116TH CONGRESS
1ST SESSION

S. 1085

To support research, development, and other activities to develop innovative vehicle technologies, and for other purposes.

IN THE SENATE OF THE UNITED STATES

APRIL 9, 2019

Mr. PETERS (for himself, Mr. ALEXANDER, and Ms. STABENOW) introduced the following bill; which was read twice and referred to the Committee on Energy and Natural Resources

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A BILL

To support research, development, and other activities to develop innovative vehicle technologies, 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 ''Vehicle Innovation Act of 2019''.

SEC. 2. DEFINITIONS.

In this Act:

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

(2) SECRETARY.—The term ''Secretary'' means the Secretary of Energy.

SEC. 3. OBJECTIVES.

The objectives of this Act are—

(1) to establish a consistent and consolidated authority for the vehicle technology program at the Department;

(2) to develop United States technologies and practices that—

(A) improve the fuel efficiency and emissions of all vehicles produced in the United States; and

(B) reduce vehicle reliance on petroleum-based fuels;

(3) to support domestic research, development, engineering, demonstration, and commercial application and manufacturing of advanced vehicles, engines, and components;

(4) to enable vehicles to move larger volumes of goods and more passengers with less energy and emissions;

(5) to develop cost-effective advanced technologies for wide-scale utilization throughout the passenger, commercial, government, and transit vehicle sectors;

(6) to allow for greater consumer choice of vehicle technologies and fuels;

(7) shorten technology development and integration cycles in the vehicle industry;

(8) to ensure a proper balance and diversity of Federal investment in vehicle technologies; and

(9) to strengthen partnerships between Federal and State governmental agencies and the private and academic sectors.

SEC. 4. COORDINATION AND NONDUPLICATION.

The Secretary shall ensure, to the maximum extent practicable, that the activities authorized by this Act do not duplicate those of other programs within the Department or other relevant research agencies.

SEC. 5. AUTHORIZATION OF APPROPRIATIONS.

There are authorized to be appropriated to the Secretary for research, development, engineering, demonstration, and commercial application of vehicles and related technologies in the United States, including activities authorized under this Act—

(1) for fiscal year 2020, $313,567,000;

(2) for fiscal year 2021, $326,109,000;

(3) for fiscal year 2022, $339,154,000;

(4) for fiscal year 2023, $352,720,000; and

(5) for fiscal year 2024, $366,829,000.

SEC. 6. REPORTING.

(a) TECHNOLOGIES DEVELOPED.—Not later than 18 months after the date of enactment of this Act and annually thereafter through 2024, the Secretary shall submit to Congress a report regarding the technologies developed as a result of the activities authorized by this Act, with a particular emphasis on whether the technologies were successfully adopted for commercial applications, and if so, whether products relying on those technologies are manufactured in the United States.

(b) ADDITIONAL MATTERS.—At the end of each fiscal year through 2024, the Secretary shall submit to the relevant Congressional committees of jurisdiction an annual report describing activities undertaken in the previous year under this Act, active industry participants, the status of public-private partnerships, progress of the program in meeting goals and timelines, and a strategic plan for funding of activities across agencies.

SEC. 7. VEHICLE RESEARCH AND DEVELOPMENT.

(a) PROGRAM.—

(1) ACTIVITIES.—The Secretary shall conduct a program of basic and applied research, development, engineering, demonstration, and commercial application activities on materials, technologies, and processes with the potential to substantially reduce or eliminate petroleum use and the emissions of the

passenger and commercial vehicles of the United States, including activities in the areas of—

(A) electrification of vehicle systems;

(B) batteries, ultracapacitors, and other energy storage devices;

(C) power electronics;

(D) vehicle, component, and subsystem manufacturing technologies and processes;

(E) engine efficiency and combustion optimization;

(F) waste heat recovery;

(G) transmission and drivetrains;

(H) hydrogen vehicle technologies, including fuel cells and internal combustion engines, and hydrogen infrastructure, including hydrogen energy storage to enable renewables and provide hydrogen for fuel and power;

(I) natural gas vehicle technologies;

(J) aerodynamics, rolling resistance (including tires and wheel assemblies), and accessory power loads of vehicles and associated equipment;

(K) vehicle weight reduction, including lightweighting materials and the development of

manufacturing processes to fabricate, assemble, and use dissimilar materials;

(L) friction and wear reduction;

(M) engine and component durability;

(N) innovative propulsion systems;

(O) advanced boosting systems;

(P) hydraulic hybrid technologies;

(Q) engine compatibility with and optimization for a variety of transportation fuels including natural gas and other liquid and gaseous fuels;

(R) predictive engineering, modeling, and simulation of vehicle and transportation systems;

(S) refueling and charging infrastructure for alternative fueled and electric or plug-in electric hybrid vehicles, including the unique challenges facing rural areas;

(T) gaseous fuels storage systems and system integration and optimization;

(U) sensing, communications, and actuation technologies for vehicle, electrical grid, and infrastructure;

(V) efficient use, substitution, and recycling of potentially critical materials in vehicles,

including rare earth elements and precious metals, at risk of supply disruption;

(W) aftertreatment technologies;

(X) thermal management of battery systems;

(Y) retrofitting advanced vehicle technologies to existing vehicles;

(Z) development of common standards, specifications, and architectures for both transportation and stationary battery applications;

(AA) advanced internal combustion engines;

(BB) mild hybrid;

(CC) engine down speeding;

(DD) vehicle-to-vehicle, vehicle-to-pedestrian, and vehicle-to-infrastructure technologies; and

(EE) other research areas as determined by the Secretary.

(2) TRANSFORMATIONAL TECHNOLOGY.—The Secretary shall ensure that the Department continues to support research, development, engineering, demonstration, and commercial application activities and maintains competency in mid- to long-term transformational vehicle technologies with po-

tential to achieve reductions in emissions, including activities in the areas of—

(A) hydrogen vehicle technologies, including fuel cells, hydrogen storage, infrastructure, and activities in hydrogen technology validation and safety codes and standards;

(B) multiple battery chemistries and novel energy storage devices, including nonchemical batteries and electromechanical storage technologies such as hydraulics, flywheels, and compressed air storage;

(C) communication and connectivity among vehicles, infrastructure, and the electrical grid; and

(D) other innovative technologies research and development, as determined by the Secretary.

(3) INDUSTRY PARTICIPATION.—

(A) IN GENERAL.—To the maximum extent practicable, activities under this Act shall be carried out in partnership or collaboration with automotive manufacturers, heavy commercial, vocational, and transit vehicle manufacturers, qualified plug-in electric vehicle manufacturers, compressed natural gas vehicle manufac-

turers, vehicle and engine equipment and component manufacturers, manufacturing equipment manufacturers, advanced vehicle service providers, fuel producers and energy suppliers, electric utilities, universities, national laboratories, and independent research laboratories.

(B) REQUIREMENTS.—In carrying out this Act, the Secretary shall—

(i) determine whether a wide range of companies that manufacture or assemble vehicles or components in the United States are represented in ongoing public-private partnership activities, including firms that have not traditionally participated in federally sponsored research and development activities, and where possible, partner with such firms that conduct significant and relevant research and development activities in the United States;

(ii) leverage the capabilities and resources of, and formalize partnerships with, industry-led stakeholder organizations, nonprofit organizations, industry consortia, and trade associations with expertise in the research and development of,

and education and outreach activities in, advanced automotive and commercial vehicle technologies;

(iii) develop more effective processes for transferring research findings and technologies to industry;

(iv) support public-private partnerships, dedicated to overcoming barriers in commercial application of transformational vehicle technologies, that use such industry-led technology development facilities of entities with demonstrated expertise in successfully designing and engineering pre-commercial generations of such transformational technology; and

(v) promote efforts to ensure that technology research, development, engineering, and commercial application activities funded under this Act are carried out in the United States.

(4) INTERAGENCY AND INTRAAGENCY COORDINATION.—To the maximum extent practicable, the Secretary shall coordinate research, development, demonstration, and commercial application activities among—

(A) relevant programs within the Department, including—

(i) the Office of Energy Efficiency and Renewable Energy;

(ii) the Office of Science;

(iii) the Office of Electricity Delivery and Energy Reliability;

(iv) the Office of Fossil Energy;

(v) the Advanced Research Projects Agency—Energy; and

(vi) other offices as determined by the Secretary; and

(B) relevant technology research and development programs within other Federal agencies, as determined by the Secretary.

(5) FEDERAL DEMONSTRATION OF TECHNOLOGIES.—The Secretary shall make information available to procurement programs of Federal agencies regarding the potential to demonstrate technologies resulting from activities funded through programs under this Act.

(6) INTERGOVERNMENTAL COORDINATION.—The Secretary shall seek opportunities to leverage resources and support initiatives of State and local governments in developing and promoting advanced

vehicle technologies, manufacturing, and infrastructure.

(7) CRITERIA.—In awarding grants under the program under this subsection, the Secretary shall give priority to those technologies (either individually or as part of a system) that—

(A) provide the greatest aggregate fuel savings based on the reasonable projected sales volumes of the technology; and

(B) provide the greatest increase in United States employment.

(8) SECONDARY USE APPLICATIONS.—

(A) IN GENERAL.—The Secretary shall carry out a research, development, and demonstration program that—

(i) builds on any work carried out under section 915 of the Energy Policy Act of 2005 (42 U.S.C. 16195);

(ii) identifies possible uses of a vehicle battery after the useful life of the battery in a vehicle has been exhausted;

(iii) conducts long-term testing to verify performance and degradation predictions and lifetime valuations for secondary uses;

(iv) evaluates innovative approaches to recycling materials from plug-in electric drive vehicles and the batteries used in plug-in electric drive vehicles;

(v)(I) assesses the potential for markets for uses described in clause (ii) to develop; and

(II) identifies any barriers to the development of those markets; and

(vi) identifies the potential uses of a vehicle battery—

(I) with the most promise for market development; and

(II) for which market development would be aided by a demonstration project.

(B) REPORT.—Not later than 1 year after the date of enactment of this Act, the Secretary shall submit to the appropriate committees of Congress an initial report on the findings of the program described in subparagraph (A), including recommendations for stationary energy storage and other potential applications for batteries used in plug-in electric drive vehicles.

(C) SECONDARY USE DEMONSTRATION.—

(i) IN GENERAL.—Based on the results of the program described in subparagraph (A), the Secretary shall develop guidelines for projects that demonstrate the secondary uses and innovative recycling of vehicle batteries.

(ii) PUBLICATION OF GUIDELINES.—Not later than 18 months after the date of enactment of this Act, the Secretary shall—

(I) publish the guidelines described in clause (i); and

(II) solicit applications for funding for demonstration projects.

(iii) PILOT DEMONSTRATION PROGRAM.—Not later than 21 months after the date of enactment of this Act, the Secretary shall select proposals for grant funding under this subsection, based on an assessment of which proposals are mostly likely to contribute to the development of a secondary market for batteries.

(b) MANUFACTURING.—The Secretary shall carry out a research, development, engineering, demonstration, and commercial application program of advanced vehicle man-

ufacturing technologies and practices, including innovative processes—

(1) to increase the production rate and decrease the cost of advanced battery and fuel cell manufacturing;

(2) to vary the capability of individual manufacturing facilities to accommodate different battery chemistries and configurations;

(3) to reduce waste streams, emissions, and energy intensity of vehicle, engine, advanced battery, and component manufacturing processes;

(4) to recycle and remanufacture used batteries and other vehicle components for reuse in vehicles or stationary applications;

(5) to develop manufacturing processes to effectively fabricate, assemble, and produce cost-effective lightweight materials such as advanced aluminum and other metal alloys, polymeric composites, and carbon fiber for use in vehicles;

(6) to produce lightweight high pressure storage systems for gaseous fuels;

(7) to design and manufacture purpose-built hydrogen fuel cell vehicles and components;

(8) to improve the calendar life and cycle life of advanced batteries; and

(9) to produce permanent magnets for advanced vehicles.

SEC. 8. MEDIUM- AND HEAVY-DUTY COMMERCIAL AND TRANSIT VEHICLES PROGRAM.

The Secretary, in partnership with relevant research and development programs in other Federal agencies, and a range of appropriate industry stakeholders, shall carry out a program of cooperative research, development, demonstration, and commercial application activities on advanced technologies for medium- to heavy-duty commercial, vocational, recreational, and transit vehicles, including activities in the areas of—

(1) engine efficiency and combustion research;

(2) onboard storage technologies for compressed and liquefied natural gas;

(3) development and integration of engine technologies designed for natural gas operation of a variety of vehicle platforms;

(4) waste heat recovery and conversion;

(5) improved aerodynamics and tire rolling resistance;

(6) energy and space-efficient emissions control systems;

(7) mild hybrid, heavy hybrid, hybrid hydraulic, plug-in hybrid, and electric platforms, and energy storage technologies;

(8) drivetrain optimization;

(9) friction and wear reduction;

(10) engine idle and parasitic energy loss reduction;

(11) electrification of accessory loads;

(12) onboard sensing and communications technologies;

(13) advanced lightweighting materials and vehicle designs;

(14) increasing load capacity per vehicle;

(15) thermal management of battery systems;

(16) recharging infrastructure;

(17) compressed natural gas infrastructure;

(18) advanced internal combustion engines;

(19) complete vehicle and power pack modeling, simulation, and testing;

(20) hydrogen vehicle technologies, including fuel cells and internal combustion engines, and hydrogen infrastructure, including hydrogen energy storage to enable renewables and provide hydrogen for fuel and power;

(21) retrofitting advanced technologies onto existing truck fleets;

(22) advanced boosting systems;

(23) engine down speeding; and

(24) integration of these and other advanced systems onto a single truck and trailer platform.

SEC. 9. CLASS 8 TRUCK AND TRAILER SYSTEMS DEMONSTRATION.

(a) IN GENERAL.—The Secretary shall conduct a competitive grant program to demonstrate the integration of multiple advanced technologies on Class 8 truck and trailer platforms, including a combination of technologies listed in section 8.

(b) APPLICANT TEAMS.—Applicant teams may be comprised of truck and trailer manufacturers, engine and component manufacturers, fleet customers, university researchers, and other applicants as appropriate for the development and demonstration of integrated Class 8 truck and trailer systems.

SEC. 10. TECHNOLOGY TESTING AND METRICS.

The Secretary, in coordination with the partners of the interagency research program described in section 8—

(1) shall develop standard testing procedures and technologies for evaluating the performance of advanced heavy vehicle technologies under a range of

representative duty cycles and operating conditions, including for heavy hybrid propulsion systems;

(2) shall evaluate heavy vehicle performance using work performance-based metrics other than those based on miles per gallon, including those based on units of volume and weight transported for freight applications, and appropriate metrics based on the work performed by nonroad systems; and

(3) may construct heavy duty truck and bus testing facilities.

SEC. 11. NONROAD SYSTEMS PILOT PROGRAM.

The Secretary shall undertake a pilot program of research, development, demonstration, and commercial applications of technologies to improve total machine or system efficiency for nonroad mobile equipment including agricultural, construction, air, and sea port equipment, and shall seek opportunities to transfer relevant research findings and technologies between the nonroad and on-highway equipment and vehicle sectors.

SEC. 12. REPEAL OF EXISTING AUTHORITIES.

(a) IN GENERAL.—Sections 706, 711, 712, and 933 of the Energy Policy Act of 2005 (42 U.S.C. 16051, 16061, 16062, 16233) are repealed.

(b) ENERGY EFFICIENCY.—Section 911 of the Energy Policy Act of 2005 (42 U.S.C. 16191) is amended—

(1) in subsection (a)—

(A) in paragraph (1)(A), by striking ''vehicles, buildings,'' and inserting ''buildings''; and

(B) in paragraph (2)—

(i) by striking subparagraph (A); and

(ii) by redesignating subparagraphs (B) through (E) as subparagraphs (A) through (D), respectively; and

(2) in subsection (c)—

(A) by striking paragraph (3);

(B) by redesignating paragraph (4) as paragraph (3); and

(C) in paragraph (3) (as so redesignated), by striking ''(a)(2)(D)'' and inserting ''(a)(2)(C)''.

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