



The G&J Wave Energy project aligns with UNESCO Sustainable Development Goals



NO POVERTY

Goal 1: End poverty in all its forms everywhere

Target 1.4: By 2030, ensure that all men and women, in particular the poor and the vulnerable, have equal rights to economic resources, as well as access to basic services, ownership and control over land and other forms of property, inheritance, natural resources, appropriate new technology and financial services, including microfinance.

By harnessing ocean wave energy, G&J Wave Energy technology has the potential to be a renewable and sustainable energy source that could be deployed in coastal and offshore applications, often where energy access is limited. The G&J Wave Energy's Wave Energy Converter (WEC) design is rugged, simple, adaptable, omni-directional, with a design that allows for it to be constructed out of materials that are readily available and inexpensive. For instance, the first prototype was built using repurposed barrels, bicycle parts, and an automotive alternator. Building on the lessons learned from this initial prototype, a design for a second version was developed using commonly accessible automotive components, resulting in a more robust and straightforward WEC. The G&J Wave Energy WEC has the potential to not only generate clean electricity but also has the potential to foster local job creation in manufacturing, installation, and maintenance, that in turn could empower marginalized groups that could allow for the promotion of economic inclusivity. Furthermore, by reducing reliance on imported fossil fuels, a WEC helps mitigate climate change impacts, enabling vulnerable populations to be less affected by energy scarcity and environmental degradation.



ZERO HUNGER

Goal 2: End hunger, achieve food security and improve nutrition and promote sustainable agriculture

Target 2.4: By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality.

The G&J Wave Energy 2,500-watt WEC contributes to Sustainable Development target 2.4 by providing a wave generated renewable energy source which could provide, for example, power to an aquaculture offshore fish farm. The G&J Wave WEC 2,500-watt version is specifically designed to meet the supply energy needs of an aquaculture operation by providing power to support fish feeders, monitoring equipment sensors, navigation lights and safety equipment. By enhancing energy access and efficiency for the aquaculture economy coastal and offshore applications, the G&J Wave Energy WEC can contribute to the resilience and sustainability of food systems, ultimately aiding in the achievement of food security and improved nutrition.



QUALITY EDUCATION

Goal 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

Target 4.4: By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs, and entrepreneurship.

The development, deployment, and operation of wave energy converter systems provide opportunities for education and skills development in marine engineering, renewable energy, and ocean sciences. The iterative design process of the G&J

Wave Energy WEC—from early low-cost prototypes to scalable kilowatt-level systems—supports hands-on technical learning and applied research. Deployment of WEC-powered offshore monitoring platforms can further support academic institutions, vocational training programs, and research initiatives by providing real-world systems for study and skills development, thereby contributing to workforce capacity-building in sustainable marine technologies.



CLEAN WATER AND SANITATION

Goal 6: Ensure availability and sustainable management of water and sanitation for all

Target 6.4: By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater.

Wave energy converters can indirectly support clean water and sanitation objectives by providing renewable power for coastal and offshore water-related infrastructure. Wave-generated electricity can support desalination systems, water quality monitoring stations, and pumping or treatment systems in off-grid environments.



AFFORDABLE AND CLEAN ENERGY

Goal 7: Ensure access to affordable, reliable, sustainable and modern energy for all

Target 7.1: By 2030, ensure universal access to affordable, reliable and modern energy services

The Wave Energy Converter's (WEC's) project contributes to SDG 7.1 by harnessing the power of an ocean wave's vertical up and down motion. The G&J Wave Energy philosophy was to design a WEC that is rugged, simple, adaptable, omni-directional and could be constructed out of readily available, inexpensive

components and materials. This technology supports progress towards obtaining a clean, renewable energy source which can contribute to the empowerment of small coastal communities that have limited resources to generate their own power. The G&J Wave Energy 2,500-watt WEC is scalable and adaptable with sizes ranging from a few watts up to 20 kW. The G&J WEC is designed to be deployed as a standalone unit or as part of an interconnected array of units. The scalability and adaptability of the G&J Wave WEC can cater to various energy demands and environments, contributing to providing clean energy solutions that can be more accessible to diverse populations.

Target 7.2: By 2030, increase substantially the share of renewable energy in the global energy mix

Wave energy is a significant but under-utilized clean energy. This type of energy is desirable, as it is an abundant, environmentally friendly, reliable and predictable resource. It presents a promising solution to address the climate crisis by harnessing the power of ocean waves to generate clean, renewable electricity. It has potential to supply 10% to 15% of the world's electricity needs. This form of energy has a minimal carbon footprint and could significantly reduce reliance on fossil fuels, helping to decrease global greenhouse gas emissions by an estimated 1.5 billion tons annually if fully utilized. The G&J Wave 2,500-watt WEC version has the potential to specifically reduce fossil fuel use in aquaculture by providing renewable wave energy to power fish feeders, monitoring equipment sensors, navigation lights, and safety equipment. As the G&J Wave Energy WEC is scalable and is designed to function as an independent unit or in within an array of interconnected units, the design contributes to SDG 7, target 7.2 by providing affordable, off-grid renewable energy to coastal and offshore applications.



INDUSTRY, INNOVATION AND INFRASTRUCTURE

Goal 9: Industries, innovation and infrastructure

Target 9.1: Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all

The G&J wave energy WEC can contribute to the development of sustainable infrastructure by utilizing ocean energy as a clean and renewable resource. The first G&J Wave Energy WEC prototype design is a 2,500-watt WEC. Since the G&J

Wave Energy WEC is simple, rugged, and scalable (two-watt to 20 Kw), it has the capability to integrate into existing energy systems, supporting progress toward a mean for communities to create resilient power grids less reliant on fossil fuels. This shift not only supports energy security, but also contributes to the reduction of greenhouse gas emissions, aligning with the SDG Goal 9:1 of building resilient and sustainable infrastructure.

Target 9.3: Increase the access of small-scale industrial and other enterprises, in particular in developing countries, to financial services, including affordable credit, and their integration into value chains and markets

Deploying the G&J Wave Energy WEC technology can attract investment and funding opportunities for small-scale aquaculture and other small-scale blue economy industries by reducing the operating costs associated with the import of fossil fuels. Financial institutions may be more inclined to support aquaculture and blue economy projects that incorporate innovative renewable energy solutions, thus enhancing access to financing for local businesses. This increased financial access can empower small industries to adopt sustainable practices and technologies, aligning with the SDG Goal 9:3 to increase the access of small-scale industrial and other enterprises, in particular in developing countries, to financial services, including affordable credit, and their integration into value chains and markets.

Target 9.4: By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities

By targeting the aquaculture and other small-scale blue economy industry sectors of the Blue Economy, the scalable G&J wave energy design WEC has the potential to play a crucial role in retrofitting existing infrastructure to be more sustainable though the reduction on the reliance on non-renewable energy sources.

Target 9.5: Enhance scientific research, upgrade the technological capabilities of industrial sectors in all countries, in particular developing countries, including, by 2030, encouraging innovation and substantially increasing the number of research and development workers per 1 million people and public and private research and development spending

The G&J Wave Energy WEC is flexible and scalable, and the basic design allows for the creative use of readily available components and construction materials. This iterative design process supports and encourages innovation. The G&J Wave WEC design includes identifying the need for powertrain and float designs to match the power requirements and ocean conditions for a specific geographical location, embodies the spirit of enhancing research and technological capabilities.



REDUCED INEQUALITIES

Goal 10: Reduce inequality within and among countries

Target 10.2: By 2030, empower and promote the social, economic, and political inclusion of all, irrespective of economic or geographic status.

Wave energy technology can help reduce inequalities by addressing disparities in energy access faced by coastal, island, and remote communities. The modular and scalable design of the G&J Wave Energy WEC allows deployment in locations where centralized energy infrastructure is limited or unavailable. By reducing reliance on imported fuels and enabling local energy generation, wave energy supports greater economic inclusion, energy equity, and self-sufficiency.



SUSTAINABLE CITIES AND COMMUNITIES

Goal 11: Make cities inclusive, safe, resilient and sustainable

Target 11.A: Support positive economic, social and environmental links between urban, peri-urban and rural areas by strengthening national and regional development planning

The G&J Wave Energy WEC initial project goal was to develop a means for coastal communities in small-scale and developing-regions contexts with limited resources to generate green energy. The first 2,500-watt version is targeted to support small and mid-sized aquaculture fish farms. This and smaller versions of the G&J Wave Energy WEC have the potential be connected in an array which can be electrically interconnected to supply a greater electrical output. This capability supports progress toward the goal to strengthen local resilience and support sustainable development planning by fostering energy independence. The G&J Wave Energy WEC 2,500-watt version is scalable up to 20 Kw.



RESPONSIBLE CONSUMPTION AND PRODUCTION

GOAL 12: Ensure sustainable consumption and production patterns

Target 12.2: By 2030, achieve the sustainable management and efficient use of natural resources

The G&J Wave Energy WEC contributes to Sustainable Development Goal 12.2 by harnessing the power of ocean waves, providing a renewable energy source that reduces reliance on fossil fuels. An initial prototype was constructed using discarded barrels, repurposed bicycle components, and a used automotive alternator, followed by the development of a design that improves upon the initial bicycle-based WEC to create a more robust system. The second iteration of this design also incorporates automotive parts, showcasing a commitment to resourcefulness and the repurposing of materials. The design of the larger 2,500-watt version is straightforward and can be made from a variety of readily available materials and components.

Target 12.5: By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse

The integration of wave energy into the energy mix helps create a circular economy by transforming an underutilized resource into valuable energy. The low-cost versions of the G&J Wave Energy WEC design can be constructed, wholly or partially, from reused materials and components. For example, parts salvaged from old farming equipment or used automotive components can be utilized to create the power takeoff assembly. The low-cost version of the design of the G&J Wave Energy WEC aligns with the target of reducing waste.



CLIMATE ACTION

GOAL 13: Take urgent action to combat climate change and its impacts

Target 13.1: Strengthen resilience and adaptive capacity to climate-related hazards

The G&J Wave Energy WEC contributes to the SDG Goal 13.1 through the harnessing of renewable energy from ocean waves. As a potential sustainable energy solution, it has the potential to reduce reliance on fossil fuels, thereby decreasing greenhouse gas emissions. By converting kinetic energy from waves into electricity, the G&J Wave Energy converter technology not only provides a clean energy source, but also supports progress toward enhancing energy security and resilience against climate impacts. Implementing such innovative energy solutions helps communities adapt to climate change while supporting global efforts to limit temperature rise and promote environmental sustainability.

Target 13.3: Improve education, awareness-raising and human and institutional capacity on climate change mitigation

Deploying the G&J Wave Energy technology in sectors like aquaculture and other small-scale blue economy industry sectors of the Blue Economy, contributes to the reduction in their existing carbon footprint, directly contributing to climate change mitigation. By showcasing the potential of wave energy, it can engage communities, policymakers, and educational institutions in discussions about harvesting renewable energy from ocean waves.



LIFE BELOW WATER

GOAL 14: Conserve and sustainably use the oceans, seas and marine resources

Target 14.1: By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution

G&J Wave Energy's (WEC) technology has the potential to prevent and reduce marine pollution. By harnessing the power of ocean waves, G&J Wave Energy technology could provide a renewable energy source that reduces reliance on fossil fuels, which are major contributors to marine pollution through oil spills and runoff. The prototype 2,500-watt version is targeted to offset the use of fossil fuels used in the aquaculture and monitoring sectors of the Blue Economy. Smaller and larger versions of this prototype can also be used to provide a source of green energy to small-scale coastal communities, limiting their reliance on fossil fuels.

Target 14.7: By 2030, increase the economic benefits to Small Island developing States and least developed countries from the sustainable use of marine resources, including through sustainable management of fisheries, aquaculture and tourism

The G&J Wave Energy WEC focuses on increasing the economic benefits to small island developing states and least developed countries, by providing a means to supply a sustainable use of marine resources. The scalability of the design and the potential for construction with locally sourced materials, can make this technology accessible to developing regions.

Target 14.A: Increase scientific knowledge, develop research capacity and transfer marine technology, taking into account the Intergovernmental Oceanographic Commission Criteria and Guidelines on the Transfer of Marine Technology, in order to improve ocean health and to enhance the contribution of marine biodiversity to the development of developing countries, in particular small island developing States and least developed countries

The G&J Wave Energy WEC technology contributes to the advancement in marine energy technology, providing a potential path to increased scientific knowledge and research capacity in ocean energy systems. Deployment of G&J Wave Energy technology and its potential use for powering offshore monitoring systems, directly supports the gathering of scientific data and enhances research capacity to better understand and manage ocean ecosystems.



LIFE ON LAND

Goal 15: Protect, restore and promote sustainable use of terrestrial ecosystems

Target 15.9: Integrate ecosystem and biodiversity values into national and local planning.

Although wave energy operates in marine environments, its climate mitigation benefits extend to terrestrial ecosystems. By reducing greenhouse gas emissions and fossil fuel extraction, wave energy indirectly supports the protection of land-based biodiversity.



PEACE, JUSTICE AND STRONG INSTITUTIONS

Goal 16: Promote peaceful and inclusive societies for sustainable development

Target 16.6: Develop effective, accountable, and transparent institutions at all levels.

Reliable access to clean and affordable energy strengthens institutional capacity and governance, particularly in coastal and island communities. Wave energy systems enhance energy autonomy and resilience, supporting stable and transparent community-managed infrastructure.



PARTNERSHIPS FOR THE GOALS

Goal 17: Strengthen the means of implementation and revitalize the global partnership for sustainable development

Target 17.6: Enhance North–South, South–South and triangular cooperation on and access to science, technology and innovation.

Wave energy development encourages collaboration among engineers, coastal communities, academic institutions, NGOs, and policymakers. Technology transfer, shared research, and joint pilot projects support international cooperation, particularly for small island developing states.