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THE MANTA-SEA CLEANER

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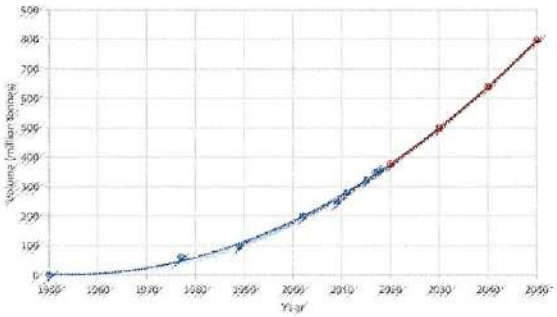
ABSTRACT:

Every year, millions of tons of plastic enter the oceans, of which the majority spills out from river. A portion of this plastic travels to ocean garbage patches, getting caught in a vortex of circulating currents. If no actions is taken, the plastic will increasingly impact our ecosystem , health and economics. This is about reducing marine plastic pollution through innovative technology. This innovative project suggests creating a cleaning boat for the ocean. This is the Sea Cleaners technical departments project. It will be called "MANTA". The boat will be running on renewable energy created by the waste it initially picked up. The engineering of the project is focussed on the production of electrical energy from waste.

1. INTRODUCTION

Our beloved home is known as the "Blue Planet". Oceans and seas covered two third of the earth surface. Habitat of large amount of living organisms. Human activities are the major threat such as Discharging of garbage, Dumbing of industrial wastes, Construction, Higher greenhouse gas emission. Pollution of the oceans and seas increase day by day. Higher percentage of pollutants in the oceans is "PLASTIC". With the increase of the population, amount of plastic usage has been increased. Every year, between 8 to 10 million tons of plastic is discharged in ocean.one bottle in the ocean can take up to 450 years to deteriorate. One part of the plastic waste is transformed into micro waste (less than 5 cm) and the other into nano waste. The problem lies initially with nano waste. Nano waste is consumed by marine organisation. This cycle impacts the entire food chain including the final link HUMANS.If this continues, in 2050 there will be more waste than fishes in seas and oceans.



2. CONCRETE SOLUTION AGAINST THIS POLLUTION

The best way to decrease the ocean pollution is to decrease the amount of pollution put in the ocean beforehand. To reduce this marine pollution, the innovative technology called "THE MANTA" is initiated by sea cleaner's technical department. This is the first-of-a -kind processing ship designed to collect, treat and converts large volumes floating plastic debris into electrical energy.

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3. DIMENSION OF MANTA

•Height: 62 m

•Width: 26 m (46 m with outriggers)
•Length: 56.5 m

•Weight: 1,800 tons

4. MANTA'S MECHANISM

The Manta is the first self-sufficient workboat capable of processing 90 to 95% of the collected plastic waste at seas. The waste-collecting conveyors brings the waste on board. A waste-to-energy conversion unit then converts the collected waste into electricity through the process of pyrolysis (which involves the thermal decomposition of materials at elevated temperature in an inert atmosphere),which in turn ,powers all of the Manta's electrical equipment. This eco-friendly method emits hardly any CO2 or pollutants into the air.

The manta extracts both floating macro-waste and smaller debris from 10 milli meters upwards and up to one metre deep. Depending on the density and closeness of the layers of waste, the Manta can collect between 1 to 3 tonnes of waste per hour, with the objective of collecting 5 to 10,000 tonnes per year. It can operate for up to 20 hours a day,7 days a week. The manta is equipped with four complementary collections:

•Waste collecting conveyors which bring the waste on board.

•Three floatable collection system, which can have a collection span of 46 metres, and pickup surface waste.

•Two small, multi purpose collection boats ,or "Mobulas",which can pick both micro and macro plastic waste from the shallowest and narrowest parts of the ocean that the Manta cant't get to.

•Two lateral cranes, which pull out the largest pieces of floating debris from the water.

The floatables collection systems, which are nets hung on the back of the boat, will not go deeper than one metre. These systems will be equipped with on-board cameras that will allow us to observe whether fish are entering or leaving the nets, and

escape hatches will also be installed so that they can be released without any problem.

5.WASTE RECYCLING

The debris from the sea is collected through the semi permeable conveyor belt. The conveyor belt fetches and transfer the debris to the waste sorting unit. These wastes are separated manually in the unit. Two units are occupied inside the boat to waste recycling,

•A waste sorting unit: This manually separates the waste, according to its type, and packages it in a way that boosts its energy efficiency.

• A waste-to-energy conversion unit: This converts the collected waste into electricity through the process of pyrolysis which, in turn, powers all of the manta's electrical equipment. This eco-friendly method does not emit any CO2 or pollutants.

All the collected waste is converted into electrical energy. The storage capacity for the plastic waste is 140 m^3 (around 50 tonnes). In addition to this, there are two 33 m^3 containers: one for drift nets and one for dangerous waste.

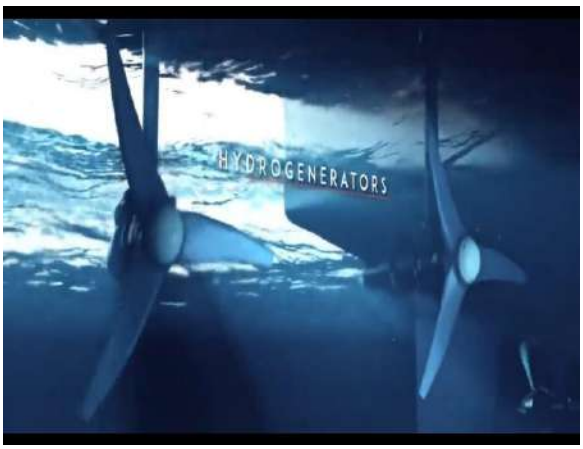
6.ENERGY UNITS

•SOLAR ENERGY: This common renewable, green energy source is usually produced using photovoltaic cells that capture sunlight and turn it into electricity. When sunlight strikes a solar cell, an electron is freed by the photoelectric effect. The two dissimilar semiconductors possess a natural difference in electric potential (voltage), which causes the electrons to flow through the external circuit, supplying power to the load. The flow of electricity results from the characteristics of the semiconductors and is powered entirely by light striking the cell.

•WIND ENERGY: Particularly suited to offshore and higher altitude sites, wind energy uses the power of the flow of air around the world to push turbines that then generate electricity. Wind turbines use blades to collect the wind's kinetic energy. Wind flows over the blades creating lift (similar to the effect on airplane wings), which causes the blades to turn. The blades are connected to a drive shaft that turns an electric generator, which produces (generates) electricity.

•HYDROELECTRIC ENERGY: Hydroelectric power, this type of green energy uses the flow of water in rivers,

streams, dams or elsewhere to produce energy. The rotor is attached to the turbine shaft, and rotates at a fixed speed. When the rotor turns, it causes the field poles (the electromagnets) to move past the conductors mounted in the stator. This, in turn, causes electricity to flow.



7.WASTE TO ELECTRICAL ENERGY

Once the waste are manually separated, only the plastic wastes are shredded and transformed into pellets before being sent to waste to energy conversion unit. The real master piece of on-board plant is ,it melts the plastic pellets at high or elevated temperature and transforms them into synthetic gas. This synthetic gas passed through the turbines and spins the turbine. This action produces electrical energy. That electricity **in turn** powers all the equipment's of the manta like on board units, propulsion unity, batteries. During this process heat in the missions, waste gases are removed by manta's principle trending in eco-friendly solution.

CONCLUSION

The waterbodies are cleaned up to the maximum without harming any other living species. This boat powers itself with the plastic wastes it collects from seas as it sails which runs as a cyclic process. This technology is fully equipped with different sources of renewable electrical energy. "THE MANTA's goal is to collect debris in sea between 5,000 and 10,000 metric tons per year".

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