116TH CONGRESS
1ST SESSION

S. _____

To provide for the modernization of the electric grid, and for other purposes.

IN THE SENATE OF THE UNITED STATES

Ms. CANTWELL (for herself, Mr. HEINRICH, and Ms. HIRONO) introduced the following bill; which was read twice and referred to the Committee on

---

A BILL

To provide for the modernization of the electric grid, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE; TABLE OF CONTENTS.

(a) SHORT TITLE.—This Act may be cited as the "Grid Modernization Act of 2019".

(b) TABLE OF CONTENTS.—The table of contents for this Act is as follows:

SEC. 2. DEFINITIONS.

In this Act:

(1) DEPARTMENT.—The term "Department" means the Department of Energy.

(2) NATIONAL LABORATORY.—The term "National Laboratory" has the meaning given the term in section 2 of the Energy Policy Act of 2005 (42 U.S.C. 15801).

(3) SECRETARY.—The term "Secretary" means the Secretary of Energy.

SEC. 3. GRID STORAGE PROGRAM.

(a) IN GENERAL.—The Secretary shall conduct a program of research, development, and demonstration of electric grid energy storage that addresses the principal challenges identified in the 2013 Department of Energy Strategic Plan for Grid Energy Storage.

(b) AREAS OF FOCUS.—The program under this section shall focus on—

(1) materials, electric thermal, electromechanical, and electrochemical systems research;

(2) power conversion technologies research;

(3) developing—

(A) empirical and science-based industry standards to compare the storage capacity, cycle length and capabilities, and reliability of different types of electricity storage; and

(B) validation and testing techniques;

(4) other fundamental and applied research critical to widespread deployment of electricity storage;

(5) device development that builds on results from research described in paragraphs (1), (2), and (4), including combinations of power electronics, advanced optimizing controls, and energy storage as a general purpose element of the electric grid;

(6) grid-scale testing and analysis of storage devices, including test-beds and field trials;

(7) cost-benefit analyses that inform capital expenditure planning for regulators and owners and operators of components of the electric grid;

(8) electricity storage device safety and reliability, including potential failure modes, mitigation measures, and operational guidelines;

(9) standards for storage device performance, control interface, grid interconnection, and interoperability; and

(10) maintaining a public database of energy storage projects, policies, codes, standards, and regulations.

(c) ASSISTANCE TO STATES.—The Secretary may provide technical and financial assistance to States, Indian Tribes, or units of local government to participate in or use research, development, or demonstration of technology developed under this section.

(d) AUTHORIZATION OF APPROPRIATIONS.—There is authorized to be appropriated to the Secretary to carry out this section $50,000,000 for each of fiscal years 2020 through 2028.

(e) NO EFFECT ON OTHER PROVISIONS OF LAW.—Nothing in this Act or an amendment made by this Act authorizes regulatory actions that would duplicate or conflict with regulatory requirements, mandatory standards, or related processes under section 215 of the Federal Power Act (16 U.S.C. 824o).

(f) USE OF FUNDS.—To the maximum extent practicable, in carrying out this section, the Secretary shall ensure that the use of funds to carry out this section is coordinated among different offices within the Grid Modernization Initiative of the Department and other programs conducting energy storage research.

SEC. 4. TECHNOLOGY DEMONSTRATION ON THE DISTRIBUTION SYSTEM.

(a) IN GENERAL.—The Secretary shall establish a grant program to carry out eligible projects related to the modernization of the electric grid, including the application of technologies to improve observability, advanced controls, and prediction of system performance on the distribution system.

(b) ELIGIBLE PROJECTS.—To be eligible for a grant under subsection (a), a project shall—

(1) be designed to improve the performance and efficiency of the future electric grid, while ensuring the continued provision of safe, secure, reliable, and affordable power;

(2) demonstrate—

(A) secure integration and management of 2 or more energy resources, including distributed energy generation, combined heat and power, micro-grids, energy storage, electric vehicles, energy efficiency, demand response, and intelligent loads; and

(B) secure integration and interoperability of communications and information technologies; and

(3) be subject to the requirements of section 545(a) of the Energy Security and Independence Act of 2007 (42 U.S.C. 17155(a)).

SEC. 5. MICRO-GRID AND HYBRID MICRO-GRID SYSTEMS PROGRAM.

(a) DEFINITIONS.—In this section:

(1) HYBRID MICRO-GRID SYSTEM.—The term "hybrid micro-grid system" means a stand-alone electrical system that—

(A) is comprised of conventional generation and at least 1 alternative energy resource; and

(B) may use grid-scale energy storage.

(2) ISOLATED COMMUNITY.—The term "isolated community" means a community that is powered by a stand-alone electric generation and distribution system without the economic and reliability benefits of connection to a regional electric grid.

(3) MICRO-GRID SYSTEM.—The term "micro-grid system" means a standalone electrical system that uses grid-scale energy storage.

(4) STRATEGY.—The term "strategy" means the strategy developed pursuant to subsection (b)(2)(B).

(b) PROGRAM.—

(1) ESTABLISHMENT.—The Secretary shall establish a program to promote the development of—

(A) hybrid micro-grid systems for isolated communities; and

(B) micro-grid systems to increase the resilience of critical infrastructure.

(2) PHASES.—The program established under paragraph (1) shall be divided into the following phases:

(A) Phase I, which shall consist of the development of a feasibility assessment for—

(i) hybrid micro-grid systems in isolated communities; and

(ii) micro-grid systems to enhance the resilience of critical infrastructure.

(B) Phase II, which shall consist of the development of an implementation strategy, in accordance with paragraph (3), to promote the development of hybrid micro-grid systems for isolated communities, particularly for those communities exposed to extreme weather conditions and high energy costs, including electricity, space heating and cooling, and transportation.

(C) Phase III, which shall be carried out in parallel with Phase II and consist of the development of an implementation strategy to promote the development of micro-grid systems that increase the resilience of critical infrastructure.

(D) Phase IV, which shall consist of cost-shared demonstration projects, based upon the strategies developed under subparagraph (B) that include the development of physical and cybersecurity plans to take appropriate measures to protect and secure the electric grid.

(E) Phase V, which shall establish a benefits analysis plan to help inform regulators, policymakers, and industry stakeholders about the affordability, environmental and resilience benefits associated with Phases II, III, and IV.

(3) REQUIREMENTS FOR STRATEGY.—In developing the strategy under paragraph (2)(B), the Secretary shall consider—

(A) establishing future targets for the economic displacement of conventional generation using hybrid micro-grid systems, including displacement of conventional generation used for

electric power generation, heating and cooling, and transportation;

(B) the potential for renewable resources, including wind, solar, and hydropower, to be integrated into a hybrid micro-grid system;

(C) opportunities for improving the efficiency of existing hybrid micro-grid systems;

(D) the capacity of the local workforce to operate, maintain, and repair a hybrid micro-grid system;

(E) opportunities to develop the capacity of the local workforce to operate, maintain, and repair a hybrid micro-grid system;

(F) leveraging existing capacity within local or regional research organizations, such as organizations based at institutions of higher education, to support development of hybrid micro-grid systems, including by testing novel components and systems prior to field deployment;

(G) the need for basic infrastructure to develop, deploy, and sustain a hybrid micro-grid system;

(H) input of traditional knowledge from local leaders of isolated communities in the development of a hybrid micro-grid system;

(I) the impact of hybrid micro-grid systems on defense, homeland security, economic development, and environmental interests;

(J) opportunities to leverage existing interagency coordination efforts and recommendations for new interagency coordination efforts to minimize unnecessary overhead, mobilization, and other project costs; and

(K) any other criteria the Secretary determines appropriate.

(c) COLLABORATION.—The program established under subsection (b)(1) shall be carried out in collaboration with relevant stakeholders, including, as appropriate—

(1) States;

(2) Indian Tribes;

(3) regional entities and regulators;

(4) units of local government;

(5) institutions of higher education; and

(6) private sector entities.

(d) REPORT.—Not later than 180 days after the date of enactment of this Act, and annually thereafter until cal-

endar year 2027, the Secretary shall submit to the Committee on Energy and Natural Resources of the Senate and the Committee on Energy and Commerce of the House of Representatives a report on the efforts to implement the program established under subsection (b) (1) and the status of the strategy developed under subsection (b)(2)(B).

SEC. 6. ELECTRIC GRID ARCHITECTURE, SCENARIO DEVELOPMENT, AND MODELING.

(a) GRID ARCHITECTURE AND SCENARIO DEVELOPMENT.—

(1) IN GENERAL.—Subject to paragraph (2), the Secretary shall establish and facilitate a collaborative process to develop model grid architecture and a set of future scenarios for the electric grid to examine the impacts of different combinations of resources (including different quantities of distributed energy resources and large-scale, central generation) on the electric grid.

(2) MARKET STRUCTURE.—The grid architecture and scenarios developed under paragraph (1) shall account for differences in market structure, including an examination of the potential for stranded costs in each type of market structure.

(3) FINDINGS.—Based on the findings of grid architecture developed under paragraph (1), the Secretary shall—

(A) determine whether any additional standards are necessary to ensure the interoperability of grid systems and associated communications networks; and

(B) if the Secretary makes a determination that additional standards are necessary under subparagraph (A), make recommendations for additional standards, including, as may be appropriate, to the Electric Reliability Organization under section 215 of the Federal Power Act (16 U.S.C. 824o). The Electric Reliability Organization shall not be under any obligation to establish any process to consider such recommendations.

(b) MODELING.—Subject to subsection (c), the Secretary shall—

(1) conduct modeling based on the scenarios developed under subsection (a); and

(2) analyze and evaluate the technical and financial impacts of the models to assist States, utilities, and other stakeholders in—

(A) enhancing strategic planning efforts;

(B) avoiding stranded costs; and

(C) maximizing the cost-effectiveness of future grid-related investments.

(c) INPUT.—The Secretary shall develop the scenarios and conduct the modeling and analysis under subsections (a) and (b) with participation or input, as appropriate, from—

(1) the National Laboratories;

(2) States;

(3) State regulatory authorities;

(4) transmission organizations;

(5) representatives of all sectors of the electric power industry;

(6) academic institutions;

(7) independent research institutes; and

(8) other entities.

(d) EFFECT.—Nothing in this section grants any person a right to receive or review confidential, proprietary, or otherwise protected information concerning grid architecture or scenarios.

SEC. 7. VOLUNTARY MODEL PATHWAYS.

(a) ESTABLISHMENT OF VOLUNTARY MODEL PATHWAYS.—

(1) ESTABLISHMENT.—Not later than 90 days after the date of enactment of this Act, the Sec-

retary, in consultation with the steering committee established under paragraph (3), shall initiate the development of voluntary model pathways for modernizing the electric grid through a collaborative, public-private effort that—

(A) produces illustrative policy pathways encompassing a diverse range of technologies that can be adapted for State and regional applications by regulators and policymakers;

(B) facilitates the modernization of the electric grid and associated communications networks to achieve the objectives described in paragraph (2);

(C) ensures a reliable, resilient, affordable, safe, and secure electric grid; and

(D) acknowledges and accounts for different priorities, electric systems, and rate structures across States and regions.

(2) OBJECTIVES.—The pathways established under paragraph (1) shall facilitate achievement of as many of the following objectives as practicable:

(A) Near real-time situational awareness of the electric system.

(B) Data visualization.

(C) Advanced monitoring and control of the advanced electric grid.

(D) Enhanced certainty of policies for investment in the electric grid.

(E) Increased innovation.

(F) Greater consumer empowerment.

(G) Enhanced grid resilience, reliability, and robustness.

(H) Improved—

(i) integration of distributed energy resources;

(ii) interoperability of the electric system; and

(iii) predictive modeling and capacity forecasting.

(I) Reduced cost of service for consumers.

(J) Diversification of generation sources.

(3) STEERING COMMITTEE.—Not later than 90 days after the date of enactment of this Act, the Secretary shall establish a steering committee to help develop the pathways under paragraph (1), to be composed of members appointed by the Secretary, consisting of persons with appropriate expertise representing a diverse range of interests in the public,

private, and academic sectors, including representatives of—

(A) the Federal Energy Regulatory Commission;

(B) the National Laboratories;

(C) States;

(D) State regulatory authorities;

(E) transmission organizations;

(F) representatives of all sectors of the electric power industry;

(G) institutions of higher education;

(H) independent research institutes; and

(I) other entities.

(b) TECHNICAL ASSISTANCE.—The Secretary may provide technical assistance to States, Indian Tribes, or units of local government to adopt or implement 1 or more elements of the pathways developed under subsection (a)(1), including on a pilot basis.

SEC. 8. PERFORMANCE METRICS FOR ELECTRICITY INFRASTRUCTURE PROVIDERS.

(a) IN GENERAL.—Not later than 2 years after the date of enactment of this Act, the Secretary, in consultation with the steering committee established under section 7(a)(3), shall submit to the Committee on Energy and Natural Resources of the Senate and the Committee on

Energy and Commerce of the House of Representatives a report that includes—

(1) an evaluation of the performance of the electric grid as of the date of the report; and

(2) a description of the projected range of measurable costs and benefits associated with the changes evaluated under the scenarios developed under section 6.

(b) CONSIDERATIONS FOR DEVELOPMENT OF METRICS.—In developing metrics for the evaluation and projections under subsection (a), the Secretary shall consider—

(1) standard methodologies for calculating improvements or deteriorations in the performance metrics, such as reliability, grid efficiency, power quality, consumer satisfaction, sustainability, and financial incentives;

(2) standard methodologies for calculating potential costs and measurable benefits value to ratepayers, applying the performance metrics developed under paragraph (1);

(3) identification of tools, resources, and deployment models that may enable improved performance through the adoption of emerging, commer-

cially available or advanced grid technologies or solutions, including—

(A) multicustomer micro-grids;

(B) distributed energy resources;

(C) energy storage;

(D) electric vehicles;

(E) electric vehicle charging infrastructure;

(F) integrated information and communications systems;

(G) transactive energy systems; and

(H) advanced demand management systems; and

(4) the role of States and local regulatory authorities in enabling a robust future electric grid to ensure that—

(A) electric utilities remain financially viable;

(B) electric utilities make the needed investments that ensure a reliable, secure, and resilient grid; and

(C) costs incurred to transform to an integrated grid are allocated and recovered responsibly, efficiently, and equitably.

SEC. 9. VOLUNTARY STATE, REGIONAL, AND LOCAL ELECTRICITY DISTRIBUTION PLANNING.

(a) IN GENERAL.—On the request of a State, regional organization, or electric utility, the Secretary shall provide assistance to States, regional organizations, and electric utilities to facilitate the development of State, regional, and local electricity distribution plans by—

(1) conducting a resource assessment and analysis of future demand and distribution requirements; and

(2) developing open source tools for State, regional, and local planning and operations.

(b) RISK AND SECURITY ANALYSIS.—The assessment under subsection (a)(1) shall include—

(1) the evaluation of the physical security, cybersecurity, and associated communications needs of an advanced distribution management system and the integration of distributed energy resources; and

(2) advanced use of grid architecture to analyze risks in an all-hazards approach that includes communications infrastructure, control systems architecture, and power systems architecture.

(c) DESIGNATION.—The information collected for the assessment and analysis under subsection (a)(1)—

(1) shall be considered to be critical electric infrastructure information under section 215A of the Federal Power Act (16 U.S.C. 824o–1); and

(2) shall only be released in compliance with regulations implementing that section.

(d) TECHNICAL ASSISTANCE.—For the purpose of assisting in the development of State and regional electricity distribution plans, the Secretary shall provide technical assistance to—

(1) States;

(2) regional reliability entities; and

(3) other distribution asset owners and operators.

(e) WITHDRAWAL.—A State or any entity that has requested technical assistance under this section may withdraw the request for technical assistance at any time, and on such withdrawal, the Secretary shall terminate all assistance efforts.

(f) EFFECT.—Nothing in this section authorizes the Secretary to require any State, regional organization, regional reliability entity, asset owner, or asset operator to adopt any model, tool, plan, analysis, or assessment.

SEC. 10. AUTHORIZATION OF APPROPRIATIONS.

There is authorized to be appropriated to the Secretary to carry out section 4 through this section $200,000,000 for each of fiscal years 2020 through 2028.