DRAFT CONCEPT PAPER ON THE ESTABLISHMENT OF THE GLOBAL OCEAN ENERGY ALLIANCE (GLOEA): OCEAN ENERGY FOR CLIMATE RESILIENT ECONOMIES

EXECUTIVE SUMMARY

The establishment and launch of a Global Ocean Energy Alliance (GLOEA), began with a Call to Action! that was led by Heads of State and Government from SIDS, at the United Nations Framework Convention on Climate Change (UNFCCC) Conference of Parties (COP26), on 11 November 2021, in Glasgow, Scotland. The GLOEA is an initiative focused on accelerating the development of ocean energy technologies and projects through partnerships that mobilize technical, human and financial resources and aims to establish a global community of vested interest with the capacity to develop a pipeline of bankable ocean energy projects to serve islands, cities, and coastal nations.

The GLOEA is intended to be a bridge between industry and research players which need to test new solutions in various climates and contexts, and the interest of SIDS and coastal countries to get access to technology and expertise, as well as with investors, project developers and government for the implementation of projects. Currently, the exchange on these issues is limited. The GLOEA will create virtual markets and an information exchange hub for south-south and triangular cooperation and learning, emphasizing "earning by doing" and the facilitation of a growing pipeline of demonstration and investment projects attracting foreign direct investment, commercial and concessional finance.

The mission of the GLOEA is to catalyse investments in Ocean Energy to promote Blue Economies and accelerate the transformation of the energy sector to increase energy security, reduce greenhouse gas (GHG) emissions and generate resources for investment in adaptation to climate change. The GLOEA intends to attract members based on professional and technical roles from the Public Sector, Private Sector, and Institutions. The concept paper details the proposed Governance Structure, and activities required to advance the establishment of the GLOEA. These activities include the development of an ocean energy platform for blue economy pilots and an Ocean Thermal Energy Conversion (OTEC) Pilot Project in the Democratic Republic of São Tomé and Príncipe (STP). The GLOEA will advocate strongly for the interests of SIDS and Least Developed Countries (LDCs) to get access to technology and expertise, as well as a "fair share" of the envisaged benefits and profits.

The goals of the Global Ocean Energy Alliance (GLOEA) are to:

a. Facilitate full commercialization of a broad range of ocean energy technologies with demonstration projects in the Caribbean and Pacific, as well as African costal countries. At least three (3) regional packages, comprising fifteen (15) projects are on course by 2030. The projects need to demonstrate strong links to productive uses and key industrial sectors in SIDS and coastal LDCs.

b. Raise financing for the first Floating Ocean Thermal Energy Conversion (OTEC) Platform in the Democratic Republic of São Tomé and Príncipe (STP), as an example for SIDS and LDCs. The project receives support from the Governments of Austria and Norway, SIDS DOCK, the United Nations Industrial Development Organization (UNIDO) and its partner the Global Environment Facility (GEF) and UNIDO's Global Network of Sustainable Energy Centres (GN-SEC). The unique capacity of the members of the GLOEA will

provide support throughout the project development cycle, from concept to feasibility studies to financing bankable projects.

c. Provide knowledge and data management, capacity building, policy and planning support for Governments, ocean energy industry and financiers. There will be strong emphasis on cross-cutting issues such as gender, digitalisation and poverty reduction.

d. Establish a regional network of ocean energy expertise through UNIDO's GN-SEC, SIDS DOCK in SIDS, and coastal LDCs.

The partners will launch the GLOEA at a Side Event on the margins of the UN Ocean Conference, scheduled for June 2022, in Lisbon, Portugal. Approximately US $4 million will be required in support of start-up of the first operational phase of the GLOEA.

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GLOBAL OCEAN ENERGY ALLIANCE (GLOEA):

OCEAN ENERGY FOR CLIMATE RESILIENT ECONOMIES

1.0 INTRODUCTION

This Concept Paper expands on a Concept Note that was developed to provide an overview and rationale for the establishment and launch of a Global Ocean Energy Alliance (GLOEA), beginning with a *Call to Action!* that was led by Heads of State and Government from SIDS, at the United Nations Framework Convention on Climate Change (UNFCCC) Conference of Parties (COP26), on 11 November 2021, in Glasgow, Scotland. The GLOEA is an initiative focused on accelerating the development of ocean energy technologies and projects through partnerships that mobilize technical, human and financial resources and aims to establish a global community of vested interest with the capacity to develop a pipeline of bankable ocean energy projects to serve islands, cities, and coastal nations.

Pursuant to a decision from Heads of State and Government that are members of the SIDS DOCK Organization and the Alliance of Small Island States (AOSIS), the SIDS DOCK Secretariat was mandated in September 2017, as contained in document A/3/10, during the third session of the Assembly of SIDS DOCK, to achieve in the shortest timeframe the commercial-scale deployment of ocean-based energy technologies that are appropriate to the demands in Small Island Developing States (SIDS) for the development of a low carbon economy with emphasis on generating sustainable gender-equity employment to replace those that will be lost due to the negative impacts of climate change. In response, the Secretariat of SIDS DOCK accelerated its work on the establishment of partnerships to support the mandate.

The GLOEA is intended to be a bridge between the industry and research players which need to test new solutions in various climates and contexts, and the interest of SIDS and coastal countries to get access to technology and expertise, as well as with investors, project developers and government for the implementation of projects. Currently, the exchange on these issues is limited. The GLOEA will create virtual markets and an information exchange hub for south-south and triangular cooperation and learning, emphasizing "earning by doing" and the facilitation of a growing pipeline of demonstration and investment projects attracting foreign direct investment, commercial and concessional finance. The GLOEA will advocate strongly for the interests of SIDS and Least Developed Countries (LDCs) to get access to technology and expertise, as well as a "fair share" of the envisaged benefits and profits.

The initial focus of the project pipeline development is across small islands and costal LDCs, where more than 10,000 megawatts (MWs) of installed fossil fuel capacity needs to be replaced in the coming decade. Many of these islands and coastal LDCs also have wider opportunities for seawater desalination, district cooling, aquaculture and mariculture, and mineral extraction which can generate additional revenues to further catalyse the Blue Economy and contribution to achieving the Sustainable Development Goals (SDGs) and help build climate resilience.

2.0 NEED FOR A GLOBAL OCEAN ENERGY ALLIANCE (GLOEA)

Establishing the Global Ocean Energy Alliance (GLOEA) is the best possible solution to addressing the problems of SIDS' low capacity to capitalize on SIDS' largest renewable energy source to create an ocean energy industry that can support adaptation efforts and build SIDS climate resilience and address the major challenge confronting SIDS who have entered a "danger zone," where more than 10,000 megawatts of installed fossil fuel capacity needs to be replaced in the coming decade. It is recognised that collective action is needed to drive the GLOEA.

There is a compelling case to be made for the need for a Global Ocean Energy Alliance (GLOEA). Ocean energy represents the most available, and the largest potential source of renewable energy in SIDS. SIDS now import, annually, more than 200 million barrels of petroleum, which cost U.S. billions, annually, and is a major cause of debt in SIDS. The SIDS maritime Exclusive Economic Zones (EEZs) are very large (especially in the Pacific) and extend to approximately one-sixth of the earth's surface. Collectively, SIDS Oceans (EEZ and extended continental shelves) make them 15 times the physical size of the European Union (EU) – SIDS are Large Ocean States. In this system, the tropical ocean acts as a giant solar energy collector for the estimated 25,000 to 35,000 barrels of oil equivalent per hectare of ocean surface.

Oceans represent an unlimited source of baseload electricity for the blue-green economy and can make a significant contribution to the SIDS economy and create jobs. The GLOEA is a proposed mechanism that can help fill the gap in ocean energy knowledge, help foster climate resilient economies in SIDS, support the global deployment of ocean energy technologies and, provide the leadership for high priority ocean energy development in SIDS and coastal LDCs.

2.1 Oceans Represent an Unlimited Source of Baseload Electricity for The Blue-Green Economy

Indeed, SIDS reside amid the largest area of renewable energy on the planet. Because the oceans contain a huge amount of energy, changes in salinity, thermal gradients, tidal currents or ocean waves can be used to generate electricity using a range of different technologies. These could provide reliable, sustainable and cost-competitive energy. Each kinetic or thermal resource has unique site requirements, characteristics, and challenges. Some forms are available for periods of time during the day, while others are continuously available. Ocean thermal energy, which is based on converting incoming solar radiation into electricity, is continuously available in all ocean locations between the tropics, and therefore represents an unlimited source of baseload electricity for the blue-green economy.

Table 1: SIDS Energy Imports and Costs[1]

Country	Refined petroleum products Imports / bbl/day (2016)	Share of GDP spent on imports (%)	Real GDP 2019 $bn	Real GDP 2020	% Change 2019 vs 2020	Tourism Income 2017 ($bn)	Tourism Income 2017 % of GDP
Antigua and Barbuda	5,065	48%	2.181	1.826	-16.28%	0.332	21.70%
Bahamas (Commonwealth of The)	19,150	11%	15.061	12.762	-15.26%	2.577	21.20%
Barbados	10,630	41%	4.678	3.902	-16.59%	1.082	22.60%
Belize	4,161	58%	2.91	2.531	-13.02%	0.426	23.20%
Cape Verde (Republic of)	5,607	22%	4.111	3.577	-12.99%	0	24.90%
Cook Islands	611					0.179	
Dominica (Commonwealth of)	1,237	65%	0.915	0.829	-9.40%	0.132	23.50%
Dominican Republic	108,500	29%	206.098	194.555	-5.60%		
Fiji (Republic of)	17,460	19%	12.693	10.406	-18.02%	1	17.50%
Grenada	1,886	55%	1.98	1.742	-12.02%	0.448	40.00%
Guinea-Bissau	2,625	16%	4.314	4.261	-1.23%	0.019	1.40%
Jamaica	30,580	51%	30.049	27.304	-9.14%	2.539	17.20%
Kiribati (Republic of)	420	85%	0.259	0.261	0.77%	0	1.50%
Maldives (Republic of the)	10,840	5%	10.809	7.412	-31.43%	2.742	59.60%
Marshall Islands (Republic of the)	2,060	85%	0.214	0.209	-2.34%	0.005	2.50%
Mauritius (Republic of)	26,960	51%	30.171	25.712	-14.78%	1.748	13.10%
Micronesia (Federated States of)		65%	0.362	0.361	-0.28%		
Nauru (Republic of)	449	74%	0.125	0.127	1.60%		
Niue	54					0	
Palau (Republic of)			0.278	0.252	-9.35%	0	48.40%
Saint Kitts and Nevis	1,743	59%	1.456	1.199	-17.65%		
Saint Lucia	3,113	43%	2.943	2.417	-17.87%	0.404	23.60%
Saint Vincent and the Grenadines	1,621	55%	1.437	1.394	-2.99%		

[1] SOURCE NEEDED

Country	Refined petroleum products Imports / bbl/day (2016)	Share of GDP spent on imports (%)	Real GDP 2019 $bn	Real GDP 2020	% Change 2019 vs 2020	Tourism Income 2017 ($bn)	Tourism Income 2017 % of GDP
Samoa (Independent State)	2,363	25%	1.17	1.147	-1.97%	0.162	19.30%
Sao Tome and Principe (Democratic Republic of)	1,027	63%	0.882	0.835	-5.33%	0.066	16.90%
Seychelles (Republic of)	7,225	10%	2.817	2.471	-12.28%	0.483	32.50%
Solomon Islands	1,577	23%	1.661	1.608	-3.19%	0	5.10%
Suriname (Republic of)	10,700	44%	10.013	8.771	-12.40%	0.046	1.40%
Tonga (Kingdom of)	910	67%	0.882	0.835	-5.33%	0.027	6.30%
Trinidad and Tobago (Republic of)		51%	37.553	35.031	-6.72%	0.475	2.10%
Tuvalu		50%	0.049	0.05	2.04%	0	5.00%
Vanuatu (Republic of)	1073	32%	0.846	0.777	-8.16%	0.217	25.10%
Total	279,647	45%	388.9	354.6	-8.83%	15.6	19.02%

Table 2: Daily Crude Oil Cost Estimates based on Price of Crude Oil[2]

Daily Crude Oil Cost Estimates based on Price of Crude Oil [3]	Price /bbl
$20,973,525	$75
$27,964,700	$100
$34,955,875	$125

[2] SOURCE NEEDED

[3] The total daily cost of oil imports would be significantly higher as refined petroleum prices are significantly higher than the price of crude and varies from country to country based on transportation and insurance cost.

Table 3: Tourism, Debt and Foreign Currency Reserve Indicators[4]

Country	Tourism (% GDP)	External Debt (%GDP)	Reserves (# of months of exports)	Estimated Fall in GDP (%)	Financial Assistance Needed (million USD)
Grenada	56	59	4	14%	137
Vanuatu	48	46	10	12%	81
Cabo Verde	46	89	5	12%	131
St. Vincent and the Grenadines	46	38	4	12%	60
Antigua & Barbuda	45	34	3	11%	243
St. Lucia	43	35	3	11%	250
Palau	43	31	n/a	11%	31
Bahamas, The	40	194	3	10%	846
Fiji	40	17	3	10%	343
Dominica	38	55	5	10%	28
Barbados	36	29	3	9%	369
Jamaica	35	108	5	9%	775
Sao Tome and Principe	27	59	3	7%	25
Mauritius	24	72	5	6%	540
Samoa	23	51	4	6%	48
Tonga	21	41	8	5%	12
Kiribati	19	8	n/a	5%	1
Solomon Islands	13	29	9	3%	23
Comoros	10	17	7	3%	19
Marshall Islands	9	52	n/a	2%	5
Micronesia (FSM)	8	29	5	2%	6
Trinidad & Tobago	8	30	9	2%	135

Tropical coastal countries in Africa, Asia, and Latin America, also have within their EEZs vast ocean resources, ranging from thermal gradients, waves, tidal, and current. Through membership in the GLOEA, they would be positioned to help drive the expanded deployment of ocean energy technologies. While thermal energy has been the principal focus of SIDS, coastal countries, globally, have focused on wave energy, particularly in European countries, and in African countries, e.g., Ghana, and Cabo Verde, an African SIDS, with ongoing small-scale wave or tidal pilot projects in operation or development. Island states and coastal nations all could start taking advantage of their vast clean renewable energy resource, taking advantage of their Blue Economy potential, including ocean energy technologies. Some regions, for example, West and East Africa,

[4] Impact of COVID-19 on tourism in small island developing states, 24 April 2020. Written by Pamela Coke-Hamilton, Director, Division on International Trade and Commodities, UNCTAD. Available at: <https://unctad.org/news/impact-covid-19-tourism-small-island-developing-states>

have excellent offshore thermal energy resources, so too, Southeast Asia and the islands of Indonesia and the Philippines. Both India, South Korea and China have research institutions exploring ocean energy conversion.

If ocean energy technologies are to make a significant contribution to the development of low carbon economies in countries, such as in the SIDS and some LDCs, where building resilience to changing climate is an urgent need, and if ocean energy technologies are to play a major role in climate change adaptation, then new and more efficient mechanisms are needed to reliably provide predictable financial resources (public, private and philanthropic), and that these resources be made available to support the Global Ocean Energy Alliance, that results in, for example, the deployment of the first commercial facility by the end of 2024. It is a critical time for Ocean Energy, and there is a great need for additional push to complement what is happening to avoid losing momentum, and that is what the *SIDS Heads of State and Government Ocean Energy Initiative* is intended to do. SIDS are taking the lead and advocating for coastal nations globally, particularly the LDCs. Establishing a Global Ocean Energy Alliance will help satisfy these needs. Countries will have the world's leading expertise at their fingertips, inspiring ideas and exchanges, plus collaboration and then ultimately action.

2.2 Fostering Climate Resilient Economies

The "Blue Economy" concept seeks to promote economic growth, social inclusion, and the preservation or improvement of livelihoods while at the same time ensuring environmental sustainability of the oceans, coastal areas and global climate. A blue economy is low-carbon, efficient, and clean. It is also an economy that is based on sharing, circularity, collaboration, solidarity, resilience, opportunity, and interdependence. The ocean makes a significant contribution to the global economy – over USD 1.5 trillion in value added in 2010. The projections suggest that by 2030, the ocean economy could more than double its contribution to global value added, reaching over USD 3 trillion, and creating approximately 40 million jobs.

The protection of the ocean's health and the greening of ocean or coastal industries (e.g., ecotourism, eco-ports) has also become an important pillar of the blue economy. Unsustainable waste and sanitation practices increasingly undermine the livelihoods, economies and societies of SIDS and coastal LDCs. Land-based pollution and over-extraction of marine resources has taken its toll on the quality of marine biodiversity and consequent impacts on economies of coastal communities in terms of reduction or loss of fisheries resources and reduction in recreational diving economic opportunities. Coastal areas are being contaminated with solid waste, sewage, industrial effluents, chemical run-off from agriculture, and wastes from the transportation sector (lubricants, coolants, battery acid, tires). Liquid waste such as sewerage and effluents from agricultural run-off are harming coral reefs, and degrading touristic beaches and fisheries, which are major sources of income for many islands. Moreover, coastal areas are increasingly challenged through the impacts of climate change and extreme weather phenomena.

Ocean energy and cleantech were identified as important growth areas in blue economy policies and strategies. The preservation of ocean health opens opportunities for cleantech solutions. A wide range of mature technologies can be used to mitigate greenhouse gas (GHG) emissions and provide public health, environmental protection, and sustainable development co-benefits. For

example, waste management and waste-to-energy (WtE) solutions can transform waste streams into valuable commodities, mitigate coastal/marine pollution and reduce fossil fuel dependency, simultaneously. Modern wastewater treatment and desalination technologies offer similar opportunities.

2.3 Supporting the Global Deployment of Ocean Energy Technologies

Ocean energy technologies are awaiting industrial up-scale. The wider definition includes an array of renewable energy technologies using non-living marine resources (e.g., wave, tidal, ocean thermal energy conversion, salinity gradients, seawater air conditioning, marine algae and bioenergy) or using marine/coastal space (e.g., offshore wind, floating PV, hybrids through co-location). Additionally, the definition includes renewable energy and energy efficiency solutions tailored for industries of the blue economy, for example, fisheries and aquaculture, desalination and freshwater, biotechnology (pharmaceutics, cosmetics), seawater mining, ocean intelligence and observation, maritime and coastal tourism, coastal business hubs, shipping and port infrastructure/services, waste to energy for coastal protection.

Whereas some technologies have already reached the stage of commercialization (e.g., offshore wind, floating PV), others are still in the stage of prototyping or demonstration. The latter are funded through research and development (R&D) grants. However, it is expected, that a broad range of these technologies is becoming commercial within the next ten years. Globally, it is estimated that renewable ocean energy could meet ten percent (10%) of the annual greenhouse gas emissions reductions needed by 2050, to keep global temperatures under 1.5ºC above pre-industrial levels. The European Ocean energy industry works towards a full industrial roll out within the next ten (10) years. It is envisaged, that ten percent (10%) of the electricity demand of the European Union (EU) will be covered by renewable ocean energy sources by 2050.

2.4 Providing Leadership for High Priority Ocean Energy Development in SIDS and Coastal LDCs

The COVID-19 crisis has reemphasized the urgent need for SIDS and LDCs to diversify their economies, reactivate or strengthen traditional sectors and tap into the value chains of emerging ones. Increasingly, SIDS and coastal LDCs are embracing the expanding blue economy as a mechanism for realizing sustainable growth and mitigating local pollution and climate change, simultaneously. Endowed with vast ocean territories and EEZs, these countries and territories could create new income streams and to diversify their economies. Therefore, as part of their blue economy aspirations, SIDS and coastal LDCs demonstrate an increasing interest to harness the opportunities of ocean energy technologies soon. Ocean energy is the largest renewable energy resource endowment for SIDS and does not require conversion of limited land area to install PV and on-grid wind infrastructure. SIDS are blessed with many renewable energy resources, and most of them are already competitive with fossil fuel-based generation (e.g., diesel, heavy fuel oil [HFO]). The decreasing technology costs for some ocean energy technologies is a powerful consideration.

Ocean energy is one of the few near-to-midterm commercial options SIDS can use to support reducing long term energy cost, generating employment, reducing trade imbalances resulting from

the more than USD 25 billion plus annual payment for fuel imports, and challenges arising from climate change (reduction in freshwater, reduction on fish catch due to warning oceans and bleaching of coral). In some SIDS, the import cost of petroleum fuels is greater than the total export earnings of the country. The use of ocean energy can reduce fossil fuel import dependency and free up scarce foreign exchange reserves for key sectors such as education, health, economic diversification, or climate change adaptation. In addition, it lowers high energy costs for industries and households, often representing a high burden for poorer communities.

However, due to certain limitations, SIDS and coastal LDCs have been unable to take advantage of ocean energy technologies and there is limited capacity and awareness about the practical application of ocean energy. There are barriers in the areas of planning, policy and regulation, knowledge, awareness, human and entrepreneurial capacity, as well as access to technology and finance. This requires a business case for specific ocean energy projects and to familiarize SIDS experts and policy makers with the latest industry trends.

3.0 GOALS OF THE GLOBAL OCEAN ENERGY ALLIANCE (GLOEA)

The goals of the Global Ocean Energy Alliance (GLOEA) are to:

a. Facilitate full commercialization of a broad range of ocean energy technologies with demonstration projects in the Caribbean and Pacific, as well as African costal countries. At least three (3) regional packages, comprising fifteen (15) projects are on course by 2030. The projects need to demonstrate strong links to productive uses and key industrial sectors in SIDS and coastal LDCs.

b. Raise financing for the first Floating Ocean Thermal Energy Conversion (OTEC) Platform in the Democratic Republic of São Tomé and Príncipe (STP), as an example for SIDS and LDCs. The project receives support from the Governments of Austria and Norway, SIDS DOCK, the United Nations Industrial Development Organization (UNIDO) and its partner the Global Environment Facility (GEF) and UNIDO's Global Network of Sustainable Energy Centres (GN-SEC). The unique capacity of the members of the GLOEA will provide support throughout the project development cycle, from concept to feasibility studies to financing bankable projects.

c. Provide knowledge and data management, capacity building, policy and planning support for Governments, ocean energy industry and financiers. There will be strong emphasis on cross-cutting issues such as gender, digitalisation and poverty reduction.

d. Establish a regional network of ocean energy expertise through UNIDO's GN-SEC, SIDS DOCK in SIDS, and coastal LDCs.

This Concept Paper is intended to help identify and organise the expertise and inputs from potential stakeholders and others, who will subsequently emerge as essential partners for the GLOEA to succeed in its mission. Secondary objectives include gathering support for the *Call to Action!* and the subsequent launch of the GLOEA, at the United Nations (UN) Ocean Conference, scheduled for 27th June to 1st July 2022, in Lisbon, Portugal. Ocean energy has long been the overlooked

renewable resource despite its multiple by-products to energy generation. However, over the past decade, there has been critical advancement cumulating in the deployment of pilot and commercial scale ocean energy projects.

4.0 SUMMARY BACKGROUND: ADVOCACY FOR OCEAN ENERGY IN SMALL ISLAND DEVELOPING STATES (SIDS) – HISTORICAL CONTEXT[5]

Since the Second United Nations International Meeting on Small Island Developing States, in Mauritius in 2005, SIDS institutions have worked with Japanese colleagues, and between 2012 to 2014, developed pre-feasibility study papers on the potential for Ocean Thermal Energy Conversion (OTEC) Technology for fourteen (14) SIDS. This provided a significant body of information to work on the concept for a SIDS Ocean Energy Programme.

In 2012, the Marshall Islands announced they had prepared a proposal for funding for USD 2.9 million for a feasibility study and was hoping for support from SIDS DOCK. The announcement was made at the Second National Coordinators' Meeting, on the margins of the Ministerial Conference on *"Achieving Sustainable Energy for All in SIDS – Challenges, Opportunities, Commitments"* in Bridgetown, Barbados 7-8 May 2012. During the National Coordinators' Meeting, a presentation on *"Ocean Thermal Energy Conversion (OTEC) For Sustainable Development,"* was delivered by Dr. Uehara, President of GEC Co. Ltd., and former President of Saga University, Japan. Whilst the funding did not materialize (World Bank said NO), efforts to promote ocean energy continued at a 2015 workshop sponsored by the CTCN, in Barbados, where SIDS requested support for capacity building and resources assessment for the development of ocean energy thermal conversion technology in SIDS.

In May 2017, at the 2017 Vienna Energy Forum (VEF), His Excellency Mr. Enele Sosene Sopoaga, OBE, Prime Minister and Minister for Public Utilities of Tuvalu, and President of the second SIDS DOCK Assembly, in his keynote address, informed the Forum of the importance of Ocean Energy Technologies to SIDS. Based on the statement delivered by the Prime Minister from Tuvalu, along with discussions during the VEF panels, the OTEC system was best seen as a "NEXUS" technology as it addresses many issues negatively impacting the sustainable development aspirations of SIDS in achieving the SDGs and the Paris Agreement. It was further accepted that OTEC systems should not be evaluated solely for its energy generation, as the established least cost energy option index (LCOE) does not capture other income streams generated by the technology, and therefore, comparison to wind and photovoltaics (PV) which have no co-products, is not valid economics. Wind and PV are both intermittent sources of energy versus OTEC which is a baseload source of energy.

Through a series of activities, the SIDS DOCK Secretariat continuously advocates for OTEC development as a viable option for SIDS in addressing trade deficits and reducing vulnerability of island states to projected climate change impacts. Attendance at forums, conferences and workshops and project development have contributed to the sustained focus and attention, including at the 2017 UN Ocean Conference, where the SIDS DOCK Island Women Open Network (IWON), the energy-gender-nexus empowerment arm of the SIDS DOCK Organization,

[5] See Annex X: Background: Advocacy for Ocean Energy In Small Island Developing States (SIDS) – Historical Context

included their voice as a major advocate for Ocean Energy, and followed up with an announcement of the IWON Campaign, launched in September 2017, on the margins of the 72nd UN General Assembly, to, **"Bring Dominique Home."** *Dominique* is the magnificent 100 KW Ocean Thermal Energy Conversion Pilot Plant located on Kumejima Island, Japan. OTEC has a myriad of livelihood opportunities available to women.

Partnerships, in the spirit of the Samoa Pathway, has been the primary vehicle to advance the development and deployment of ocean energy technologies for blue economies. In 2021, with support from the Governments of Austria and Norway, and in partnership with UNIDO, GN-SEC, and the Henry L. Stimson Centre Alliance for a Climate Resilience Earth (ACRE), SIDS DOCK hosted a virtual Side Event *"Establishing an Ocean Energy Platform as a Market Place to Support SIDS and Coastal Nations to Deploy Ocean Energy Systems*, during the Vienna Energy Forum (VEF), on 6 July 2021. The event discussed a first deliverable of the Ocean Energy for Blue Economies Platform (OEBEP), which facilitates south-south and triangular cooperation between SIDS, coastal nations, academia, industry players and financiers.

SIDS are looking to the Oceans as the main renewable energy resource that can help achieve a Blue Economy in SIDS. The Global Ocean Energy Alliance will also provide the environment to develop and implement a growing pipeline of bankable ocean energy projects in response to climate and sustainable development imperatives of coastal cities and towns and in particular small islands. The envisioned pipeline of ocean energy projects, comprised of kinetic and thermal energy conversion technologies, will provide solutions in various climates and sustainable energy challenges faced by SIDS, coastal developing countries, and cities to catalyze sustainable development. This in turn will free additional resources for additional climate adaptation efforts, which are currently committed to importing increasingly costly fossil fuels.

4.1 Literature Review – Ocean Energy Resources

The vast energy potential available from the ocean has been documented over and over in various literature, and in recent reports which provide endorsement of ocean energy's scientific and technical viability:

a. **"Marine Energy in the United States: An Overview of Opportunities[6]":** A Technical Report from the National Renewable Energy Laboratory (NREL), published in 2021, noted that focusing on the technical resource within the U.S. exclusive economic zone (EEZ) that can be harnessed for large-scale (megawatt- to gigawatt-scale) energy generation, the report found that even if only a small portion of the technical resource potential is captured, marine energy technologies would make significant contributions to meeting the U.S.' energy needs. For example, utilizing just one-tenth of the technically available marine energy resources in the 50 states would equate to 5.7 percent of the U.S.' current electricity generation - enough energy to power 22 million homes (according to the U.S. Energy Information Administration).

[6] Kilcher, Levi, Michelle Fogarty, and Michael Lawson. 2021. Marine Energy in the United States: An Overview of Opportunities. Golden, CO: National Renewable Energy Laboratory. NREL/TP-5700-78773. 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. Available at: <https://www.nrel.gov/docs/fy21osti/78773.pdf.>

b. **"Wave Energy Conversion And Ocean Thermal Energy Conversion Potential In Developing Member Countries[7]"** A Technical Report published by the Asian Development Bank (ADB) in 2014, noted the major analytical conclusion continues to be that there is a potential market of more than seven-terawatts (7 TW) for OTEC plants that produce electricity and desalinated water. However, operational records must be obtained by building and operating floating pilot plants that are scaled down from sizes identified as potentially cost-effective. The pilot projects must be operated *in situ* and for at least one (1) continuous year to obtain these records. A floating five-megawatt (5 MW) pilot plant should be operated prior to implementing the 50 to100 MW plants that would be cost-competitive throughout the world. There is also a market for smaller, land-based plants operating in Pacific Islands developing member countries with the appropriate resources. On the technology readiness level (TRL) scale, with a value of one (TRL-1) referring to technology at the conceptual stage based solely on desktop studies, with higher numbers indicating systems that are already commercially available from different suppliers and technologies with documented records of field operations considered to have reached TRL-9, evidence available in the public domain indicates OTEC systems using ocean thermal resources have achieved the TRL-7 level. For OTEC, the state of development is such that cost estimates can be provided, indicating that under certain scenarios, cost-competitive base-load electricity could be produced in developing member countries (DMCs). For OTEC systems, the technology has been validated with experimental plants, so for a given theoretical thermal resource, as represented by the temperature difference between surface waters (i.e., warm resource) and water from a 1,000 m depth (i.e., cold resource), the technical resource can be expressed, with appropriate accuracy, as the electrical energy generated at the plant.

c. **"The Suitability of the Pacific Islands for Harnessing Ocean Thermal Energy and the Feasibility of OTEC Plants for Onshore or Offshore Processing[8]"** A Research Paper published by Geosciences, in 2021, written by academic staff at the Seawater Energy Plant Research Centre, Korea Research Institute of Ships and Ocean Engineering in collaboration with School of Science, Auckland University of Technology, noted that SIDS are excellent 'testing grounds' for the further development of OTEC technologies. It concluded that it was 'probable' that if a proof of concept for OTEC plants in SIDS is realised, there would be a natural progression to larger OTEC plants (100 MW to GWs), which would serve larger markets and bigger populations.

[7] Asian Development Bank. Wave energy conversion and ocean thermal energy conversion potential in developing member countries. Mandaluyong City, Philippines: Asian Development Bank, 2014. Available at: < https://www.adb.org/sites/default/files/publication/42517/wave-energy-conversion-ocean-thermal-energy.pdf>

[8] Kim, Hyeon-Ju, Ho-Saeng Lee, Seung-Taek Lim, and Michael Petterson. 2021. "The Suitability of the Pacific Islands for Harnessing Ocean Thermal Energy and the Feasibility of OTEC Plants for Onshore or Offshore Processing" *Geosciences* 11, no. 10: 407. Available at <https://doi.org/10.3390/geosciences11100407>

d. **"White Paper on Ocean Thermal Energy Conversion (OTEC)[9]"** A Technical Report, an intergovernmental collaboration, published by the International Energy Agency's Ocean Energy Systems, noted that OTEC is a simple and reliable technology, proven in two locations (Hawaii and Japan), with low operating pressures. The simplicity results in high equipment up times and high reliability, underpinned by a well-established track record of infield performance. It noted that unlike wind (land-based or floating) or solar power (land-based or floating), the footprint requirements for OTEC plants are small. The oil and gas floating production experience demonstrated that floating facilities can be built which are durable and long lasting. Floating OTEC plants can be dry docked when required, thus increasing the life of the facilities, and reducing the cost of difficult, and sometimes hazardous, offshore maintenance and process equipment overhaul. The report noted that the present state of proven pipeline technology is such that an island-based 2.5 MW system is achievable today, further, that a 10 MW floating OTEC plant is technically achievable. The report recommended policymakers should include OTEC in national energy and climate plans as a sensible and beneficial way for all countries to understand the full range of resources they can access. Lastly, the report noted that a full legal framework was necessary for installing floating OTEC systems in international waters.

5.0 DESCRIPTION OF THE GLOBAL OCEAN ENERGY ALLIANCE (GLOEA): A MECHANISM TO PROMOTE THE DEVELOPMENT AND DEPLOYMENT OF OCEAN ENERGY TECHNOLOGIES FOR BLUE ECONOMIES IN SMALL ISLAND DEVELOPING STATES (SIDS) AND COASTAL LEAST DEVELOPING COUNTRIES (LDCs)

The GLOEA is being established to provide the environment for the global promotion of ocean energy and for the development of partnerships to generate an expanding pipeline of commercial demonstrations and bankable projects and correct the current market failure for ocean energy. Specifically, environmental harm that comes from climate change is not considered in the cost of producing energy. The GLOEA must increase awareness on the commercial aspects of ocean energy projects and influence the development of innovative financing tools that de-risk pilot and first-of-a-kind demonstrators. A major function of the GLOEA will be promoting the project pipeline and establishing partnerships to provide the financial resources needed for implementation. Currently, financing of such projects is extremely limited.

5.1 The Mission and Composition of the Global Ocean Energy Alliance

The GLOEA Mission: *To catalyse investments in Ocean Energy to promote Blue Economies and accelerate the transformation of the energy sector to increase energy security, reduce greenhouse gas (GHG) emissions and generate resources for investment in adaptation to climate change.*

[9] Ocean Energy Systems [OES] (2021), White Paper on Ocean Thermal Energy Conversion (OTEC). International Energy Agency (IEA) Technology Programme for Ocean Energy Systems (OES). Available at <www.ocean-energy-systems.org>

The GLOEA intends to attract members based on professional and technical roles from the Public Sector, Private Sector, and Institutions. Two levels of membership are proposed: (a) Partners, which are governments, energy research organizations and institutions, and private sector companies (project and technology developers) who are interested in developing ocean energy solutions for small islands and coastal cities, and organizations who are interested in developing ocean energy solutions for small islands and coastal cities, and organizations that wish to be directly involved with the operations and governance of the GLOEA, and; (b) Associates, which are potential investors, ocean energy associations, development institutions, tertiary institutions and the media. All partners in the Alliance participate fully at and between meetings, share expertise and information, are "Ocean Energy Champions" and build networks to support the work of the Alliance.

Public Sector: Small islands, coastal cities and nations, both members and non-members of the United Nations, which have development of ocean energy resource as a major interest.

Private Sector: Technology developers, engineering, procurement and construction companies, investors and fund managers, equipment manufacturers and suppliers.

Institutions: Tertiary, technology research laboratories, United Nations agencies, international and regional energy agencies, development organizations, civil society organisations (CSOs), financial institutions, and the media.

5.2 Benefits of Joining the GLOEA

Members are governments, organizations, institutions and individuals being directly linked with the GLOEA and contributing to its mission. The success of the GLOEA relies on its members as they represent the vested interest that will drive the initiative. GLOEA membership is assessed against clear criteria to be developed by a proposed Core Working Group and a Bureau. Membership is free and invite-only currently. Benefits of joining the GLOEA include:

a. Being up to date with the ocean energy movement, climate resilience, innovation and transformation, sustainability and corporal social responsibility. SIDS are projected to be the first causalities of the climate changes coming, including more ferocious and frequent natural events and disasters.

b. Having ready access to "up to dated" information generated by the Ocean Energy Platform for Blue Economies powered by SustainChain™, related to the development of ocean energy technologies, trends and deployment.

c. Sharing experience with the main Ocean Energy organizations in the different ocean energy fields – learning about successful experiences of the other members of the Alliance, ideas related to new technologies which could be launched on its own market.

d. Participating in common projects at the global and regional level.

e. Accessing capacity building opportunity to receive certification and competency in Ocean Energy and learning about training subjects and contents.

f. Opportunity to share experiences and challenges with leading Ocean Energy organizations and work together on new concepts, products and services.

5.3 GLOEA Governance Structure

It is proposed that governance of the Alliance will be overseen by a Bureau, of no more than nine (9), with SIDS national government representation as the majority and chair of the Bureau, complemented by private sector and UN representation, regional institutions, and the GLOEA Core Working Group (CWG), taking gender into consideration, during the first operational phase of the Global Ocean Energy Alliance.

The Bureau, which will be the main policymaking entity, will be headed by the President of the Assembly of SIDS DOCK. The Bureau will direct the work of the GLOEA Core Working Group that will manage the implementation of the *Ocean Energy for Blue Economies Platform* to facilitate science and technology exchanges necessary for advancing ocean energy technologies, and in particular the commercial-scale deployment of ocean-based energy technologies that are appropriate to the demands in SIDS and coastal countries. The work of the GLOEA Bureau will be conducted virtually and supported by the Secretariat of SIDS DOCK and UNIDO. Membership on the Bureau is voluntary, and members do not receive any remuneration.

Most Bureau members will be identified prior to the launch of the GLOEA scheduled for June 2022 and will possess the relevant backgrounds and expertise in policy, financing, political, technical, environmental and social remits.

5.4 GLOEA Core Working Group (CWG)

The Call to Action! for the Establishment of the Global Ocean Energy Alliance was initiated by the SIDS DOCK Secretariat, with the support of the Governments of Austria and Norway, along with its partners the United Nations Industrial Development Organization (UNIDO) Global Network of Regional Sustainable Energy Centres (GN-SEC)[10] and the U.S.-based Henry L. Stimson Centre Alliance for a Climate Resilient Earth (ACRE). The partners have established a GLOEA Core Work Group (CWG), which is led by the SIDS DOCK Secretariat.

The aim of the GLOEA CWG is to promote and increase the awareness about the potential of ocean energy to bring about massive reduction in greenhouse gas (GHG) emissions, as noted by several scientific and technical reports. The GLOEA CWG will also recruit additional members, ensuring strategic entities (technology developers, financial institutions and investors, equipment manufacturers, government representatives) are participating; and critical expertise including technology transfer, information exchange, research and development, financing, capacity building and institutional strengthening. Compatibility, capability, and commitment will be the major criteria in the selection of the GLOEA CWG.

[10] Particularly, CCREEE, PCREEE, ECREEE, EACREEE, SACREEE, CEREEAC and RCREEE

The GLOEA CWG will be be responsible for completing the formation of the GLOEA, and the job to bring the right framework, the right organizations, and the right relationships together to move the project forward to the next step – the launch of the GLOEA in June 2022, during the UN Ocean Conference in Lisbon, Portugal. Whereas SIDS DOCK will bring its strong knowledge and expertise in SIDS, UNIDO and the GN-SEC will bring in its expertise from its global energy networks. Stimpson Centre/ACRE brings together industries from across the private sector, universities, national laboratories, financial institutions, insurance and reinsurance companies, national security think tanks, environmental organisations, multilateral development banks, and UN connected networks, and encourages collaboration and innovation between its member-organisations and creates Public-Private Partnerships ("PPPs") as called for in UN Sustainable Development Goal (SDG) 17 – Partnerships for the Goals: Strengthen the means of implementation and revitalise the global partnership for sustainable development.

The GLOEA CWG is committed to achieving a common objective - establishment of the GLOEA, by contributing time and critical expertise. In addition to the potential resources and capabilities of the partners in GLOEA, they also met three important requisites to be part of the Alliance: Compatibility, Capability, and Commitment, which are very important in the selection of a partner. Trust is another characteristic that has evolved and developed between the current CWG members, who have been associated with the SIDS DOCK Organization since its establishment in 2015, and it is this trust that is expected to strengthen the operations of the Alliance, which in turn will attract new partners.

5.4.1. Composition of the GLOEA Core Working Group

The current members of the CWG include representatives from the SIDS DOCK Secretariat, UNIDO GN-SEC, and the Henry L. Stimson Centre/ACRE. Additional members will be recruited and added during October 2021, right up to November 2021, at the COP26, with the *Call to Action!* and the subsequent launch of the GLOEA, in 2022. It is proposed that the GLOEA Core Working Group be composed of no more than eleven (11), with regional representation and taking gender into consideration.

Authority: The Core Working Group will be headed by a Chair, supported by two Vice-Chairs. The Chair will conduct the meetings of the Core Working Group and work with the SIDS DOCK Secretariat and UNIDO to set the agenda, distribute and review minutes, plan and set meeting dates, prepare reports, and adhere to SIDS DOCK and partner policies, among other responsibilities. The Core Working Group will report to a *GLOEA Bureau*, by providing regular reports to the Bureau, and by communicating any emerging issues to the Bureau, which is intended to be the main GLOEA policymaking entity, headed by the President of the Assembly of SIDS DOCK. The Core Working Group also reports to the SIDS DOCK Assembly, by providing a written report of its activities and by giving verbal reports at Assembly and Executive Council Meetings.

On the matter of resources to support the work of the GLOEA Core Working Group, the Secretariat of SIDS DOCK and UNIDO will provide administrative and communication support to the Core Working Group. The work of the Core Working Group will be done virtually, and by means of email and other methods of communication, and small group working. Membership on the Core

Working Group is voluntary, and members do not receive any remuneration. See Annex X – Terms of Reference Global Ocean Energy Alliance Core Working Group (GLOEA-CWG).

6.0 DESCRIPTION OF ACTIVITIES AND ACTIONS TO ADVANCE THE ESTABLISHMENT OF THE GLOBAL OCEAN ENERGY ALLIANCE (GLOEA)

6.1 Development of the Ocean Energy Platform (OEP) for Blue Economies

One initiative under the Global Ocean Energy Alliance (GLOEA) aims at the establishment of an Ocean Energy Platform (OEP) for Blue Economies in SIDS. To have more impact, the OEP will adopt a regional approach and many activities will be implemented through GN-SEC centres. It will provide services related to policy advisory, knowledge management, qualification and certification, as well as investment facilitation and matchmaking. With support from the Governments of Austria and Norway, SIDS DOCK and its partners UNIDO and the Stimson Centre/ACRE organized several joint events on the platform (e.g., Vienna Energy Forum - VEF 2021). Further information is available at: http://ocean.gn-sec.net. As a first step it was decided to establish a virtual information and communication platform of the OEP.

In establishing an Ocean Energy Platform as a marketplace to support SIDS and coastal nations to deploy ocean energy systems, one of the first activities in this regard is development of the Ocean Energy Platform for Blue Economies, which facilitates south-south and triangular cooperation between SIDS, coastal nations, academia, industry players and financiers. The Ocean Energy Platform for Blue Economies is an early and necessary component of the Global Ocean Energy Alliance (GLOEA), that was decided on by the stakeholders attending the SIDS DOCK/UNIDO Side Event at the July 2021, Vienna Energy Forum (VEF).

Special interest in the platform comes from the members of the SIDS DOCK organization, who are highly dependent on importation of costly fuel as mentioned earlier, and have very limited land area where competition for land for biological diversity, freshwater production, food production and infrastructure are constantly increasing, a situation that is further aggravated by coastal erosion and saltwater intrusion that is forcing relocation of population and reduction in food production areas. The SIDS are large ocean states whose EEZ gives them jurisdiction over vast areas of the tropical ocean and facing threats to their future existence as viable states, see ocean energy as game changer for them. Despite the vast thermal energy in the tropical ocean, and the great need for sustainable energy, remains untouched and no plan for its development, despite the vast potential for helping SIDS address critical areas of vulnerability to changing climate such as fresh water and food security, and providing the foundation for the Blue Economy in SIDS.

SustainChain™, a supporter of the GLOEA, is currently hosting and testing the development of the OEP as part of their wider interest in promoting ocean energy. SustainChain™ is a vast web of connected action to speed progress toward the Sustainable Development Goals (SDGs); they represent a large integrated community and sustainability change engine where scalable solutions, funding for viable innovations, and forging integral partnerships can be found. SustainChain™ supports the GLOEA Core Working Group (CWG) and is providing:

a. At no cost, the ocean energy platform to connect government planners, academics, engineers and investors to share research, mobilize funding, and create a hub for ocean energy experts.

b. Access to the SustainChain™ community and information to inspire island and coastal state lawmakers to prioritise ocean energy development in recognition of the vast ocean resources under their control.

c. A unique tool to assist in the identification of thematic action paths and partnerships to rapidly deploy ocean energy technologies and build stronger support for pilot projects and training.

d. The high-level leadership team to advocate with Heads of State and Government and Heads of Corporations for significant investments in ocean energy.

e. Assistance in mobilising financial support to operationalize the GLOEA, and support technical, pre-feasibility studies and capacity building.

The Platform will play a major role in the recruitment of GLOEA members, and information to interested parties to support both the COP26 *Call to Action!* and the launch of the GLOEA in 2022. The Platform is to be the market infrastructure for doing business with countries and the private sector in ocean energy. Users of this free-to-use platform will be able to post or respond to requests for collaboration on Ocean Energy topics, from sourcing financial support, finding local partners, technical specialists, or academic partners.

6.1.1 Ocean Thermal Energy Conversion (OTEC) Pilot Project in São Tomé and Príncipe (STP) to be developed under the Ocean Energy Platform (OEP)

Under the platform, a first Ocean Thermal Energy Conversion (OTEC) pilot project is being developed in partnership with SIDS DOCK, private developers (Global OTEC Resources) and investors, as well as the Government of São Tomé and Príncipe (STP). The feasibility of the OTEC technology has been demonstrated in various locations (e.g., Japan). The envisaged pilot project would provide STP with 1.5 MW of baseload power in the first instance and then increasing to 10 MW within four years. Through the OEP and based on the already available concept design of a suitable system, UNIDO will partly co-support the development of the required feasibility assessments through the OEP.

The objective is to validate the suitability of its design to STP's geographic and marine properties. The efforts are supported by the Global Environment Facility (GEF) and Green Climate Fund (GCF) funded UNIDO projects, "Strategic program to promote renewable energy and energy efficiency investments in the electricity sector of São Tomé and Príncipe" and, "Building institutional capacity for a renewable energy and energy efficiency investment programme for Sao Tome and Principe." Both projects foresee support for the development of innovative renewable energy investment projects, including ocean energy, and assist the country to position itself as a

hub for technology demonstration. The project will become an important demonstration within the GN-SEC "Makerspace[11]".

STP simultaneously faces challenges of affordable energy, energy security and climate change mitigation/adaptation. The population's greatest need is access to affordable, reliable and sustainable energy services. Energy is a basic human right. The STP National 2030 vision places a strong emphasis on integrating renewable energy into its energy mix and moving away from dependence on imported diesel for power generation. The OTEC plan would complement the efforts to up-scale other renewable sources, particularly small hydro power development and solar PV. Due to biodiversity and grid stability concerns, both technologies have some limitations. The 160,000 km2 exclusive economic zone (EEZ) around STP is an untapped solar heat battery. Ocean Thermal Energy Conversion (OTEC) plants could supply carbon- free, baseload power. Moreover, OTEC has a strong link to multiple productive uses within the blue economy.

6.2 Development of a Strategy for the Institutionalization of the Ocean Energy Platform – Phase I: Preparatory Phase (Formation of the Platform)

The strategy for institutionalizing the OEP is based on the "UNIDO Approach." For example, UNIDO provides key technical services for the establishment and operation of regional sustainable energy centres in partnership with regional economic communities/organizations. UNIDO's support model is implemented in three phases: preparatory phase, first operational phase and second operational phase. This model has been successfully applied in all nine (9) of UNIDO's regional centres. This phase, the preparatory phase, will include:

a. To create an action plan with timelines that will identify a permanent home for the OEP, that will address oversight, e.g., its management, administration and financing.
b. Further development of the OEP and defining its operational requirements.
c. To conduct an annual evaluation of the OEP to determine how effective it has been in supporting marketplace development, public knowledge and perception of ocean energy, and level and robustness of information on the platform, among other areas to be tested. The GLOEA CWG is expected to play a key role in identifying the matrices to be used.
d. To generate a greater awareness of the GLOEA and the OEP and solicit additional donors and partners.

6.3 SIDS Heads of State and Government *First Call to Action! for the Establishment of the Global Ocean Energy Alliance (GLOEA)*

In his Opening Statement, on behalf of His Majesty's Government and the people of the Kingdom of Tonga, and for the first time as Prime Minister and President of the sixth Assembly, the Honourable Rev. Dr. Pohiva Tu'i'onetoa, Prime Minister of the Kingdom of Tonga, announced a *Call To Action! to support the Global Ocean Energy Alliance (GLOEA): Ocean Energy For Climate Resilient Economies*, which SIDS DOCK and its Partners, led by the Kingdom of Tonga, planned to launch at the 26th session of the Conference of the Parties (COP 26) to the United Nations Framework Convention on Climate Change (UNFCCC), scheduled to be held in Glasgow, United Kingdom, in November 2021.

[11] https://www.gn-sec.net/sites/default/files/documents/files/050321_gn-sec_presentation.pdf

"Tapping into the wealth our oceans, would give us that boost to not just enter the "Race to Climate Resilience," but to stay in the Race, he said. There is the little-known fact that, according to the United Nations Educational, Scientific and Cultural Organization (or UNESCO), the bacteria used to detect the presence of COVID-19 is found in the depths of the ocean. There are also vast amounts of minerals that reside at the bottom of the ocean that are destined to play a role in the Fourth Industrial Revolution (Industry 4.0), as promoted by SIDS DOCK's Institutional Partner, the United Nations Industrial Development Organization (UNIDO).

The Prime Minister noted that while all the leadership of Small Island Developing States (SIDS) and low-lying developing states and coastal cities have been pre-occupied with combating the COVID-19 virus, they have not lost sight of the fact that almost all SIDS are ninety percent (90%) dependent on the importation of fossil fuels, which requires SIDS to spend tens of billions of dollars in foreign exchange annually, to import petroleum fuels. SIDS need to replace some ten thousand (G) megawatts of fossil fuel-powered electricity generating plants, over the coming decades, plants which consume more than $5 billion dollars' worth of fuel, annually. Ten thousand megawatts represent most of the existing generating capacity in the SIDS. However, because most of these plants have reached or exceeded their economic life and are no longer efficient users of fuel, we in SIDS must ensure that we take collective action to replace these generators with Ocean Energy Systems.

SIDS face a huge dilemma as they consume diesel, which is expensive and dirty. Before COVID-19, the cost of electricity in Tonga was thirty-seven cents (0.37) per kilowatt hour, which is about three times more compared to the United States (U.S.) at ten cents (0.10) per kilowatt hour. A year later, today, Tongans are paying about forty cents (0.40) per kilowatt hour, and climbing, and prices won't be coming back down anytime soon.

The Prime Minister asked development partners to answer the Call To Action! and join the Global Ocean Energy Alliance to help protect and conserve the oceans and support the development of the SIDS Ocean Energy Work Programme. "We are seeking partners and we are looking to our oceans and in particular, ocean energy, as a principal source of energy to help a number of islands survive and thrive. This is the only true option we have left," he said.

The Honourable Rev. Dr. Pohiva Tu'i'onetoa gave another impassioned *Call To Action!* during his virtual keynote address, delivered on 11th November 2021, at the SIDS DOCK Side Event on the margins of the 26th United Nations (UN) Climate Change Conference of the Parties 2021 (COP26) on the *Call To Action! for the Establishment of the Global Ocean Energy Alliance (GLOEA)*, held at Wood House, in Glasgow, Scotland, referring to ocean energy "as the greatest chance to help meet the 2050 goals for net zero emissions and climate resilience in Small Island Developing States (SIDS), coastal developing cities and Least Developed Countries (LDCs). The Side Event was chaired by His Excellency Mr. Ronald Jumeau, Ambassador and former Permanent Representative of the Republic of Seychelles to the UN and Chair of the Executive Council of SIDS DOCK, and the newly appointed SIDS DOCK Roving Ambassador for Oceans. SIDS DOCK and its partners, UNIDO and Stimson/ACRE, also introduced the OEP powered by SustainChain™, during the event.

Prime Minister Tu'i'onetoa was supported in the Call To Action! by the two Vice-Presidents of the sixth session of the SIDS DOCK Assembly, the Honourable Rev. Wavel Ramkalawan, President of the Republic of Seychelles, and the Honourable John Briceño, Prime Minister of Belize, respectively, along with Dr. The Honourable Ralph Everard Gonsalves, Prime Minister of Saint Vincent and the Grenadines and former Vice-President of the third session of the Assembly of SIDS DOCK. They were joined by the Honourable Dr. Jorge Lopes Bom Jesus, Prime Minister of the Democratic Republic of São Tomé and Príncipe, where the first floating Ocean Thermal Energy Conversion (OTEC) Platform, being developed in partnership with the United Kingdom (UK) company Global OTEC, is expected to be deployed in 2024, helping to unburden the people of Sao Tome and Principe from importing expensive and dirty fossil fuels, and provide a demonstration for scaling up across small islands, coastal developing cities and Least Developed Countries (LDCs) and help achieve the Sustainable Development Goals (SDGs).

UNIDO intends to contribute to the building up of ocean energy project pipelines promoted through the Global Network of Regional Sustainable Energy Centres (GN-SEC). The various centres cover most of the thirty-eight (38) SIDS and accelerates the energy transition by creating spill-over effects, economies of scale and joint learning. The government of the United Arab Emirates (UAE) also invited the international community and the private sector to join the UAE in its support for the Call to Action! for ocean energy and the GLOEA. In her remarks, Her Excellency Dr. Nawal Al-Hosany, Permanent Representative of the UAE to the International Renewable Energy Agency (IRENA), Permanent Mission of the UAE to the United Nations, announced that the new UAE-IRENA USD 400 million global climate finance facility, the Energy Transition Accelerator Financing (ETAF) Platform, will include financing for ocean energy, where in 2023, at COP28, in Abu Dhabi, the UEA hopes to showcase support for the first ocean energy projects. The ETAF was launched at COP26.

The Prime Minister of Tonga announced that the partners will officially launch the GLOEA at the UN Oceans Conference, scheduled for June 2022, in Lisbon, Portugal, and asked the international community and the private sector to answer the Call To Action! and join the Global Ocean Energy Alliance to help protect and conserve the oceans and support the development of the SIDS Ocean Energy Work Programme. "We are seeking partners and we are looking to our oceans and in particular, ocean energy, as the principal source of energy to help a number of islands survive and thrive. Ocean energy is the big game changer to turn the tide on climate change and get to Net Zero. This is the only option left for our children's survival and our future," he said. See Annex X – SIDS DOCK COP26 Side Event Concept Note and Agenda, 11 November 2021, Wood House, Glasgow, Scotland. The video link to the Side Event can be found here: https://drive.google.com/file/d/1AG_g_7jgHZcsWoIwhbQ0sMvsYT7dRYNI/view?usp=sharing

6.4 Global Ocean Energy Alliance (GLOEA) Launch Event, UN Ocean Conference, Lisbon, Portugal, June 2022

The proposed launch of the GLOEA at the United Nations Ocean Conference in Lisbon, Portugal in June 2022, will mark the beginning of a global effort to direct significant investments in developing the largest global renewable energy resource endowment. Until now, it has not been the subject of any serious global effort despite the desperate need to reduce greenhouse gases from the energy sector. The introduction of ocean energy technologies in the market face manifold

barriers related to policy and regulation, technology availability, knowledge management and awareness, capacity building, as well as finance and entrepreneurship.

The launch of the GEOA will represent a milestone in the almost two-decades long advocacy to promote oceans as a major renewable energy resource to produce clean energy. It will also mark the beginning of a collective approach on the part of like-minded governments to work collectively for the greater good and to use their energy markets as the catalyst for driving commercial scale investment in their countries. The launch will also see the operationalization of the Ocean Energy Platform, which will provide a real time marketplace where governments, investors, equipment manufacturers and marine services providers can look for partners.

6.5 First Operational Phase of the Global Ocean Energy Alliance – First Operational Phase: (2023-2025)

It is anticipated that resulting from the launch of the OEP on the 4th of November 2021 and three Call to Action! events, including at the launch event for the GLOEA in Lisbon, there is a critical or near critical mass of vested interest representing governments, private sector project developers, investors, and organizations and institutions who would have found an enabling environment being promoted by the leaders of SIDS, for promoting ocean energy investments. Additionally, there would have been significant increase in awareness about the potential of ocean energy and its relevance to the greatest environment and economic challenges facing the global population caused by changing climate. See Annex X – Draft Global Ocean Energy Alliance Launch Plan.

7.0 DRAFT INDICATIVE BUDGET

In the optimistic development scenario of the Establishment of the Global Ocean Energy Alliance (GLOEA), the total indicative budget requirement for the running and technical programme costs amount to 3,533,200 Euros or USD 4,015,000. This budget would allow the GLOEA to have an initial impact. Funding for the conservative scenario will be secured by UNIDO, Stimson/ACRE, SIDS DOCK, and its other partners. The initial budget will allow the leadership of the GLOEA to kick-start the operations and activities. During the first operational phase, the GLOEA is projected to reach financial sustainability through core funding from development partners, local partners, the host country (TBD), and mobilised project funding and eventually, provision of services. During the first operational phase, Governments will not be expected to provide monetary contributions to the GLOEA. The GLOEA will start with a very small staff base, headed by the SIDS DOCK Roving Ambassador for Oceans, and will expand depending on the mobilised funding and developed programmes and projects.

In the optimistic development scenario, the partners will mobilize the envisaged financial resources during the first operational phase.

Table 4: Indicative budget for the start-up and first operational phases of the GLOEA & OEP: Optimistic development scenario (in Euros)[12]

START-UP AND FIRST OPERATIONAL PHASES OF THE GLOBAL OCEAN ENERGY ALLIANCE (GLOEA) AND THE OCEAN ENERGY PLATFORM (OEP)

	Start-Up Phase	First Operational Phase				
OUTCOME	**2022**	**2023**	**2024**	**2025**	**Total US$**	**Total €**
Launch of the GLOEA – Lisbon, Portugal, June 2022	40,000				**40,000**	**35,200**
Enhanced regional institutional capacities for Ocean Energy through the creation and efficiently managed and financially sustainable GLOEA & GOP	30,000	250,000	250,000	350,000	**880,000**	**774,400**
2: Accelerated development, adoption and execution of regional and national gender sensitive Ocean Energy polices, targets and incentives through targeted regional interventions		100,000	250,000	250,000	**600,000**	**528,000**
3: Strengthened capacities of local key stakeholder groups through the up-scaling and replication of certified training and ocean energy research programs and mechanisms through the GN-SEC Online Capacity Building Program on Sustainable Energy for Islands		150,000	250,000	250,000	**650,000**	**572,000**
4: The awareness and knowledge base of local key institutions and stakeholder groups on Ocean Energy are strengthened, especially through the GN-SECs	50,000	100,000	200,000	250,000	**600,000**	**528,000**
5: Increased Ocean Energy business opportunities for local companies, investors and industry through the development and implementation of regional investment promotion programs and tailored financial schemes		350,000	400,000	400,000	**1,150,000**	**1,012,000**
6: Transfer of the Ocean Energy Platform & Design, Launch, Test to the GLOEA Web Platform	15,000	20,000	30,000	30,000	**95,000**	**83,600**
ESTIMATED TOTAL	**135,000**	**970,000**	**1,380,000**	**1,530,000**	**4,015,000**	**3,533,200**

[12] Exchange rate 1/26/2022: 1 USD to Euro = 0.88 Euro

ANNEX X

BACKGROUND: ADVOCACY FOR OCEAN ENERGY IN SMALL ISLAND DEVELOPING STATES (SIDS) – HISTORICAL CONTEXT

Since the Second United Nations International Meeting on Small Island Developing States, in Mauritius in 2005, SIDS institutions have worked with Japanese colleagues, and between 2012 to 2014, developed pre-feasibility study papers on the potential for Ocean Thermal Energy Conversion (OTEC) Technology for fourteen (14) SIDS. This provided a significant body of information to work on the concept for a SIDS Ocean Energy Programme.

In 2012, SIDS DOCK convened the Second National Coordinators' Meeting, on the margins of the Ministerial Conference on *"Achieving Sustainable Energy for All in SIDS – Challenges, Opportunities, Commitments"* in Bridgetown, Barbados 7-8 May 2012. During the National Coordinators' Meeting, a presentation on *"Ocean Thermal Energy Conversion (OTEC) For Sustainable Development,"* was delivered by Dr. Uehara, President of GEC Co. Ltd., and former President of Saga University, Japan. The presentation highlighted Dr. Uehara's visits and measurements of ocean water temperature across the globe – out of five potential sites: Marshall Islands, Micronesia, Caribbean, Okinawa, and Reunion, the Marshall Islands had the most consistent temperature conducive to OTEC, which is a temperature of approximately 25 degrees Celsius, year-round. The delegate from the Marshall Islands said they prepared a proposal for funding for USD 2.9 million for a feasibility study and was hoping for support from SIDS DOCK. The delegate from Cabo Verde said they would like to know if it is possible for them to also have a feasibility study done for an OTEC plant, however, Dr. Uehara said that once they have completed the OTEC plant in the Marshall Islands and it is up and running, then they can look at doing another plant.

Under the *Barbados Declaration on Achieving Sustainable Energy for All in Small Island Developing States (SIDS),* the meeting Outcome Document, the Heads of State and Government of the Alliance of Small Island States (AOSIS) agreed that SIDS DOCK was "a valuable tool to support SIDS efforts to develop and implement national, regional and inter-regional energy policies, plans and strategies to address the special vulnerabilities of SIDS, while ensuring supplies of secure, reliable, affordable and environmentally-friendly energy and power, and encouraged SIDS that have not yet done so, to consider becoming members of SIDS DOCK." SIDS DOCK was also recognized by the SE4ALL Initiative as a critical vehicle through which technical and financial support, capacity building, and preparation of investment opportunities are delivered to SIDS DOCK members in order to achieve the three objectives of the SE4ALL Initiative and the core purposes of SIDS DOCK.

On October 30, 2015, in Barbados, during the SIDS capacity building workshop sponsored by the Climate Technology and Network Centre (CTCN) and co-organized by the SIDS DOCK Secretariat, there was a request from the participants to support capacity building and resources assessment for the development of ocean energy thermal conversion technology in SIDS.

The SIDS DOCK Island Women Open Network (IWON), the energy-gender-nexus empowerment arm of the SIDS DOCK Organization, included their voice as a major advocate for Ocean Energy,

recognizing the myriad livelihood opportunities available to women. On 26 October 2016, the then Chair of the IWON, Her Excellency Ms. I. Rhonda King, Ambassador and Permanent Representative of Saint Vincent and the Grenadines to the UN, delivered a powerful presentation: *"Ocean Energy Development Unique to Small Island Developing States (SIDS),"* to the United Nations Department of Economic and Social Affairs (UNDESA) and Global Energy Interconnection Development and Cooperation Organization (GEIDCO) High-level Luncheon and Discussion, "Building Global Energy Interconnection and Achieving Worldwide Sustainable Development of Energy," calling for the immediate development and deployment of Ocean Energy in SIDS.

The SIDS DOCK Secretariat also advocated for OTEC development as a viable option for SIDS in addressing trade deficits and reducing vulnerability of island states to projected climate change impacts at the *Bloomberg Asia and Pacific Renewable Energy Summit*, in Shanghai, China, in November 2016. In May 2017, at the 2017 Vienna Energy Forum (VEF), His Excellency Mr. Enele Sosene Sopoaga, OBE, Prime Minister and Minister for Public Utilities of Tuvalu, and President of the second SIDS DOCK Assembly, in his keynote address, informed the Forum of the importance of Ocean Energy Technologies to SIDS. Based on the statement delivered by the Prime Minister from Tuvalu, along with discussions during the VEF panels, the OTEC system was best seen as a "NEXUS" technology as it addresses many issues negatively impacting the sustainable development aspirations of SIDS in achieving the SDGs and the Paris Agreement. It was further accepted that OTEC systems should not be evaluated solely for its energy generation, as the established least cost energy option index (LCOE) does not capture other income streams generated by the technology, and therefore, comparison to wind and photovoltaics (PV) which have no co-products, is not valid economics. Wind and PV are both intermittent sources of energy versus OTEC which is a baseload source of energy.

At the UN Oceans Conference, held from 3-9 June 2017, in New York, during the SIDS Ministerial, the SIDS DOCK Secretariat echoed the importance of ocean energy technologies to the future battle with climate changes impacts. This was followed by a similar call from the IWON Chair, who announced an IWON Campaign to be launched in September 2017, on the margins of the 72nd UN General Assembly, to, **"Bring Dominique Home."** *Dominique* is the magnificent 100 KW Ocean Thermal Energy Conversion Pilot Plant located on Kumejima Island, Japan. Additionally, in 2019, SIDS DOCK assisted the Caribbean Community (CARICOM) Secretariat in organizing the *Caribbean Marine Energy Technology (CariMET) Forum*, held in St. George's, Grenada, from 6-7 November 2019. The meeting was hosted by the Caribbean Community (CARICOM) Secretariat, co-hosted by the Caribbean Centre for Renewable Energy and Energy Efficiency (CCREEE) and the Government of Grenada, and supported by the Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ) and SIDS DOCK, with strategic partners such as the Caribbean Institute for Meteorology and Hydrology (CIMH), the Regional Universities Network (RUN), and the United States Department of Energy (U.S. DoE).

The CariMET Forum provided an opportunity for those at the forefront of technology exploration and project development within the marine energy sector in the Caribbean Community (CARICOM), in particular, and the Caribbean region, in general, to meet, interact, present their latest knowledge and debate new ideas and issues pertinent to the development and deployment of Ocean Thermal Energy, including Seawater Air-conditioning, and Kinetic Marine Energy, *viz.*

Offshore-Wind, Tidal and Wave, options. More specifically, the CariMET Forum sought to, *inter alia:* (a) Build and transfer knowledge, through the sharing of global, regional and national experiences, on marine renewable energy and the realistic opportunities on offshore options for grid and off-grid energy service generation; (b) Develop a strategic research agenda to support continued improvement of understanding of the potential impacts of marine renewable energy projects on the sustainable development landscape in CARICOM SIDS; and (c) Develop a framework for businesses and communities of practice, as well as prospective developers and investors, to actively engage with governments to deepen the exploration of opportunities within the regional marine renewable energy sector.

In 2019, under the International Climate Initiative 2019, a Project Proposal was submitted to the Government of Germany Federal Ministry for the Environment, Nature Conservation, and Nuclear Safety (BMU), by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, titled: *Supporting the implementation of NDCs in the Caribbean – transforming the transport and energy sectors towards a low-carbon and climate-resilient future (NDC-TEC).* The Offer was finalized in April 2021. Under the grant for approximately 20 million euros, from the German government for the climate change project, funding for six (6) focus countries have been provided: Antigua and Barbuda, Belize, Grenada, Jamaica, Guyana, and St. Lucia, with CARICOM as the Political Partner. SIDS DOCK is part of Consortium including the Caribbean Development Bank (CBD), the Caribbean Centre for Renewable Energy and Energy Efficiency (CCREEE), the Caribbean Community Climate Change Centre (CCCCC), The University of the West Indies (UWI) and Climate Analytics (CA). As a Consortium partner, SIDS DOCK will promote global exchange between Caribbean and other SIDS on the good practices and lessons learnt derived from the project. Furthermore, SIDS DOCK will provide support for research and development in the area of innovative topics such as Ocean Thermal Energy Conversion (OTEC)/Seawater Air Conditioning (SWAC) and hydrogen and technical advice for the proposal development.

The aim of the project is to support CARICOM Member States in enhancing the ambition of their Nationally Determined Contributions (NDCs) under the Paris Agreement, and in implementing transformative actions within the energy and transport nexus. It offers tailored support to the countries in accelerating the implementation and raising the ambition of their NDCs in the energy and transport sectors. Strategic access to climate financing for NDC implementation is facilitated. In Saint Lucia, Jamaica and Guyana flagships introduce new and market-disruptive technologies, which lead to long-term climate change mitigation and increased resilience. The flagships comprise technology demonstrations, capacity building and enabling frameworks for a long-term sectoral shift and serve as a model for further uptake in the region. Through knowledge products, dissemination and regional outreach, all CARICOM member states will benefit from good practices and are encouraged to position themselves as leaders for comprehensive and innovative NDC implementation.

In 2020, SIDS DOCK, UNIDO, the Climate Technology Center (CTCN), and the Global Network of Regional Sustainable Energy Centers (GN-SEC), jointly hosted a webinar on, "*Ocean Energy Technologies for Blue Economies in Small Island Developing States (SIDS).*" The Webinar took place on 30 November 2020, virtually, via conferencing. The Webinar's principal aim was to contribute to the envisaged *Ocean Energy Platform for Blue Economies*, advocated by SIDS DOCK and UNIDO, in close coordination with the GN-SEC. The Platform goal is to build a bridge

between the industry and research players, which need to test new solutions in various climates and contexts, and the interest of SIDS and coastal developing countries to get access to technology and expertise. Currently, the exchange on these future-oriented issues is limited. The Platform will raise awareness and promote the different ocean energy technologies and their potential to help SIDS in addressing issues such as lowering energy cost, employment generation, reducing the negative trade balances due to petroleum imports, and new challenges posed by a changing climate (reduction in freshwater, reduction on fish catch due to warming oceans and bleaching of coral) and generating alternate industries to replace those that will be negatively impacted such as farming. The Platform will also create awareness on the potential contribution of ocean energy to the implementation of *Blue Economy Strategies* of SIDS.

On the November 25, 2020, the SIDS DOCK organization and International Renewable Agency signed a Memorandum of Understanding (MoU), focused on developing capacity for the regional energy centers (Caribbean Centre for Renewable Energy and Energy Efficiency and the Pacific Centre for Renewable Energy and Energy Efficiency) to support government in the development of ocean energy.

In 2021, in partnership with UNIDO, GN-SEC, and the Henry L. Stimson Centre Alliance for a Climate Resilience Earth (ACRE), SIDS DOCK hosted a virtual Side Event *"Establishing an Ocean Energy Platform as a Market Place to Support SIDS and Coastal Nations to Deploy Ocean Energy Systems*, during the Vienna Energy Forum (VEF), on 6 July 2021. The event discussed a first deliverable of the Ocean Energy for Blue Economies Platform (OEBEP), which facilitates south-south and triangular cooperation between Small Island Developing States (SIDS), coastal nations, academia, industry players and financiers.

On 28 September 2021, during the sixth session of the Assembly of SIDS DOCK, the SIDS Leaders fully endorsed the GOEA, and issued a *Call To Action!* Calling upon the development community to support the GOEA, noting that the SIDS are looking to the Oceans as the main renewable energy resource that can help achieve a Blue Economy in SIDS. The Assembly of SIDS DOCK was informed that the Alliance will also provide the environment to develop and implement a growing pipeline of bankable ocean energy projects in response to climate and sustainable development imperatives of coastal cities and towns and in particular small islands. The envisioned pipeline of ocean energy projects, comprised of kinetic and thermal energy conversion technologies, will provide solutions in various climates and sustainable energy challenges faced by SIDS, coastal developing countries, and cities to catalyze sustainable development. This in turn will free additional resources for additional climate adaptation efforts, which are currently committed to importing increasingly costly fossil fuels.