AMENDMENT TO RULES COMMITTEE PRINT 116-63

OFFERED BY MS. STEVENS OF MICHIGAN

Page 593, after line 17, insert the following:

Subtitle G—Research and Development

SEC. 6701. DEFINITIONS.

In this subtitle:

(1) ALTERNATIVE FUEL.—The term ''alternative fuel'' means a fuel that is sustainably produced and, or, that results in a significant reduction in carbon dioxide (CO2) emissions, or other particulate or toxic emissions, over the lifecycle of such fuel.

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

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

SEC. 6702. VEHICLE RESEARCH AND DEVELOPMENT.

(a) IN GENERAL.—The Secretary shall conduct a program of research, development, and demonstration activities on more efficient and sustainable materials, technologies, and processes with the potential to substantially reduce or eliminate petroleum from the manufacture, use,

and the emissions of the passenger and commercial vehicles with lower cost of vehicle manufacturing and ownership, including activities in the areas of—

(1) electrification of vehicle systems; including compact and efficient electric drivetrain systems;

(2) power electronics, electric machines, and electric machine drive systems, including—

(A) electronic motors, including advanced inverters and motors that can be used for passenger vehicles and commercial vehicles;

(B) magnetic materials, including permanent magnets with reduced or no critical materials;

(C) improving partial load efficiency;

(D) design of power electronics and electric motor technologies that enable efficient recycling of critical materials; and

(E) other technically feasible areas for power electronics and electric machine advances.

(3) vehicle batteries and relevant systems, including—

(A) advanced batteries systems, ultracapacitors, and other competitive energy storage devices;

(B) the development of common interconnection protocols, specifications, and architecture for both transportation and stationary battery applications;

(C) improving energy density and capacity, recharging robustness, extreme fast charging and wireless charging capabilities, and efficiencies to lower cost;

(D) thermal management of battery systems;

(E) improving efficient use, substitution, and recycling of potentially critical materials in vehicles, including rare earth elements and precious metals, at risk of supply disruption; and

(F) advanced battery protection systems for safe handling of high voltage power;

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

(5) vehicle systems and components, including—

(A) engine efficiency and combustion optimization;

(B) waste heat recovery;

(C) transmission and drivetrains;

(D) advanced boosting systems;

(E) idle reduction systems and components;

(F) innovative propulsion systems; and

(G) vehicle fuel cells and relevant systems;

(6) hybrid and alternative fuel vehicles, including—

(A) vehicle fuel cells and relevant systems, including power electronics systems to regulate the fuel cell voltages;

(B) synthetic fuels from recycled CO2 and net-zero carbon liquid fuels; and

(C) advanced biofuel technologies;

(7) aftertreatment technologies, aerodynamics, rolling resistance (including tires and wheel assemblies), accessory power loads of vehicles and associated equipment, friction and wear reduction, and lubricants for hybrid and electric vehicles;

(8) vehicle weight reduction, including—

(A) more sustainable and cost-effective lightweighting materials; and

(B) the development of higher efficiency manufacturing processes to make sustainable lightweight materials and fabricate, assemble, and use dissimilar materials, including—

(i) lightweighted systems which combine several existing vehicle components; and

(ii) voluntary, consensus-based standards for strategic lightweight materials;

(9) improved vehicle recycling methods to increase the recycled material content of feedstocks used in raw material manufacturing;

(10) vehicle propulsion systems, including—

(A) engine and component durability;

(B) engine down speeding;

(C) engine compatibility with and optimization for a variety of transportation fuels, including biofuels, synthetic fuels, and other liquid and gaseous fuels;

(D) advanced internal combustion engines;

(E) transmission gear and engine operation matching; and

(F) advanced transmission technologies;

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

(12) leveraging automation in both vehicle and infrastructure systems;

(13) infrastructure, including—

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

(B) extreme fast wired and wireless charging systems;

(C) integration, bidirectional capability, and operational optimization of vehicle electrification for light, medium, and heavy duty with the charging infrastructure and the grid; and

(D) sensing, communications, and actuation technologies for vehicle, electric grid, and infrastructure, including—

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

(ii) vehicle-to-vehicle, vehicle-to-pedestrian, vehicle-to-cloud, and vehicle-to-infrastructure technologies;

(14) retrofitting advanced vehicle technologies to existing vehicles;

(15) transportation system analysis to further understand the energy implications and opportunities of advanced mobility solutions, including—

(A) advanced vehicle technologies, including automation;

(B) new mobility business models, real time information, transit, and micro mobility choices;

(C) consumer travel decisions and e-commerce engagement, including travel behavior and potential strategies for reducing vehicle miles traveled to reduce emissions;

(D) goods movement and delivery interactions, including with car transport;

(E) infrastructure advancements and linkage with vehicle-to-everything,

(F) quantification of technology, policy, and investment decisions on mobility, access, equity, and the environment; and

(G) overall system optimization;

(16) aligned industry standards for strategic lightweight materials;

(17) energy efficient advanced computing systems, technology, and networking for vehicular onboard, off-board, and edge computing applications;

(18) identifying strategies to mitigate the long-term ramification of vehicle and mobility technology

research, development, and demonstration stemming from events such as economic downturns; and

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

(b) SECURITY OF ON-ROAD TRANSPORTATION.—

(1) IN GENERAL.—The Secretary, in coordination with other relevant Federal agencies, shall establish a research and development program focused on the cyber and physical security of interconnections between vehicles, charging equipment, buildings, and the grid for plug-in electric vehicles, connected vehicles, and autonomous vehicles, including the security impacts, efficiency, and safety of plug-in electric vehicles using alternating current charging, high-power direct current fast charging, and extreme fast charging, defined as charge rates of 350kW and above.

(2) ASSESSMENT.—The Secretary shall develop an assessment of emergent cybersecurity threats and vulnerabilities to the United States on-road transportation system and connected infrastructure with 5- to 10-year impact by identifying areas of research where Federal cross-agency research coordination and cooperation will help address such threats and vulnerabilities.

(3) REPORT.—Not later than 180 days after the date of enactment of this Act, the Secretary shall submit to the Committee on Science, Space, and Technology of the House of Representatives, and the Committee on Energy and Natural Resources of the Senate a report summarizing the current research and challenges associated with cyber-physical protection and resiliency of electric and connected and automated vehicle technologies.

(c) VEHICLE ENERGY STORAGE SYSTEM SAFETY.—

(1) IN GENERAL.—The Secretary shall support a program of research, development, and demonstration of vehicle energy storage safety and reliability.

(2) ACTIVITIES.—In carrying out this section, the Secretary shall support activities to—

(A) research the mechanisms that lead to vehicle energy storage system safety and reliability incidents;

(B) develop new materials to improve overall vehicle energy storage system safety and abuse tolerance;

(C) perform abuse testing;

(D) advance testing techniques;

(E) demonstrate detailed failure analyses;

(F) develop strategies to mitigate vehicle energy storage cell and system failures; and

(G) development of crush-induced battery safety protocols and standards to improve robustness.

(d) VEHICLE TECHNOLOGIES ADVISORY COMMITTEE.—

(1) IN GENERAL.—Not later than 180 days after the date of enactment of this Act, the Secretary shall establish the Advanced Vehicle Technologies Advisory Committee (in this section referred to as the ''advisory committee'') to advise the Secretary on vehicle technology and mobility system research advancements. The advisory committee shall be composed of not fewer than 15 members, including representatives of research and academic institutions, environmental organizations, industry, and nongovernmental entities, who are qualified to provide advice on the research, development, and demonstration activities under this Act (in this section referred to as the DOE Vehicle Program).

(2) ASSESSMENT.—The advisory committee shall assess—

(A) the current state of United States competitiveness in advancing vehicle technologies and mobility systems, including—

(i) the scope and scale of United States investments in sustainable transportation research, development, demonstration, and

(ii) research, development, and demonstration activities to lower vehicle and fuel lifecycle emissions;

(B) progress made in implementing the DOE Vehicle Program, including progress of research activities to lower vehicle emissions, considering emissions at each stage of the vehicle and fuel lifecycle;

(C) the need to revise the DOE Vehicle Program;

(D) the balance of activities and funding across the DOE Vehicle Program;

(E) the management, coordination, implementation, and activities of the DOE Vehicle Program;

(F) whether environmental, safety, security, and other appropriate societal issues are

adequately addressed by the DOE Vehicle Technologies Program; and

(G) other relevant topics as decided by the Secretary.

(3) REPORTS.—Not later than 2 years after the date of enactment of this Act, and not less frequently than once every 3 years thereafter, the advisory committee shall submit to the Secretary, the Committee on Science, Space, and Technology of the House of Representatives a report on—

(A) the findings of the advisory committee's assessment under paragraph (1); and

(B) the advisory committee's recommendations for ways to improve the DOE Vehicle Program.

(4) APPLICATION OF FEDERAL ADVISORY COMMITTEE ACT.—Section 14 of the Federal Advisory Committee Act (5 U.S.C. App.) shall not apply to the Advisory Committee.

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

(1) relevant programs within the Department, including—

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

(B) the Office of Science;

(C) the Office of Electricity;

(D) the Office of Fossil Energy;

(E) the Office of Cybersecurity, Energy Security, and Emergency Response;

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

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

(2) relevant technology research and development programs within other Federal agencies, including—

(A) the Department of Transportation;

(B) National Institute of Standards & Technology;

(C) National Science Foundation; and

(D) other Federal agencies as determined by the Secretary.

(f) INTERGOVERNMENTAL COORDINATION.—The Secretary shall seek opportunities to leverage resources and support initiatives of Federal, State, and local governments in developing and promoting advanced vehicle technologies, manufacturing, and infrastructure.

(g) SECONDARY USE APPLICATIONS OF VEHICLE BATTERIES.—

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

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

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

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

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

(E) assesses the potential for markets for uses described in subparagraph (B) to develop; and

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

(G) 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.

(2) REPORT.—Not later than 18 months 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 paragraph (1), including recommendations for stationary energy storage and other potential applications for batteries used in plug-in electric drive vehicles.

(3) SECONDARY USE DEMONSTRATION.—

(A) IN GENERAL.—Based on the results of the program described in paragraph (1), the Secretary shall develop guidelines for projects that demonstrate the secondary uses and innovative recycling of vehicle batteries.

(B) 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 subparagraph (A); and

(ii) solicit applications for funding for demonstration projects.

(5) PILOT DEMONSTRATION PROGRAM.—Not later than 2 years after the date of enactment of this Act, the Secretary shall select proposals for Federal financial assistance under this subsection, based on an assessment of which proposals are mostly likely to contribute to the development of a secondary market for vehicle batteries.

(h) STUDY TO EXAMINE BATTERY SCIENCE AND TECHNOLOGY PATHWAYS.—

(1) IN GENERAL.—The Secretary shall enter into an agreement with the National Academies of Sciences, Engineering, and Medicine under which the National Academies agree to conduct a study on battery technologies to advance research toward a resilient and low-carbon transportation system and electric grid. Such study shall—

(A) identify promising battery technologies;

(B) recommend research priorities to support the development of sustainable battery value chains, including analyzing human rights, environmental impacts, and recycling and reuse infrastructure;

(C) examine market, policy, and technology barriers to their development; and

(D) recommend strategic research priorities on technology pathways to develop affordable, sustainable, safe, efficient, and long-lasting batteries to meet future transportation and energy storage demands.

(2) REPORT.—The agreement entered into under subsection (a) shall include a requirement that the National Academies, not later than 24 months after the date of enactment of this Act, submit to the House Committee on Science, Space and Technology, and the Senate Committee on Energy and Natural Resources a report on the results of the study conducted pursuant to such subsection.

SEC. 6703. RESEARCH AND DEVELOPMENT PROGRAM FOR ADVANCED VEHICLE MANUFACTURING TECHNOLOGIES.

The Secretary shall carry out a research, development, and demonstration program of advanced vehicle manufacturing technologies and practices, including innovative, efficient, and sustainable processes—

(1) to increase the production rate and decrease the cost of advanced battery and fuel cell manufacturing, including synthesis of precursor materials for electrodes;

(2) to develop technologies enabling flexible manufacturing facilities that can accommodate different battery chemistries and configurations;

(3) to reduce or repurpose waste streams, reduce 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 other applications;

(5) to develop manufacturing and additive manufacturing processes to fabricate, assemble, and produce cost-effective lightweight materials with enhanced functionality such as advanced aluminum, steel, and other metal alloys, advanced polymers, polymeric composites, and carbon fiber for use in vehicles and related tooling;

(6) to leverage the use of machine learning toward manufacturing and additive manufacturing optimization;

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

(8) to improve the lifetime and reduce the lifecycle impacts of advanced batteries; and

(9) to reuse valuable components and materials such as permanent magnets and other electric drive components for advanced vehicles.

SEC. 6704. AUTHORIZATION OF APPROPRIATIONS.

There are authorized to be appropriated to the Secretary for research, development, and demonstration, of alternative fuels, vehicle propulsion systems, vehicle components, and other related technologies in the United States, including activities authorized under this subtitle—

(1) for fiscal year 2021, $396,000,000;

(2) for fiscal year 2022, $415,800,000;

(3) for fiscal year 2023, $436,590,000;

(4) for fiscal year 2024, $458,419,500; and

(5) for fiscal year 2025, $481,340,475.

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