114TH CONGRESS
1ST SESSION

S. _____

To facilitate modernizing the electric grid, and for other purposes.

IN THE SENATE OF THE UNITED STATES

Ms. CANTWELL introduced the following bill; which was read twice and referred to the Committee on _____

A BILL

To facilitate modernizing 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.

This Act may be cited as the ''Grid Modernization Act of 2015''.

TITLE I—GENERAL PROVISIONS

SEC. 101. STATEMENT OF POLICY ON GRID MODERNIZATION.

It is the policy of the United States to promote and advance—

(1) the modernization of the energy delivery infrastructure of the United States, including bolstering the reliability, affordability, diversity, efficiency, security, and resilience of domestic energy supplies, through advanced grid technologies;

(2) the modernization of the electric grid—

(A) to continue facilitating the development of a Smart Grid as characterized in section 1301 of the Energy Independence and Security Act of 2007 (42 U.S.C. 17381);

(B) to enable a robust multidirectional power flow that leverages distributed energy resources; and

(C) to facilitate the alignment of business and regulatory models to achieve a grid that optimizes—

(i) the entire electric delivery system; and

(ii) a sustainable, reliable, and resilient energy future;

(3) relevant research and development in advanced grid technologies, including—

(A) energy storage;

(B) predictive tools and requisite real-time data to enable the dynamic optimization of grid operations;

(C) power electronics that ease the challenge of intermittent and distributed generation;

(D) real-time data and situational awareness tools and systems; and

(E) tools to increase data security, physical security, and cybersecurity awareness and protection;

(4) the leadership of the United States in basic and applied sciences to develop a systems approach to innovation and invention of cybersecure advanced grid technologies, architectures, and control paradigms capable of managing diverse supplies and loads;

(5) the safeguarding of the critical energy delivery infrastructure of the United States and the enhanced resilience of the infrastructure to all hazards, including—

(A) extreme weather events;

(B) cyber and physical threats; and

(C) other factors that affect energy delivery;

(6) the coordination of goals, investments to optimize the grid, and other measures for energy efficiency, advanced grid technologies, interoperability, and demand response resources;

(7) partnerships with States and the private sector—

(A) to facilitate advanced grid capabilities and strategies; and

(B) to provide technical assistance, tools, or other related information necessary to enhance grid integration, particularly in connection with the development at the State and local levels of strategic energy, energy surety and assurance, and emergency preparedness, response, and restoration planning;

(8) the deployment of information and communications technologies at all levels of the electric system;

(9) opportunities to provide consumers with timely information and advanced control options;

(10) sophisticated or advanced control options to integrate distributed energy resources and associated ancillary services;

(11) open-source communications, database architectures, and common information model stand-

ards, guidelines, and protocols that enable interoperability to maximize efficiency gains and associated benefits among—

(A) the grid;

(B) energy and building management systems; and

(C) residential, commercial, and industrial equipment;

(12) private sector investment in the energy delivery infrastructure of the United States through targeted demonstration and validation of advanced grid technologies; and

(13) establishment of common valuation methods and tools for cost-benefit analysis of grid integration paradigms.

SEC. 102. GRID STORAGE PROGRAM.

(a) IN GENERAL.—The Secretary of Energy (acting through the Assistant Secretary of the Office of Electricity Delivery and Energy Reliability) (referred to in this Act as the ''Secretary'') shall conduct a program of research and development 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 and electrochemical systems research;

(2) power conversion technologies research;

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

(4) device development that builds on results from research described in paragraphs (1) through (3), including combinations of power electronics, advanced optimizing controls, and energy storage as a general purpose element of the electric grid;

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

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

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

(8) standards for storage device performance, control interface, grid interconnection, and interoperability.

(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 deployment of technology developed under this section.

SEC. 103. ELECTRIC SYSTEM 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 system 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 make recommendations regarding additional standards that may be required, if any, to en-

sure the interoperability of grid systems and associated communications networks.

(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 investments; 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 the electric industry;

(6) academic institutions;

(7) independent research institutes; and

(8) other entities.

TITLE II—DEMONSTRATION PROGRAMS

SEC. 201. TECHNOLOGY DEMONSTRATION ON THE DISTRIBUTION SYSTEM.

(a) IN GENERAL.—The Secretary shall conduct 6 demonstration projects to expand the application of technologies to improve observability, advanced controls, and prediction of system performance on the distribution system.

(b) PARTICIPATION.—The demonstration projects conducted under subsection (a) shall include the participation of a diverse selection of relevant owners and operators of distribution systems, including—

(1) a utility;

(2) a political subdivision of a State; and

(3) an electric cooperative.

(c) CYBERSECURITY PLAN.—Each demonstration project conducted under subsection (a) shall include the development of a cybersecurity plan.

SEC. 202. RESILIENT COMMUNITIES PROGRAM.

(a) IN GENERAL.—The Secretary shall establish a program for the development and promotion of grid-scale energy storage with microgrids to enhance the resilience of critical infrastructure.

(b) COLLABORATION.—The program established under subsection (a) shall provide for the collaboration of relevant stakeholders in the program, including—

(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.

(c) PHASES.—The program established under subsection (a) shall be divided into the following phases:

(1) Phase I, which shall consist of the development of a feasibility assessment.

(2) Phase II, which shall consist of cost-shared demonstration projects that include the development of physical and cybersecurity plans to take appropriate measures to protect and secure the electric grid.

(3) Phase III, which shall establish a benefits analysis plan to help inform regulators, policymakers, and industry stakeholders about the value of the resilience investments of Phase II.

TITLE III—STANDARDS AND ASSISTANCE FOR STATES

SEC. 301. STATE CONSIDERATION OF RESILIENCE.

(a) ADOPTION OF STANDARDS.—Section 111(d) of the Public Utility Regulatory Policies Act of 1978 (16 U.S.C. 2621(d)) is amended by adding at the end the following:

''(20) RESILIENCE.—

''(A) DEFINITION OF ELECTRIC GRID RESILIENCE.—The term 'electric grid resilience' means the ability of the electric grid to adapt to changing conditions and withstand and rapidly recover from disruptions.

''(B) REQUIRED CONSIDERATION.—Each electric utility shall incorporate into the integrated resource planning of the electric utility consideration of electric grid resilience.

''(C) FACTORS.—Consideration under subparagraph (B) shall include an evaluation of potential benefits of enhancing electric grid resilience, including—

''(i) system stability under severe and nontraditional hazards;

''(ii) adaptation to region-specific natural threats and vulnerabilities;

''(iii) adaptation to climate change-related extreme weather disruptions;

''(iv) support provided to interdependent critical infrastructures reliant on energy services to operate;

''(v) reduced costs under normal operating conditions;

''(vi) enhanced distributed generation and microgrid functionality to operate as an integrated energy system in intentional islanding mode;

''(vii) localized energy generation that avoids incurrence of transmission and distribution losses;

''(viii) system operational flexibility; and

''(ix) ancillary environmental benefits, including greenhouse gas reductions.''.

(b) COMPLIANCE.—

(1) TIME LIMITATIONS.—Section 112(b) of the Public Utility Regulatory Policies Act of 1978 (16 U.S.C. 2622(b)) is amended by adding at the end the following:

''(7)(A) Not later than 1 year after the date of enactment of this paragraph, each State regulatory

authority (with respect to each electric utility for which it has ratemaking authority), and each nonregulated electric utility, shall—

"(i) commence the consideration referred to in section 111; or

"(ii) set a hearing date for such consideration, with respect to the standard established by paragraph (20) of section 111(d).

"(B) Not later than 2 years after the date of enactment of this paragraph, each State regulatory authority (with respect to each electric utility for which it has ratemaking authority), and each nonregulated electric utility, shall—

"(i) complete the consideration required under subparagraph (A); and

"(ii) make the determination referred to in section 111 with respect to the standard established by paragraph (20) of section 111(d).".

(2) FAILURE TO COMPLY.—Section 112(c) of the Public Utility Regulatory Policies Act of 1978 (16 U.S.C. 2622(c)) is amended by adding at the end the following: "In the case of the standard established by paragraph (20) of section 111(d), the reference contained in this subsection to the date of

enactment of this Act shall be deemed to be a reference to the date of enactment of that paragraph.''.

SEC. 302. VOLUNTARY MODEL PATHWAYS.

(a) ESTABLISHMENT OF VOLUNTARY MODEL PATHWAYS.—

(1) FINDING.—Congress finds that a set of voluntary model pathways for modernizing the electric grid would provide policymakers and regulators with valuable and flexible options to consider in adapting policy or regulatory mechanisms to match the needs of an evolving electric grid.

(2) ESTABLISHMENT.—Not later than 90 days after the date of enactment of this Act, the Secretary 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 that can be adapted for State and regional applications by regulators and policymakers;

(B) facilitates the modernization of the electric grid to achieve the objectives described in paragraph (3);

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

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

(3) OBJECTIVES.—The pathways established under paragraph (2) shall facilitate achievement of the following objectives:

(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 for private investment in the electric system.

(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.

(4) STEERING COMMITTEE.—Not later than 90 days after the date of enactment of this Act, the Secretary shall establish a steering committee to facilitate the development of the pathways under paragraph (2), 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 Smart Grid Task Force; and

(B) the Smart Grid Advisory Committee.

(b) TECHNICAL AND FINANCIAL ASSISTANCE.—

(1) IN GENERAL.—The Secretary may provide technical and financial assistance to States, Indian tribes, or units of local government to adopt 1 or more elements of the pathways developed under subsection (a)(2).

(2) DISTRIBUTION OF FINANCIAL ASSISTANCE.—Any financial assistance provided to a State under paragraph (1) may be distributed by the State to units of local government in the State for purposes of implementing the pathways developed under subsection (a)(2).

SEC. 303. PERFORMANCE METRICS FOR ELECTRICITY INFRASTRUCTURE PROVIDERS.

(a) IN GENERAL.—Not later than 2 years after the date of enactment of this Act, the Secretary shall—

(1) develop baseline, voluntary model performance metrics to facilitate and promote the adoption of best practices and processes for electricity infrastructure providers to design, build, and implement a modernized electric grid and maximize opportunities to enhance progress in grid technologies and capabilities, consumer engagement, and policy;

(2) quantify the potential performance improvements that could be achieved through deployment of new grid technologies and systems; and

(3) distribute through appropriate channels a report describing the findings under paragraph (1).

(b) CONSIDERATIONS.—In developing the performance metrics under subsection (a)(1), 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 value to ratepayers, including broad economic and related

impacts from improvements to the performance metrics;

(3) appropriate ownership and operating roles for electric utilities that would enable improved performance through the adoption of emerging, commercially available or advanced grid technologies or solutions, including—

(A) multicustomer microgrids;

(B) distributed energy resources;

(C) energy storage;

(D) electric vehicles;

(E) electric vehicle charging infrastructure;

(F) integrated information and communications systems; and

(G) advanced demand management systems; and

(4) with respect to States, the role of the grid operator in enabling a robust future electric system 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. 304. DISTRIBUTION PLANNING.

(a) IN GENERAL.—Upon the request of a State or regional organization, the Secretary shall partner with States and regional organizations to facilitate the development of State and regional distribution plans by—

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

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

(b) EXISTING TOOLS.—The tools developed under subsection (a)(2) shall build on existing tools used or developed by the Department of Energy.

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

(1) the evaluation of the physical and cybersecurity 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 a holistic all-hazards approach that includes

communications infrastructure, control systems architecture, and power systems architecture.

(d) TECHNICAL ASSISTANCE.—For the purpose of developing electricity distribution plans, the Secretary shall provide technical assistance to—

(1) States;

(2) regional reliability entities; and

(3) other distribution asset owners and operators.

TITLE IV—AUTHORIZATION OF APPROPRIATIONS

SEC. 401. AUTHORIZATION OF APPROPRIATIONS.

There is authorized to be appropriated to the Secretary carry out this Act (including the amendments made by this Act) and other related activities $200,000,000 for each of fiscal years 2017 through 2021.