

(4) To promote the development of water power technologies to improve economic growth and enhance cross-institutional foundational workforce development in the water power sector, including in coastal communities.

(Pub. L. 110-140, title VI, §633, as added Pub. L. 116-260, div. Z, title III, §3001(a), Dec. 27, 2020, 134 Stat. 2480.)

Editorial Notes

PRIOR PROVISIONS

A prior section 17212, Pub. L. 110-140, title VI, §633, Dec. 19, 2007, 121 Stat. 1686, related to marine and hydrokinetic renewable energy research and development, prior to the general amendment of this part by Pub. L. 116-260.

§ 17213. Hydropower research, development, and demonstration

The Secretary shall conduct a program of research, development, demonstration, and commercial application for technologies that improve the capacity, efficiency, resilience, security, reliability, affordability, and environmental impact, including potential cumulative environmental impacts, of hydropower systems. In carrying out such program, the Secretary shall prioritize activities designed to—

(1) develop technology for—

(A) non-powered dams, including aging and potentially hazardous dams;

(B) pumped storage;

(C) constructed waterways;

(D) new stream-reach development;

(E) modular and small dams;

(F) increased operational flexibility; and

(G) enhancement of relevant existing facilities;

(2) develop new strategies and technologies, including analytical methods, physical and numerical tools, and advanced computing, as well as methods to validate such methods and tools, in order to—

(A) extend the operational lifetime of hydropower systems and their physical structures, while improving environmental impact, including potential cumulative environmental impacts;

(B) assist in device and system design, installation, operation, and maintenance; and

(C) reduce costs, limit outages, and increase unit and plant efficiencies, including by examining the impact of changing water and electricity demand on hydropower generation, flexibility, and provision of grid services;

(3) study, in conjunction with other relevant Federal agencies as appropriate, methods to improve the hydropower licensing process, including by compiling current and accepted best practices, public comments, and methodologies to assess the full range of potential environmental and economic impacts;

(4) identify opportunities for joint research, development, and demonstration programs between hydropower systems, which may include—

(A) pumped storage systems and other renewable energy systems;

(B) small hydro facilities and other energy storage systems;

(C) other hybrid energy systems;

(D) small hydro facilities and critical infrastructure, including water infrastructure; and

(E) hydro facilities and responsive load technologies, which may include smart buildings and city systems;

(5) improve the reliability of hydropower technologies, including during extreme weather events;

(6) develop methods and technologies to improve environmental impact, including potential cumulative environmental impacts, of hydropower and pumped storage technologies, including potential impacts on wildlife, such as—

(A) fisheries;

(B) aquatic life and resources;

(C) navigation of waterways; and

(D) upstream and downstream environmental conditions, including sediment movement, water quality, and flow volumes;

(7) identify ways to increase power generation by—

(A) diversifying plant configuration options;

(B) improving pump-back efficiencies;

(C) investigating multi-phase systems;

(D) developing, testing, and monitoring advanced generators with faster cycling times, variable speeds, and improved efficiencies;

(E) developing, testing, and monitoring advanced turbines capable of improving environmental impact, including potential cumulative environmental impacts, including small turbine designs;

(F) developing standardized powertrain components;

(G) developing components with advanced materials and manufacturing processes, including additive manufacturing; and

(H) developing analytical tools that enable hydropower to provide grid services that, amongst other services, improve grid integration of other energy sources;

(8) advance new pumped storage technologies, including—

(A) systems with adjustable speed and other new pumping and generating equipment designs;

(B) modular systems;

(C) alternative closed-loop systems, including mines and quarries; and

(D) other innovative equipment and materials as determined by the Secretary;

(9) reduce civil works costs and construction times for hydropower and pumped storage systems, including comprehensive data and systems analysis of hydropower and pumped storage construction technologies and processes in order to identify areas for whole-system efficiency gains;

(10) advance efficient and reliable integration of hydropower and pumped storage systems with the electric grid by—

(A) improving methods for operational forecasting of renewable energy systems to

identify opportunities for hydropower applications in pumped storage and hybrid energy systems, including forecasting of seasonal and annual energy storage;

(B) considering aggregating small distributed hydropower assets; and

(C) identifying barriers to grid scale implementation of hydropower and pumped storage technologies;

(11) improve computational fluid dynamic modeling methods;

(12) improve flow measurement methods, including maintenance of continuous flow measurement equipment;

(13) identify best methods for compiling data on all hydropower resources and assets, including identifying potential for increased capacity; and

(14) identify mechanisms to test and validate performance of hydropower and pumped storage technologies.

(Pub. L. 110-140, title VI, §634, as added Pub. L. 116-260, div. Z, title III, §3001(a), Dec. 27, 2020, 134 Stat. 2480.)

Editorial Notes

PRIOR PROVISIONS

A prior section 17213, Pub. L. 110-140, title VI, §634, Dec. 19, 2007, 121 Stat. 1687, related to National Marine Renewable Energy Research, Development, and Demonstration Centers, prior to the general amendment of this part by Pub. L. 116-260.

§ 17214. Marine energy research, development, and demonstration

(a) In general

The Secretary, in consultation with the Secretary of Defense, Secretary of Commerce (acting through the Under Secretary of Commerce for Oceans and Atmosphere) and other relevant Federal agencies, shall conduct a program of research, development, demonstration, and commercial application of marine energy technology, including activities to—

(1) assist technology development to improve the components, processes, and systems used for power generation from marine energy resources at a variety of scales;

(2) establish and expand critical testing infrastructure and facilities necessary to—

(A) demonstrate and prove marine energy devices at a range of scales in a manner that is cost-effective and efficient; and

(B) accelerate the technological readiness and commercial application of such devices;

(3) address marine energy resource variability issues, including through the application of energy storage technologies;

(4) advance efficient and reliable integration of marine energy with the electric grid, which may include smart building systems;

(5) identify and study critical short-term and long-term needs to maintaining a sustainable marine energy supply chain based in the United States;

(6) increase the reliability, security, and resilience of marine energy technologies;

(7) validate the performance, reliability, maintainability, and cost of marine energy de-

vice designs and system components in an operating environment;

(8) consider the protection of critical infrastructure, such as adequate separation between marine energy devices and submarine telecommunications cables, including through the development of voluntary, consensus-based standards for such purposes;

(9) identify opportunities for crosscutting research, development, and demonstration programs between existing energy research programs;

(10) identify and improve, in conjunction with the Secretary of Commerce, acting through the Under Secretary of Commerce for Oceans and Atmosphere, and other relevant Federal agencies as appropriate, the environmental impact, including potential cumulative environmental impacts, of marine energy technologies, including—

(A) potential impacts on fisheries and other marine resources; and

(B) developing technologies, including mechanisms for self-evaluation, and other means available for improving environmental impact, including potential cumulative environmental impacts;

(11) identify, in consultation with relevant Federal agencies, potential navigational impacts of marine energy technologies and strategies to prevent possible adverse impacts, in addition to opportunities for marine energy systems to aid the United States Coast Guard, such as remote sensing for coastal border security;

(12) develop numerical and physical tools, including models and monitoring technologies, to assist industry in device and system design, installation, operation, and maintenance, including methods to validate such tools;

(13) support materials science as it relates to marine energy technology, such as the development of corrosive-resistant materials;

(14) improve marine energy resource forecasting and general understanding of aquatic system behavior, including turbulence and extreme conditions;

(15) develop metrics and voluntary, consensus-based standards, in coordination with the National Institute of Standards and Technology and appropriate standard development organizations, for marine energy components, systems, and projects, including—

(A) measuring performance of marine energy technologies; and

(B) characterizing environmental conditions;

(16) enhance integration with hybrid energy systems, including desalination;

(17) identify opportunities to integrate marine energy technologies into new and existing infrastructure; and

(18) to¹ develop technology necessary to support the use of marine energy—

(A) for the generation and storage of power at sea; and

(B) for the generation and storage of power to promote the resilience of coastal commu-

¹ So in original.