

Reflective Essay- Home for 2030 project.

Introduction

Our task as a group was to design a conceptual active house for 2030. An efficient active house should incorporate passive house principles, renewables, energy efficiency/storage along with an appropriate response to climatic factors. Following recent events in the South Wales valleys, we concluded that flooding would be a prominent issue with houses in 2030 and began to explore the possibility of incorporating flood resistance into our scheme.

Examples of flood defence and avoidance in buildings already exists and the relevant technologies are at our disposal. Having said this, the use of these technologies seems to evade the South Wales valleys where recent flooding took place. NASA predict global water levels to rise 65 centimetres by 2100 (Weeman, 2018), which will increase the amount of flooding that occurs and emphasises the importance of flood resistant dwellings in years to come.

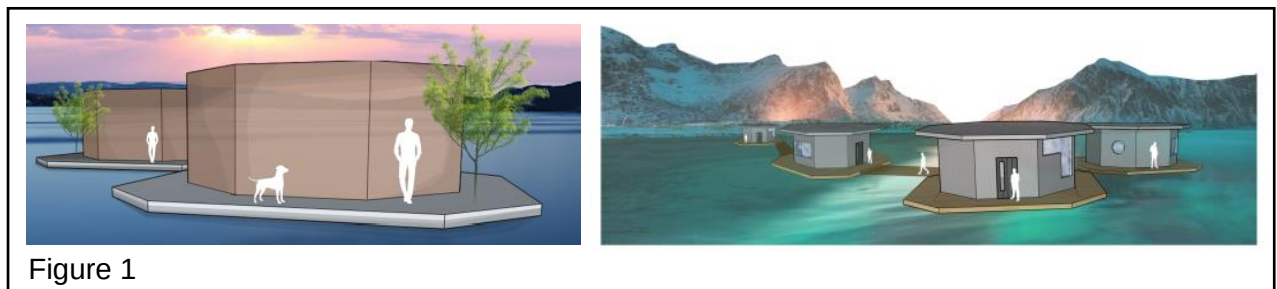


Figure 1

Flood resistance.

Perhaps the most challenging aspect of this project was deciding on the appropriate technologies that would make our FL-HEX scheme flood resistant. The initial technology that would provide us with flood resistance was thought to be similar to that of an inflatable life raft (see figure 2). If this concept was adopted, a manual command would have to be made to inflate certain areas of the pods to create buoyancy and lift the pods from its foundations and remain above water level. The issue with this of course is knowing when a risk of flooding exists (many were recently caught unawares throughout Wales and were unable to prepare appropriately). Of course, an alternative to this would be on-site sensors that will identify when water levels are dangerously high, and then activate the inflatable technology.

By using an inflatable technology to evade flooding we'd of course be running the risk that something could go wrong with the system, e.g. punctured air pockets or faults with sensors. Following this consideration, we then decided that a flood defence would be most effective if it were built into the infrastructure of the building. We then began to research existing technologies and found that technologies are available that achieve flood resistance in the way we hope FL-HEX would. There were two examples that were most applicable. The first is an example used by Baca Architects for a scheme located on a flood-prone island in the river Thames (WebUrbanist, 2014) where a 'wet dock' beneath the house would fill allowing the house to

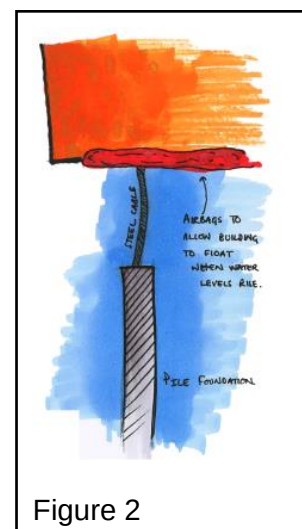


Figure 2

float above water level. The second example and one that we found most suitable to the FL-HEX scheme is a piled foundation where the pods can detach and float when water levels rise (see figure 3). To prevent the pods from floating off, they are anchored to floating mooring posts. The hollow concrete body beneath the pods act like a ship's hull and allows them to float. We determined the piled foundation most suitable as it can be applied both on land and on water sources. It also suits the polygon shape of the pods and can be adapted when creating FL-HEX communities.

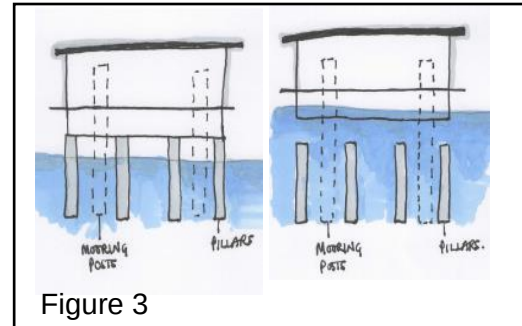


Figure 3

Design and Layout.

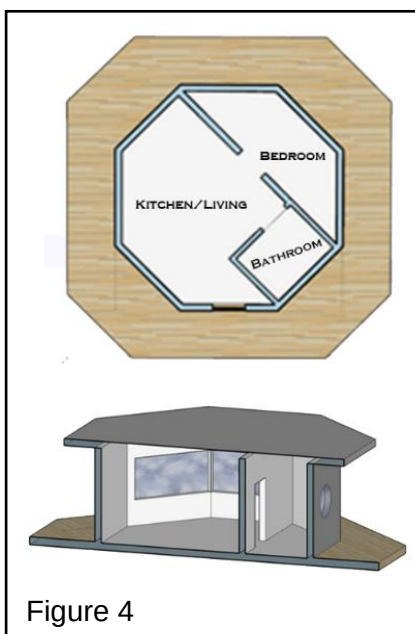


Figure 4

The design and layout of FL-HEX is based around the concept of a flexible pod system for one or two occupants that can be joined and adapted to create self-sustaining, flood resistant communities. The design is not restricted to any site and is applicable to all locations near or above water sources. This is made possible due to the type of piled foundation used as stated in the above paragraph. As well as flood resistance, we hoped the FL-HEX would also provide an answer to our growing global populations and will allow populations to inhabit the water when space on land becomes limited. The plan consists of a living/kitchen area, a bedroom and bathroom. This interior layout is flexible and appropriate for personalisation due to the modular construction method and exterior load bearing walls. The design also allows numerous pods to be linked by walkways to create communal living areas. Levels can also be added to expand occupancy and help create thriving communities. Our scheme is therefore a series of adaptable living spaces that can be further adapted to meet the needs of future generations.

Materials and Renewable Energy.

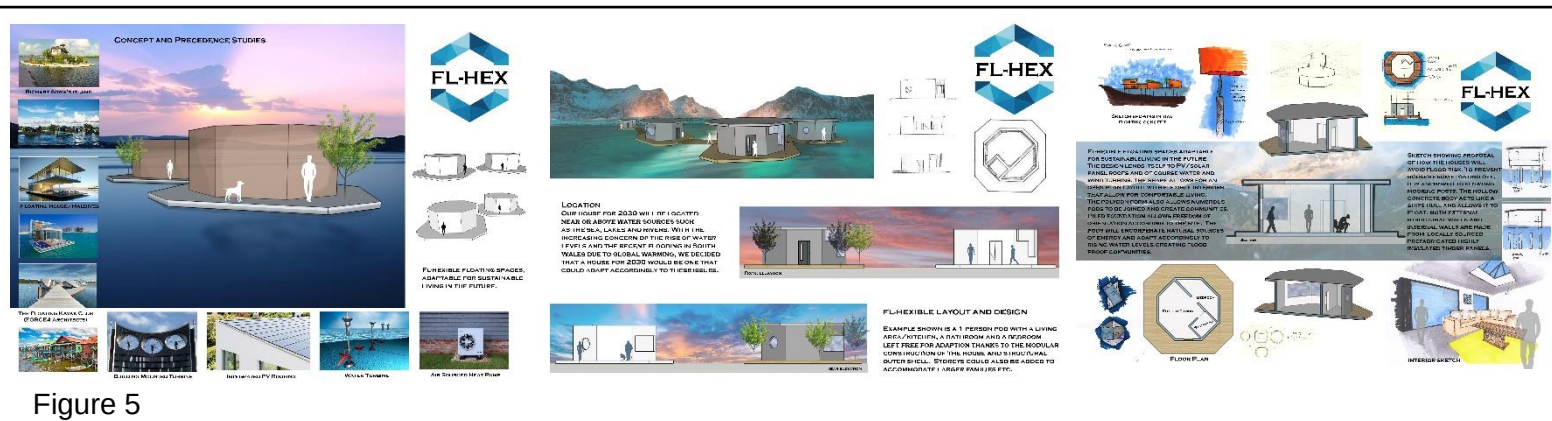
Both external structural walls and internal walls are constructed from highly insulated prefabricated timber panels. This allows the FL-HEX pods to be constructed off site and tailored to the clients demands and site orientation. For example, each panel can be carefully constructed, with windows placed on walls in response to the orientation and sun path, to maximise solar gain. The material choices and consideration of embodied carbon are often significant when considering the environmental impact of any scheme. Of course, in an ideal world the use of concrete would be minimal. But in this instance, concrete is the main structural material of the foundations and hollow deck that allows the pods to float. The use of concrete here provides a water-resistant foundation that gives longevity to the scheme.

Having said this, the use of concrete and its environmental impact is balanced with the use of locally sourced and manufactured timber. The further the distance between the site and where the timber is sourced/manufactured the higher the carbon embodiment. Therefore, it's important that the timber is sourced, treated and prefabricated as local to the site as possible. As a group we also identified the importance of renewable energy sources in our house for

2030. The scheme would obviously lend itself to water and wind turbines due to its location near water sources, and the flat roofs will allow for integrated PV roofing. These technologies will, in turn, allow large groups to create self-sustaining communities by utilising nearby water ways and utilising the FL-HEX floating technologies. The choice of renewables allows for power supply 24 hours a day, it is vital that excess power is stored.

Conclusion

To conclude, FL-HEX responds to a real-life, timely issue and therefore this scheme is a suitable response to the House for 2030 project. It incorporates new technologies with the older ideology of communal living and therefore makes it an appropriate response to climate change. If I were to take the FL-HEX project further, a study must be done to look at how every component of the self-sufficient communities would work. Perhaps schools, shops and public buildings would become integrated into FL-HEX communities, allowing for jobs and social activities? I would also further explore the use of renewable energy sources and calculate how much energy is needed to sustain a community of this nature. The way energy is sourced and stored can then be adapted to create self-sufficient, off-grid communities that use active house principles in response to climate change.



Reference List.

Figure 1- Author (2020) 3D proposals of FL-HEX House for 2030.

Figure 2- Author (2020) Conceptual sketch of floating mechanism.

Figure 3- Author (2020) Diagram showing proposed floating mechanism.

Figure 4- Author (2020) Proposed plan and section showing internal layout.

Figure 5- Author (2020) Proposed FL-HEX sheets for competition entry.

WebUrbanist. (2014). Amphibious Architecture: 12 Flood-Proof Home Designs. [online] Available at: <https://weburbanist.com/2014/10/20/amphibious-architecture-12-flood-proof-home-designs/> (Accessed 04/03/2020).

Weeman, K. (2018). New study finds sea level rise accelerating – Climate Change: Vital Signs of the Planet. [online] Climate Change: Vital Signs of the Planet. Available at: <https://climate.nasa.gov/news/2680/new-study-finds-sea-level-rise-accelerating/>. (Accessed 04/03/2020).