Reflection Paper – The Harvested Home

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The concept of the Harvested Home is to conceive of a building envelope *entirely* made from renewable bio-based materials. At first glance, the problem might seem trivial; numerous examples of vernacular architecture throughout human history could fit this description. However, the crux lies in making the said envelope as efficient, durable, and fashionable, as its modern counterparts. What is currently at stake is not only a quest for low-embodied energy enveloped, but also an attempt to maintain our current standard of living. Indeed, we often forget that most of Net Zero, Passivhaus, LEED and other such certifications are made possible by the use of high-performance –and non-renewable–petroleum-based membranes, adhesives, electronics, insulation, paints, metals, acid-bathed lumber and other miraculous materials ushered in by a century of inexpensive oil. In the twilight years of this leisurely era, these products could vanish with the comforts they brought along. The Harvested Home presents itself as a solution in this grim scenario. In theory, it offers a contemporary housing typology with an ultra-low carbon footprint, fully biodegradable structure, and fully renewable down to its smallest detail.

Admittedly, creating a building envelope is a task that must be tailored to respond to precise environmental conditions, and one should not build in the desert as he/she would in the Arctic Circle. In the present case, the temperate maritime climate of the Netherlands provided with a balanced set of constraints and opportunities for the project; geographically convenient, yet neither too extreme nor clement. The island of Texel in Noord-Holland was selected because its protected ecosystems were extremely sensitive to human activity, hence the positive impacts of the harvested home would be more apparent. Specifically, the final choice fell on rehabilitating a sector of the Kogerstrand Camping in De Koog, which is located in the Dunes of Texel National Park, as a way to demonstrate how the Harvested home could allow the sector to “heal” the scars left by decades of camping activity. Indeed, certain areas of the camping still show aging and intrusive infrastructure, pieces of synthetic construction materials ripped off by the wind, and other imprints of infertile soil left by the heavy recreational vehicles of seasons past. For this project, the proposed solution is to replace a part of the camping with a series of housing units that would be less intrusive than recreational vehicles and present little to no risk of contaminating the ecosystem: the Harvested Homes.

To remediate these issues mentioned above, the Harvested Homes’ geometry was designed with two core imperatives: to disturb the ground as little as possible, and to mitigate the effects of high winds and rain. Hence its triangular form, the Harvested Homes can efficiently evacuate rainwater while deviating the important wind loads from its surface. The triangle’s lower center of mass grants it superior stability in addition to being reducing the number of weak points. Moreover, every housing unit can be mounted on piles that can accommodate the jagged topography of the dunes. As a result, the homes can be built on the dunes without having to pour foundation slabs or carving out the dunes to make a flat surface. These design decisions reduce the risks of building materials breaking off form the main structure, but combined with the Harvested Homes’ fully biobased envelope, they ensure that whatever does will be biodegradable, and

thus will not put the ecosystem at risk. In doing so, it demonstrates that protecting fragile ecosystems does not necessarily imply prohibiting new developments.

This raises an important methodological question: how does one assess a building's impact on the environment? Many choose to declare their architectural project's "sustainability" on the grounds of its energy consumption, carbon dioxide emissions, local sourcing of its components, and such. But since all are simultaneously correct, the most exhaustive solution is to assess the environmental impacts of a building for its entire life cycle: from the making of its materials to its dismantlement. To do so, the method of Life-Cycle Assessment (LCA) was used to estimate the impacts of various synthetic building components and compare them to bio-based counterparts. Prior to the design phase, the research thesis tackled the topic of bio-based vapor control layers in wooden housing specifically. It provided the tools to estimate the environmental impacts from cradle to cradle of the most difficult to replace building component, the water resistant layer. Understanding the dynamic and bi-lateral flow of water vapour through wall assemblies served to prolong the longevity and wellness of the building's bio-based envelope and its occupants. In the end, only a handful of non-renewable building components could not be replaced for a lack of safe and tested alternatives. Indeed, replacing the copper of electrical wiring was simply too speculative and hazardous to be included in the project's final iteration. The same could be said about plumbing. Nevertheless, great efforts were made to cluster plumbing and electrical services to minimise the use of non-organic materials.

The Harvested Home project demonstrates, at least in principles, that fully bio-based building envelopes can live up to the stringent performance standards of modern constructions. It shows that, in addition to lowering our collective carbon footprint, it is now possible to eliminate non-renewable materials from our homes' walls without compromising on style, comfort, or energy savings. While many envisioned a purely bio-based construction as a return to ancient practices, the Harvested Home embraces new state-of-the-art materials and the construction techniques of the digital age.