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A SUSTAINABLE FUTURE: DEVELOPING A GREEN FUTURE



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What is SUSTAINABILITY?

Climate change is a current problem humanity faces from their actions. The cause of climate change, also known as global warming, is the consistent rapid warming of the earth's atmosphere caused by human activity (UN.org). Climate change poses an unprecedented threat to human civilization and the ecosystems on this planet. Yet as days after days pass by, the more toxic gasses spread through our atmosphere and the more our government refuses to take action, the more we approach the vile disasters that await us. The time to change, the time to act, and the time to awaken is now. From years of oblivious behavior, global sea level has risen 8 inches since reliable record keeping began in 1880. By 2100, it is forecast to rise by another 1-8 feet (Climate.gov). This is the result of the addition of water to the melting of the ice sheet and the expansion of seawater as it heats up. Since the 1900s, many glaciers around the world have rapidly melted (Science.org.au). Human activity underlies this phenomenon. In particular, after the industrial revolution, emissions of carbon dioxide and other greenhouse gasses raised the temperature, even more at the poles, and as a result, glaciers are rapidly melting, breaking into the sea, and retreating to the earth (Royal Society). This rapid melting affects not only us but also the poor wildlife in the South and the North Pole regions (Hancock, 2020.). The troubles of this inevitable reality have struck humanity with a sense of urgency and as a result as our world increases at rate we dare to dream, technology and sustainability are our only hope for building a greener future.





Millions of people drive to work every day. The downside of petroleum cars is that millions of vehicles emit greenhouse gasses that destroy our atmosphere. Vehicle emissions contribute to the top causes of climate change. One of the most pivotal and popular advancements society is making is the development of electric cars (Future Transport.gov). Due to the toxic, contaminated fumes that emitted by modern-day commutes powered by fossil fuels, the technology being utilized into the production of these futuristic vehicles could be seen as the next jump for humanity. Electric cars are propelled by one or more electric motors, using energy stored in rechargeable batteries (Sustainable Development.org).



A Hyperloop can be visualized as a sealed tube part of a system of tubes with low air pressure (Inverse.com). The absence of air particles causes the commute to travel substantially free of air resistance or friction. The Hyperloop could potentially convey people or objects at hypersonic speeds while being energy efficient compared with existing high-speed rail systems (Virgin.hyperloop). Out of the immense carbon produced over the globe, transport is responsible for 21% percent and thus, by the substitution with electrical vehicles, this will reduce a small yet significant amount of greenhouse gasses (Climate.council). Yet, our atmosphere has an exuberantly high amount of emissions meaning by just removing air polluting materials won't have any major impact. What is needed is a natural vacuum, to extract the carbon dioxide from the atmosphere. Yet how? The answer rests with vertical green walls.



One of the world's largest cities and yet the most sustainable, Singapore, has been renowned for its utilization and implementation of natural vegetation, such as plants and a variety of Flora Species. What can be highlighted from their use is how they use it in a both effective and sufficient method (Great Green Wall.org). Well provided from the picture below, they place vegetation around buildings and apartments. Connecting this aspect to the extraction mechanism humanity has failed to humanely-create, plants are natural extractors of carbon-dioxide. One of the components aiding plants to undergo the photosynthesis effect is the practical application of carbon dioxide (Science News). Green vertical walls not only capture carbon but metabolize harmful toxins and filter air particles, creating a healthy environment to breathe and attract fauna life. By using a wide diversity of plants, a green wall can significantly increase the number and variety of insects and birds, helping to return a more sustainable ecosystem in urban environments (Earth.org). One of the ways civilization can employ sustainable methods to infrastructure is through green walls. The interior of many buildings rely on fossil-fuel power electricity to function facilities such as heating and cooling predicaments (reliefweb.com). Yet, green walls have a natural tool to provide insulation for interior locations and furnish cool air for exterior areas. This removes the need for air conditioners and heaters. The thick barrier created by vegetation absorbs 41% more sound than the common material used today (National Geographic.org). This has shown to create serene environments which have positively impacted the wellbeing of people.



**The Future of our World
IS IN OUR HANDS**

Algae POWER



Algae is one of the most broad categories encompassing photosynthetic eukaryotic organisms of bacteria. It ranges from both unicellular to multicellular bacteria types, stemming from micro forms such as *Chlorella* to more large and visible representations like giant kelp and seaweed (EPA.gov). What is the unique factor of algae and distinguishes it from any other form of renewable energy, is its ability to be utilized as fuel. More specifically, biofuel. Biofuel, being a common euphemism for biomass, is carbon neutral fuel and can be perceived as a renewable source of energy (ScienceDirect.com). Biofuel can be created in multiple methods such as burning and filtration yet obtain the result in the final state as oil and biogas. Biofuel can take place on materials like wood, plants and trees yet gives a rise to water impurity and scarcity (phys.org).



Increasing production of biofuels from row crops will likely result in more water pollution due to soil erosion and the increased use of pesticides affecting the natural produce we buy and eat (Nature.com). It will also impact habitats as with more wood needed for fuel, the more deforestation takes place, resulting in an unbalanced food chain. What is effective and sustainable particularly about algae is that it is a photosynthetic bacteria, meaning it will continue to reproduce and multiply through exposure to sunlight and carbon dioxide (Forbes.com). This allows the organism to gain more energy and thus undergo the process for photosynthesis resulting in an abundant amount of algae (Britannica.com). Also, in comparison to fossil fuels, algae takes a shorter time to reproduce and has a higher production efficiency and thus a shorter time to transfer energy and create electricity (live.science). Its sustainability is evident through its ability to continuously multiply through a natural and non-synthetic process. Implementation of algae power can not only impact the environment positively, yet society itself (WaterNSW.au). This is evident from the higher energy capabilities algae power possesses, as it can produce over 30 times more energy per unit than fossil fuels (Energy Education.ca). Algae power; effective, abundant and most importantly sustainable.

ECOLOGICAL CARBON CATCHERS

Though not having a particular physical appearance in cities yet contribute to the scheme of events, whales are a perfect example of how wildlife can reduce and make more sustainable cities (au.whales.org). As already explained how the excessive emissions of carbon have rendered the atmosphere vulnerable, an extraction solution must be put into play. The main food source of whales are fish and krill (whalesandclimate.org). Yet, the decrease of whales in our ocean water began to actually decrease the amount of fish and krill. Whales normally feast in the depths of the ocean where large numbers of fish and krill dwell (WWF.org). They return back to the photic zone where they release feces. These waste products are filled with rich elements of iron and nitrogen (Journalistsresource.org). Since the photic zone is the only zone with suitable conditions for photosynthesis to take place, most of the plant-like substances dwell in that zone. Most common plant-like substance is plankton (whalefacts.org).

Plankton actually benefits positively from the nutrients in the feces of whales. The fundamental concept of these feces is their ability to fertilize these plant-like substances that live in the photic zone (IWC.int). Fertilizing the plankton is not only what the whales do. As the whales maneuver their bodies up and down on the surface of the water, they push the plankton back up into the photic zone, in order to give it more time to reproduce (CSIRO.com). With more plankton created, the more food fish and krill have to consume. Yet, plankton has several aspects that aid the environment. Plankton not only feeds fish and creatures of the sea, this substance also absorbs carbon dioxide from the atmosphere (Ocean Fdn.org). When the time comes for these planktons to sink, they carry the carbon dioxide with them to the depths of the sea where the carbon dioxide remains for thousands of years (Climatekids.nasa.gov). The more plankton generated, the more carbon dioxide absorbed from the atmosphere, decreasing carbon dioxide emissions and bringing an end to climate change and supporting a healthier and more sustainable city as Whales are not the only creatures who obtain this natural ability (science.nasa.gov).



SO WHERE ARE WE TODAY?

Throughout this report, I can't stress enough on the true impacts of climate change. An impact on our ecosystems, a impact on our biodiversity and an impact on our world and society. Many have began to pounce on this forever conundrum to aid in the fight. Yet, individually we are a drop while together we are an ocean. The true change will only occur if together, as a society, a nation and a world will build the future that was once a dream. The time to CHANGE is NOW.

CHANGE YOUR THOUGHTS

AND YOU CHANGE
THE WORLD



BIBLIOGRAPHY

Investopedia. 2021. Sustainability. [online] Available at: <https://www.investopedia.com/terms/s/sustainability.asp> [Accessed 23 June 2021].

Encyclopedia Britannica. 2021. sustainability | Description, Theories, & Practices. [online] Available at: <https://www.britannica.com/science/sustainability> [Accessed 23 June 2021].

Sphera. 2021. The Sustainability of Electric Motors - Sphera. [online] Available at: <https://sphera.com/spark/the-sustainability-of-electric-motors/> [Accessed 23 June 2021].

En.wikipedia.org. 2021. Hyperloop - Wikipedia. [online] Available at: <https://en.wikipedia.org/wiki/Hyperloop> [Accessed 23 June 2021].

Urbangreening.info. 2021. [online] Available at: <https://www.urbangreening.info/benefits-of-green-walls#:~:text=The%20introduction%20of%20vertical%20gardening%20techniques%20significantly%20increases,assessment%20schemes%20and%20may%20help%20with%20planning%20applications.> [Accessed 23 June 2021].

Nichols, M., 2021. Green walls are great, but they need to work efficiently. [online] Inhabitat.com. Available at: <https://inhabitat.com/green-walls-are-great-but-they-need-to-work-efficiently/> [Accessed 23 June 2021].

Encyclopedia Britannica. 2021. Algae | Definition, Characteristics, Classification, Examples, & Facts. [online] Available at: <https://www.britannica.com/science/algae> [Accessed 23 June 2021].

Power of Positivity: Positive Thinking & Attitude. 2021. "Algae Power Plant" Removes as Much CO₂ As An Acre of Trees. [online] Available at: <https://www.powerofpositivity.com/algae-power-plant-removes-as-much-co2-as-acre-of-trees/#:~:text=Algae%20powers%20the%20bioreactor.%20%E2%80%9CWhat%E2%80%99s%20amazing%20about%20algae,carbon%20out%20of%20the%20air%20much%20more%20efficiently.> [Accessed 23 June 2021].

Iberdrola. 2021. Sustainable infrastructure, a must in the fight against climate change. [online] Available at: <https://www.iberdrola.com/sustainability/sustainable-infrastructure> [Accessed 23 June 2021].

En.wikipedia.org. 2021. List of tallest wooden buildings - Wikipedia. [online] Available at: https://en.wikipedia.org/wiki/List_of_tallest_wooden_buildings#:~:text=Wooden%20skyscrapers%20are%20estimated%20to%20be%20around%20a%20higher%20rigidity%20and%20strength%20to%20wooden%20structures. [Accessed 23 June 2021].

2021. [online] Available at: <<https://arena.gov.au/what-is-renewable-energy/>> [Accessed 23 June 2021].

Interactive, O. and Interactive, O., 2021. Is Beekeeping Sustainable? – The Australasian Beekeeper. [online] The Australasian Beekeeper. Available at: <<https://www.theabk.com.au/articles/2016/8/3/is-beekeeping-sustainable>> [Accessed 23 June 2021].

Beeculture.com. 2021. SUSTAINABLE BEEKEEPING | Bee Culture. [online] Available at: <https://www.beeculture.com/apr_sustainable-beekeeping/> [Accessed 23 June 2021].

En.wikipedia.org. 2021. Seascraper - Wikipedia. [online] Available at: <<https://en.wikipedia.org/wiki/Seascraper>> [Accessed 23 June 2021].

History. 2021. Pictures: Floating Cities of the Future. [online] Available at: <<https://www.nationalgeographic.com/history/article/120730-future-floating-cities-science-green-environment>> [Accessed 23 June 2021].