

1. Executive Summary

This project is about solving the Sargassum problem which is found in the Caribbean countries negatively impacting the tourism industry big time and hurting the natural ecosystem on its settlement in the oceans all over the world which will play big role on climate change big time. The best solution for such kind of problem is a long term solution but the Caribbean economy depends upon tourism big time that it needs an urgent solution other than cleaning up the algae on a normal or standard method. Since the basic problem is the fact that the algae float, pile up and decay on the shore: we will give it no time to pile up and decay by using a smart device to cleanly and effectively collect the Sargassum within few hours if not minutes at very lower cost and least effort with no human interaction. After the collection of the Sargassum has taken place we will use the Sargassum as an input for other purposes like construction of brick and other purposes. This will create a circular economy in the Caribbean by creating new economy that creates harmful waste in to a value input for other industries. This will transform the Sargassum from being a major problem to become a very advantageous or profiting raw material that helps create new industry.

The main goals of the project are

- Solving the Caribbean Sargassum problem by smart collection method,
- Providing the Sargassum for input for local industries creating circular economy,
- Creating jobs for local communities,
- Creating a self powered collection mechanism or at least running the mechanism in very efficient way that does not require or do on depend up on nonrenewable power sources that generate carbon emission,
- No negative effect on plants and animals on the oceans near the shore,
- Promote sustainable technologies and promote innovation,

The outcomes from the implementation of this project are

- Restoration of the Caribbean economy from tourism which the Sargassum has been hurting,
- Restoration of the beautiful Caribbean shore's beauty we all know, free from the Sargassum becoming major health risk,
- Better management of effect of climate change; transforming the effect from being a major problem to become a great benefit to have,
- Increased employment from the project implementation and creation of new industry that utilize Sargassum,
- New electric power source if the mechanism is made successful to be self sustained using wave energy for local beach industries to generate electric power and utilize it,
- Protection and preservation of the ecosystem; plants and animals near the shore which the Sargassum has been the reason for damage and even create a better environment for the plants and animals
- Inspiration for the young generation that imprints the idea that a major problem can be turned in to a major advantage with just a right attitude and innovative mind.

2. Innovation

Record-breaking amount of Sargassum is in the Caribbean resulting in the highest problem ever gotten. The major problems it has brought are it piles up on beaches, sometimes many feet thick and begins to decay. The hydrogen sulphide that gets released smells like rotting eggs and many resorts had to close their doors. Since the species are Sargassum natans and Sargassum fluitans float they block sunlight creating dead zone beneath them because plants under need sunlight to survive and the cleanup and removal of sargassum is an expensive task.

Sargassum is a natural, even essential, part of the Caribbean's ecosystems but these recent blooms are having a devastating impact on the region, both ecologically and economically. Many tourist areas and islands were inundated this year. It piles up on beaches, sometimes many feet thick and begins to decay. The hydrogen sulphide that gets released smells like rotting eggs and many resorts had to close their doors. Hydrogen sulphide is dangerous to humans in large quantities, causing headaches, dizziness, nausea and even asthma has been reported in some local communities. It is also extremely corrosive to metals and concrete. Barbados was hit particularly hard, and even found dead dolphins stuck in the weed, as well as turtles and many other fish species.

This project proposes new way to solve this problem. The best solution is a long term solution but the Caribbean economy depends upon tourism that it needs a quick solution other than cleaning up the algae on normal or standard method. Since the basic problem is for the algae float, pile up and decay: we will give it no time to pile and decay by using a device seen above. Since the algae have considerable volume and we have the advantage of the current, we use the green structure to direct Sargassum into the red blade. The green structure is stationary fixed with the ground depending on the direction of the current of the shore. Then the blade will force the Sargassum to be collected in the holding storage made up of a flexible hard net that can pass the water but not the algae. The storage will prevent the Sargassum from decaying. Then regularly we change the holding net.

There are two main concerns of this product which are

1. Power source for the mechanism - how the blade is powered is the top concern of this design and for that we have two options which are using solar rechargeable batteries and using the energy of the current to run the turbines. The current can be a source of mechanical power which can directly be connected to the turbines that run the blade. We can use this mechanical power to run the blade without using any additional power and if the energy of the current wave is strong enough, we can even generate electric power for local beach industries for them to utilize the electric power crating additional advantage for the community. This will be very important in terms of cost because building a power infrastructure just for producing electric power from the beach using current wave energy is expensive for most countries and if we can manage to “kill two bird with one stone” as in solve the Sargassum problem and generate electric power, it will be huge impact for the Caribbean. But if the current is not strong enough using a rechargeable battery is feasible. The design will be modified after onsite inspection with proper data.
2. The structural stability of the mechanism - the shear force of the wave will test the mechanism structure big time. Our solution to withstand the shear force is using a special anchor technology which is frequently used by many parts of the world in beach structures. This mechanism uses a principle called skin friction which is known in its low cost and high strength mechanism especially for sandy shores. Skin friction is basically the friction caused by surface contact between the anchor and the sand that will create a very strong bond with each other. The number of anchors, the thickness of anchor, depth or height of the anchor and other relevant factors will depend on the site conditions of the beach which will be different for different locations of different site.

As seen in the picture below there is space that is between the devices for the aquatic animals to pass through. Since the suction is heavy only near the blade live aquatic animals will not be sucked in. My calculations gave me if we clean/ sort 35,000 gallons

(US) in 8 hours we need a minimum flow rate of 73 gallons (US) per minute turbine for 20-inch intake line. Since there are multiple devices installed in the Caribbean beach it is enough to get the job done. From my research, this much sargassum will be cumulated in a matter of days and from my calculation every week the net must be changed.

After successful collection of the Sargassum in a clean and efficient way the second step is creating a circular economy using the Sargassum as a raw material for industries that process and utilize Sargassum to produce some products. According to my resources there are number of small scale manufacturers that uses Sargassum to manufacture products like bricks, furniture, home use equipments and even building houses made from Sragassum. By connecting the people who regularly change the net holding the collected Sargassum in the shore with the manufacturers who utilize the Sargasumm, we can create new market where the collectors will get paid per volume of Sargassum depending on the market rate of the manufacturers. This is will create a new circular economy and transform the Sargassum from becoming a major problem to big opportunity that generate profit.

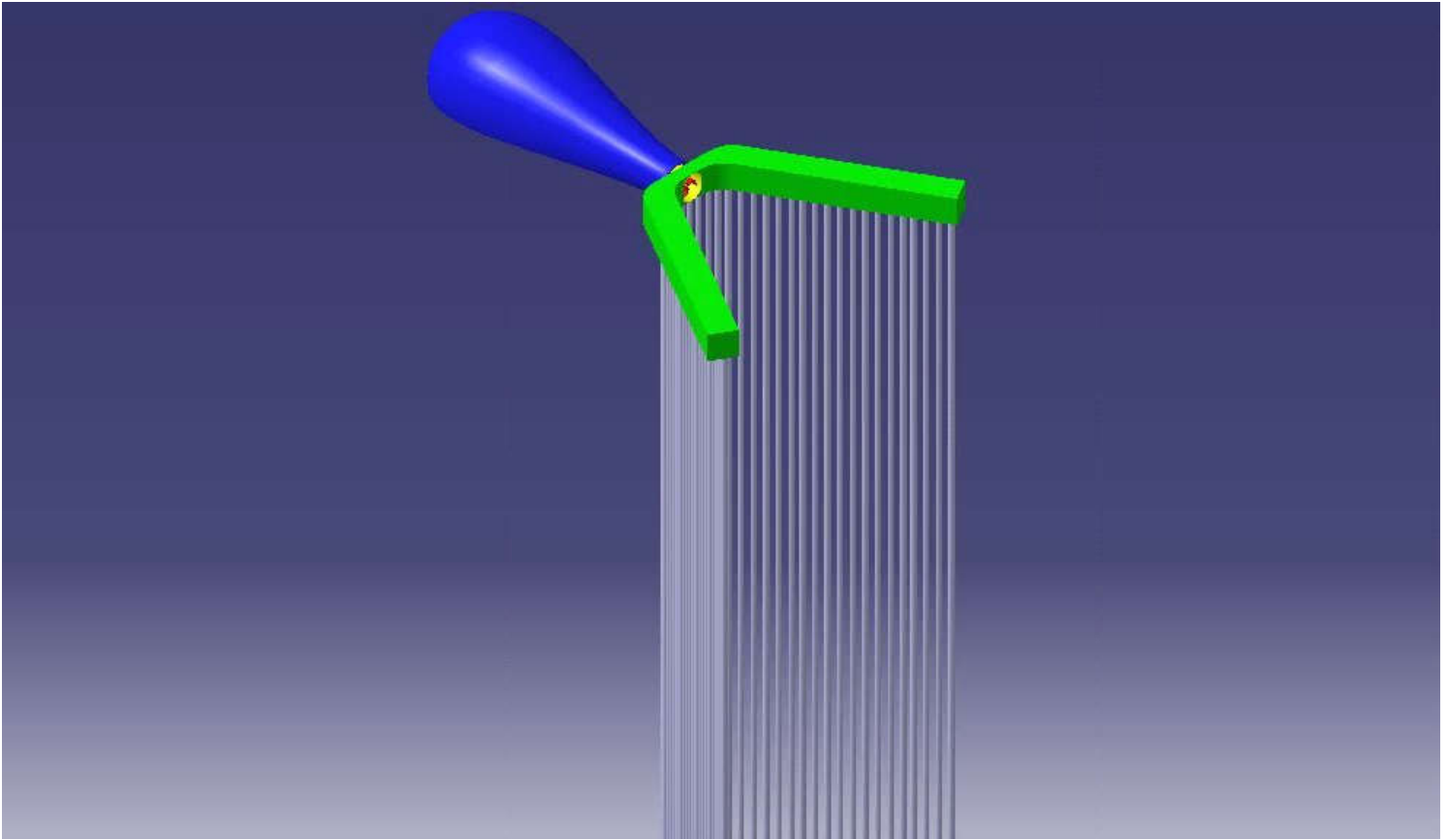


Figure 1- 3D model of the structure and mechanism



Figure 2- 3D model of the structure and mechanism installed on shore

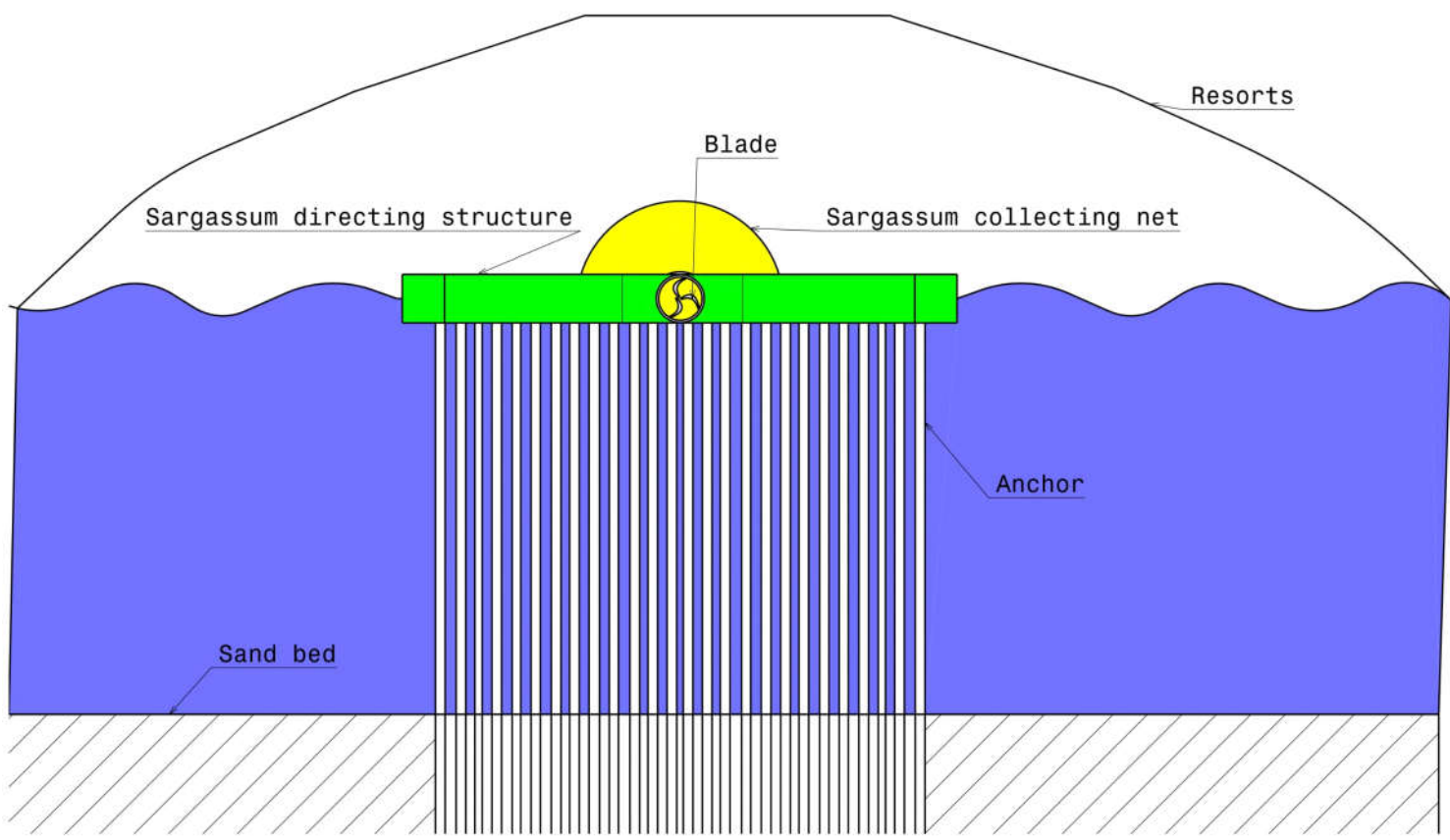


Figure 3- Front view of the structure and mechanism installed on shore

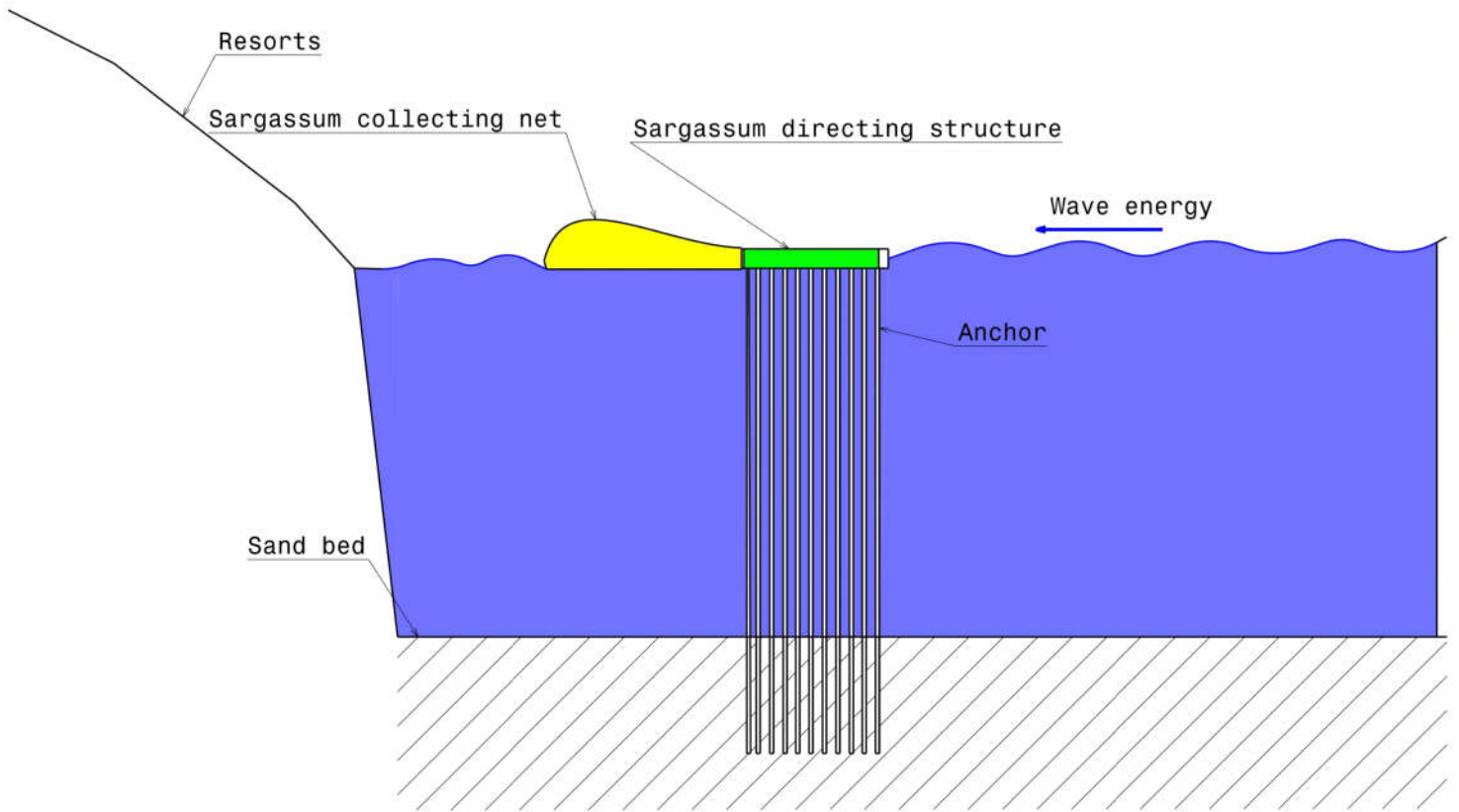


Figure 4- Side view of the structure and mechanism installed on shore

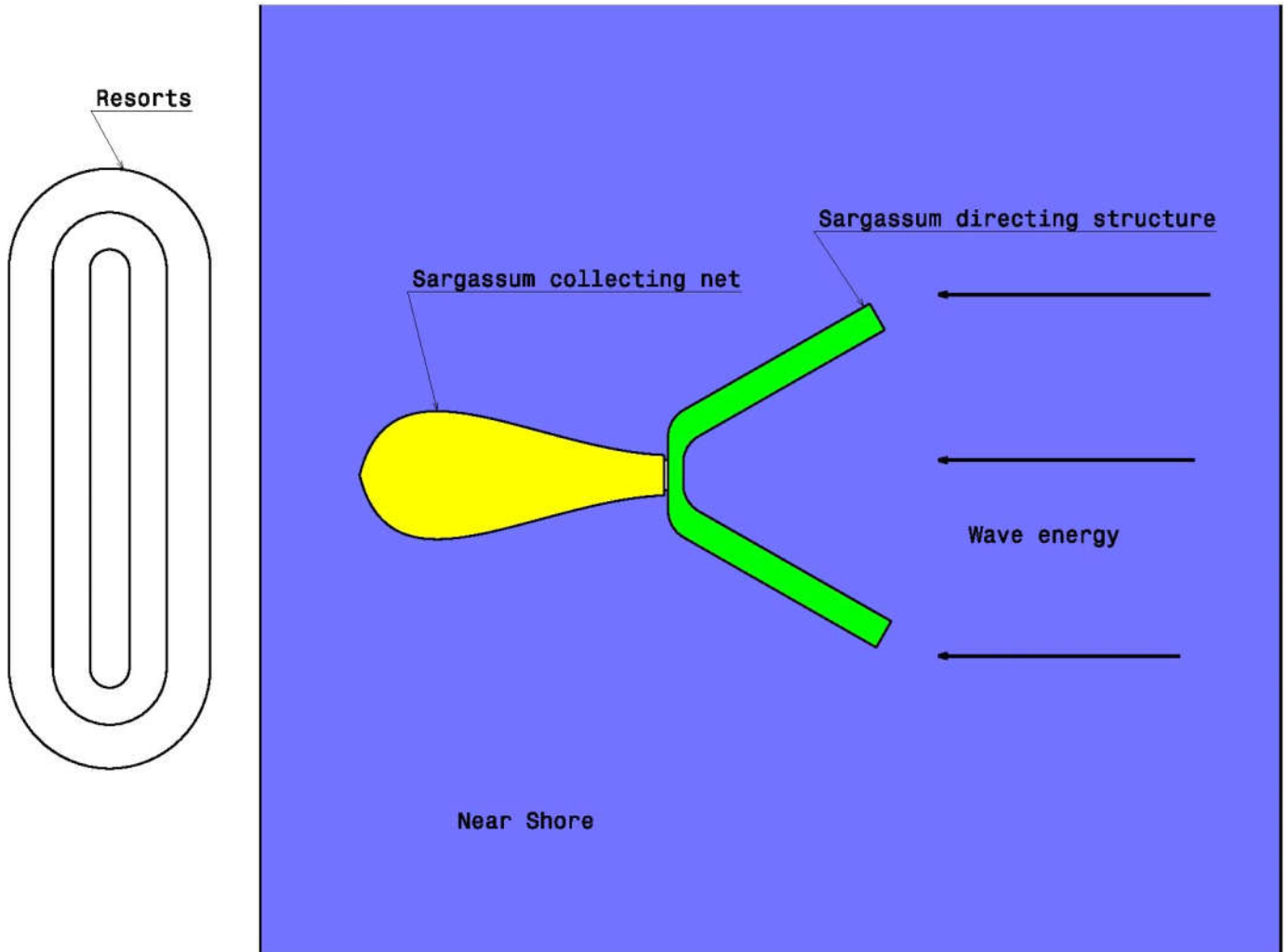


Figure 5- Top view of the structure and mechanism

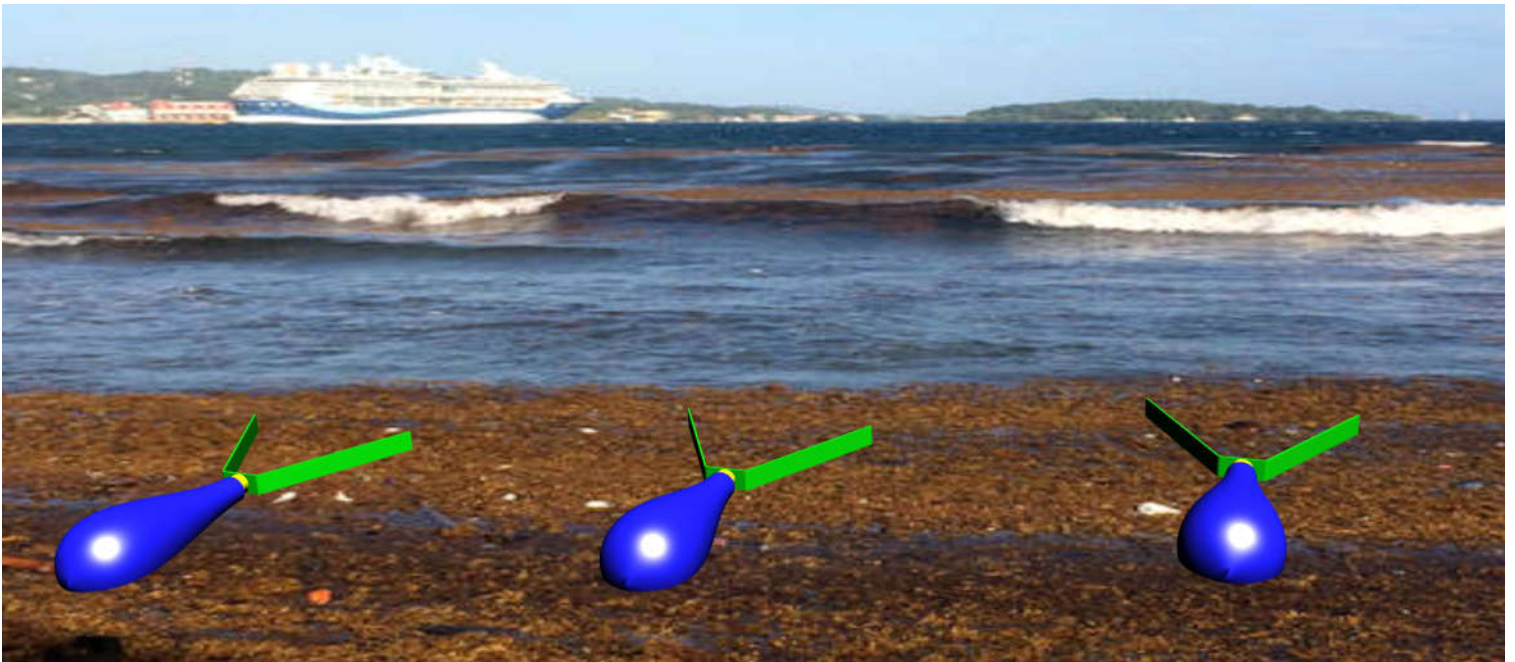


Figure 6- 3D model of the structure and mechanism installed on shore

3. Market Feasibility

In order to fully understand the market feasibility of this project, we need to grasp who are the stakeholders that will be benefited from implementation of the project first. This project has two major stakeholders that are benefited from the outcome of the implementation of the project. The major two stakeholders of this project are

- i. The private resorts – Caribbean resorts are the number one must see places in the world because they provide service like no place in the world. The experience for most visitors is perfect that people spend fortune to get there and stay as long as they can afford. But the Sargassum have become a big problem on the resorts because it have created discomfort to the experience of the tourist that resorts are forcing to close their doors but tourists do not come for indoor experience but outdoor one. So, since the resorts are the one that has been impacted by the problem most, they are the main beneficiaries of the implementation project. Considering their income loss, the resorts will be our primary stakeholders or clients to pay for the project.
- ii. The government – the major bodies of the government that will directly affected from the implementation of the projects are;
 - A. Tax collector authority – As we all know that good business for one company means better profit which leads to higher tax collection for the authorities. That is why the tourism in the Caribbean is one of the major sectors that drive the economy of the continent. But if the business of the tourism is getting hurt due to phenomenon outside control of the service providers, it is the responsibility for that authority to invest in the solution for the sake for keep collecting good tax from the service providers. So, that authority is our primary stakeholders or clients to pay for the project.
 - B. The ministry of health authority – it is known that the health ministry of a certain country has the responsibility to create a safe and healthy environment for its citizens and any legal foreigners who come in to that country. From reports on the Caribbean many people are suffering critical

health issues caused by the Sargassum from small continues health problem to big life threatening illness that is caused by the smell of the rotting Sargassum. For that reason it is the responsibility of the health ministries of the Caribbean to invest in the solution. So, this authority will make the stakeholder or client of this project who will pay for implementation of the project.

- C. Industry linkage authority – as mentioned above, this project convert the Sargassum from being a major problem to become a sustainable raw material creating new circular economy which create and link new industries. This directly aligns with the objective of the industry linkage authorities who are always in research of creating new ways for their citizens create new jobs, find easier raw materials for the manufacturing companies based in their respective countries and so on. This project will be on very useful tool in their mission and become major client of my company.

When transitioning to the implementation stage, the direct clients will be the authorities because it will be easier for management for the project, construction of the infrastructure and money flow if my company has one point of contact instead of many. The government can deal with the local resorts how they can pay and implement the project.

4. Management Feasibility

The world as we know it has been changed because of the new crisis of the Coronavirus (COVID-19) and it is going to change how projects are managed and implemented for a long time to come. So our company is forced to design new approach that can cope up with this reality. This project also have developed an implementation mechanism for the project that considers the new reality of Coronavirus (COVID-19) because while solving this problem is very critical for the economy of Caribbean and fighting climate change for the world, peoples should not have to risk their health while implementing the project. This is done by allocating local engineers in different locations, provide product specifications based on site conditions and make the installation without personals moving from one site to another. This will avoid the infection risk of Coronavirus (COVID-19) big time.

In terms of technical management, this project is supported by the full personals of the Digital Makers Space community composed of leading experts in conservation, marine tech, Sargassum farming, marine engineering and many others from all over the world. The community manager Tom Quigley and Dr. Anrew Thaler are my advisor and they have been helping me curate the team because I got awareness about the problem through a platform called the digital maker space by conservation x labs. The community manager tom posted the problem and I started proposing many solutions and I remember the community saying no to my different design ideas and big yes to this design finally. I have brilliant Jamaican engineers who supports in design of the turbines and among other things.

The product supply for clients will be done in two ways which are

- I. Product design specifications supply depending up on site conditions – information like depth of the shore which the Sargassum settles, type of the soil under the water of the shore which the Sargassum settles, wave energy or current force of the shore which pushes the Sargassum to settle in the shore and other factors determines the design specification of the product. Based on these

designs, our company gives the clients the specification of our product for them to manufacture the product and install it.

- II. Physical product supply for specific site – as stated above, after clients give site specifications our company will manufacture product and ship to the clients but this process will increase cost because of the current low transportation accessibility because of Coronavirus (COVID-19) crisis of the world. Our company is also considering manufacturing in temporary workshops in each site after the client award us the job contract but this also requires to move personals from one location to another which may increase risk of getting infection of Coronavirus (COVID-19) for our personals and the community where the team is heading.

To say few words about my background, I have dedicated my life for invention and research because not only I have big dreams but also it is my only way out of poverty. We all have a talent we know or did not find out yet. Mine happens to be inventing. I discovered this talent of mine when I was in second year student during my university life. Starting from that point everything seemed not important except creating new ideas. So, until now I have invented more than 70 inventions.

You can find some of my inventions via

<https://contest.techbriefs.com/profile?user=89682>

<https://www.herox.com/crowdsourcing-community/antenehgashaw-123126>

<https://desall.com/User/AntenehGashaw/Portfolio>

<https://challenges.openideo.com/profiles/antenh.g/contributions#recent-contributions>

My latest big international honors are

- Winner of Mechanical maker challenge by NASA/ JPL- 2019 with my design invention “Mechanical eye”
- Finalist in TKF plastic innovation challenge 2019 with my invention “Smart green washer”

- Top 100 inventions of 2019 by create the future contest by tech briefs with my project “Cone solar panel”
- Top 10 winner of TIA challenge 2019 with my multiple unique solutions and invention
- Finalist in Enel challenge on MV & LV distribution challenge 2019 with my invention “Turbine for avoiding birds in MV & LV distribution lines”

I believe that I have made many contributions to science so far and just to mention some,

- In the recent Hawaii natural problem challenge which is the saving the Ohi’a challenge (<https://conservationx.com/challenge/invasives/ohia>), I submitted more than 30 possible solution which you can see via <https://conservationx.com/challenge/invasives/ohia/projects>
- I have developed more that 20 inventions for solution, management and prevention of the Coronavirus (COVID-19) which you can see via <https://solve.mit.edu/challenges/health-security-pandemics/solutions/22229> or <https://contest.techbriefs.com/profile?user=89682>
- I have designed a Green- technology that will solve the micro fiber problem in the oceans which you can see via <https://2019.spaceappschallenge.org/challenges/earths-oceans/trash-cleanup/teams/the-saviors/project>
- I have designed a Green- technology that will solve the micro Plastic problem in the oceans which you can see via <https://contest.techbriefs.com/2019/entries/medical/9465>
- I have many contribution for agriculture industry with my multiple project like <https://challenges.openideo.com/challenge/food-system-vision-prize/open-submission/isolation-farming>

- I have contributed to Teraforming Mars with my project Melting mars polar ice cap <https://www.globalinnovationexchange.org/innovation/melting-mars-polar-ice-cap>
- I have contributed on reduction of plastics in packaging in beverage industries with my project bottle belt <https://contest.techbriefs.com/2019/entries/sustainable-technologies/9466>
- I have invented a mechanism that will solve the hurricane crisis of the USA for good and I am looking for a department to submit my white paper which you can see via <https://www.herox.com/ideas/128-solving-us-hurricane> and few of my honorary certificates are shown below.



Figure 6- NASA- JPL winners certificate

Certificate of Achievement

This Certificate of Achievement Presented to

Anteneh Gashaw

*Recognizing your submission as a Top 100 Entry in the
Create the Future 2019 Design Contest*

Cone Solar Panel

Presented
November 2019


Joseph T. Pramberger
President, Tech Briefs Media Group

Figure 6- Certificate of achievement for top 100 inventions of 2019

5. Financial Feasibility

The financial sustainability of this project follows simple procedure which bases on prototype demonstration for clients and supply product specifications based on site condition of the implementation area. In order to build the prototype the first thing I did was to apply in many seed funding platforms for conservation projects, sustainable project supporters listed below

- ConX tech prize for funding on building prototypes for projects that focus on solving world's top conservation crisis like this one. It is published in the Digital Maker Space site by conservationx labs which you can see via <https://conservationx.com/project/id/372/caribbeansargassumproblem> . This project is currently being evaluated for funding for building quality prototype and demonstration for clients.
- This project is also one of contestant in the plastika reparabilis challenge for building prototype and demonstration for clients which you can see via the link <https://www.herox.com/plastika-reparabilis/round/346/entry/21723>
- In the past I have also applied for the create the future contest by tech briefs with my more than 50 inventions including this project which you can see via <https://contest.techbriefs.com/2019/entries/manufacturing-robotics-automation/9468>
- Assuming I will get the seed funding from this program, I will use the seed money for demonstration for clients and the first payment of the first client will be the means to scale up the project.

In terms financial projections, it depends on site conditions and the cost of one product may not be the same for different locations but if we considered only for one specific site of implementation and have a cost of X value, we can forecast the overall cost. All we need to do is make mathematically calculated estimation how many would be needed per kilometer of coastline, and from there we can have a cost estimate on what it would cost governments to purchase. It may sound high at first but the device should

last for multiple years, so it should be divided by the life span of the product. Plus, as we begin building in bulk, the overall cost should go down.

The return of investment from implementation of this project is seen with minimal time because the tourism industry of the Caribbean generate large amount of income at normal condition before Sargassum and the tourism industry has showed major decrease in income because of the Sargassum. Solving the Sargassum will restore the previous income showing instant return of investment.