as pollution, energy, transport, etc. and not solely energy efficiency.

A reduction in the running costs of a building is the main advantage of BREEAM. Clients say that with an extra 2% investment in BREEAM, when attempting to achieve a higher rating, the reduction in energy usage can repay these costs within the first 2-5 years (Breeam.com, 2017).

Commercial buildings with a BREEAM rating, can help create a healthy working environment. Having excellent air quality, the correct amount of light passing through the windows, can help increase well-being and productivity by 8-11% for the individuals who employ the building. This is being proven more often as many buildings are becoming BREEAM certified. This in turn adds value to the property. The Royal Institution of Chartered Surveyors (RICS) did a report and found that a 21% premium was paid for BREEAM certified buildings and an increase of 18% on rent. This again shows that the initial cost of BREEAM will be repaid in more areas than one (Breeam.com, 2017).

With the government constantly increasing the requirements for newly constructed buildings, creating a BREEAM certified building will mean long-term compliance with the government.

2.3 Disadvantages of BREEAM

A negative aspect of BREEAM can be due to its assessment being wide-ranging. This is because it can sometimes divert focus away from the main aspects of the building. For example, a commercial building being assessed may not reach a high rating in BREEAM, even though it contains excellent lighting, low water consumption, etc. This can be caused due to the fact for not having bike racks or sufficient recycling bins for example (Fresh Workspace, 2015). BREEAM would be more beneficial and reliable if the main aspects of a building were considered first and then the lesser amenities were added later.

BREEAM can also increase costs of the construction. However, this is all voluntary as the developer can decide whether to invest more money to achieve a higher rating or a lesser sum to achieve a rating of 'good' for example.

There is always lots of paperwork when involving BREEAM and strict record keeping. This can slow down construction therefore causing more cost.



Figure 2: (Inhabit, 2013)

3.0 Passivhaus

3.1 An Introduction to Passivhaus

Passivhaus is the global leading approach to energy efficiency. Currently, it is the fastest growing energy performance assessor in the world. There are now over 30,000 buildings currently in line with Passivhaus' standards (The Passivhaus Standard, 2017). The Passivhaus standard can be defined; "A Passivhaus is a building, for which thermal comfort can be achieved solely by post-heating or post-cooling of the fresh air mass, which is required to achieve sufficient indoor air quality conditions – without the need for additional recirculation of air" (The Standards Origins, 2017). Passivhaus is used globally (at least one building has been designed in every European country) and works as successfully in warmer climates as it does in mild climates (Global Application, 2017). The requirements of a Passivhaus are;

- Heating demands of lower than 15 kWh per square meter annually
- The primary energy demands are required to be lower than 120 kWh/m²a
- Finally, a Passivhaus must pass a pressure test which is limited to 50 pascals and the pressure not exceeding 0.6 times a rooms volume per hour

All three of these are required for a Passivhaus to be certified (Greenmatch.co.uk, 2017).

The Passivhaus principles are based around continuous insulation to reduce heat losses, appropriate shading and efficient windows, continuous airtightness to avoid leakages and moisture, a sophisticated ventilation unit and no thermal bridges therefore limiting weak points in the building envelope.

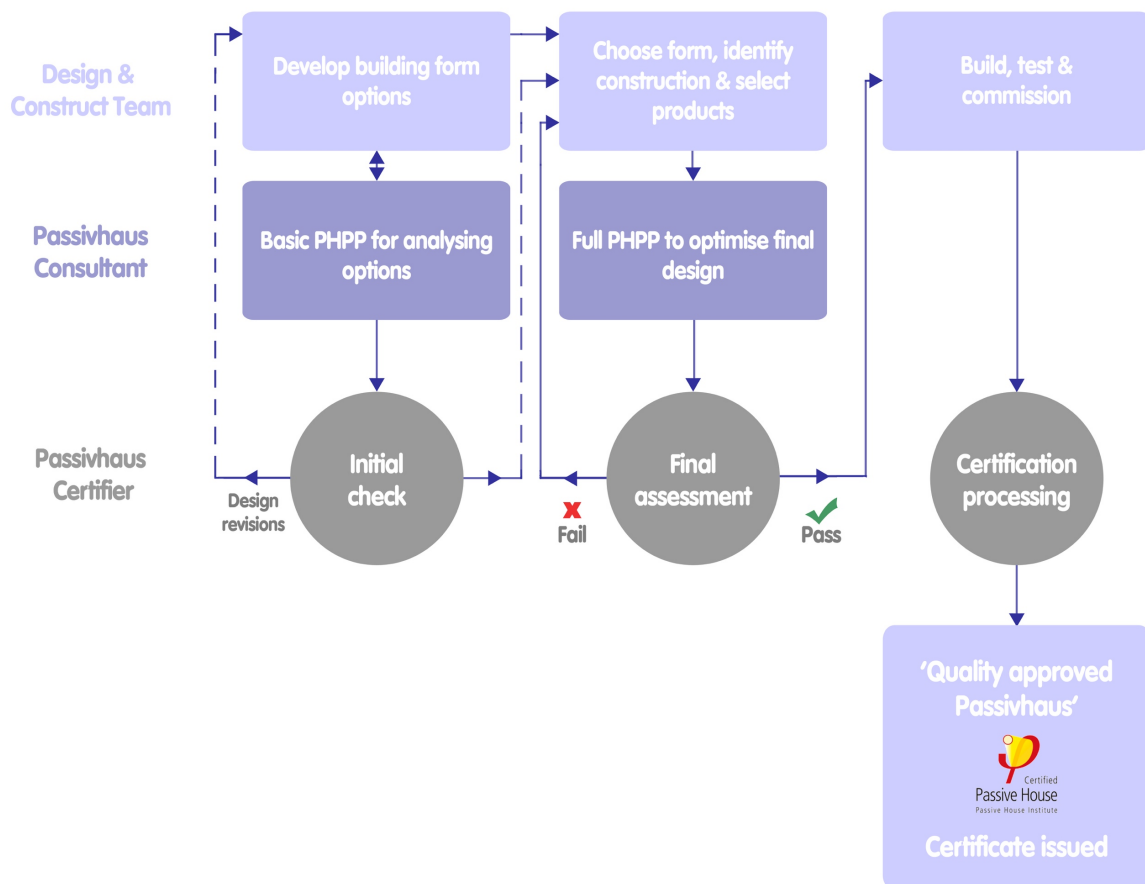


Figure 3: (Passivhaustrust.org.uk, 2017) PHPP – Passivhaus Planning Package

Figure 3 clearly lays out the Passivhaus process for certifying houses. It shows the trial and error required to reach the goal of Passivhaus approval.

3.2 Advantages of Passivhaus

A common misconception with Passivhaus is the term 'zero carbon'. These are two completely different things. For example, Passivhaus will not use any on-site renewables as its aim is to conserve energy rather than generate it. Zero Carbon homes however will use on-site renewables and the regulations are much less strict than Passivhaus (Ricci, P. 2016).

An advantage of Passivhaus is how stable the temperature can be, from any month of the year. This is important in a country such as the UK which can see temperatures reaching 30°C in the summer and potentially dropping below 0°C in the winter months. The internal temperature of a Passivhaus is strictly regulated so that temperatures remain comfortable at any point in the year. This works due to the silent, automation ventilation system which helps control the internal temperature while avoiding drafts for example (Ricci, P. 2016). The ventilation unit provides fresh air 24/7 creating a high air quality environment.

The costs of running your home are becoming increased ever more due to the energy companies increased rates. A Passivhaus helps avoid this by not needing any type of heating system or radiators. The average cost of heating a medium sized house is £666 per annum (Ovoenergy.com, 2017). Using a Passivhaus solution, these costs will be saved. These costs are best saved with sufficient insulation, more efficient windows, and the superior ventilation system. See figure 3 regarding the average energy use for different types of homes.

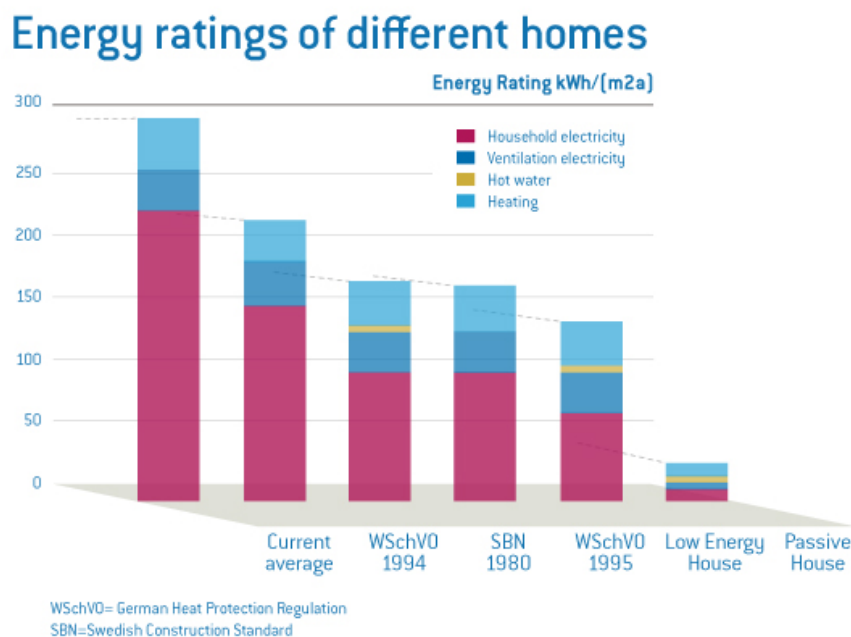


Figure 4: (BorsodChem, 2017)

Figure 4 shows the true advantage of energy conservation. The lack of energy being required to run a Passivhaus is shown here when compared to an average home and compared to a low energy house.

3.3 Disadvantages of Passivhaus

Passivhaus in the long term can save a homeowner hundreds of pounds a year. However, a disadvantage of Passivhaus is the initial cost. If a new build is being constructed, the initial cost is estimated to increase the overall project by 15 – 20%. This can vary and can be slightly higher or lower (Selincourt, 2014). These costs will generally be seen as extravagant currently, but as governments increase legislation requiring more homes to be energy efficient, more people will require a Passivhaus.

As seen in figure 1, the energy usage of a Passivhaus is far superior to any other type. This comes at an initial cost and the ability to create a Passivhaus can be difficult due to its strict legislation and tests. These issues can delay construction times as one slight error will be the difference between certifying a Passivhaus and not certifying.

One of the largest disadvantages is the fact that the homeowner will need to monitor and maintain the system. This means not only to know when to open the windows, but when filters will need to be changed, when to boost the ventilation, etc. This means that a certain amount of knowledge will be required when living in a Passivhaus home. Once the house has been certified as Passivhaus, no alterations will be allowed. Even something as minor as a satellite cable running through the wall is not allowed. You can however alter your house as you wish but this will more than likely remove the Passivhaus certification.

Even though the homeowner needs to monitor the house, very often in the summer Passive homes overheat due to the rising temperatures. This is a common problem which can be uncomfortable and hard to change. You would not be able to install an air conditioning unit for example as once the house has been registered as a Passivhaus, no internal/external changes will be allowed otherwise you will void the certification.



Figure 5: (BuildingTalk, 2016)

4.0 Comparing BREEAM and Passivhaus

4.1 How are they different?

BREEAM and Passivhaus are both green building certifications. However, they both have their own pros and cons and both are slightly different. The main difference is that Passivhaus is simply an energy efficiency standard, whereas BREEAM oversees a whole range of aspects. This be both an advantage and a disadvantage. Passivhaus could be seen as too focused, and not varied enough. BREEAM however can be too wide ranging and not focused enough. BREEAM can keep up with new government legislation and can constantly update ratings to meet new requirements. For example, the highest rating received is 'outstanding' but this was not always the case. Previously the highest rating was 'excellent' but they introduced 'outstanding' to meet the new government legislation. Passivhaus however has a specification that will not change as it has exact measurements.

4.2 Are they similar in any way?

BREEAM and Passivhaus are very separate ideas. Subsequently though, they are both green certifications. This meaning that if either are enforced on a building it will benefit the environment around us due to the energy savings regarding Passivhaus and more areas regarding BREEAM. One of BREEAM's core 9 measurements is 'Energy' and this is another similar area. However, Passivhaus simply focus' their whole certification on energy whereas BREEAM have many other areas to look at. There are lesson comparison points between the BREEAM and Passivhaus as they're both so different. BREEAM can be said to operate a 'top-down' approach whereas Passivhaus is a 'bottom up' approach. This meaning that Passivhaus homes are designed from the start how much energy will be required, used and how it can be re-used (Heale, 2016). However, BREEAM's system is a simpler system of marking and grading but you will not know the exact carbon emissions for example until the building is being used for its purpose.

5.0 Conclusion

To conclude, although both assessments are green certifications, it is clear to see the differences. Passivhaus would be more suited to a new build, due to the building being built around the Passivhaus standard, whereas BREEAM can be used in any situation as it is a criteria based certification. It is also clear to see why BREEAM is the leader in sustainability as it covers such a high range of areas. They both have their uses however, and it is expected that both Passivhaus and BREEAM will be around for much longer due to government measures that are always updating to new measures.

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