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CalWave Power Technologies, Inc Comments on the Draft 2022 Integrated Energy Policy Report (IEPR) Update

Additional submitted attachment is included below.

CALWAVE

September 5, 2022

California Energy Commission
Docket Unit, MS-4
Docket No. 22-IEPR-01
715 P Street
Sacramento, California 95814-5512

Subject: CalWave Power Technologies, Inc. Comments on the Draft 2022 Integrated Energy Policy Report (IEPR) Update [Docket Number: 22-IEPR-01]

Dear Vice Chair Siva Gunda, CEC Leadership, and Staff,

CalWave Power Technologies, Inc. ("CalWave") appreciates the opportunity to comment on the California Energy Commission's (CEC) Draft 2022 Integrated Energy Policy Report (IEPR) Update. CalWave commits to supporting the CEC's continued efforts to advance policy and planning to achieve a safe, resilient, and clean energy future for all. In understanding that the challenges of transforming California's energy system require analysis and stakeholder engagement that do not necessarily align with the annual IEPR cycle, we look forward to participating in the ongoing work to help the CEC expand and update forecasts in the near term. Given the opportunity to evaluate the potential of wave energy across topics in this Draft Report, we are providing insights specific to energy reliability, reducing costs, Western electricity integration, the role of hydrogen, and economic and workforce development for consideration.

About CalWave
CalWave is a California-based wave energy developer founded out of UC Berkeley in 2014, receiving support from Cyclotron Road and Activate in 2015-2016. Our mission is to provide reliable, cost-effective ocean wave technologies for sustainable energy access. We are committed to working with diverse stakeholders to advance comprehensive recommendations focused on lowering the cost of clean energy for California ratepayers and ensuring a just, equitable, and efficient energy transition.

CalWave's wave energy converter technology is called the xWave. The xWave is built on game-changing industry advancements, which CalWave was awarded the highest performance for, through the US Department of Energy's (DOE) Wave Energy Prize. The xWave achieves the highest efficiency by operating fully autonomously and fully submerged, which allows for protection from aggressive swells and storms, while also permitting energy capture from multiple degrees of freedom.

In July 2022, CalWave successfully concluded California's first long-duration wave energy project after 10 months of operation at 99.8% uptime without intervention. We are now preparing to scale our technology for grid-connected use at PacWave, the first federally approved, utility grid-connected wave energy site in the US. CalWave has been awarded four competitive development contracts from the US DOE Water Power Technologies Office since 2017,

including a $7.5M award in January 2022 to accelerate the commercial viability of wave energy and deploy at scale to meet decarbonization goals. CalWave has secured a collaboration contract with one of the world's largest public utility companies to investigate synergies between offshore wind and wave farm co-location to realize power availability and cost-benefit potentials.

Increasing Energy Reliability & Reducing Costs

As energy reliability remains a key focus and driver of energy policy in California, there is a significant opportunity for wave power to support grid stability through periods of peak demand and extreme events. Wave power is the world's largest unused renewable energy resource, capable of satisfying over 30% of US and global electricity demand.[1] The key benefits of wave energy include greater consistency, predictability, and energy density than existing renewables. Wave power is available both day and night and generally peaks in the winter, providing an especially large resource during cold nights when energy demand soars. These features present the opportunity to meet baseload needs alongside providing economical advantages.[2]

Several studies have found that the diversification of renewable energy resources will lead to the lowest cost of energy. For example, the Castle Wind & E3 study concluded that California ratepayers can save $2 billion through the deployment of 8 GW of offshore wind by 2040.[3] The savings potential of wave power is significantly larger due to its higher consistency, offering commercial advantages in hybrid applications by reducing the need for energy storage and smoothing the inconsistent availability associated with wind and solar PV, however, no detailed assessment comparable to the aforementioned study has been conducted for wave energy yet. Given the state's target and ongoing development of offshore wind, wave and wind co-location presents another significant scenario for increasing energy reliability and reducing costs. Co-location opportunities are now being explored through site-specific feasibility assessments in the Northeast US and globally. Anticipated advantages include increased capacity factors and reduced supporting infrastructure costs.

Western Electricity Integration

Wave energy can play a significant role in transforming California's electricity system, and may substantially reduce challenges faced by the Western Interconnection related to market development, resource adequacy, and transmission development, given that 68.5% of California's population lives in coastal communities.[4] Integrating wave power into the state's energy mix would eliminate the need for additional large-scale transmission lines, contrary to wind and solar infrastructure in the middle of the country.

The Role of Hydrogen - Hydrogen Production through Wave Energy

In the continued assessment of hydrogen, wave power can contribute to the critical need for baseload clean energy to operate electrolyzers for green hydrogen production. Growing bodies of research and leadership, particularly in Europe, have demonstrated support. For example,

[1] Marine Energy in the United States: An Overview of Opportunities | Department of Energy
[2] Ocean Wave Energy in the United States: Current Status and Future Perspectives
[3] Study shows offshore wind in California could save ratepayers up to $2B by 2040
[4] NOAA California Office for Coastal Management

the European Marine Energy Centre has demonstrated marine energy for enabling hydrogen-powered aviation.[5] Additionally, the Intergovernmental Panel on Climate Change (IPCC) has assessed ocean energy as having one of the lowest lifecycle emission profiles, at 17 gCO_2e/kWh. The IPCC forecasts the displacement of 1.38 - 1.9 $GtCO_2$ emissions equivalent annually from ocean energy, emphasizing the opportunity for exploring wave power for hydrogen production in California to reduce greenhouse gas emissions.[6]

Economic Opportunity and Workforce Development

CalWave values the CEC's work in hosting IEPR workshops focused on economic opportunities and workforce efforts. We stand in support of increasing capacity and knowledge-building mechanisms to promote equitable socioeconomic development as the clean energy sector grows. CalWave currently provides reporting on our diversity, equity, inclusion, and accessibility work to the US DOE, however, this data would be beneficial to include in the CEC's Energy Equity Indicators system as well since the majority of our activities are taking place in California. For example, CalWave has been aiding workforce development by supporting educational training and curriculum building through nonprofit and university partners.

CalWave understands that wave energy presents a significant opportunity for high-quality job creation and economic growth. The wave energy industry can create similar numbers of local jobs for fabrication, operations, and maintenance as the offshore wind industry. Estimates project that by 2050 over 300 GW of marine energy capacity will be installed globally, resulting in the creation of 680,000 direct jobs.[7] Time is of the essence for ensuring that California constituents do not get left behind in preparing for the future.

CalWave appreciates the opportunity to provide public comment for the CEC's consideration of wave energy in line with topics covered in this Draft Report. An additional resource provided by CalWave to inform related policy can be found and will continue to be updated here. We look forward to advancing collaboration to achieve a clean, reliable, efficient, and just energy transition for all.

With gratitude,

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[5] HyFlyer projects : EMEC: European Marine Energy Centre
[6] Technology-specific Cost and Performance Parameters
[7] Marine Energy in the U.S. | National Hydropower Association