

An Ocean of Perpetual Green Hydrogen GS 27°North Marine Hydrokinetic Energy Project March 2021



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Executive Summary

Our company, OceanBased Perpetual Energy (OceanBased) is developing an innovative business that will harness the power of ocean currents. Specifically, we plan to access the Gulf Stream off the southeast coast of Florida and use its power into create a sustainable source of clean energy. The so-far untapped resource is vast; 30 million cubic meters of water are moving off Florida's coast every single second -- at a high velocity of up to 2.5 meters per second.

While the concept is not new, we will be a trailblazer and the first in the United States to commercialize an ocean current renewable energy project. We recognize that being the first poses great opportunity, as well as challenges. Therefore, we have identified strategic and highly qualified partners to successfully address such challenges, navigate through the permitting and outreach process, lead the system design and integration, and manage project execution.

The overall concept of the facility consists of installing a series of 1-MW Current Energy Converters (CEC), each submerged below the ocean surface at a depth of approximately 50 m and tethered to a strong anchor on the seafloor. The generated power will be transmitted to shore and into Florida's grid via a submarine transmission cable or transmitted to a specialized vessel where it will be stored as hydrogen. Working with our strategic and contractor technical partners, we have laid out a phased approach that maximizes success while reducing risks.

The project location off the southeast coast of Florida was carefully chosen since it offers multiple unique strengths, further enabling project success. The Gulf Stream in this area has some of the highest velocities and kinetic energy flux making it one of the richest ocean current resources in the world. Water depths are comparatively shallow for open ocean conditions. The ocean current is close to shore, facilitating easy access from nearby port facilities for system installation and operational maintenance. Furthermore, the project is located near a highly populated region with a high baseload demand. Florida needs power!

Unlike other renewable energy sources such as wind and solar, the continuous flow of the Gulf Stream can provide power 24 hours a day, 365 days every year. As a result, this project can provide a new means of generating valuable baseload electricity -- without reliance on fossil fuels or nuclear energy. Climate change is becoming a growing concern and is driving increased reliance on renewable energy in the United States. For example, the Department of Energy estimates that renewable energy has the potential to generate 80% of the electricity needed in the United States by 2050, up from almost 20% today. Not surprisingly in 2020, the United States was ranked as the most attractive country for renewable energy investment.





ceanBased

Our Phase 1 Preliminary will set the stage for permanently anchored Phase 1, Phase 2, and beyond. We will outfit a 100-meter marine vessel with a 1 MW Current Energy Converter on a custom deployment and retraction system. The CEC will be deployed in predetermined locations where we would consider permanent installations for following Phases 1 and 2. The electricity generated from the CEC will operate an onboard hydrogen electrolyzer/reverse osmosis system, producing clean hydrogen fuel from the seawater that can be stored and delivered to hydrogen consumers worldwide. The Phase 1 Preliminary will provide valuable utility to our project in addition to early stage revenue and will provide ability to prove out current velocities and demonstrate power production in a variety of Gulf Stream locations, as well as other current and tidal locations worldwide, where permanent installations could be deployed in future phases. It will provide a staging facility for geophysical and environmental surveys of identified optimal locations to support licensing and permitting efforts. We could also provide facilities and resources for academic and corporate research efforts related to energy production, hydrogen production, and marine biology. We believe this Phase 1 Preliminary could spur worldwide interest in the ability to produce electricity from ocean currents around the world, stored as hydrogen produced from sea water, transported to remote and populated locations alike, where hydrogen can be converted back to electrical current, or used to power automobiles, trucks, trains, planes, and a variety of industrial applications.

Phase 1 (5 MW) of the project will capitalize on the efforts of the Phase 1 Preliminary, including identified optimal locations and supporting geophysical and environmental surveys. Specifically, this phase will result in the first permanently installed ocean Current Energy Converter of its type in the world, and will build intellectual capital and value in terms of CEC technology development, environmental permits, legislative efforts, and array operation in the marine environment. Generated power will be stored as green hydrogen offshore for delivery to hydrogen consumers worldwide.





Phase 2 (100MW) will generate power to be sold onshore and provide a long-term revenue stream. Power brought onshore can be sold directly into the electrical grid or stored as hydrogen fuel. Hydrogen fuel could be later converted to power for the electrical grid at times of need or delivered to various hydrogen consumers. Additionally, the generated energy could be used offshore for underwater data centers or a ship-based hydrogen fuel cell generation facility.

Research contends that the Gulf Stream, off the Florida Coast alone, could yield 4-6 Gigawatts of extractable power. Continuing north along the Eastern Seaboard, the Gulf Stream could yield dozens of Gigawatts and hundreds of Terawatt hours of clean, renewable energy. Our vision is 100MW Phases following Phase 2 to continue for decades, as well other western boundary current and tidal locations around the word. The possibilities are endless. In summary, at OceanBased, we are focused on building the value of our company and generating a long-term revenue stream from the sale of our renewable power generation for our investors. OceanBased is seeking like-minded investors who desire to do the same.



Marine Energy in the USA: March 2021



Marine Energy in the United States: An Overview of Opportunities

Levi Kilcher, Michelle Fogarty, and Michael Lawson National Renewable Energy Laboratory

NREL is a national laboratory of the U.S. Department of Energy Office of Energy Efficiency & Renewable Energy Operated by the Alliance for Sustainable Energy, LLC Technical Report NREL/TP-5700-78773 February 2021

This report is available at no cost from the National Renewable Energy Laboratory (NREL) at www.nrel.gov/publications.

Contract No. DE-AC36-08GO28308

- Marine Energy has been identified by the US Department of Energy as an immense and widely distributed resource that is significantly underdeveloped, and could be used to harness large-scale energy generation
- Total Marine Energy technical resource in the USA is estimated at 2,300 TWh/yr, which is about 57% of the electricity generated by those states in 2019.
- Utilizing 1/10th of this resource would equate to 5.7% of our nations electrical generation, or 22 million homes. (40-90 GW). 5 times total US Solar Production
- "We believe the next step would be to take a more coordinated and comprehensive approach to answering these questions. That is, though the challenge of doing so is great, it would be wise to take a more **detailed look at the Gulf Stream** system before pursuing large- or even medium-scale energy extraction opportunities."
- Ocean current energy (49 TWh/yr) could provide clean reliable power to the Atlantic southeastern states. Florida has a particularly attractive opportunity in the Florida Current, which is part of the Gulf Stream. The Florida Current is attractive because the flow, which squeezes between the coastline around Miami and the shallow shoals of the Bahamas, is both relatively close to shore and highly energetic (depth-averaged current speeds approaching 2 m/s). Installing 1 GW of capacity in the Gulf Stream, at an assumed capacity factor of 70%, would harness 12% of the resource and power the equivalent of more than 550,000 homes.



US Marine Energy Resources





The Florida Gulf Stream: A More Detailed Look May 2020



The Gulf Stream has been flowing for millions of years and will be flowing for millions more, running perpetually 24/7/365 at an average speed of 1.5 meters per second ,6.5 kilometers per hour. The Florida Current portion of the Gulf Stream begins 5 miles East Coast of South Florida, more than 40 miles wide, and 60 miles long. Our experienced team recently executed the **Gulf Stream Power Demonstration**, with the support of the Southeast National Marine Renewable Energy Center at FAU and its years of study, revealing the viability of the Gulf Stream as a reliable source of clean perpetual energy for generations to come.



Gulf Stream Florida Current

OceanBased is focused on a specific area within the Florida Current section Gulf Stream, between latitude 26°N and latitude 27°N. within 5 to 20 miles East of Palm Beach Florida, as an opportune location for commercialization of Ocean Current HKE. Studies indicate more than 5 GW of extractable energy exists within this area.

Determinants include:

- S Consistent velocity and direction
- Proximity to Metro South Florida
- S Limited Marine Life Interference
- Favorable Seabed Topography
- S Favorable conditions for submarine cabling



Distributions of (a) Annual Mean Surface Current Speed, (b) Standard Deviation, (c) Coefficient of Variation of the Gulf Stream off the Southeast Coast of Florida





Vessel Mounted ADCP based Energy Predictions ~ 3.0 kW/m²





Visibility and Media Assets

Click any icon to follow the link



Comprehensive Media Summary Click Here











Tests verify clean energy from the Gulf Stream

9



Management Team

Strong Leadership **Professional Experience Project Focused Committed Group**



Nasser M N Alshemaimry

Laurie Gam **Executive Administrator**



Founder, Chairman & CEO

Robert Flohr VP, Business Development

David House

VP, Marketing



Mark Cooper President & COO



Gary Girard Vice President



Engaging Strategic Partners



Licensing and Permitting Entities





Contractor Partners











SUMMIN



SNMREC

OceanBased is a Preferred Partner of the <u>U.S. Southeast National Marine Renewable Energy Center</u> (<u>SNMREC</u>) at Florida Atlantic University</u>. Research and development related to marine renewable energy has a long history at FAU and took a quantum jump forward with an award from the FAU System's Center of Excellence competition in 2007. This investment was increased the next year with a legislative appropriation associated with the formation of the <u>Florida Energy Systems Consortium</u> among the state universities.

Subsequent funding from the <u>U.S. Department of Energy (DOE) Wind and Water Power Program</u>, part of the <u>U.S. Office of Energy Efficiency and Renewable Energy</u>, and from several private corporations paved the way for the designation at FAU of the SNMREC in 2010 by the DOE.

The SNMREC seeks to advance the science and technology of recovering energy from the oceans' renewable resources, with special emphasis on those resources available to the southeastern United States and initially focusing on ocean currents and offshore thermal resources. In its leadership role, the SNMREC helps promote economic development and energy independence for the nation.

As part of FAU's Division of Research, SNMREC staff works closely with OceanBased on developing the best, most cost-effective solutions for renewable energy generation from the Gulf Stream.

This Partnership enables OceanBased to:

- Collaborate fully with the SNMREC's dedicated experts on proposal development, custom regulatory support, design evaluation, project development, test planning and other functions
- Gain preferred access to SNMREC testing and evaluation infrastructure and tools
- Benefit from SNMREC-supervised interaction with federal and state regulators
- Participate in the U.S. Open-Ocean Current Energy Project Development Regulatory Roadmap
- Secure preferred voluntary public exposure via SNMREC-generated media opportunities, including press releases, documentaries and more







Project Site Location

The location of the project is determined based on oceanographic conditions of the Gulf Stream off the southeast Florida coast. Previous studies under U.S. Government grants identified less hard bottom and environmentally sensitive benthic habitats the area offshore of Palm Beach and Martin Counties. Geophysical and benthic surveys in several lease blocks off Palm Beach County indicate that the bottom substrate consists of predominately unconsolidated sand, and not support complex 3-dimensional benthic biological assemblages. These surveyed areas are also adjacent to nearshore areas that have gaps in environmentally sensitive habitats to allow electric cables to be brought ashore with less environmental impacts.

OceanBased is focusing its efforts on the Bureau of Ocean Energy Management (BOEM) lease blocks indicated in yellow. The Commercial Demonstration Phase will deploy in various locations within the focus area complemented by submarine surveys of the sea floor to further define the exact site location for construction of Phase 1 and Phase 2, and to support the BOEM lease block application.



OceanBased has chosen Global Sub Dive and Triton Submarines for geophysical survey work





Project Timeline Phase 1 1MW Phase 1 Preliminary Vessel • + 4 MW Sea Floor Deployed Phase 1 Preliminary **BOEM Limited Lease** • Phase 1 Permitting Hydrogen Storage • Phase 2 Phase 1 100 MW Design ٠ **BOEM Full Lease** • Phase 1 Hydrogen Storage • Procurement FERC Full Grid Connected License Ph 1 System • Deploy Ph 1 Array Deploy Phase 2 Permitting Phase 2 Design Phase 2 Procurement Phase 2 Deployment 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030



Phase 1 Preliminary



1.4 Meters/Second Gulf Stream Currents @ 24 Hours/Day

+ 1 MW OceanBased Current Energy Converter

450 kg Clean Green Hydrogen/Day

- Demonstrate Early Stage Revenue
- Demonstrate green hydrogen from sea water
- Environmental Study Staging
- Geophysical Survey Staging
- Electrolyzer Test Center
- Current Energy Converter Test Center
- Revenue Producing Research Platform



Phase 1 Preliminary

Vessel Configuration											
			Drive Train	/Tooling							
	Bl	ade Procur									
					H ₂ Electrolyzer						
					H ₂ Comp/S	torage G	Green Hydrogen Pr	oduction			
BOEM Phase 1 Lease Application-Supporting EIS Environmental and Geophysical Studies											
			(OPEX							
Jan 2021	Apr 2021	Jul 2021	Oct 2021	Jan 2022	Apr 2022	Jul 2022	Oct 2022	Jan 2023			



Phase 1-2 Commerical



1.4 Meters/Second Gulf Stream Currents @ 24 Hours/Day

+ 100 MW OceanBased Current Energy Converters

4500 kg Clean Green Hydrogen/Day

- Phase 1 5 MW
- Phase 1 H₂ Production
 Offshore
- Battery Charging Capability
- Phase 2 100MW
- Phase 2 Export Cable to Shore
- Phase 2 H₂ Production or Grid Connection



Phase 1 Commercial Timeline



Commercial Phase



Phase 2 Timeline

	CE	C Procurement						
								+ +
	Export Cable Sys				100MW			
		Onshore Substatior	n/H2 Production	Cor	400M	400M 400M se 2 will begin the full-scale commercializ		
Phase 2				of c brin con MV	ocean current ener nging power to sho mection to the elec V Phases 3 and bey	gy with a 100 M pre for conversio ctrical grid. Lon yond into the Gig	W array with exponted by the set of the set	port cables agen or for 100 ne 2030's
 BOEM Permanent FERC License (For 	t Lease Grid Connection)			S	System Deployment			
Jun 2027 Jan 2	2028 Jun 2	2028 Jan 2	2029 J	un 2029 Jan	 2030 Jun	2030 J	lan 2031	Jun 2031

Imagine a world where the ocean's currents are harnessed, converted to clean energy for the electrical grid, or stored as clean hydrogen fuel for delivery anywhere in the world.

Carbon negative technology. No CO2 emissions. No pollution.

Creating jobs and providing economic benefit for state and local communities, we are doing our part to "Power the Blue Economy" and provide a better, safer, cleaner world for generations to come.

The Gulf Stream is an abundant resource with Gigawatts of kinetic energy in its currents, 24 hours a day. Its clean, renewable, sustainable, perpetual energy.

Our Phase 1 Preliminary will bring worldwide expertise together to advance ocean hydrokinetic energy and green hydrogen production from sea water.

> Environmentally conscious. Clean energy driven. Green Fuel for the future.

We are OceanBased Perpetual Energy.

-Nasser M.N. Alshemaimry Chairman & CEO

Thank you for your interest in OceanBased Perpetual Energy

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