

## Powell Dobson

### PassivHaus

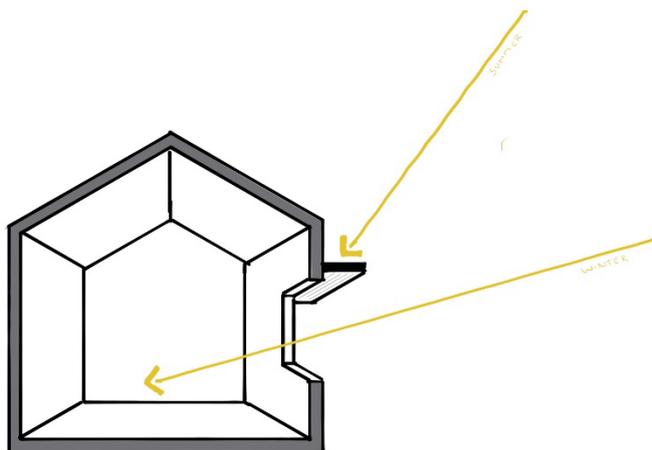
## Papers

### Series 1\_Paper 7\_ **Building Orientation**

The sun at its surface is 5,500 degrees Celsius. You would need to explode 100 billion tons of dynamite every second to match the energy produced by this glowing mass in the sky. It is an energy source that needs to be respected, and if possible, harnessed.

**What's 'good' about the sun?** Why burn fossil fuels, and waste precious resource, when we have a power station floating above our heads. As you already know, a PassivHaus is pretty good at keeping energy within its fabric, limiting energy and heat loss. However, it is not full proof. If you keep the front door open when you get the shopping from the car, let the dog out in the garden, or have a mischievous toddler, energy escapes. By harnessing natural sunlight, and manipulating the amount and location of your glazing, you can let this free energy flow into your home, to top up the space heating requirements, without reliance on fossil fuels.

**How do we manipulate the sun?** Firstly, we make sure the building is placed in the most 'effective' orientation. The sun rises in the east, and sets in the west, with due south being its highest point in the day. Ideally, we aim for 30 degrees or so of due south for the main façade, as it offers the most amount of energy per day.



There is a big difference between the sun's position in the sky day to day, depending on what time of the year or season you find yourself in. In the winter, the sun is low, and easily able to shine into the building. Due south gives the maximum opportunity and time to capture the energy throughout the day, and catch the sun at its highest and warmest point. It is for this reason that typically, you will find that a PassivHaus has larger glazed sections on the southern façade, drawing this winter sun inside. The sun's rays are able to reach deep into the footprint, and be trapped within the fabric, providing the necessary energy top up needed to reduce the reliance on space heating by other means.

In contrast in the height of the summer, when the internal conditions of the building are already warm, excess sunlight making its way through these southern facing windows as a direct gain could be an issue, resulting in uncomfortable warm conditions for the occupants. During the summer months, the sun is at its highest point in the sky, which is actually good thing, as it is easier to control. If shading is designed correctly, with the use of brise soleil for example, or even clever placement of deciduous trees, the hotter, higher summer sun can be blocked from entering the building.

Eastern and western glazing is something that also needs consideration. Unlike south facing summer sun, which sits high in the sky, eastern and western sun light is lower in the sky, as it is at the rising or setting of the sun's cycle. The low angle makes it very hard to control, particularly in the summer months, when the sun is at its hottest, as it is able to bypass the more 'traditional' solar shading tricks as mentioned above. A summers

evening, with direct sunlight making its way into the building via large expanses of western glazing would result in pretty unbearable internal conditions.

The exact size and location of the glazing, paired with the orientation of the building is a very delicate balancing act. We are able to model the likelihood of the building overheating, and the amount of energy that could be expected to enter the building in the winter for space heating, by inputting the necessary data into the PHPP. It is a great tool, which is able to show changes in performance in real time, as different elements of the building are flexed, such as window sizes adjusted, shading depths reduced, or building location rotated slightly on the plot. Pretty powerful bit of software.

This brings an end to our first series of **PPP**. I hope you have found it interesting, or maybe stoked an enthusiasm to find out more about this great design concept. The response from this series has been fantastic, leading to many interesting and thought evoking debates over the past couple of months, thank you all for getting in touch, and really buying into what these papers were meant to do....start conversations.

As always, please do get in touch if you fancy discussing any of the papers, and look out for the next series, starting soon

Coming Soon: Series 2\_ **Mulberry Park PassivHaus Case Study**.

**Oliver Henshall Technical Associate**

E: [oliver.henshall@powelldobson.com](mailto:oliver.henshall@powelldobson.com)

 @HenshallOli

 @PDArchitects

*Sunshine, the most precious gold to be found on earth.*