In conceiving the proposal for a next-generation residential care center, the Planeteers team aspire to a negative carbon footprint and the highest occupant experience. Our proposal has global outreach and scalable potentials; nonetheless, it has been carefully calibrated around the specific requirements of the climate and infrastructural conditions of Puerto Rico. There are four foundational goals for this proposal: 1) minimize the carbon footprint for the development both from the construction and operational side; 2) maximize the use of passive design strategies to increase the thermal, visual, and air quality experience of the space; 3) use of next-generation materials to develop low-maintenance, resilient solutions; 4) use of landscape and building articulation to engage with the community at large.

The site for the project is in Punta Santiago, one of the most severely impacted places hit by the Hurricane Maria. Our research found that Punta Santiago remains isolated from the rest of the Island, while there are residential care centers in Puerto Rico. The proposal aims to reconnect the urban fabric and increase visibility for the area, proposing a 'neighborhood' scheme that relates to the scale of the existing context. The project articulates around entry gardens and vegetated courtyards to create welcoming spaces. This approach allows to provide connection to multiple sunken gardens, serves a resilient measure for stormwater retention, and allow units to have access to the prevailing winds coming from the west.

From a health and wellness perspective, the project employs integrated design strategies and advanced materials to deliver a high-quality environment. The outdoor stairs and catwalks aim to promote activity, visibility, and interaction while serving a shading element. The living room, a type of mid-door space, create transparency and activate interaction while ensure access to daylight. The exterior shading element is designed to reduce direct solar gains and it made from an innovative nanofiber membrane, which acts as moisture pump. Activated by solar energy, the membrane is highly hygroscopic and has the potential to bring Relative Humidity from 90% to 60% range. This allows to utilize Adaptive Comfort Standards with more confidence, also relying on the cross-ventilation driven by the exposure of all units to the prevailing wind from the southeast. Finally, thermal mass is used through earth tubes which lower the operative temperature during they day. The dining space is passively cooled using stratification to reduce the heat buildup in the space.

From a construction perspective, the project is based on a typical 13' x 40' x 11' module, which is well suited to prefabrication of the mass-timber structure and building systems using flat-pack concepts. To meet the embodied carbon goals, the project will rely on a carbon negative concrete foundation with Blue Planet Systems carbon capture technology. With sequester carbon concrete, the embodied carbon intensity of the foundation and walkways will be neutral and offset 100% of the typical concrete embodied carbon. The project also does not include any continuous or cavity insulation due to the thermal emittance and solar reflectance of the green roofs and Solar PV arrays. The onsite generation is anticipated to offset the carbon debt of the construction materials within 16 years of operation.

To take advantage of the heavy rainfall the location experiences, a rainwater harvesting system with cistern storage and water treatment will be utilized to reduce the municipal water use. Combined with greywater treatment, over 50% of the water load can be recovered further reducing the city water demand.