FAC SYSTEMS INC.

SSUE FOR A VARIETY OF APPLICATIONS

INTRODUCTION

The SSUE[1] is a significant breakthrough in platform technology at sea. Presently, airborne craft such as helicopters are not deployed or landed on vessels in severe weather. The objective of the SSUE concept is to create a stable, continuously level platform module as an automated ship system when needed. This stable platform will permit the reliable launch or recovery of helicopters (military, coast guard or commercial) in a wide range of sea conditions. Unmanned aerial vehicles, both fixed wing and rotary wing, could be recovered under similar circumstances. The concept is adaptable to other applications such as transfers of men, material and operational payloads at sea. A stable platform module could significantly enhance the operation of certain types of equipment. In short, the SSUE concept has a boundless range of potential applications, as the reader will discover below.

We invite you to explore the promise and possibilities of the SSUE. In Section I, we will offer a brief history and explanation of the concepts. We will then present in Section II an overview of some potential applications we have envisioned for the SSUE.

SECTION I: HISTORY AND EXPLANATION OF THE CONCEPT

The novel technical solution for the SSUE was originally intended to enable landing a helicopter on a vessel in rough seas. The concept is a reversal variation of a device called the BILLY BOARD (See FIG.1). The BILLY BOARD invention was introduced by Dr. Billy J. Hartz at the University of Washington as a device to explore the balance performance of the human body. The basic premise was to create an unstable surface in a stable environment. This design was accomplished by manufacturing a solid cylinder that is cut with a plane at an angle to the cylinder for adjusting the inclined angle of the top surface. On top of the cylinder is a solid surface plate mounted on ball bearings, free to rotate. As the angle of the cut cylinder is changed, the top surface becomes very unstable and difficult for a person standing on the surface to maintain balance.

FIG.1 The BILLY BOARD - Balance Skill Board

[1] SSUE is an acronym for "Stable Surface in an Unstable Environment." The patent title is "Stabilizing Surface For Flight Deck or Other Uses".

The proposed SSUE would invert a BILLY BOARD (turn it upside down), adding ball bearings (or wheels) on the inclined cut and on the top surface. The SSUE is simply a cylinder cut at a bias angle. The cylinder top becomes the stable surface. The cylinder parts rotate in a manner to compensate for motion in the base below, such as caused by ocean waves. A hollow cylinder is utilized instead of solid cylinder so that a gyroscope, a microprocessor, gears, motors and a connection to a power source can be inserted to power the desired rotation of the cylinder parts. A stable surface can be maintained on the top surface when the environment makes the bottom surface unstable.

The SSUE can be built in all sizes and shapes. The first model developed in 2004 cost roughly $5000 in materials. This working model is twelve inches in diameter by eight inches in height. It can handle about 200 pounds of vertical load. The energy the SSUE draws is minimal since the load on the motors is only about .3 to .5 % of the vertical load. The outside torque is dissipated externally, and all rotating surfaces have frictionless action as in slew bearings. If there is an outside torque, e.g. a helicopter lands off-center on the platform, the load on the motors could reach 10% of the vertical load.

SECTION II: APPLICATIONS

Introduction

Our initial work on the SSUE contemplated its use as a platform for take-off and landing a helicopter on ships of all types. We think the SSUE concept may be applied to many other types of systems including weapons, sensors, construction, aircraft, shipping, transportation, etc. As refinements occur, we think that more applications of the SSUE concept in the environment will arise. Below, we offer several ideas for your consideration.

a. The SSUE as a Vertical Take-Off and Landing Aircraft Platform

It is highly desirable that helicopters may operate from a flight deck that is flat and stable in a variety of sea states from calm to rough. Currently, the pilot of a helicopter must shut off the engine and literally fall on the landing pad when the seas are moderately stable. As proposed, the SSUE stability system will compensate for more drastic sea motions by utilizing moving cylinder parts powered by motors that are controlled by a processor. The processor is connected to a sensor that determines and invokes corrections to achieve the necessary angle between the two cylinder components to make the surface stable.

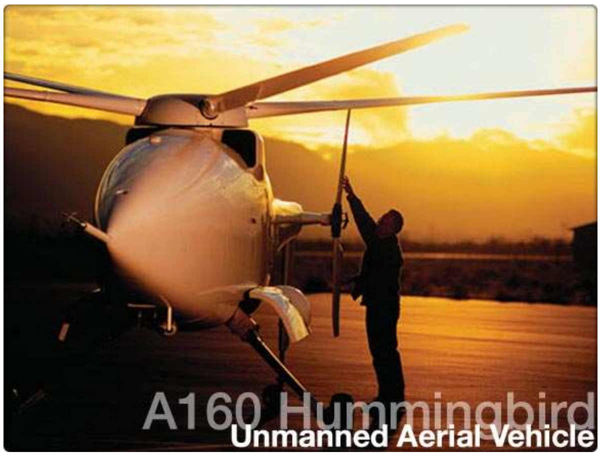
Based upon our calculations, one proposal would have a 50 ft diameter surface built approximately 8.55 ft off the deck in the normal position. Compensation could be achieved if the pitch/roll of the ship is as much as ±20°. The landing surface is expected to be level, but periodically shifts horizontally (as the top part of the cylinder rotates) to a maximum of ±1.76 ft. This horizontal shift has no impact on the helicopter since most vessels drift while the helicopter lands.

Helicopters may currently land on sloped terrain to a maximum allowable slope of 10° (the FAA recommends the slope be no greater than 5°). However, most slope landings are performed parallel to the slope. On ships the landing must be performed while the slope can be in any direction. This reduces the allowable slope to 5°.

This system provides for safe operation in a variety of shipboard conditions including high ship speeds and up to Sea States (SS) 5.

It is anticipated that the flight deck could also be utilized by unmanned aircraft such as those illustrated immediately below.

Pictures of UAV and VTUAV
Unmanned aircraft



Courtesy from Boeing web page

b. Human Comfort in an Unstable Environment

There is not a limitation as to the size of the SSUE. Pleasure craft and fishing boats of all sizes could utilize an appropriately-sized SSUE that could be mounted on the deck to reduce seasickness or increase safety. Cruise ships could also employ SSUE applications; for example, an entire cabin or deck space could be equipped in whole or part to meet special needs. Cabin furniture such as beds and recreational items such as pool tables also could be mounted on small SSUEs. Balconies could be equipped with SSUE technology for sports activities such as for golf or as a dining area. Some of these applications could be incorporated in an aircraft. For example, an SSUE could be installed beneath a passenger seat to minimize motion sickness.

c. Drilling and Construction Applications

The safety of workers and the prevention of damage to sensitive equipment are of critical importance in drilling and construction operations at sea. The continuously stable platform of the SSUE would enhance the safety of workers and equipment. Such stability would be very useful when drilling anchors or piles. Moreover, offshore oil drilling operations could similarly benefit from an SSUE on a ship or an oil platform.

Construction equipment or buildings of various types could be moved safely via ship on a SSUE stabilized platform. The SSUE could be used to ship complete manufactured buildings to remote locations which lack construction capabilities. Critical crane operations and maneuvers could be performed better, especially during severe weather conditions.

d. Transportation of Materials, People and Vehicles

The SSUE could be used to transport many hazardous or chemical products that require stability[2]. Ambulances, trains, trucks, cars, planes, and ships could be equipped with an SSUE for a variety of purposes. For example, ambulances could have a stable platform for performing procedures on patients. Trains could have stable sleeping areas.

With the use of an SSUE, it would be possible to have floating foundations for bridges. The bridge column would sit on an SSUE platform and might require elevation stability (see footnote 2), as well as a means to adjust to any water current (e.g. a propeller driven platform or an anchored platform). Similarly, it would be possible to construct a floating airport which uses the SSUE concepts. We have developed more detailed plans and specifications for these and some other potential applications which are available upon appropriate request.

e. Inland Rescue Operations

[2] If the application requires a stable elevation as well, such technology could be incorporated. For example, adjustments can be made utilizing prying forces and/or counter balance load as in elevator technology. Global Positioning System (GPS) technology can provide a reference point for the elevation; however, GPS presently is not fast enough for this application..

It is possible to have a compact SSUE which is light in weight and self-powered by a generator. The potential uses are many. For example, a helicopter could lift the SSUE and set it down on mountain slopes, other types of uneven terrain, or snow. A helicopter landing then could be made for rescue operations, etc. once the surface is level.

f. Surgical procedures in an Unstable Environment

An operating room could be made stable in a navy hospital ship or any ship with such facilities. Surgery could then be performed in a stable environment.

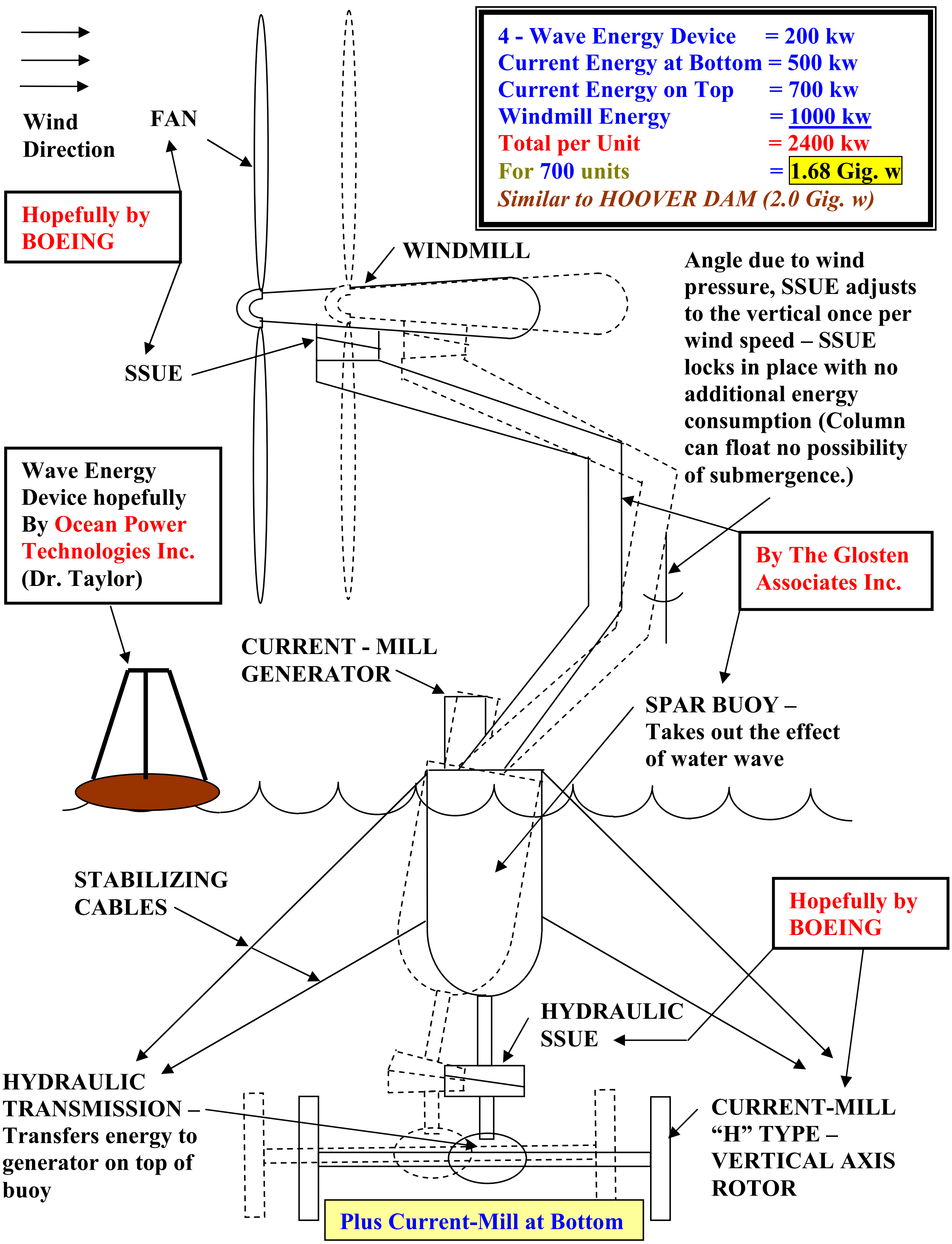
g. Windmill/Currentmill/Wave Energy Applications

The use of windmill technology provides an opportunity to harness the wind as an alternative energy source. We propose that it is possible to use the SSUE as part of that program, allowing the expansion of windmills to greater areas of the oceans. This would be accomplished by mounting the windmill on a SSUE platform attached to an anchored buoy with a keel. The key advantages are as follows:

1. The wind in the ocean is readily available.
2. The expensive real estate required for inland windmill farms is not an issue.
3. No foundation is required in the water and the water can be deep.
4. The ocean windmill(s) can be located far from land (out of sight) so that esthetics is not an issue.
5. The equipment is removable and salvageable.
6. The killing of birds and bats is not as great an issue as the location would probably be outside their range.
7. Noise ceases to be a problem.

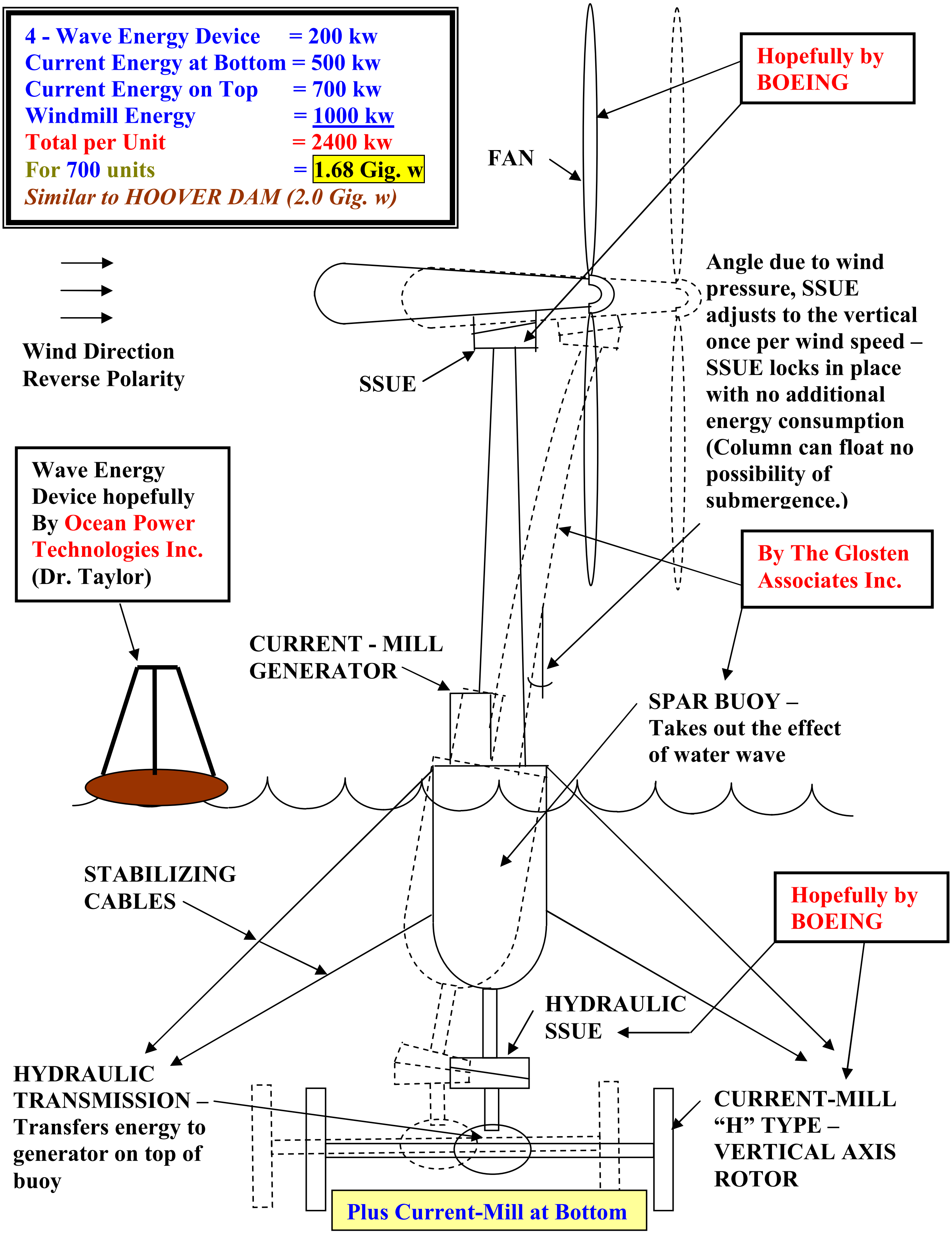
As described previously, we have extensive technical details concerning our proposed windmill/current-mill application.

Inland windmill farm to be rebuilt in the ocean



Schematic of Wind/Current-Mill/Wave Energy Plant-

Wind is assumed to blow approximately in the same direction – If wind blows unpredictably, use a vertical column for the windmill and place the SSUE slightly below the lowest point of the windmill fan blade.



Schematic of Wind/Current-Mill/Wave Energy Plant-
Wind is assumed to blow approximately in the same direction **(Reverse Polarity)** – If wind blows unpredictably, use a vertical column for the windmill and place the SSUE slightly below the lowest point of the windmill fan blade.

This source of power will help fulfill ever increasing needs for electricity. Additionally, the plant could be used to produce hydrogen through electrolysis of seawater or fresh water in lakes. Thus, wind/current power could produce low cost, clean energy for use in the transportation sector. The electricity generated could also be utilized to produce clean water through desalination concepts such as reverse osmosis.

The wind can be unpredictable. It can vary from place to place and from moment to moment. It can be invisible and not easily measured without special instruments. Wind speed can be affected by trees, buildings, hills and valleys. It can be a scattered energy source that cannot be easily contained or stored. In the ocean some of these characteristics of wind can be less of a detriment to power generation than on land. The challenge is to harness the wind of the ocean, which demands considerable study.

It has been said that a land-based wind turbine should experience year-round average wind speeds of at least 12 mph to be economically practical. On the oceans the criteria is different and the winds are seasonal, but more predictable. Sailing ships have managed to harness the wind and effectively utilize the resource for centuries. The great abundance of wind and wave energy at sea is waiting to be harnessed.

The global energy available from marine currents is a very large resource, and it has a number of advantages. At any given offshore site, the energy density from currents is four times that of wind. The diameter of a water turbine can therefore be less than half that of a wind turbine to achieve the same output. The velocity of the ocean current, and therefore the output of power from a turbine, is completely predictable. Again, we think that our SSUE combined with a turbine for water currents using hydraulic transmission to transfer the energy to a generator on top of the same buoy of the windmill will harness more energy than other concepts, reduce the wear and tear on machinery, and reduce cost.

We think that our floating synergetic energy models should initially be in any offshore location that has strong marine currents and predictable winds. These are sites where our concepts would most likely offer cost-effective alternatives. Our solution has the potential to supply significant quantities of energy and to play an increasing role in complementing other technologies in the future global energy supply mix.

Moreover, our synergetic plants have two out of four minimal environmental impact solutions: wind energy and marine current energy. Our concept should achieve world wide acceptance.

h. Land Base Windmills Applications

Instead of using rigid type columns for the land base windmill we can use flexible type column that has deflections at the tip of the column. Then we can install an SSUE at the tip of the tower to keep the propeller in the direction of the wind using reverse polarity propeller similar to the ocean type windmill above. This allows us to go to higher in elevation and capture more wind and energy with a sure wind speed and not be restricted to limit deflections of the column. The price of the SSUE would be a small token for the amount of energy harnessed. A preliminary analysis shows for a 437ft diameter propeller with a 345ft tower (highest point = 563.5ft to the tip of the propeller) deflects 18ft at the tip with a 15 degrees tilt. This tilt is a very low consumption of energy on the SSUE. The energy produced by these towers is 5 megawatt per windmill. If we build 400 inland of 5 megawatt windmills we can produce 2000 mega watt equivalent to Hoover Dam. There going to be a no flight zone restriction in the windmills zone similar to Manhattan New York -World Trade Center Twin Tower - 1 WTC (the North Tower, which featured a 360-foot high TV and radio antenna added in 1978, stood 1,368 feet high, and 2 WTC (the South Tower, which contained the observation deck, was 1,362 feet (415 m) high**.** If we can build these gigantic buildings and enormous bridges we can certainly built these windmill tower and conquer our energy demands. The 400 windmill towers would occupy approximately 10 square miles (4 rows of a 100 towers each row is ten miles long). Hopefully, the propeller and the SSUE are designed and manufactured by Boeing to reduce the weight of the propeller.

The other possibility of this application is to install these tall windmills in an existing windmill farm with similar size propellers and go higher. Since the wind is available in that area already we can double or quadruple the energy.

i. Forest Fire Robots
Forest fires introduce a large amount of CO_2 to the atmosphere beside the financial casualty to the public, government and the loss of lives. We propose a Fire Fighting Robots that uses a hydraulic SSUE to go up the sloped terrain. Each Robot has a large enough tank of water that can move through forest trees and can refill the water tank from a near by mother station. The robot has a fixed four cameras in four directions and each camera is inserted in thermos type housing with a long life batteries and a glass cover for heat protection. The cameras send video by a wireless connection. The robot has a driving mechanism similar to army tanks tracks and the driving hydraulic mechanism is supplied with a thermo protected electric wires from a nearby generator. The pump and motor has a special insulations and cooling mechanism. These driving selections were assumed based on that if batteries or fuel tanks are used they would explode from the heat.

j. Robots in Space
It should be an obvious application to use the SSUE for space robots.

k. Tracking the Sun
It is evident when you turn the SSUE upside down and the stable surface is on the bottom and the tilt surface (unstable surface) on top we can adjust the top surface in the direction of the sun. In this case the tilt is calculated using a programmable SSUE algorithm and so we can track the sun. This application can be used in energy such as directing solar panels in the direction of the sun to give 38% more energy. Also, building algae refineries with parabolic mirrors can be programmed to point at the position of the sun just before it rises over the horizon. Thus the mirrors can also sit on the SSUE as the solar panels. The SSUE for tracking the sun is proven cost effective 10:1 ratio in energy consumption and is much rugged and sturdy. The slew bearings can also be built for protection in sand storms in case the SSUE is used in the desert.

l. HVAC
Just as we can program to track the sun the SSUE can be programmed to save heat and air-conditioning is a facility. For example in an aircraft hanger the energy losses are high. We can position the heaters (convex or forced air) in a desired direction and save at least 50% of the

energy consumption. Directing the SSUE can be done from a computer program for the entire facility or using a remote control device etc.

m. Sprinkler System
Similar to directing heat in HVAC applications we can direct sprinklers to put out fires. For example, in an aircraft fire directing the sprinkler foam directly on the fire without having humans close to the fire is desirable.

n. Medical Prosthesis
In medicine, a prosthesis (plural prostheses) is an artificial extension that replaces a missing body part. It is part of the field of biomechatronics, the science of fusing mechanical devices using the SSUE with human joints, muscle, skeleton, and nervous systems to assist or enhance motor control lost by trauma, disease, or defect. Prostheses are typically used to replace parts lost by injury (traumatic) or missing from birth (congenital) or to supplement defective body parts.

l. Satellite dish
A dish is a type of parabolic antenna designed to receive microwaves from communications satellites, which transmit data transmissions or broadcasts, such as satellite television. A dish that is mounted on a pole and driven by a stepper motor can be controlled and rotated to face any satellite position in the sky. Motor-driven dishes are popular with enthusiasts. There are three competing standards: DiSEqC, USALS, and 36v positioners. Many receivers support all of these standards. The SSUE can improve the operation of the dish in high winds and allows longer life. The similarity to solar trackers shows a great mechanical advantage in using the SSUE.

CONCLUSION

The SSUE is an innovative concept that upon further development will have multiple uses. We have provided only an overview of the concept in the discussion above. We have detailed technical information available upon appropriate request.

Addendum:

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<u>Letter of support from Lockheed Martin</u>:

<u>Email From Boeing Information, Space & Defense Systems:</u>

These documents will be furnished upon appropriate request.

<u>Windmill design support from Global Power Generation, Inc.</u>