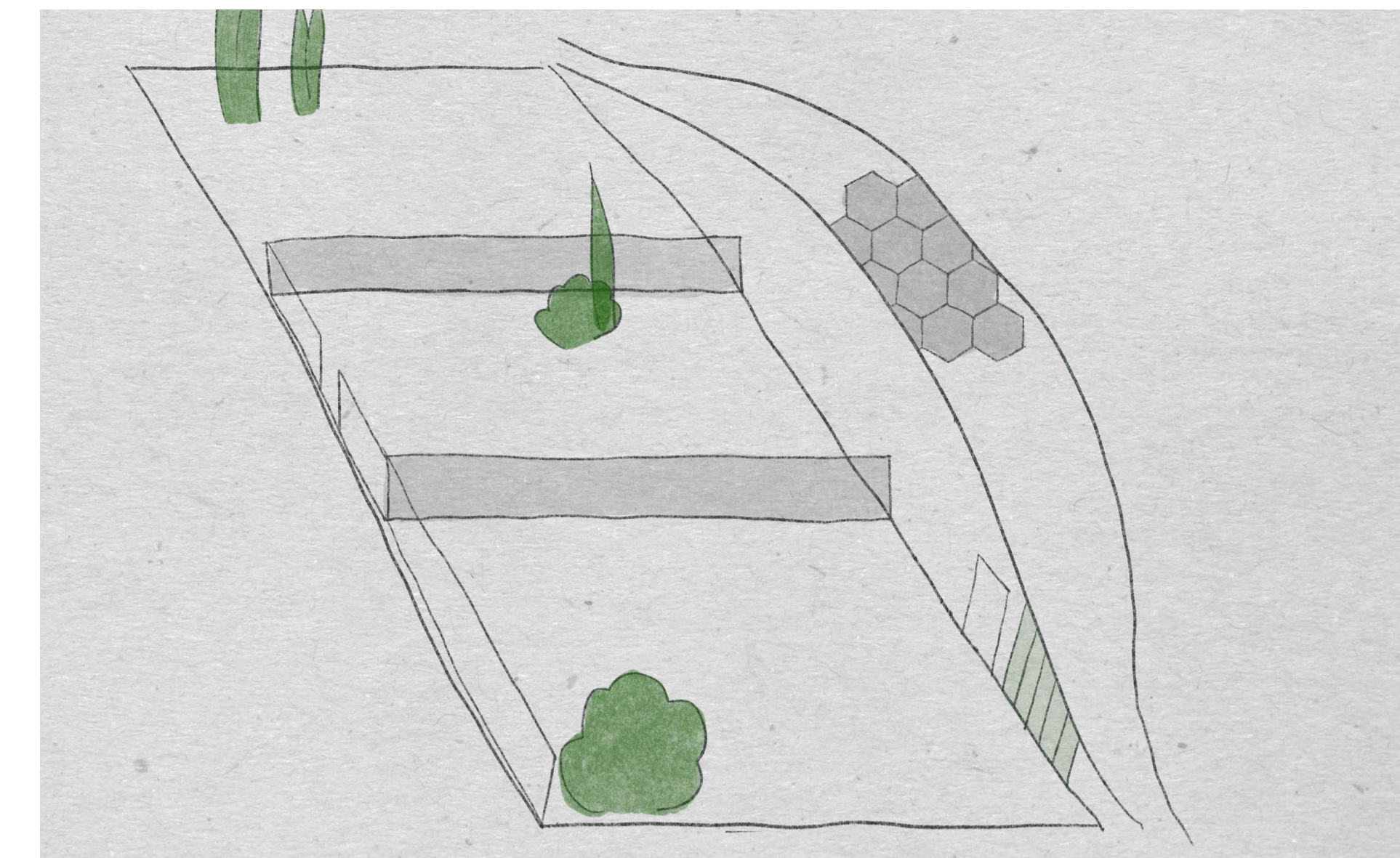


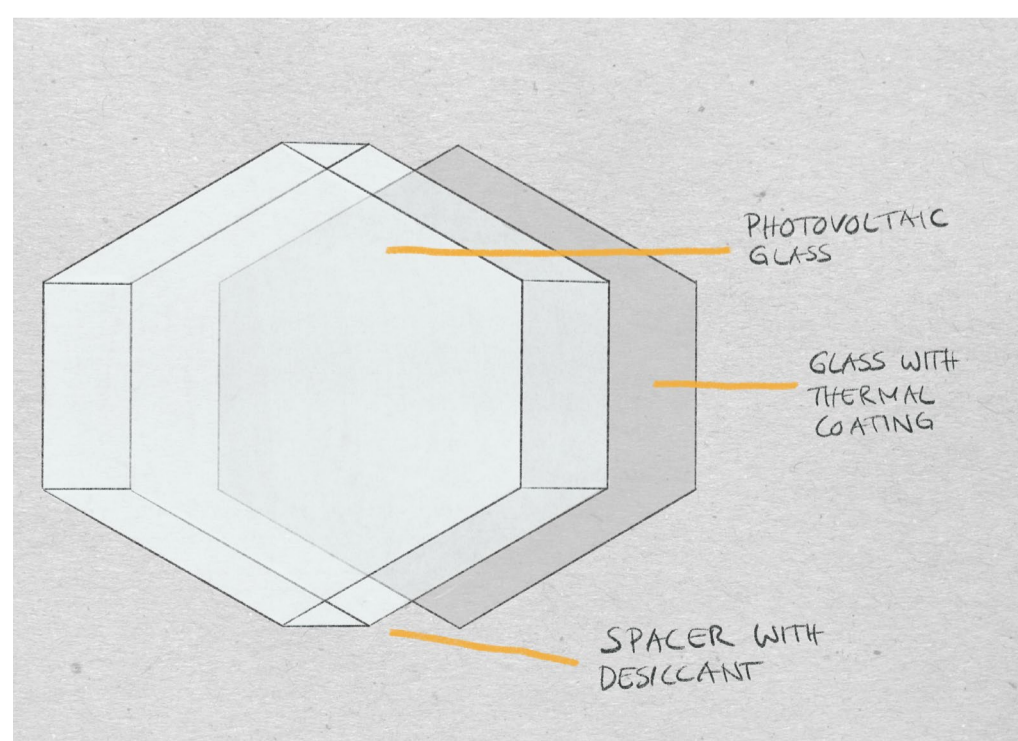
Regarding the building materials for the dunes, we wanted to pay special attention to the sustainability and accessibility of the materials used. For the foundation and the interior walls, instead of concrete - notorious for being environmentally harmful - a mixture of natural stone and clay is used. The stone and clay are recyclable, can filter pollutants, and are sourced in Germany. The dunes are also supported by recycled steel structures and insulated with cork, obtained through sustainable means by peeling bark off trees that regrow. In this way, no trees need to be cut down.



maduneland can be translated to the scale of Schrebergartens. The idea is that several Schrebergartens share a common dune instead of having conventional small cottages. One dune can house around 2-5 of these cottages and the space in front can be effectively used for gardening. The gardens not only benefit from the energy generated from the algae reactors and solar panels, but the communal dune creates a sense of connection between the owners of the individual gardens. Moreover, the roof of the dunes can be used for additional gardening or as a relaxing space offering a nice

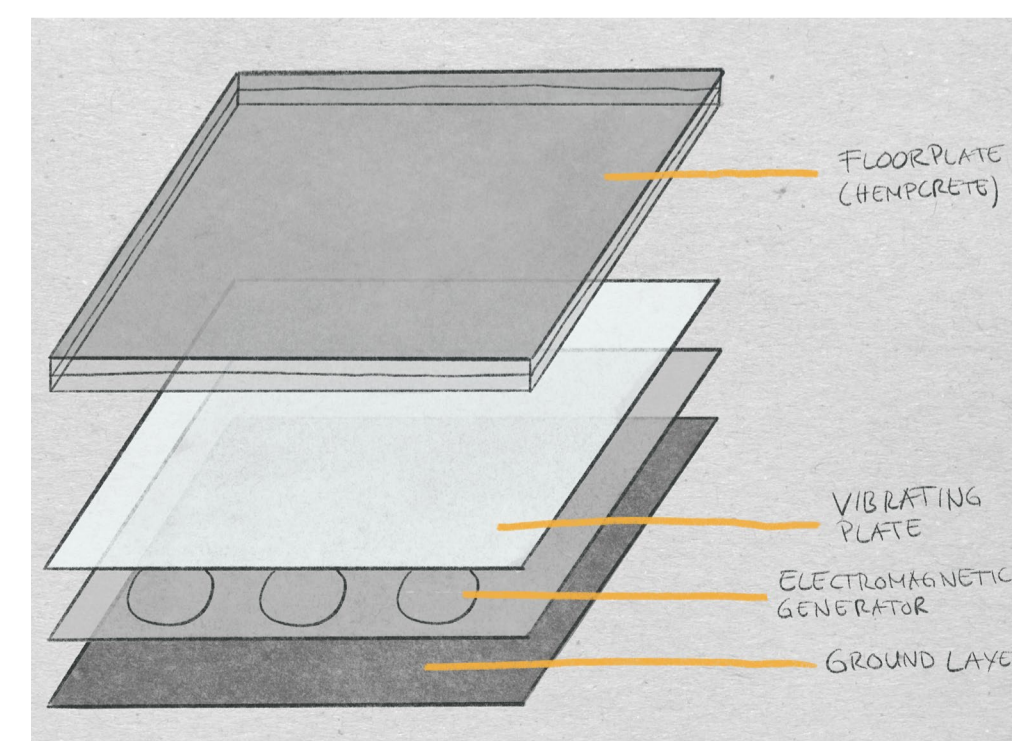
maduneland with its sustainable, renewable technologies, produces more energy than it consumes. The surplus energy is then fed back into the grid and used to supply the surrounding residential houses. Additionally, the dunes' aerodynamic architecture allows air to flow unhindered in ma duneland providing cooling, fresh air. Ma duneland is a concept that meets the needs of the city's residents and communities, meant to not only be conceivable but to be long-lasting.

282,4 MWh are generated annually in ma duneland.



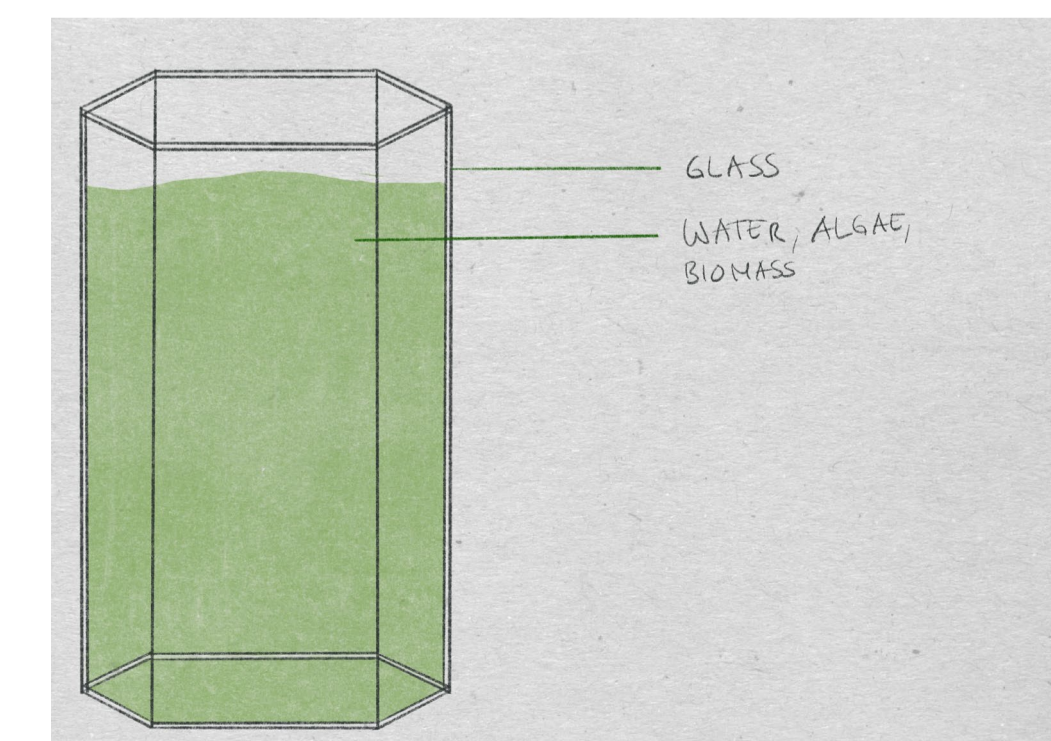
Photovoltaic effect:
Transparent solar panels convert sunlight into energy

To prevent the interiors from heating up like a greenhouse, there will be an inner layer of heat-insulating glass to keep the temperature comfortable inside. Vertical gardening inside further insulates the dune. The outer layer will be made of transparent photovoltaic modules artfully disguised as the glass on the southern side of the dunes. Additionally, transparent solar panels are multifunctional and easily installed in buildings that might use glass otherwise.



Piezoelectric effect:
When pressure is applied to the plate the generator vertically displaces -> energy and data

The skatepark offers a unique and novel way to generate energy, through the use of kinetic tiles. The tiles collect the kinetic energy from the skaters and convert it as power for the dunes.



Hydrothermal process:
Sunlight and carbon dioxide -> Thermal energy and biomass -> renewable biofuel
Storage in dunes through underground thermal storage system

Algae reactor panels act as large windows and will be installed all throughout the dunes facades. We use algae bioreactor panels as windows to convert sunlight and carbon dioxide to thermal energy and biomass that can be converted into renewable biofuel through a hydrothermal process. Additionally, the algae bioreactor panels provide adaptive shading and act as a thermal insulator as well as a solar collector. The generated heat can also be stored in the dunes through an underground thermal storage system.