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Floating Home

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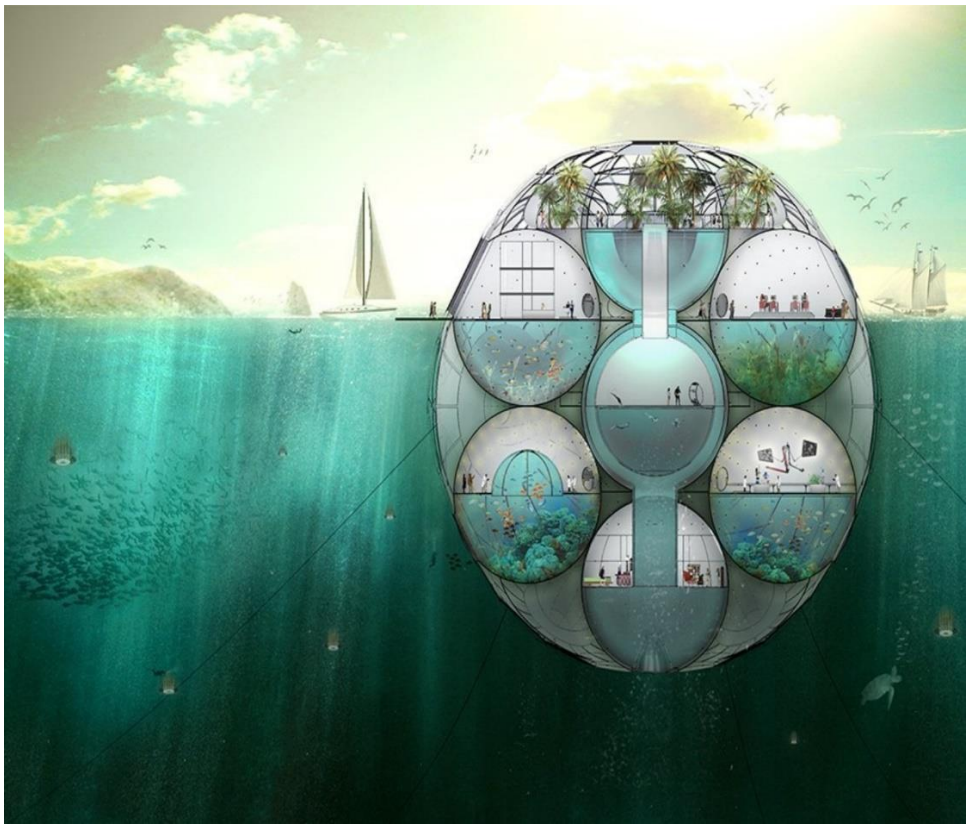


Introduction

Floating homes are any structures that can float or submerge and travel on substantial distances while being completely sustainable and allowing its inhabitants to remain at sea for a prolonged period. Floating homes are sustainable alternative to traditional land-based housing for a variety of reasons. This paper sets out to establish that floating homes are more sustainable than traditional land-based homes due to their adaptability to rising sea levels, reduced land consumption, enhanced energy efficiency through passive cooling systems and innovative waste management practices.

Literature Review

Floating homes offer a compelling housing solution in the face of rising sea levels and increased flooding due to climate change. Today, even more so than ever before, traditional land-based homes in flood-prone areas face significant risk of destruction, whereas floating homes can cable of rising with the water levels, reducing the impact of floods and offering a safer habilitation alternative.[1]

Moreover, with a significant shortage of housing, floating homes offer a particularly advantageous alternative and access to cheaper housing. This allows land to be saved for green spaces and improve the overall air quality on our planet.[2]

Next, floating homes can be designed to include renewable energy sources such as solar panels, passive cooling systems, waste processing devices and drinking water re-generation. Specifically, floating homes could incorporate an advanced waste management systems such as greywater recycling and composting toilets, both of which reduce environmental impact and reduce our growing waste management issue.[3]

In addition, floating homes provide mobility and flexibility in terms of location. If a storm is coming, floating home can relocate to a safer location. If it is cloudy today, floating home can more to a sunny location to take advantage of its solar panels. Such mobility reduces the long-term economic impact of weather-related destructions.[4]

Finally, many floating homes are built with sustainable material and methods that reduce the cost of construction and the overall environmental impact on the planet.[5]

Experimental Procedure

To address the hypothesis, a hypothetical floating structure was designed.

A Hypothetical Structure

A hypothetical structure was designed that can be used as a floating home.[6] However, other possible structures could also be used as alternatives.

Analysis of Literature As Presented

Based on the literature review, data was extracted to analyze a variety of factors, impacting the effectiveness of the floating homes, such as indoor temperatures and level of comfort, innovative waste management and environmental impact, use of sustainable materials and water storage, water quality and structural stability, and potential for energy storage.

[1] H. Stopp & P. Strangfeld, “Floating houses – an innovative idea for coastlines and river districts in times of global climate change,” The Sustainable City VII, Vol 2, pp. 733-744.
[2] Danilescu, “Study on the Architectural Projects of the Floating Structures for Housing and Leisure, along the Danube,” Journal of Danubian Studies and Research, ISSN: 2284-5224.
[3] Id.
[4] Felbermayr & Groschl, “Naturally Negative: The Growth Effects of Natural Disasters,” Journal of Development Economics 111 (2014), pp. 92-10.
[5] Vera, Navarro & Samperio, “Climate change and income inequality: An I-O analysis of the structure and intensity of the GHG emissions in Mexican households,” Energy for Sustainable Development 60 (2021)
[6] See Figure 1 for further details.

Discussion of the Results

After results were recorded and analyzed, the following inferences have been drown:

1. **Floating homes can maintain comfortable indoor temperatures through passive cooling methods involving water**

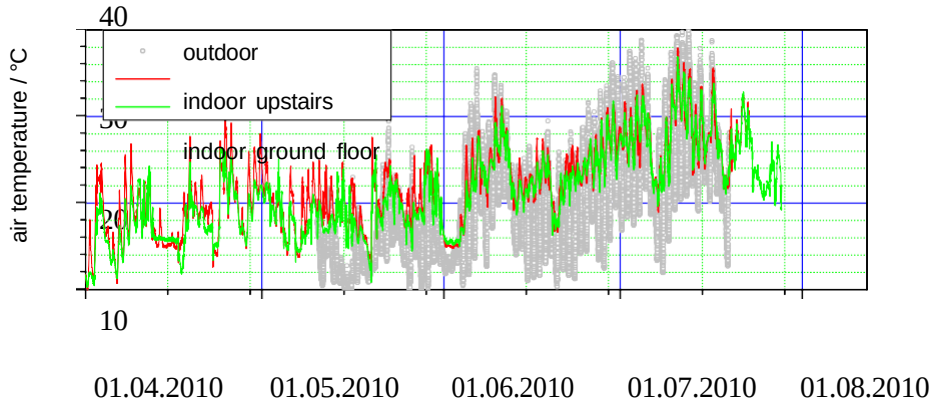


Figure 13: Profile of the outdoor and room air temperatures for the floating house "Ar-che" in the early summer and midsummer of 2010.

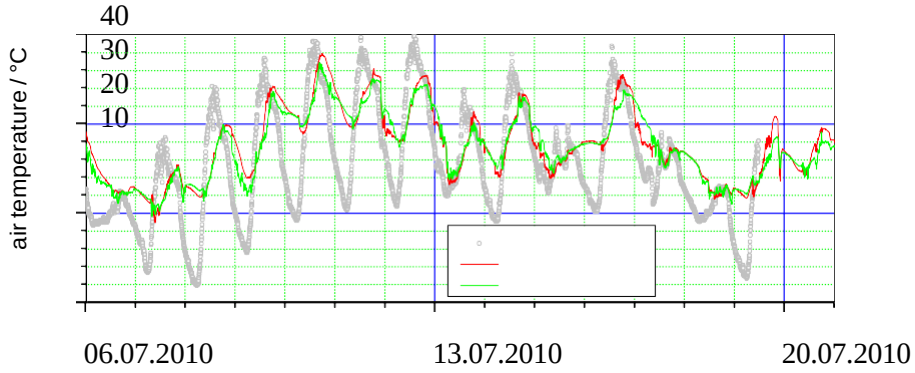


Figure 14: Room air temperature profile of the floating holiday home (fig. 6) in the upper and ground floor during a period of fine weather in July 2010.

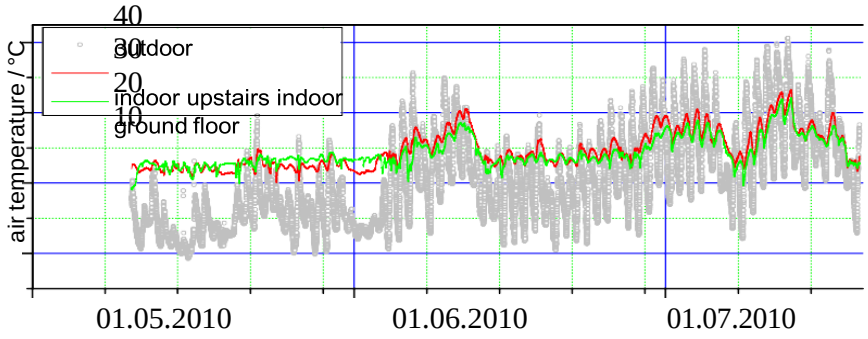


Figure 15: Room air temperature profile of the "Ar-che" (fig. 5) in the upper and ground floor in comparison with the outdoor temperature profile during a period of hot weather in the summer of 2010.

2. **Architectural design in floating homes can enhance energy efficiency and reduce environmental impact by optimizing natural ventilation and shading**

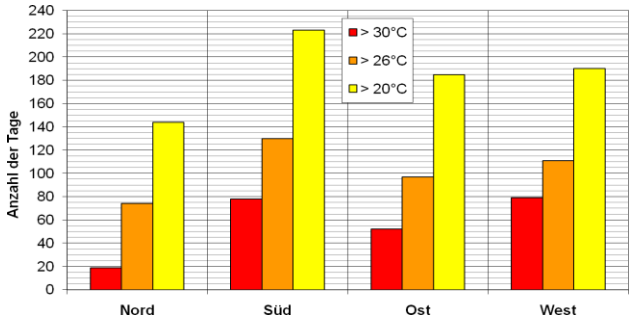
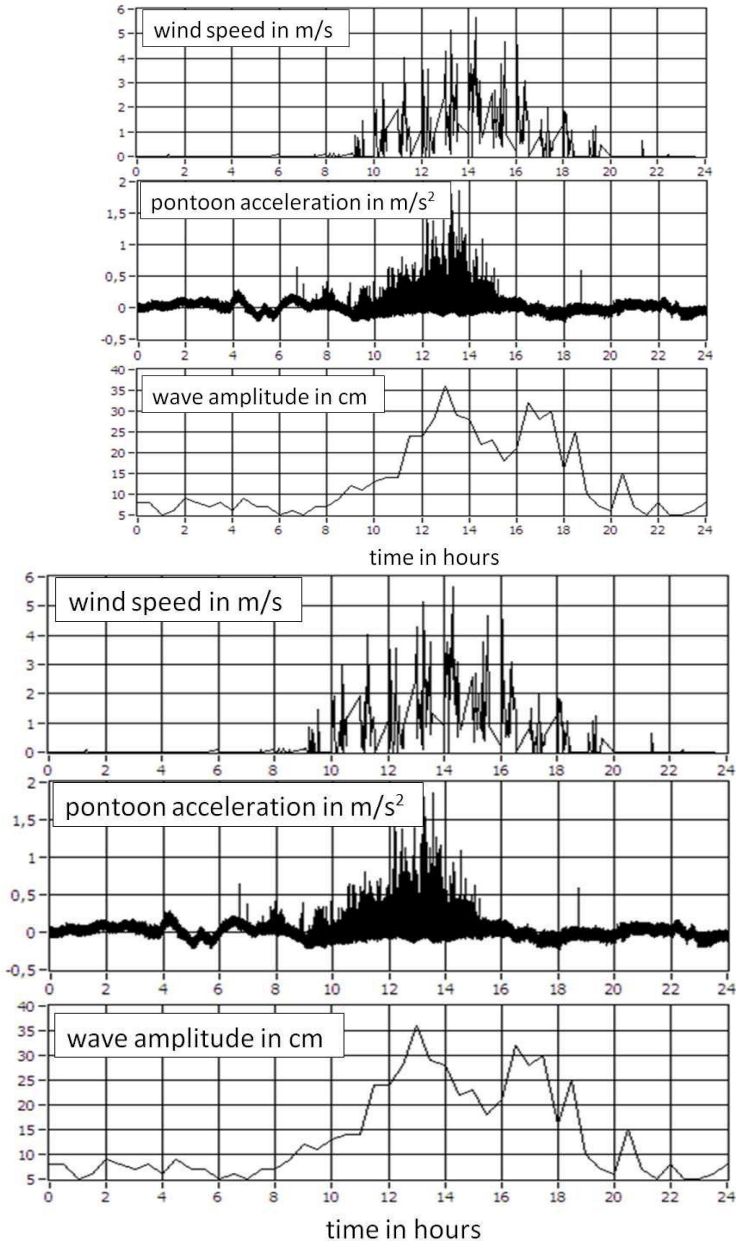


Figure 16: Number of days with cross-border room temperatures in case of four different positions of the balcony of the floating house in fig. 6.

3. **Measuring wave parameters, essential for ensuring the long-term stability and minimal environmental disruption of floating homes**



4. Innovative materials can enhance the sustainability of floating homes by reducing energy consumption for heating and cooling

Floating storage reservoirs

It is possible to develop self-existing floating storage reservoirs. Solar energy is added by direct and diffuse radiation collected through a transparent cover. This could be, for example, a thermal insulating window glass with an additional heat insulating blind during the night. The envelope of the reservoir is thermally insulated from the surrounding water. The capacity can be enlarged by means of so-called phase change materials. Figure 20 shows the lowering of temperature of a floating water storage reservoir dependent on the mixture of paraffin.

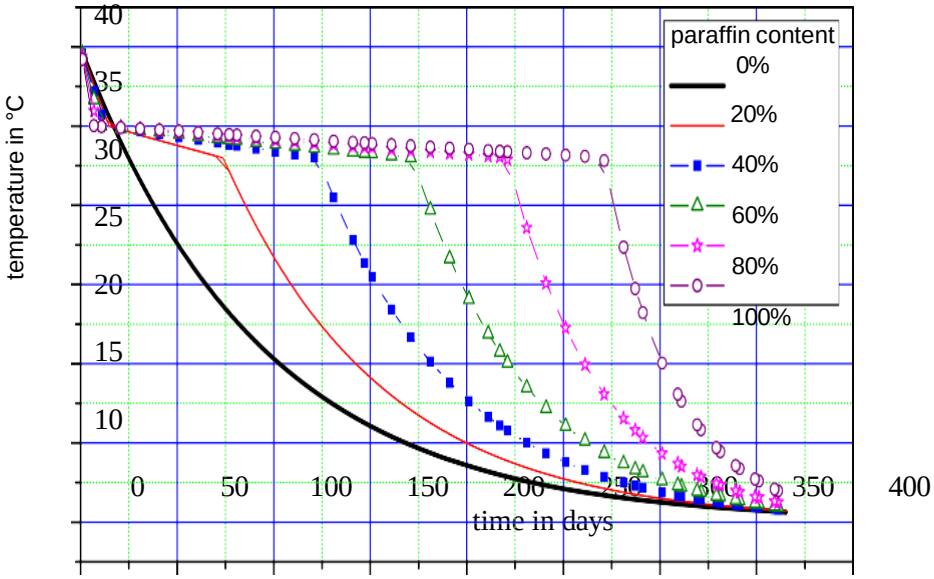


Figure 20: Cooling process of a water tank in dependence of the percentage of phase change materials (PCM) [4].

5. Building materials have an influence on room humidity and moisture flow, emphasizing the potential for using sections of floating home as storage reservoirs and the benefits of passive air conditioning to minimize energy use

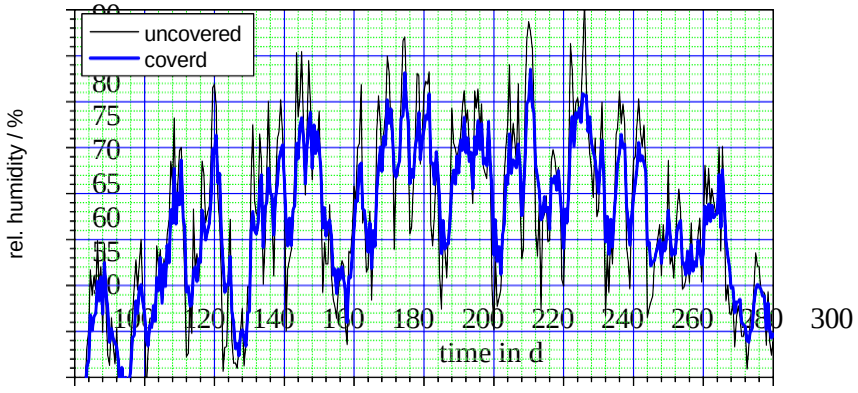


Figure 21: Comparison of the room air humidity between paneled and not paneled internal insulation made of foam glass.

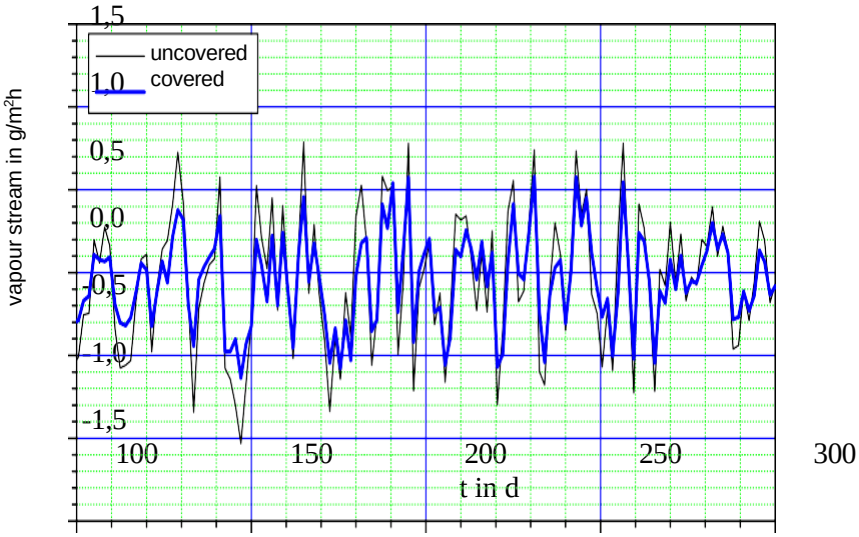
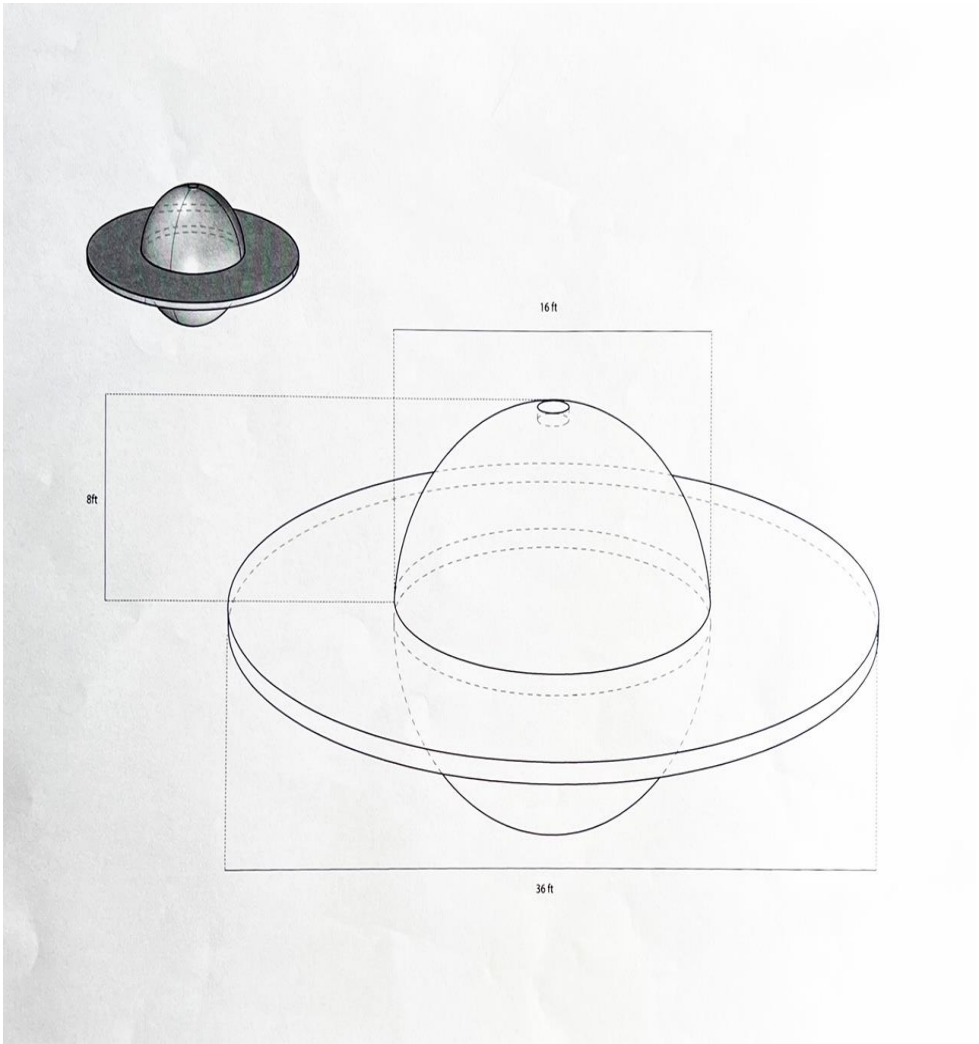
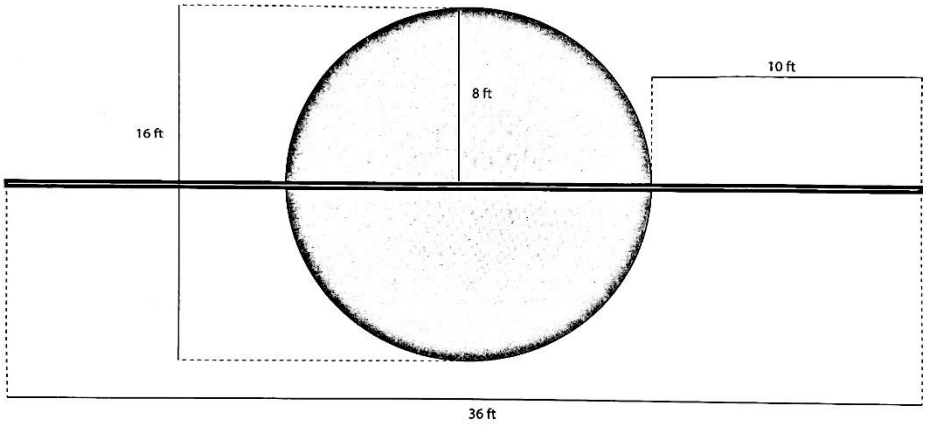
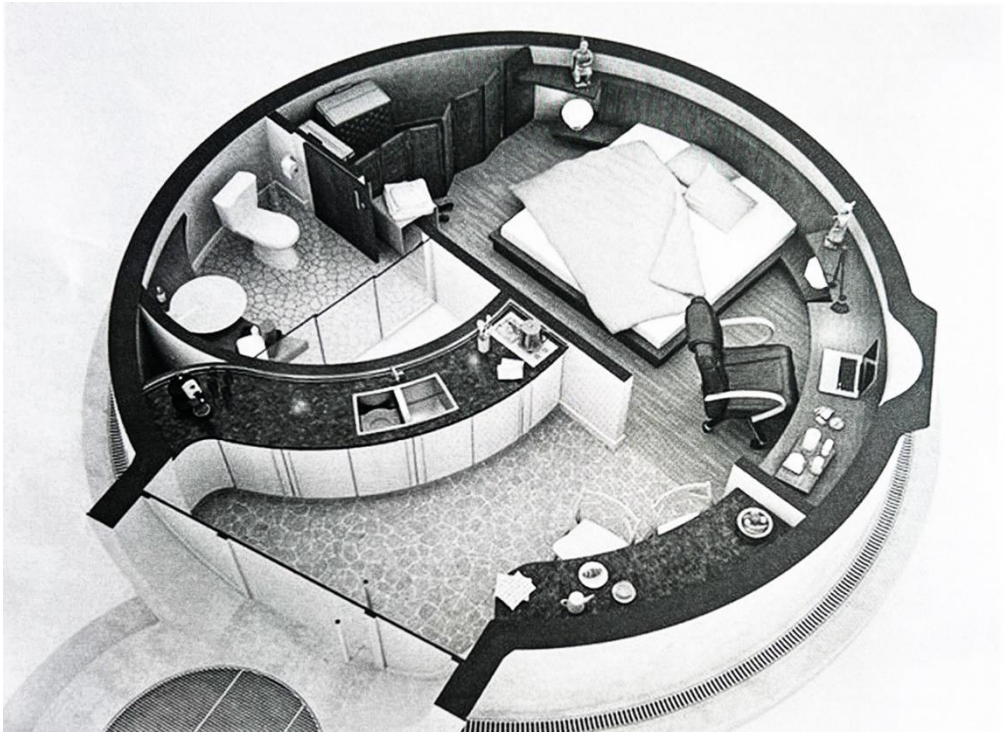


Figure 22: Comparison of moisture flows at the interior wall-surface between paneled and not paneled internal insulation made of calcium silicate.







Conclusion

Based on the data analyzed and presented, it is clear that floating homes are more sustainable than traditional land-based homes due to their adaptability to rising sea levels, reduced land consumption, enhanced energy efficiency through passive cooling systems and innovative waste management practices.