LAGI 2022 Mannheim

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1,500 Word Essay Submission

Through trauma and despair, this site has been through it all. Primarily, this site housed U.S. Military Barracks in the 1940s and has sat fairly decolite with minor upkeep ever since. As time passed, growth and natural development inhabited this site, ultimately taking away from its functionality and usage by the citizens of Mannheim. Our team sought to turn this forgotten site into a work of art by being inspired by the natural growth and decay that took place over the years. Our design incorporates grand mushroom-like structures that appear to be growing out of the site along with nature itself. These large structures will allow users to move about the site, experiencing different levels and perspectives on their journey. Not only does this structure supply our main source of entertainment and community for citizens, but it also houses our hydro catching devices that will help us collect and store water for the main renewable energy source that we have on our site. Set away from our site, not to be in conjugation with it but to aid the complexity of our project, we developed a large labyrinth. Within this labyrinth, users can get lost in the intricacy that is our renewable energy resource. The walls of the labyrinth are inset with clear glass tubes that hold our algae oil biofuel production systems. Not only will these tubes house our systems, but they will also provide the users with valuable information on how these systems work and how they can develop this system into one of their designs of their own.

 Germany being one of the larger scale producers of algae, it deemed fit to intertwine this type of nature with our production of energy. Our team discovered a new renewable energy resource that transform’s algae into an oil that is a more powerful fuel source than other renewable sources like solar, wind and lithium. Although this is a pretty popular source of energy in Germany, many of these algae farms are tucked away in isolated plots of land, away from civilization. Algae farms are one of those rare sights that people often don't see on a daily basis, and so introducing this new technology to the site will expose the general public to beautiful yet sustainable forms of energy. Uniquely implementing these tubes of algae into our wood frame partitions around our site will allow people to travel through beauty, as well as the very visible and active algae production. Our team is intrigued by the concept of visibly beautiful forms of energy. We wanted to focus on providing the city of Mannheim with an endless supply of clean and renewable energy that can be harnessed in the purest form of beauty that allows all walks of life to be entertained and awed by our resilient infrastructure. More specifically, this new technology we are using is called Phycobloom. Phycobloom is a sustainable energy resource that harnesses the ingenuity of living organisms by using algae which is one of nature's best photosynthesizers, meaning they are excellent for drawing carbon out of earth's atmosphere and turning it into rich and easy to harvest algae oil. The oil extraction is quite easy as well compared to its past harvesting method which included fully crushing and killing the algae resulting in a very slow, expensive and highly unsustainable process. Luckily now, this new technology uses synthetic biology power to allow the algae to continuously release its oils into the surrounding encasement it is in for maximum oil production and collection. Scientists have claimed that algae oil can be cheap enough to replace the need for fossil fuels. With this new renewable energy resource, we are expected to generate roughly 120.99 g/m^2 of biomass from algae oil per year.

With this technology in place, users can see the algae process as they pass by these partitions. The intrigue in this technology will leave people coming back for more, as well as allowing their curiosity to help them learn about this astonishing technology. As much as we wanted to keep biofuel our main energy resource on our site, our team decided to take our project a step further by adding solar panels to our site to help generate more energy for the city of Mannheim to use.

The country of Germany is the world's largest solar PV market, resulting in them being the world's number one leader in Europe. Farmers benefited greatly from this technology, being able to profit from over twenty five percent of this energy source. Our algae farm following in the footsteps of other German farmers will also indulge in this consumption of renewable solar energy. Using Photovoltaic energy is as popular in residential areas, as it is in commercial, resulting in easy scalability and allure to invest and have one as your own. Unlike the normal square panels, this uniquely curated set of panels will be extruding from various angles, capturing sunlight intensely throughout the day. Just like real mushrooms and nature need sunlight to grow, our solar panels will capture sunlight and power surrounding infrastructure and buildings, allowing them to grow and thrive and mimic the already thriving nature. On average, Germany has around ten hours of sunlight daily, with June and July being the most abundant in sunlight. When the sun shines it is rays, energy from the sunlight is captured by the PV cells in each panel. Once captured by the PV cells, the energy creates electrical charges that move responding to the internal electrical field in the cell, causing electricity to flow. Germany has its cloudy days, and regardless of the weather conditions during the day, the solar panels are still capable of capturing and creating energy from the sun. One solar panel produces around 250 to 400 watts of energy per hour, which is normally about a sixth of what you’d need to power a house. Sitting at the very top of our mushroom infrastructure is our large solar panel system, which will be used to provide enough power for both the site and surrounding structures. The angles and ridges on the roof are extruded in such a way where multiple panels are stretched toward the sun, creating very intense sunlight focus. Although the winters bring some of the darkest days, the panels will still be able to absorb sunlight regardless of the cloudiness or darkness of the day. As long as it is daytime, the panels will be absorbing and creating energy as the days go by. Not only is it a sustainable system, but owners of solar panels tend to end up saving more money, and even getting money in return after about 6-12 years of owning solar panels, due to not having to pay electricity bills. With beauty and sustainability, our solar panels will bring us closer to net zero energy to power the site, as well as the events planned for the land.

An issue our team ran into was about not having enough water to supply to the algae farms and without enough water, algae can not grow and develop as well during the dry seasons, and our team did not want to make our project less sustainable by having to borrow water from the city, so we had to come up with a solution. In order for our team to collect as much water as we can for the site, we decided to install rain catchers underneath the large mushroom platforms we have. These fog catchers are large mesh sheets that are designed to cling onto precipitation and water moisture from the air and drip down the mesh netting and into a collection tank. From these collection tanks we will be able to strategically lay out where the water needed to go for the algae production. By incorporating these fog catchers into our design, we are able to limit the amount of resources we need to take from the pre existing infrastructure. With these fog catchers in place, we are expected to collect about 9 liters of water for every square meter of mesh we have per day. This was a big problem our team had to solve, being that we did not want to build a so-called ‘sustainable’ structure that ironically needed to have a city water pump connected to it, eating up the city's ever so depleting water source. These fog catchers helped us eliminate that issue and helped us greatly enhance our design by making it much more self sustainable.

Considering the beauty aspect of the project, as well as the sustainable aspects, this project will give Germany a new sense of life and sense of good health. We want our project to inspire people's imagination of what art and architecture can be, and also beautifully inform them about the new renewable energy resource we have on our site. As beautiful as the German mushrooms that now grow on the past life of the site, as well as the intriguing new technology that will create curiosity, this infrastructure will give people a place to grow a sense of community, as well as their knowledge.

300 Word Narrative Submission:

The M.A.P., or Mannheim’s Algae Production, is our team's design implementation for a sustainable and renewable energy production public pavilion that allows users to interact with the structures as well learn and indulge in new renewable energy resources that are immensely more sustainable than solar, wind, and lithium. Our design uses Algae production to create a biofuel that will greatly benefit the city of Mannheim. By incorporating biofuels into a cities infrastructure a huge benefit is that the cities transportation system can more rapidly transition to a completely petroleum-free transportation system. Our algae production on our site is expected to generate roughly 120.99 g/m^2 of biofuel each year. On top of our biofuel production, our team is also expecting to generate about 12.29904 kWh per day from our 750 square meters of solar panels we have on the roof of our structure. To enhance our team's design as well as generate a more self-sustainable and environmentally friendly structure, we added fog catching nets under the platforms of our structure so that we can collect and store water on our own in order to provide water for the algae production. Our team wished to provide the city of Mannheim with a great new resilience public park that also inspires to promote some of the United Nations Sustainable Development Goals. Some of the goals our team sought out to achieve with the design of our structure were to promote health and well-being for people of all ages, ensure quality education and promote lifelong learning opportunities, build resilient infrastructure that promotes sustainable industrialization while also ensuring access to affordable, reliable, and sustainable energy for everyone.