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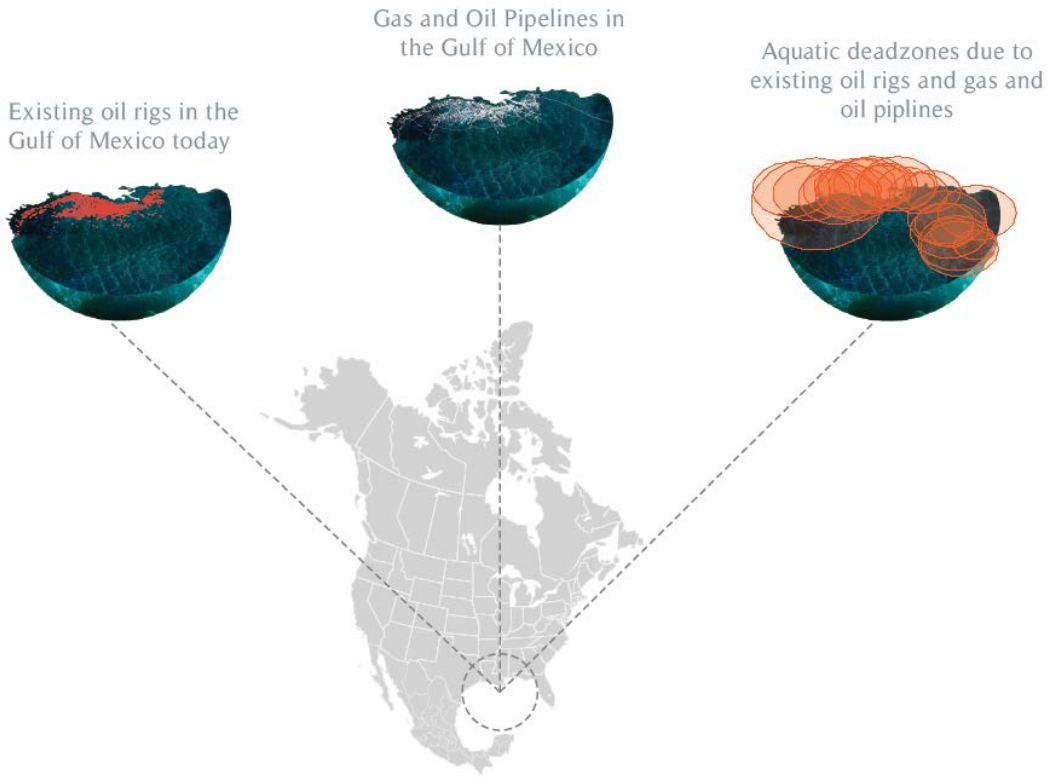
Introduction:

The Gulf of Mexico is widely known as one of the most offshore oil-platform infested areas in the world. The thousands of oil-platforms scattered throughout the gulf are operational so long as oil is available to be extracted, *but what happens when the oil finally ceases?*



Typically, when offshore oil platforms are not operable for more than half a decade, they are decommissioned. The decommissioning is then followed by dismantling, resulting in an abundant resource for salvaged metal and metal components that can potentially be used in other projects within the same region. *(reference 1)*.

Figure 1 Oilrig dismantling

The project proposed suggests using salvaged metals and whole components taken from the oilrig following its dismantling then using them to assemble a floating research center. The center can be used by researchers to travel from one location to another along the shores of the gulf and studying the impact of the 2010 BP oil spill on wildlife and vegetation. Made of salvaged materials from the very cause of the oil spill, it can also serve as an exhibition space and ultimately spread awareness about the horrors of the impact of the 2010 oil spill on the region's ecosystems through the researcher's findings.

Figure 2 The horrific effects of the 2010 BP Oil Spill on bird species

The competition chosen simply asked for the design of a building that would serve as a nature interpretation centre in a specific site, creating a connection between the user and the site chosen in a conceptual way. In response to the competition challenge, the project promotes a deep understanding and assimilation between users and nature through its design concept and source of materials, self and environmental sustainability as well as minimal disturbance to the site by virtue of its floatability. The design challenge was pursued and executed with the **oilrigs** themselves used as example for structure and technical solutions dealing with offshore conditions, the **Arctia Shipping Ltd Headquarters** as a realized floating building project precedent, and the **Commercial Complex for Building Industry** as a precedent for passive design principles.

Precedent 1: Oil rigs: (Structure and materials)

To begin with, the research centre's structure is based mainly on the structure of the oilrig itself. The project applies lessons learned from the design of these massive floating facilities with regards to structure and finishes, as well as achieving its most essential feature; its floatability. Firstly, the main structure of the research centre is comprised of the derrick towers of the oil rig (8 in total as shown in *figures 4 and 5*) tilted to the side and attached at the ends to form the skeleton of the structure. The derrick towers are chosen as they are structurally strong load bearing elements made from heavy beams, as they are intended to be used to elevate the derrick *(reference 2)*.

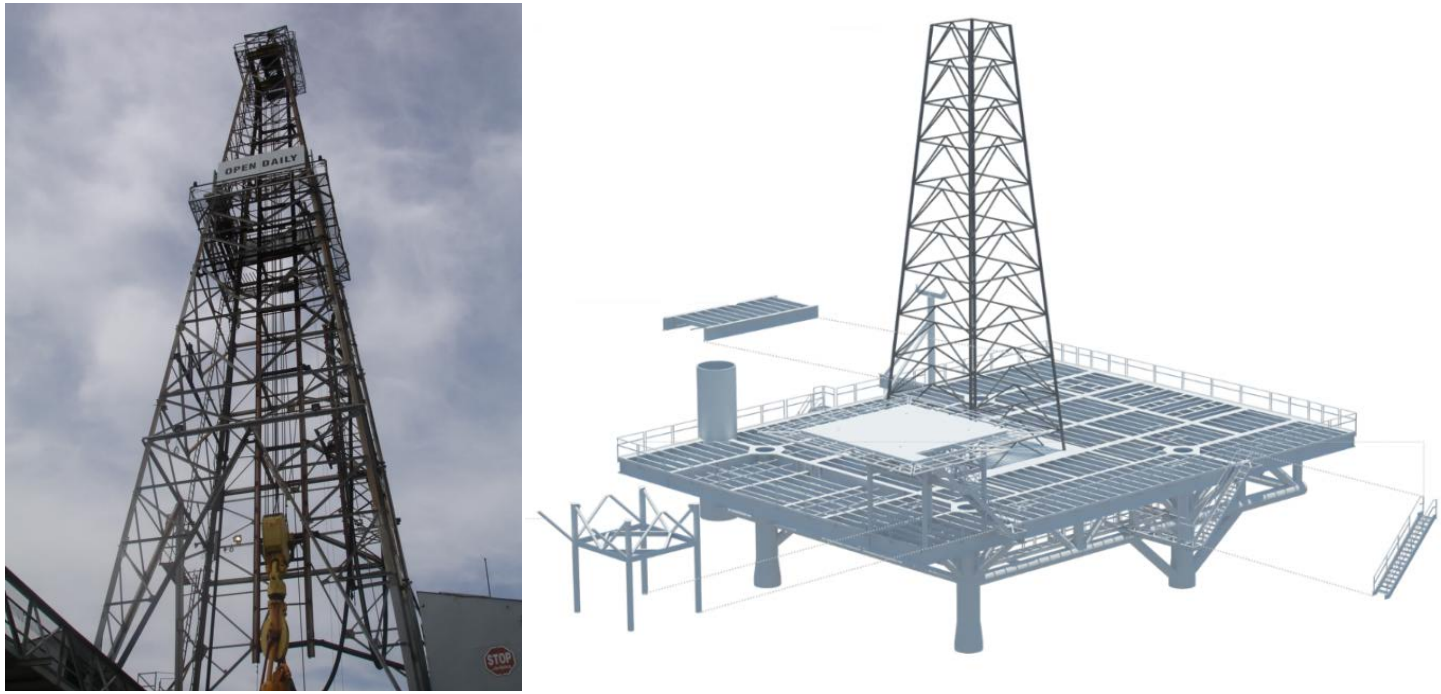


Figure 3 Typical oilrig derrick tower

In addition, other components that can be salvaged and re-used in the main structure are the metal beams that the platform of the rig is made up of, which can be cut and used as structural elements such as floors/ceilings, columns, decks as shown in figure 4. The helipad structure is similarly used to support the water filtration system high up in order to allow the water to freely flow to the rest of the building after being filtered.

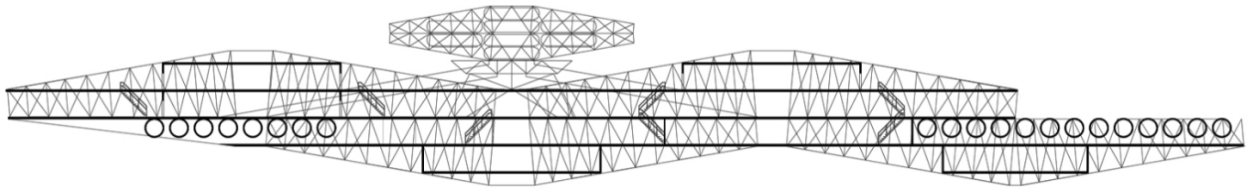


Figure 4 Building Elevation

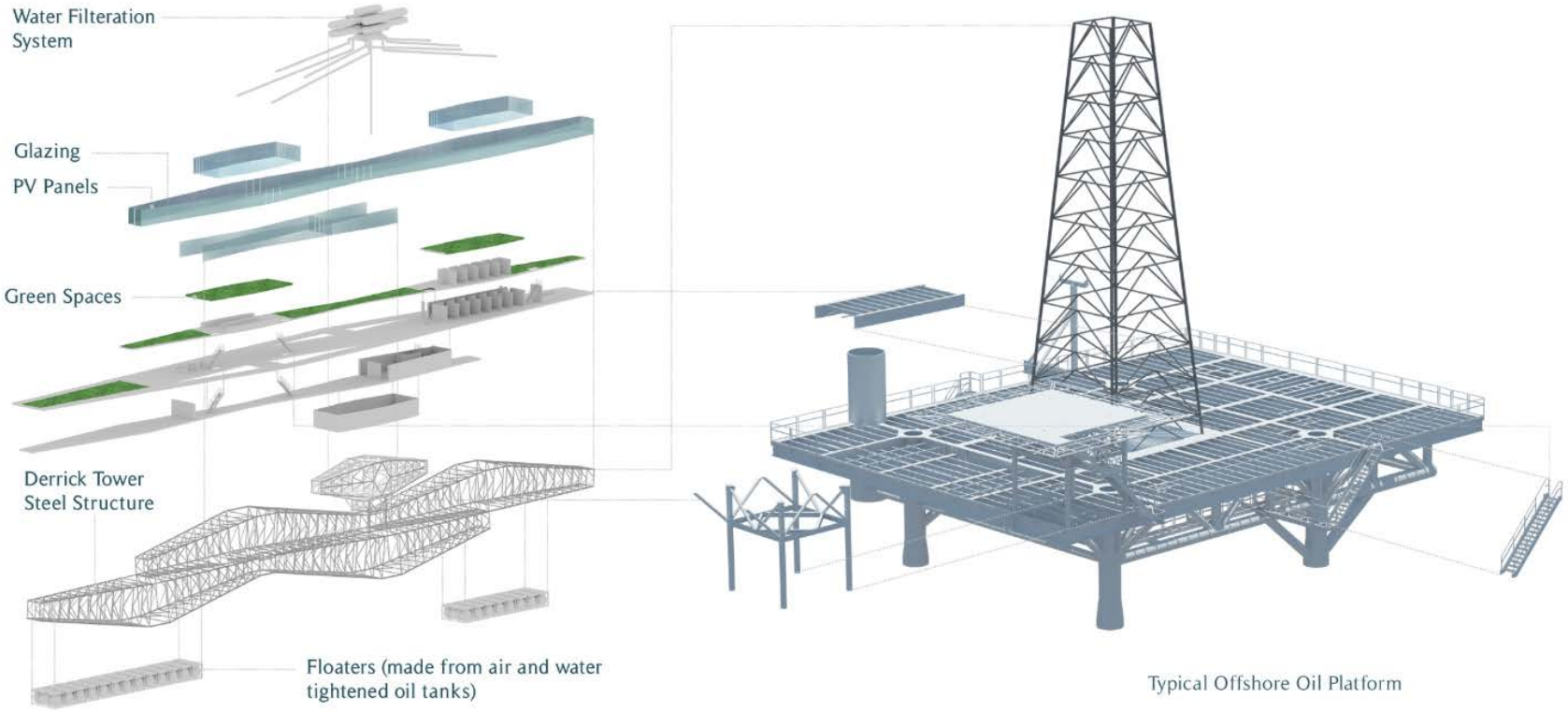


Figure 5 use of oil rig components in the design

Lastly, to achieve the floatability that many oil rigs feature, granting them flexibility, the oil tanks collected from the decommissioned rig can be emptied and air-tightened and used as floaters. Some tanks can also be cleaned to use for the water filtration system. Other smaller elements such as pipes can also be used to create the plumbing network of the building, providing the centre with clean running water.

Precedent 2: Arctia Shipping Ltd Headquarters (floatability and flexibility)

The project proposes a floating structure; built off-site allowing for flexible research and intimate studies with the immediate environment that the researchers choose. Firstly, similar to the Arctia Shipping Ltd Headquarters project in Helsinki, a floating office building, the project can be built off-site. Like in the Arctia project, this allows the research centre to not impact the environment with its construction and disturb the ecosystems that are still suffering from the effects of the oil spill. In turn, the project that seeks to research and shed light on the environmental tragedy that the Gulf of Mexico's waters were subjected to in 2010 does not contradict its purpose for being built in the first place. Like the Arctia project, the structure of the research centre can be built on land then towed to the locations targeted for research *(reference 3)*. Having the building float also means that no land clearing or impact is applied to the local environments of the chosen research locations if the building was to be built on land.

Figure 6 Exterior photo of Arctia Shipping Ltd Headquarters

Secondly, similar to the Arctia project, the research centre also allows for intimate research with its surroundings. Since the project floats, the structure's immediate context can be the gulf shores that were impacted by the oil spill. In the Arctia project, the office building floats directly besides the ships of the company, allowing the company's employees a more intimate work place with excellent connections to the ships *(reference 3).* Similarly, the research centre, with its partially glazed underwater level, allows the researchers to be as close as possible to the subjects of their studies.

Figure 7 Arctia Shipping Ltd Headquarters proximity to its ships

Lastly, unlike the Arctia project however, the research centre is not fixed within its location. One of the centre's best features is its ability to be towed to any gulf location the researchers wish to study. In other words, as a floating structure with no fixed foundation, the centre can be towed from one location to another using smaller boats, similar to the way a floating oil rig is towed to the oil extraction sites.

Figure 8 Oilrig being towed to site of oil extraction

In summary, as a floating structure, the research center can be fabricated on land out of the salvaged metal components then towed to a location where an oil spill has once occurred, providing researchers with a facility that allows them to fully study the area and the impact of the spill on the shores, animals and plants in chosen areas without causing disturbance to the sensitive ecosystems that can be caused by an otherwise on site construction.

Precedent 3: Commercial Complex for Building Industry (passive design principals)

For a project that strives to respect and improve the environment, it is important to ensure that the structure itself has minimal impact on the environment. In other words, the building uses basic passive design principals to generate energy and maintain a proper human comfort zone with minimal dependency on fossil fuel energy. In a hot humid climate such as that of the Gulf of Mexico, passive cooling through maximized ventilation and heat gain avoidance is key to limiting, and at times even eliminating, the building's reliance on electricity. Firstly, natural ventilation in the building is achieved using its form. Similar to the Commercial Complex for Building Industry project *(reference 4),* the research centre's design features a fluid, long and narrow form with openings on either end, as well as in the middle, as evident in *figure 10.*

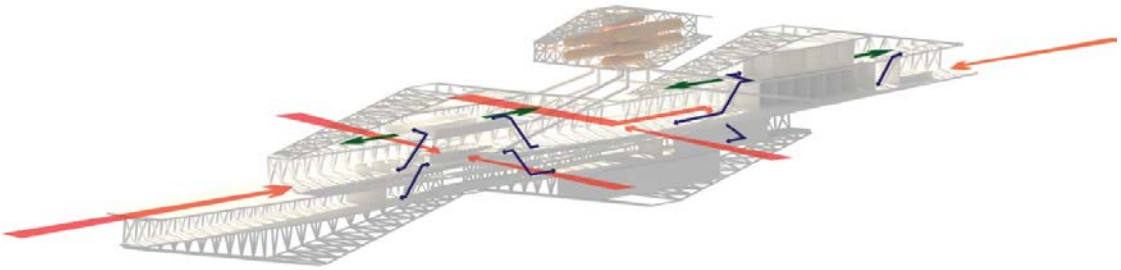


Figure 9 Researcx centre access diagram

This allows for natural ventilation as fresh cool air enters the building from the openings in the ground floor and flow from one side to the other. The open staircases and the overall open concept design approach of the research centre also facilitates the flow of cold air through the mainly occupied spaces before escaping as hot air to the outside through the openings on the second floor.

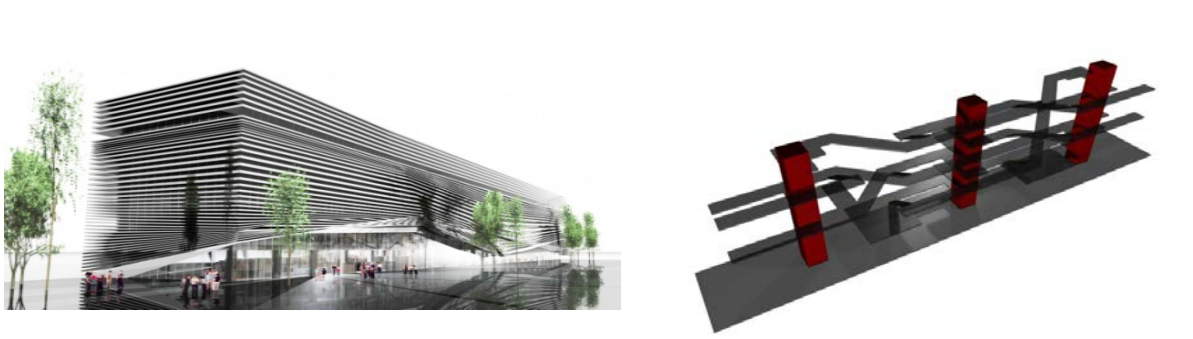


Figure 10 Commercial Complex for Building Industry

Secondly, the design features a large PV panel facade that can ultimately generate enough energy to sustain the research centre's basic electricity needs. In other words, as shown in *figure 4*, an entire facade is covered in PV components that are partially and

decoratively scattered throughout it as shown in *figure 11* below, allowing for energy to be absorbed from the sun if the building is to be oriented correctly. In other words, in the summer when extra energy is needed for additional mechanical cooling for instance, the structure can be rotated and anchored such that the PV facade side is facing the South.

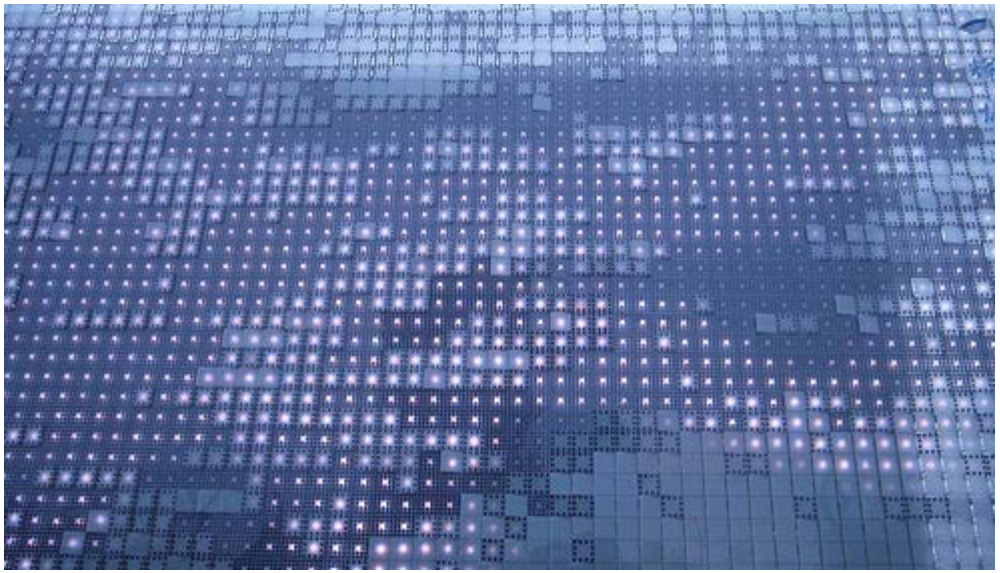


Figure 11 PV facade alternating pattern precedent

Lastly, similar to the Commercial Complex building's use of the slotted facade as a tool to avoid excess heat gain through partial shading *(reference 4),* the research centre also uses the PV panel facade as a semi solid wall to protect the interior spaces from excess sun rays on hot summer days. That is to say, in the summer when heat is unwanted, similar to what was mentioned above, the floating building is oriented such that the protected wall faces the South direction's sun. The interior research spaces are still subject to daylight using the diffused northern light that shines through from the opposing facade, creating perfectly lit work environments for the researchers. In the winter, on the other hand, the building is rotated to face the exact opposite direction, allowing the sun to come through the exposed glazed side and heat up the spaces, eliminating the need for heating completely.

Conclusion:

In conclusion, the proposed project examines the issue of oil spills and the impact of the infestation of offshore oil platforms in the Gulf of Mexico. In response, the proposal suggests a facility for temporary research assembled from salvaged oil platform metal and components, is self-sustaining and works with the nature and conditions of the site to successfully achieve its mission, and honors

the oil spill sites as well as the natural environment by applying passive design principals in order to limit and eliminate the use of fossil fuel. In other words, the nature interpretation center borrows its structure form oil platforms, which are assembled to provide the necessary program to fulfill the requirements of a research center/living space for researchers. The centre also features a floating design which enables the researchers to be surrounded by the very subjects they are studying and reach out to and study all the areas they wish to examine in the gulf. Lastly, the center uses the region's conditions in order to achieve a design that is sustainable and self-sustaining, providing the occupants with a stable human comfort zone using passive design techniques like natural ventilation and PV panel systems. In the end, the competition challenges designers to create a nature interpretation centre to connect its occupants with a chosen immediate context, and what better way to connect an occupant to a natural environment than to provide them with the proper spaces and interior environments that aids them in studying, researching and connecting with nature from within their carefully designed work spaces.

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