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# Glossary

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Powering the Blue Economy: Exploring Opportunities  
for Marine Renewable Energy in Maritime Markets

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## Glossary

**Alternating current:** An electric current that reverses its direction at regularly recurring intervals.

**Aquaculture:** The cultivation of aquatic organisms (such as fish or shellfish), especially for food.

**Array:** An arrangement of similar devices. In ocean energy devices, this means a number of similar devices arranged into a single group to provide a combined energy output. Also known as a farm.

**Autonomous underwater vehicle:** An unmanned vehicle designed to operate underwater without guidance according to preprogrammed instructions.

**Auxiliary power:** Electric power that is provided by an alternate source and that serves as backup for the primary power source at the station main bus or prescribed sub-bus.

**Availability:** Percentage of time an energy device is operational and able to convert energy.

**Axial flow:** Having the fluid or gas flowing parallel to the axis.

**Benefit-to-cost ratio:** An indicator, used in cost-benefit analysis, to identify the relationship between the cost and benefits of a proposed project.

**Biodiesel:** A fuel that is similar to diesel fuel and is derived (usually) from vegetable or plant oil.

**Bulk power market:** Type of energy market that is restricted to wholesale suppliers and retailers (resellers) and a few select large-scale customers. Retailers who acquire energy on the wholesale market for resale elsewhere are typically responsible for providing any ancillary services needed by their eventual customers. These services can include peak supply and back-up service, which may also be acquired on the wholesale market.

**Capacity factor:** Same as load factor or full-load factor. The ratio of the mean generation to the peak generation on a renewable energy generator. Either expressed in percentage (referring to a reference time period) or in equivalent full load hours per year.

**Capital expenditure:** An amount paid out that creates a long-term benefit (as one lasting beyond the taxable year).

**Combined-cycle hydropower:** Increasing hydropower production by installing hydrokinetic turbines behind existing conventional hydropower stations. The hydrokinetic turbines will capture additional power from the energy remaining in water currents exiting the hydropower station.

**Commercial viability:** The state of a technology having proven both a high readiness and technology performance level such that an array-scale project is deemed investment worthy, being safe, reliable, and cost competitive.

**Conductivity:** The ratio of the electric current density to the electric field in a material.

**Conversion efficiency:** The conversion efficiency ( $\eta$ ) of a device is the proportion of energy converted to a useful form (e.g., electricity) compared to the total energy available to the device.

**Cross-flow turbines:** A low-speed water turbine wherein the water passes through the turbine transversely, or across the turbine blades.

**Desalination:** Removal of salt and other minerals from seawater to make it suitable for human consumption and/or industrial use. Reverse osmosis is a commonly used desalination method in which saltwater is forced through a membrane that allows water molecules to pass but blocks other molecules, such as salt and various minerals.

**Device:** An individual unit capable of absorbing power and converting it to electricity (or other energy form for delivery in case of nonelectric applications); the device is just one subsystem alongside a number of others making up the system.

**Direct current:** An electric current flowing in one direction only and substantially constant in value.

**Distributed energy:** On-site generation or decentralized energy in which electrical generation and storage is performed by a variety of small, grid-connected devices referred to as distributed energy resources.

**Edge caching:** The use of caching servers to store content closer to end users.

**Electrical load:** An electrical part or portion of a circuit that consumes (active) electric power.

**Electrolysis:** Electrolysis is the process of using electricity to split water into hydrogen and oxygen. This reaction takes place in an electrolyzer.

**Electromagnetic pulse:** A pulse of high-intensity electromagnetic radiation generated especially by a nuclear blast high above the Earth's surface and held to disrupt electronic and electrical systems.

**Energy density:** The amount of energy (as in a beam of radiation) per unit volume.

**Energy efficiency:** The goal to reduce the amount of energy required to provide products and services.

**Energy storage:** The capture of energy produced at one time for use at a later time. A device that stores energy is generally called an accumulator or battery.

**Exclusive Economic Zone:** Extends no more than 200 nautical miles from the territorial sea baseline and is adjacent to the 12 nautical mile territorial sea of the United States, including any other territory or possession over which the United States exercises sovereignty. Within this zone, the United States has sovereign rights for the purpose of exploring, exploiting, conserving, and managing natural resources, whether living or nonliving, of the seabed and subsoil and the superjacent waters and with regard to other activities for the economic exploitation and exploration of the zone, such as the production of energy from the water, currents, and winds.

**Floating point absorber:** A floating structure that absorbs energy from all directions through its movements at/near the water surface.

**Frequency control:** A process to maintain stability in the power system. In power systems, when the load is more than the supplying power, the frequency in the system will drop.

**Fuel cells:** A device that continuously changes the chemical energy of a fuel (such as hydrogen) and an oxidant directly into electrical energy.

**Grid resiliency:** The ability of an electric grid to reduce the magnitude and/or duration of disruptive events. The effectiveness of an electric grid depends on its ability to anticipate, absorb, adapt to, and/or rapidly recover from a potentially disruptive event.

**Hydraulic pressure:** The pressure of hydraulic fluid that is exerted in all directions of a vessel, hose, or anything in which it is supposed to exert the force per unit area. This pressure is responsible for creating the flow in a hydraulic system as fluid flows from high to low pressure.

**Hydropower:** The production of electricity by water power.

**Hyperscale data center:** A computer architecture that expands and contracts based on the current needs of the business. Scalability is seamless and involves a robust system with flexible memory, networking, and storage capabilities.

**Inductive power transfer:** The transmission of electrical energy from a power source to an electrical device without the use of cord conductors.

**Installed capacity:** The installed capacity of a device is the total power that the device can produce when operating correctly and at full power output. Traditionally, this is the installed capacity of the electrical generator in a device. Installed capacity is usually measured in kilowatts or megawatts.

**Intermittent energy source:** Any source of energy that is not continuously available for conversion into electricity and outside direct control because the used primary energy cannot be stored.

**International Energy Agency – Ocean Energy Systems:** General ocean energy glossary. <https://www.ocean-energy-systems.org/publications/oes-reports/guidelines/document/ocean-energy-glossary-2007-/>.

**International Electrotechnical Commission (IEC) TC114 Marine Energy Terminology Technical Specification: IEC TS 62600-1. Marine Energy – Wave, Tidal, and other Water Current Converters – Part 1: Terminology.** [http://www.iec.ch/dyn/www/f?p=103:7:0:::FSP\\_ORG\\_ID,FSP\\_LANG\\_ID:1316,25/](http://www.iec.ch/dyn/www/f?p=103:7:0:::FSP_ORG_ID,FSP_LANG_ID:1316,25/).

**Isolated power systems:** An ungrounded electrical service for various applications that remain in operation in the event of a single line-to-ground fault situation.

**Internet of things:** The networking capability that allows information to be sent to and received from objects and devices (such as fixtures and kitchen appliances) using the internet.

**Kilowatt-hour:** Amount of energy transferred. One kilowatt for 1 hour. Equivalent to electric heater running for 1 hour.

**Levelized cost of energy:** The lifetime project costs divided by lifetime energy production, resulting in the total present value cost of operating a power plant. Levelized cost of energy characterizes the average price in \$/kilowatt-hour that a power plant must receive to break even over its operational lifetime.

**Life cycle:** The implementation of a project over all of its stages: engineering (includes permitting), procurement, construction, installation, operations, maintenance, decommissioning, disposal. Usually used in the context of levelized cost of energy.

**Load balancing:** The use of various techniques by electrical power stations to store excess electrical power during low demand periods for release as demand rises.

**Marine energy:** Renewable energy that may be harnessed by exploiting an aspect of the physical, chemical, or thermodynamic characteristics of oceans and seas, including tidal movement, wave motion, thermal gradients, salinity gradients, and currents.

**Megawatt-hour:** Is equal to 1,000 kilowatts of electricity used continuously for 1 hour.

**Operational expenditure:** Money spent on the ongoing costs of running a business or organization, such as wages and rent on premises.

**Oscillating water column:** A type of wave energy converter that harnesses energy from the oscillation of the seawater inside a chamber or hollow caused by the action of waves.

**Overtopping:** The rising of water over the top of a barrier.

**Performance:** In most cases, as in the clause “performance and reliability,” performance generally refers to the energy capture and conversion efficiency, but in the case of technology performance level, performance refers to all attributes of the array and any necessary supporting infrastructure that impact the techno-economic viability of the technology.

**Point absorber:** A floating structure that absorbs energy from all directions through its movements at/near the water surface. It converts the motion of the buoyant top relative to the base into electrical power.

**Power take-off:** A system incorporated to a renewable energy device that allows energy to be converted from the physical motions of the device to a useful form, such as electricity.

**Project:** Captures all aspects of a demonstration or deployment, including (if applicable depending on scale and product produced from project) permitting, training/securing workforce, arranging power purchaser or nonelectric product buyer, and so on, that may not be captured by “system.” Projects can be pilot or commercial and can be at the device or array scale. A commercial project involves selling electricity to a grid (utility or micro), or a nonelectric product. A utility project is a specific commercial project delivering electricity as its product, at higher capacities serving a grid of significant size.

**Readiness:** The degree to which technology has progressed from an early stage of development (i.e., conceptualization) through to commercialization, wherein the technology and its application in an array and supporting infrastructure have been derisked to a degree the technology is certifiable/insurable at reasonable rates commensurate to other similar energy projects).

**Reliability:** Broad term intended to include all system aspects that affect the availability (percent of time the energy conversion system is not in operation and thus available to convert energy from the resource and deliver the product—electricity—to the end user). For instance, downtime of the system regardless of the degree of severity—from an unreliable component that breaks but can be fixed through to the failure of the system to survive—are all covered in the “reliability” term for the purpose of this strategy document.

**Resiliency:** The ability to prepare for and adapt to changing conditions and withstand and recover rapidly from disruptions.

**Reverse osmosis:** The movement of freshwater through a semipermeable membrane when pressure is applied to a solution (such as seawater) on one side of it.

**Run-of-river turbine:** A device that harvests energy from flowing water to generate electricity in the absence of a large dam and reservoir.

**Survivability:** A measure of a device's ability to remain intact and operational in extreme environmental conditions.

**System:** Refers to the device, mooring, grid connection (or energy delivery in case of nonelectric applications) subsystems as well as effort and infrastructure for installation, operation, and maintenance, recovery over the lifecycle.

**Technologies:** Refers to any and all components, devices, systems, or arrays at any scale.

**Technology performance level:** Metric that rates a technology on a scale of 1 to 9 for having the necessary attributes to be techno-economically viable in a target market of high energy intensity, low cost of energy.

**Technology readiness level:** Metric that ranks a technology on a scale of 1 to 9, from the beginning of exploration and planning to the commercial application of the technology.

**Terawatt-hour:** Electrical energy consumption rate equivalent to a trillion watts consumed in 1 hour.

**Tidal turbine:** A device that converts the kinetic energy from the movement of water coming from a change in tide into electricity.

**Utility-scale generation:** An electricity generation facility that feeds power into the grid and supplies a utility with energy for their customers.

**Variable generation:** An energy resource, like renewable energy, that is nondispatchable because of its fluctuating nature.

**Voltage:** A quantitative expression of the potential difference in charge between two points in an electrical field.

**Wave energy converter:** A technology that can convert the energy of waves into useful energy, such as electricity.

**Wave power generation:** The capture of energy of wind waves to do useful work (e.g., electricity generation, water desalination, or pumping water).