

CORAL MANUFACTURE STATION

REDUCE, RE-USE, REEF-CYCLE



FONDATION
JACQUES ROUGERIE
GÉNÉRATION ESPACE MER
ACADÉMIE DES BEAUX-ARTS



2023 PRIX DE LA FONDATION JACQUES ROUGERIE

Catégorie de Prix : GRAND PRIX AWARD FOR THE SEA

Nom du projet

Description

Coral Manufacture Station

Plastic has become a global issue with our oceans being filled with our waste, but what if we could turn this waste into an architectural opportunity?



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ISSUES

Over 400 million tons of plastic are produced every year for use in a wide variety of applications, with 14 million tons of plastic end up in the ocean every year, and plastic makes up 80% of all marine debris found from surface waters to deep-sea sediments. Marine species ingest or are entangled by plastic debris, which causes severe injuries and death.

A study by the World Wildlife Fund estimated that at least 100,000 marine animals die from plastic pollution every year. Plastic pollution threatens food safety and quality, human health, coastal tourism, and contributes to climate change.

To address an architectural future on water, we need to use architecture as a platform to respond to current issues, with ideas of re-using plastic for building materials as a sector that needs more developing.



A diver as he gets ready to dive in the plastic wave along Roatan, an island off the coast of Honduras.



Plastic are not typically broken down in the digestive track and accumulate in the animal over time, here a fish cut up



From trash to compacted plastic blocks, ByFusion processing image



These blocks are have structural opportunities, 83% less CO2 emissions than concrete blocks
Zero waste – ByFusion can use construction residual to create more ByBlocks

ADDRESS
PLASTIC
WASTE
BY USING
PLASTIC
WASTE

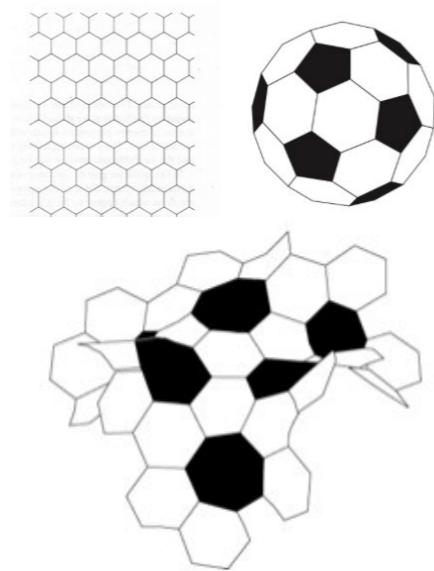
GEOMETRY

Modern architecture and urban planning remain rectilinear, with geometrical forms that can be easily understood, Euclidean in mathematical terms.

Marine animals, like corals, kelps, sea sponges, and nudibranchs all display hyperbolic geometry in the surfaces of their being, non-Euclidean in mathematical terms.

Nature has been for millennia's experimenting with hyperbolic forms, the sea being one of the most important test beds.

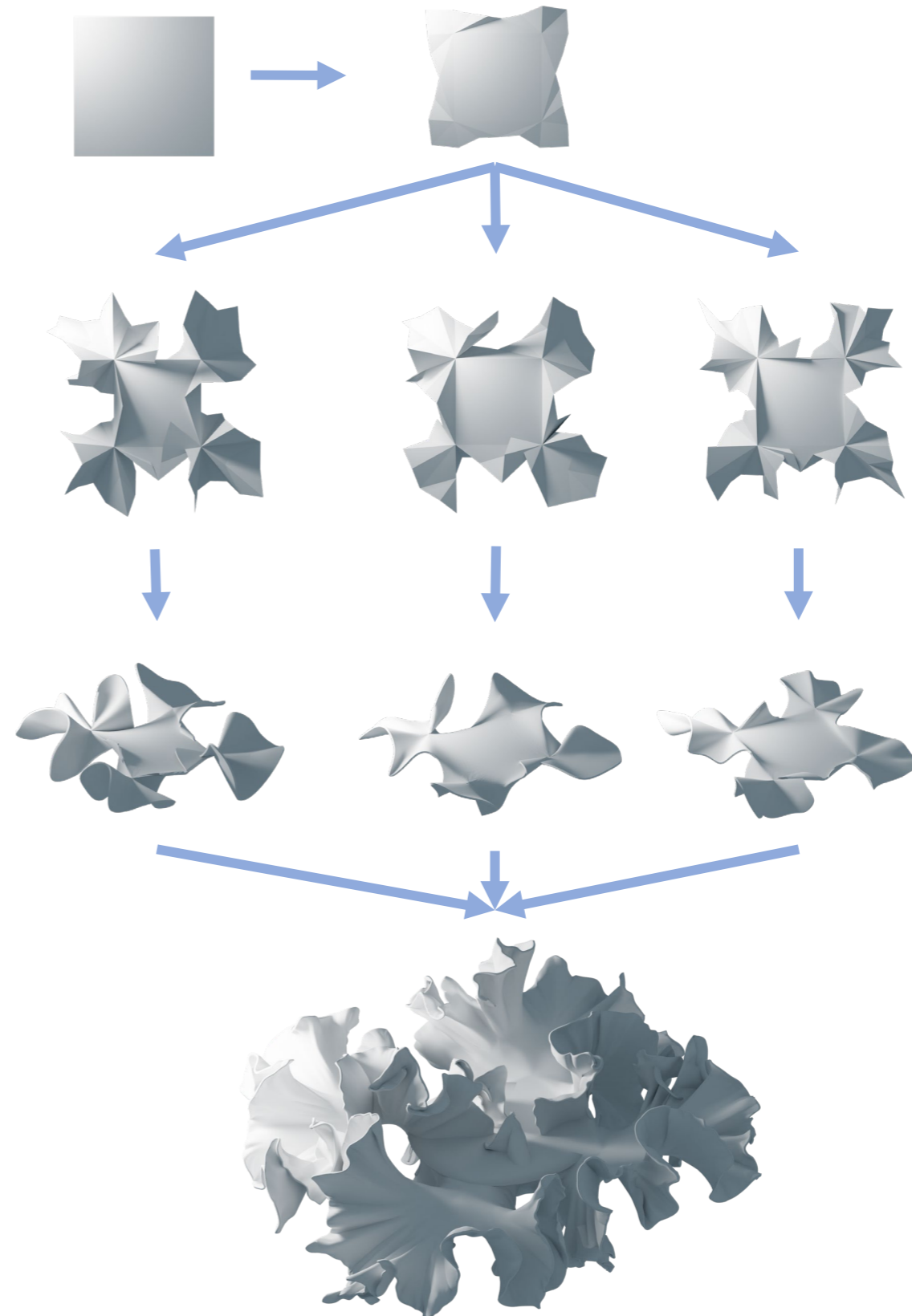
To create the form of the spaces, multiple variations and tests have been created responding to this logic.



Mathematical diagrams ,from crochetcoralreef
Research on non-Euclidean geometry



The frilly forms of corals and sponges are biological variations of hyperbolic geometry



1.

A plane gets treated with differential growth at the tips, mimicking coral growth

2.

Variations are produced, each growing differently outwards

3.

Each are subdivided to better mimic corals soft edges, solidified and given thickness

4.

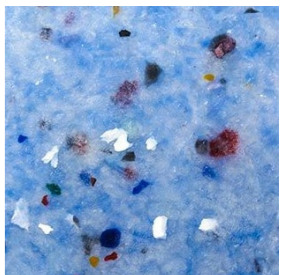
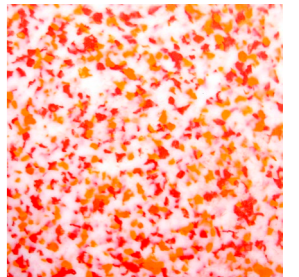
Final shape, acting as quadrant of design, comes from repeating these steps with different variations, until finding a form that is closer suited for architectural intervention

TEXTURAL POTENTIALS

Plastic becomes a playful component in the façade, and depending on the plastic types, different textures come alive.

On the right-hand side, from top to bottom, the black and white texture is from chopping boards, the one below coffee, the one used in the renders is a varied mixed, which usually turns white with colorful speckles. If plastics are sorted out, outputs can be controlled.

The secondary objective of the CMS is to also investigate the effects of each plastic type, to test durability, weather-proof qualities, thermal insulation and more.

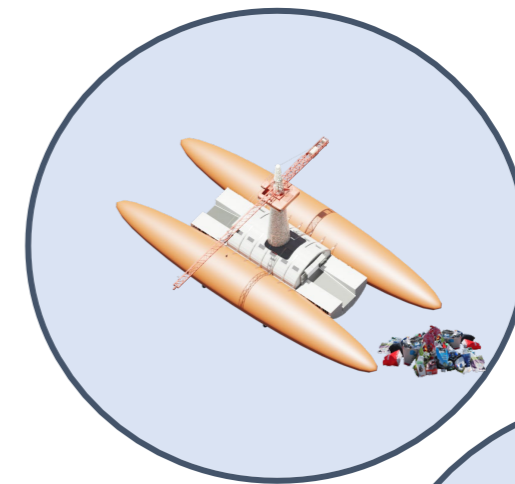
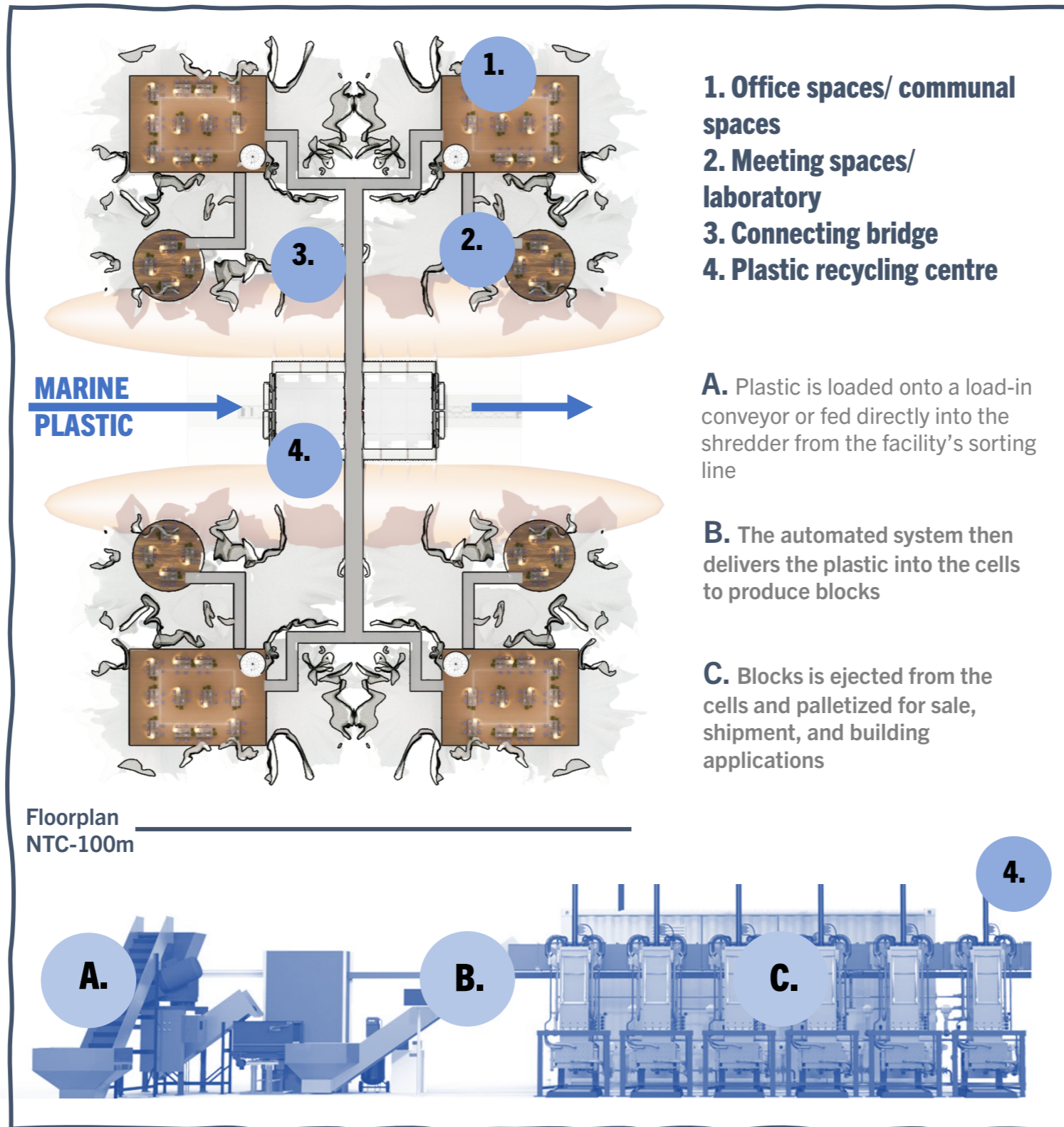


TIMELINE OF CMS

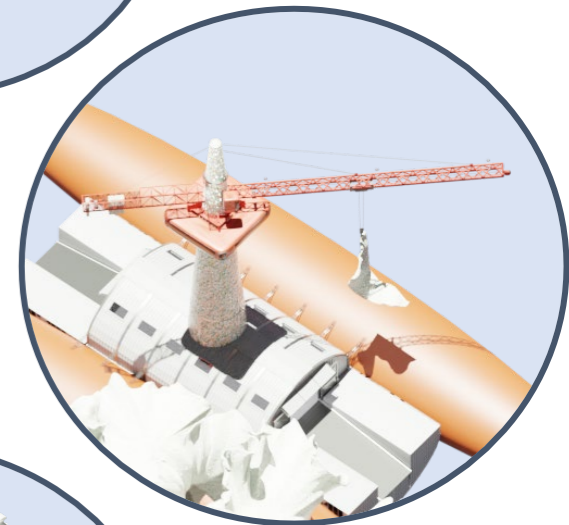
The Coral Manufacture Station (CMS) proposes to start with an infrastructural/engineering challenge first and foremost, cleaning up the ocean using an independent floating recycling center, that can convert maritime plastic waste as building materials.

These materials would be used for the further expansion of the CMS, serving as office spaces/ living quarters, furthermore extra processed parts to be used to create the basis of independent floating platforms.

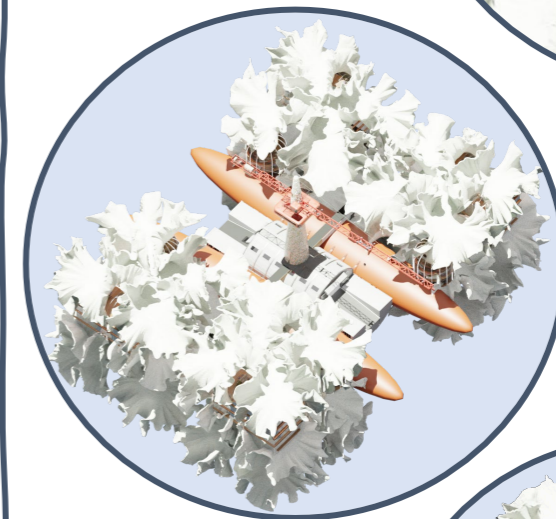
These additional independent floating units can be deployed for islands and countries, such as Tuvalu, in dire need of help.



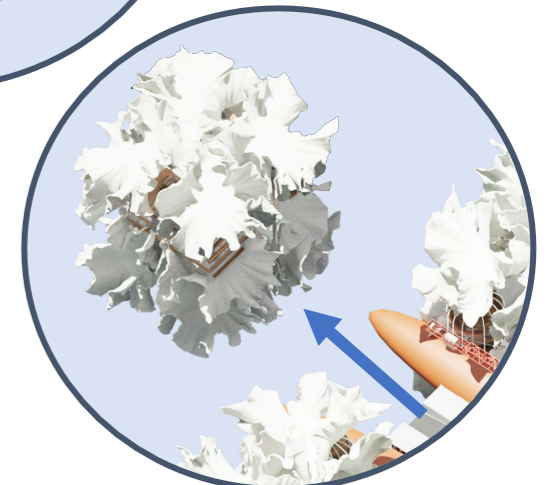
STAGE 1. CMS navigates towards a pile of plastic floating waste, loading it in through the conveyor belt



STAGE 2. Once plastic is converted, it becomes building blocks for the extension of CMS, the crane helping place elements



STAGE 3. Once plastic is converted, it becomes building blocks for the extension of the CMS, the crane helping place the elements



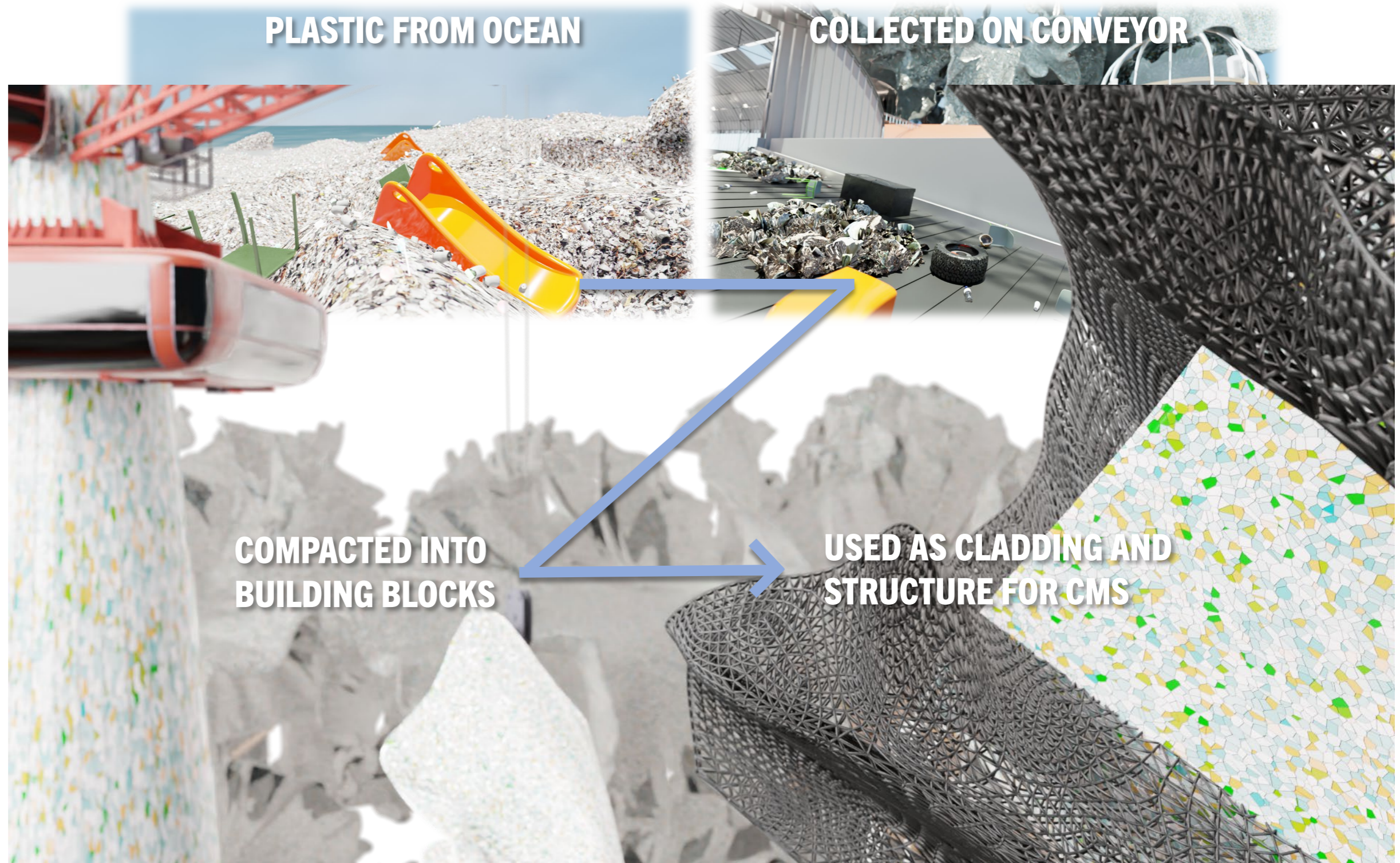
STAGE 4. Process continues, creating needed infrastructure of sinking islands and countries in need

PLASTIC CIRCULARITY

The CMS aims to research how this compacted plastic can be used for building blocks for architectural and infrastructural projects.

The plastic is collected from the ocean, taken into the CMS by ways of a conveyor belt dipped in the ocean, after manufacturing the crane helps move these elements across.

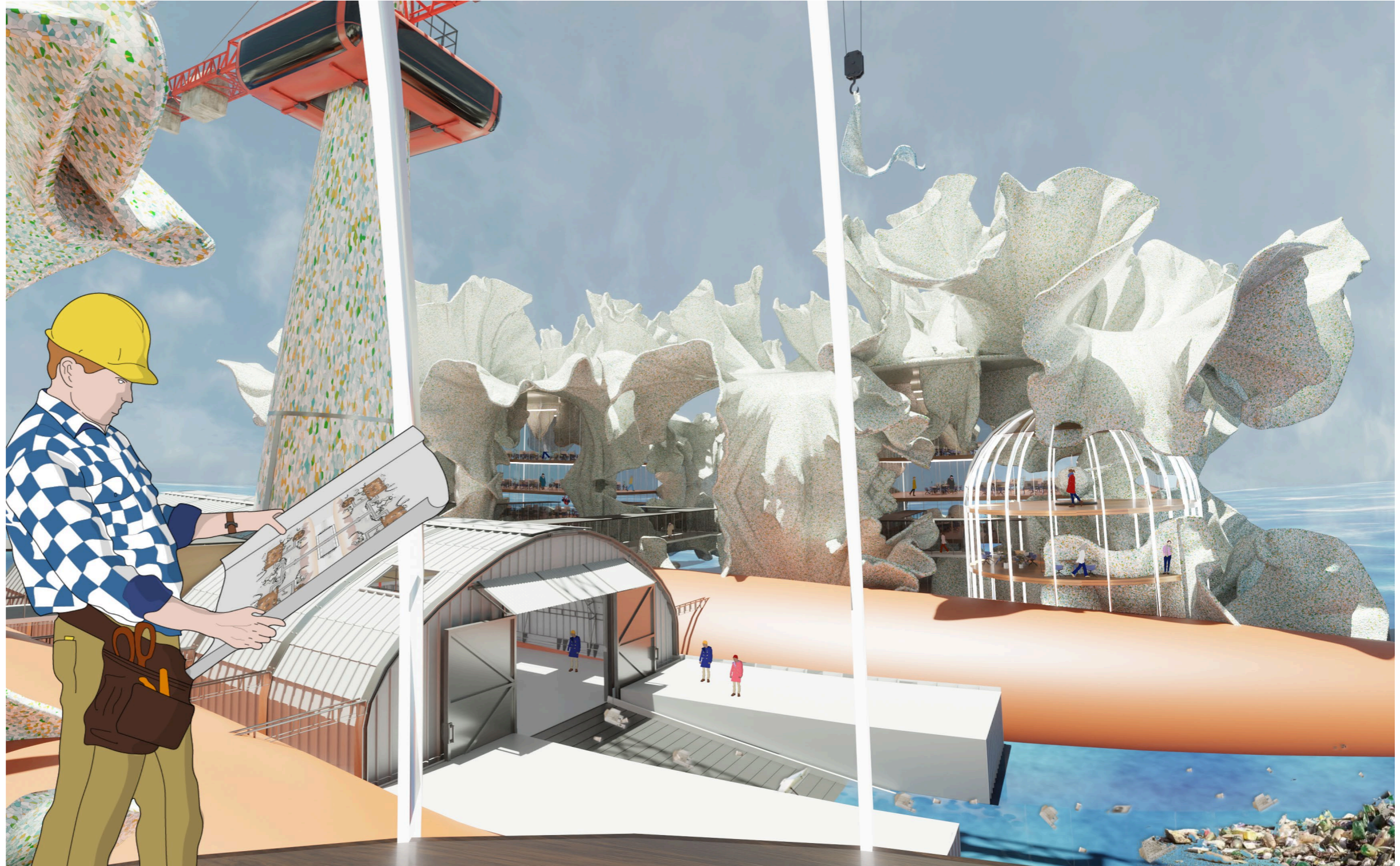
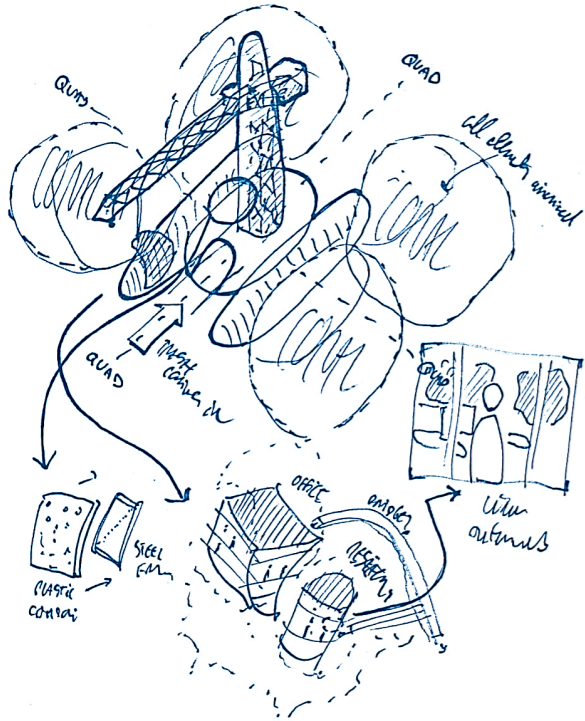
The station is itself an experiment, using the processed plastic as structure at times and cladding at times.



MATERIAL AND SPATIAL LOGIC

The design of the CMS is based on a quadrant system, each corner has the same replicated set of coral patterns, creating an equilibrium that helps it float in the ocean.

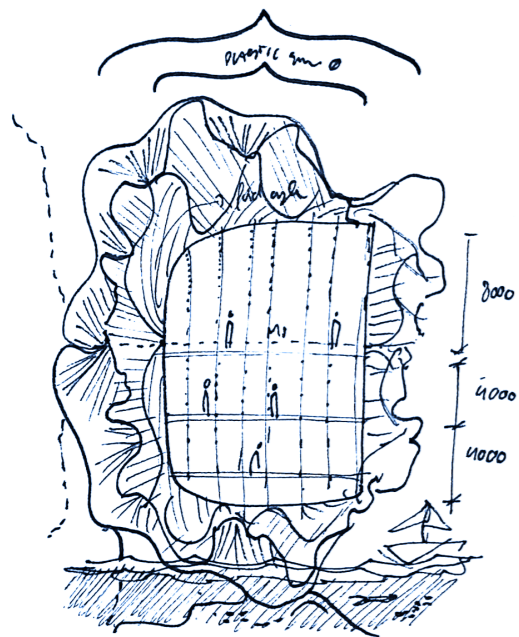
The recycled plastic is used as a water-proof cladding for the structure, moreover, aesthetically creating a vibrant space to work and live in.



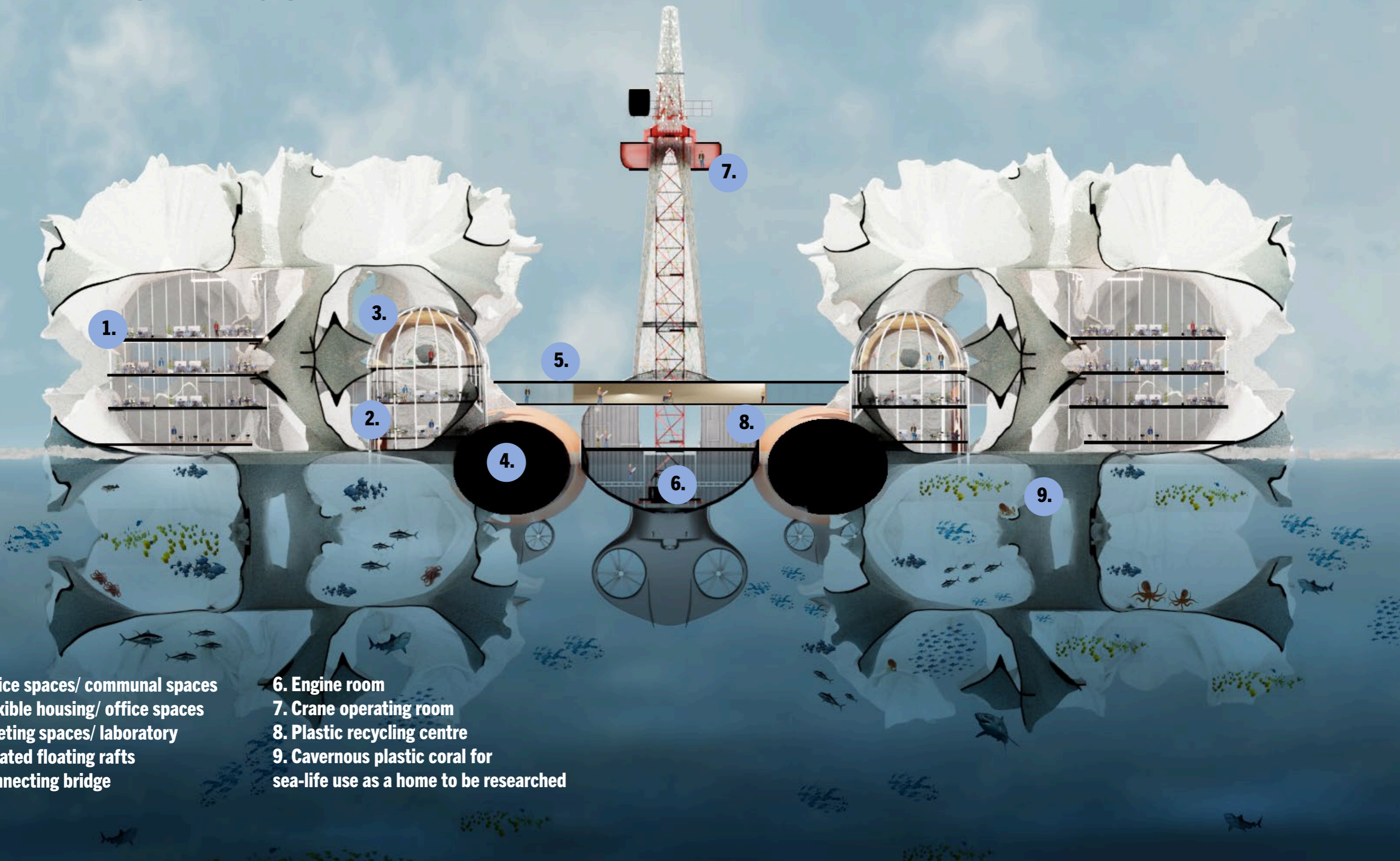
PLASTIC BIOMIMICRY

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INNER WORKINGS



- 1. Office spaces/ communal spaces
- 2. Flexible housing/ office spaces
- 3. Meeting spaces/ laboratory
- 4. Inflated floating rafts
- 5. Connecting bridge

- 6. Engine room
- 7. Crane operating room
- 8. Plastic recycling centre
- 9. Cavernous plastic coral for sea-life use as a home to be researched

EXPANSION OUTWARDS

Plastic has become a global issue. As we continue to use single-use plastics in our daily lives, the ocean and its creatures will suffer, as unless a drastic change in how plastic is fully recycled, plastic islands will continue to proliferate and gain exponentially in size.

The Great Pacific Garbage Patch is three times the size of France and is the world's biggest ocean waste repository, with 1.8 billion pieces of floating plastic, killing as a consequence thousands of marine animals each year.

The Coral Manufacture Station aims to be one small part of a much-needed mission to restore our planet, by using fire to fight fire, hence plastic against plastic, for the betterment of our planet.

<https://www.bbc.com/future/article/20210510-how-to-recycle-any-plastic>

<https://www.gvi.co.uk/blog/smb-how-many-marine-animals-die-from-plastic-pollution/#:~:text=The%20majority%20of%20marine%20animal,from%20plastic%20pollution%20every%20year.>

<https://www.byfusion.com/micro-diversion-platform/>

<https://oceanbites.org/plastics-and-colors-and-fish-oh-my/>

Fish, along with many other animals, ingest plastic because they mistake it for food. Plastic are not typically broken down in the digestive track and accumulate in the animal over time. Picture

Credit: <https://assets.rbl.ms/6471225/980x.jpg>.

<https://www.nbcnews.com/science/environment/earth-s-coral-reefs-could-be-gone-2100-research-finds-n1138151>

Bleached coral on Australia's Great Barrier Reef near Port Douglas in February 2017. Brett Monroe Garner / Greenpeace via Reuters file

<https://tt.loopnews.com/content/floating-island-trash-caribbean-sea>

A diver as he gets ready to dive in the plastic wave along Roatan, an island off the coast of Honduras. (Image: Caroline Power)

<https://crochetcoralreef.org/artscience/hyperbolicspace/#:~:text=Indeed%20corals%2C%20kelps%2C%20sea%20sponges,years%2C%20especially%20in%20the%20sea.>

The frilly forms of corals and sponges are biological variations of hyperbolic geometry, as seen here on the Great Barrier Reef, near Cairns, Queensland, Australia. Wikimedia/Toby Hudson, CC BY-SA

<https://www.thebubble.org.uk/current-affairs/environment/tuvalu-is-sinking/>

<https://smile-plastics.com/materials/>

<https://www.iberdrola.com/sustainability/plastic-island-in-pacific-eighth-continent#:~:text=Its%20nickname%2C%20the%20eighth%20continent,of%20marine%20animals%20each%20year.>