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111TH CONGRESS, 1st Session } HOUSE OF REPRESENTATIVES { REPORT 111–254

ADVANCED VEHICLE TECHNOLOGY ACT OF 2009

SEPTEMBER 11, 2009.—Committed to the Committee of the Whole House on the State of the Union and ordered to be printed

Mr. GORDON of Tennessee, from the Committee on Science and Technology, submitted the following

R E P O R T

[To accompany H.R. 3246]

[Including cost estimate of the Congressional Budget Office]

The Committee on Science and Technology, to whom was referred the bill (H.R. 3246) to provide for a program of research, development, demonstration, and commercial application in vehicle technologies at the Department of Energy, having considered the same, report favorably thereon with an amendment and recommend that the bill as amended do pass.

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79–006

I. AMENDMENT

The amendment is as follows:

Strike all after the enacting clause and insert the following:

SECTION 1. SHORT TITLE.

This Act may be cited as the "Advanced Vehicle Technology Act of 2009".

SEC. 2. FINDINGS.

Congress finds the following:

(1) According to the Energy Information Administration, the transportation sector accounts for approximately 28 percent of the United States primary energy demand and greenhouse gas emissions, and 24 percent of global oil demand.

(2) The United States transportation sector is over 95 percent dependent on petroleum, and over 60 percent of petroleum demand is met by imported supplies.

(3) United States heavy truck fuel consumption will increase 23 percent by 2030, while overall transportation energy use will decline by 1 percent.

(4) The domestic automotive and commercial vehicle manufacturing sectors have increasingly limited resources for research and development of advanced technologies.

(5) Vehicle, engine, and component manufacturers are playing a more important role in vehicle technology development, and should be better integrated into Federal research efforts.

(6) Priorities for the Department of Energy's vehicle technologies research have shifted drastically in recent years among diesel hybrids, hydrogen fuel cell vehicles, and plug-in electric hybrids, with little continuity among them.

(7) The integration of vehicle, communication, and infrastructure technologies has great potential for efficiency gains through better management of the total transportation system.

(8) The Federal Government should balance its role in researching longer-term exploratory concepts and developing nearer-term transformational technologies for vehicles.

SEC. 3. OBJECTIVES.

The objectives of this Act are to—

(1) develop 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;

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

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

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

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

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

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

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

SEC. 4. DEFINITIONS.

For the purposes of this Act:

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

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

SEC. 5. AUTHORIZATION OF APPROPRIATIONS.

(a) IN GENERAL.—The following sums are authorized to be appropriated to the Secretary for research, development, demonstration, and commercial application of vehicles and related technologies, including activities authorized under this Act:

(1) $550,000,000 for fiscal year 2010.

(2) $560,000,000 for fiscal year 2011.

(3) $570,000,000 for fiscal year 2012.

(4) $580,000,000 for fiscal year 2013.

(5) $590,000,000 for fiscal year 2014.

(b) MEDIUM AND HEAVY DUTY COMMERCIAL VEHICLES.—From the amounts authorized under subsection (a), there are authorized to be appropriated for carrying out title II—

(1) $200,000,000 for fiscal year 2010;
(2) $210,000,000 for fiscal year 2011;
(3) $220,000,000 for fiscal year 2012;
(4) $230,000,000 for fiscal year 2013; and
(5) $240,000,000 for fiscal year 2014.

(c) USER FACILITIES.—From the amounts authorized under subsection (a), there are authorized to be appropriated for carrying out section 104—

(1) $35,000,000 for fiscal year 2010;
(2) $30,000,000 for fiscal year 2011;
(3) $20,000,000 for fiscal year 2012;
(4) $15,000,000 for fiscal year 2013; and
(5) $15,000,000 for fiscal year 2014.

(d) NON-ROAD PILOT PROGRAM.—From the amounts authorized under subsection (a), there are authorized to be appropriated for carrying out section 204—

(1) $20,000,000 for fiscal year 2010;
(2) $20,000,000 for fiscal year 2011; and
(3) $20,000,000 for fiscal year 2012.

TITLE I—VEHICLE RESEARCH AND DEVELOPMENT

SEC. 101. PROGRAM.

(a) ACTIVITIES.—The Secretary shall conduct a program of basic and applied research, development, 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 Nation's passenger and commercial vehicles, including activities in the areas of—

(1) hybridization or full electrification of vehicle systems;
(2) batteries and other energy storage devices;
(3) power electronics;
(4) vehicle, component, and subsystem manufacturing technologies and processes;
(5) engine efficiency and combustion optimization;
(6) waste heat recovery;
(7) transmission and drivetrains;
(8) hydrogen vehicle technologies, including fuel cells and internal combustion engines, and hydrogen infrastructure;
(9) aerodynamics, rolling resistance, and accessory power loads of vehicles and associated equipment;
(10) vehicle weight reduction;
(11) friction and wear reduction;
(12) engine and component durability;
(13) innovative propulsion systems;
(14) advanced boosting systems;
(15) hydraulic hybrid technologies;
(16) engine compatibility with and optimization for a variety of transportation fuels including liquid and gaseous fuels;
(17) predictive engineering, modeling, and simulation of vehicle and transportation systems;
(18) refueling and charging infrastructure for alternative fueled and electric or plug-in electric hybrid vehicles;
(19) gaseous fuels storage system integration and optimization;
(20) sensing, communications, and actuation technologies for vehicle, electrical grid, and infrastructure;
(21) efficient use and recycling of rare earth materials, and reduction of precious metals and other high-cost materials in vehicles;
(22) aftertreatment technologies;
(23) thermal management of battery systems;
(24) development of common standards, specifications, and architectures for both transportation and stationary battery applications; and
(25) other research areas as determined by the Secretary.

(b) TRANSFORMATIONAL TECHNOLOGY.—The Secretary shall ensure that the Department continues to support activities and maintains competency in mid- to long-

term transformational vehicle technologies with potential to achieve deep reductions in petroleum use and emissions, including activities in the areas of—

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

(2) multiple battery chemistries and novel energy storage devices, including electromechanical batteries and other nonchemical batteries;

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

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

(c) INDUSTRY PARTICIPATION.—To the maximum extent practicable, activities under this Act shall be carried out in partnership or collaboration with automotive manufacturers, heavy commercial and transit vehicle manufacturers, 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. In carrying out this Act the Secretary shall—

(1) 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;

(2) 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;

(3) develop more efficient processes for transferring research findings and technologies to industry;

(4) give consideration to conversion of existing or former vehicle technology manufacturing facilities for the purposes of this Act; and

(5) promote efforts to ensure that technologies developed under this Act are produced in the United States.

(d) INTERAGENCY AND INTRAAGENCY COORDINATION.—To the maximum extent practicable, the Secretary shall coordinate research, development, demonstration, and commercial application 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 Delivery and Energy Reliability;

(D) the Office of Fossil Energy;

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

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

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

(e) COORDINATION AND NONDUPLICATION.—In coordinating activities the Secretary shall ensure, to the maximum extent practicable, that activities do not duplicate those of other programs within the Department or other relevant research agencies.

(f) 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.

(g) 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.

SEC. 102. SENSING AND COMMUNICATIONS TECHNOLOGIES.

The Secretary, in coordination with the relevant research programs of other Federal agencies, shall conduct research, development, and demonstration activities on connectivity of vehicle and transportation systems, including on sensing, computation, communication, and actuation technologies that allow for reduced fuel use, optimized traffic flow, and vehicle electrification, including technologies for—

(1) onboard vehicle, engine, and component sensing and actuation;

(2) vehicle-to-vehicle sensing and communication;

(3) vehicle-to-infrastructure sensing and communication; and

(4) vehicle integration with the electrical grid.

SEC. 103. MANUFACTURING.

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

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

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

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

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

(5) produce cost-effective lightweight materials such as advanced metal alloys, polymeric composites, and carbon fiber;

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

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

(8) produce permanent magnets for advanced vehicles.

SEC. 104. USER TESTING FACILITIES.

Activities under this Act may include construction, expansion, or modification of new and existing vehicle, engine, and component research and testing facilities for—

(1) testing or simulating interoperability of a variety of vehicle components and systems;

(2) subjecting whole or partial vehicle platforms to fully representative duty cycles and operating conditions;

(3) developing and demonstrating a range of chemistries and configurations for advanced vehicle battery manufacturing; and

(4) developing and demonstrating test cycles for new and alternative fuels, and other advanced vehicle technologies.

TITLE II—MEDIUM AND HEAVY DUTY COMMERCIAL AND TRANSIT VEHICLES

SEC. 201. PROGRAM.

(a) IN GENERAL.—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 and transit vehicles, including activities in the areas of—

(1) engine efficiency and combustion research;

(2) on board 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) 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) complete vehicle modeling and simulation;

(18) hydrogen vehicle technologies, including fuel cells and internal combustion engines, and hydrogen infrastructure;

(19) retrofitting advanced technologies onto existing truck fleets; and

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

(b) LEADERSHIP.—The Secretary shall appoint a full-time Director to coordinate research, development, demonstration, and commercial application activities in

medium- to heavy-duty commercial and transit vehicle technologies. Responsibilities of the Director shall be to—

(1) improve coordination and develop consensus between government agency and industry partners, and propose new processes for program management and priority setting to better align activities and budgets among partners;

(2) regularly convene workshops, site visits, demonstrations, conferences, investor forums, and other events in which information and research findings are shared among program participants and interested stakeholders;

(3) develop a budget for the Department's activities with regard to the interagency program, and provide consultation and guidance on vehicle technology funding priorities across agencies;

(4) determine a process for reviewing program technical goals, targets, and timetables and, where applicable, aided by life-cycle impact and cost analysis, propose revisions or elimination based on program progress, available funding, and rate of technology adoption;

(5) evaluate ongoing activities of the program and recommend project modifications, including the termination of projects, where applicable;

(6) recruit new industry participants to the interagency program, including truck, trailer, and component manufacturers who have not traditionally participated in federally sponsored research and technology development activities; and

(7) other responsibilities as determined by the Secretary, in consultation with interagency and industry partners.

(c) REPORTING.—At the end of each fiscal year the partnership shall submit to the Secretary and relevant Congressional committees of jurisdiction an annual report describing activities undertaken in the previous year, active industry participants, efforts to recruit new participants, progress of the program in meeting goals and timelines, and a strategic plan for funding of activities across agencies.

SEC. 202. CLASS 8 TRUCK AND TRAILER SYSTEMS DEMONSTRATION.

The Secretary shall conduct a competitive grant program to demonstrate the integration of multiple advanced technologies on Class 8 truck and trailer platforms with a goal of improving overall freight efficiency, as measured in tons and volume of freight hauled or other work performance-based metrics, by 50 percent, including a combination of technologies listed in section 201(a). 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. 203. TECHNOLOGY TESTING AND METRICS.

The Secretary, in coordination with the partners of the interagency research program described in section 201(a)—

(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. 204. 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 heavy duty nonroad equipment, and shall seek opportunities to transfer relevant research findings and technologies between the nonroad and onhighway equipment and vehicle sectors.

II. PURPOSE OF THE BILL

The purpose of H.R. 3246 is to provide for a program of research, development, demonstration and commercial application in vehicle technologies at the Department of Energy.

III. BACKGROUND AND NEED FOR LEGISLATION

For over two decades the Department of Energy has funded a wide range of research activities on passenger vehicles and heavy-

duty trucks through its Vehicle Technologies program. The program's mission is to ". . . Develop 'leap frog' technologies that will provide Americans with greater freedom of mobility and energy security, while lowering costs and reducing impacts on the environment." Most recently, the Department of Energy has addressed these research needs through two public-private research programs: The 21st Century Truck Partnership (21CTP), which conducts research and development through collaborations with the heavy-duty trucking industry, and the FreedomCar and the Hydrogen Fuel Initiative programs, which engages in pre-competitive, high-risk research needed to develop technologies that will apply to a range of affordable passenger cars and light trucks.

Over the last decade, federal research priorities have shifted between passenger and heavy duty vehicles, as well as diesel-hybrids, hydrogen-fueled, and battery-powered drive systems. While the various programs have had some successes in transferring component technologies to the marketplace, critics contend that previous Administrations have adopted an inconsistent winner-take-all approach to vehicle research where one technology or platform receives the large bulk of funding, only to have funding cut before the programs can reasonably be expected to develop commercially viable technologies. It is argued that what is needed is long-term sustained funding on a broad range of areas from near-commercial technologies to exploratory research on systems with the potential to revolutionize transportation in the U.S. Striking the appropriate research balance and strengthening the federal commitment in this area is especially critical at a time when both the automotive and commercial trucking industries have limited resources for increasingly expensive research and development.

LIGHT DUTY VEHICLES AND THE FREEDOMCAR PARTNERSHIP

The FreedomCar Partnership has been focused primarily on research and development for hydrogen-powered passenger vehicles. The program replaced the Clinton Administration initiative, the Partnership for a New Generation of Vehicles (PNGV), which was funded for 10 years with the goal of developing ultra-efficient diesel hybrid passenger vehicles with fuel mileage up to 80 miles per gallon. PNGV resulted in prototype vehicles that met the criteria, but was ultimately cancelled in 2001 ostensibly at the request of the industry partners represented as U.S. Council for Automotive Research (USCAR—Daimler Chrysler, Ford, and General Motors). The FreedomCar program was launched in 2003 as a collaborative effort between the Department of Energy, energy companies, and the USCAR partners, with the primary aim to help industry make mass-market fuel cell and hydrogen combustion vehicles available at an affordable cost within 10 to 15 years. While simultaneously pursuing their own proprietary research, the partners were to work together to develop hydrogen technology roadmaps, determine technical requirements and goals, and suggest research and development priorities for the federal program.

FreedomCar has raised public debate over the proper role of the government in research and development with market applications, as well as the appropriate level of funding for such long-term research which may come at the expense of more immediate research needs in the vehicle sector. Critics of the program believe that

there are too many technical and economic hurdles to the development of affordable, practical hydrogen and fuel cell technology for automobiles, and that federal research should focus on more realistic near-term objectives such as the development of battery and electric vehicle technologies, and other improvements to existing vehicle platforms. Proponents of hydrogen research contend that for these same reasons it is the appropriate role of government, it will require many years of sustained funding to realize its potential for revolutionizing the transportation sector, and withdrawing support now would amount to the squandering of several years and billions of dollars in government and private research.

Between 2003 and 2008, the FreedomCar and hydrogen-related research at the Department of Energy saw a steady increase in funding from $184.6 million to $338.5 million. However, for Fiscal Year 2009, the Bush Administration's request for hydrogen related research dropped 30 percent below the Fiscal Year 2008 funding level, indicating that the program's focus would shift in part towards plug-in hybrid and alternative fuel vehicles technologies. The Obama Administration continued this trend in the FY 2010 request by proposing to cut hydrogen related research even further, to approximately $68 million (in addition to the total of $333 million for Vehicle Technologies). Recent House and Senate Appropriations bills indicate that funding will be restored to the range of $155 million to $190 million. However this near-term funding issue is ultimately resolved, other recent legislation and industry and public interest clearly indicate that vehicle electrification—and advanced battery development, in particular—is becoming a major priority for federal technology programs.

While hydrogen and electrification technologies are the most high-profile activities for DOE vehicle programs, the Department funds and performs R&D in a variety of other areas to meet industry needs. These include, but are not limited to, combustion research for engines and fuels, modeling and simulation of vehicle and transportation systems, lightweight vehicle materials, manufacturing technologies, and vehicle testing and standards development. Furthermore, with adequate resources DOE could expand its scope to include more research in areas such as vehicle connectivity, innovative propulsion systems such as microturbines, and innovative battery chemistries and other energy storage devices such as flywheels and supercapacitors.

Regardless of the technology focus, there appears to be universal agreement that federal vehicle technology research and development programs will only be effective through robust partnerships with industry and amongst a wide range of vehicle technology developers and manufacturers. While the bulk of innovation still comes from the research labs of the original equipment manufacturers, the industry is increasingly reliant upon the resources and expertise of smaller component-level manufacturers in pushing the technology envelope. In this regard, the federal government can play an important role in coordinating activities and disseminating research findings amongst both traditional and new participants in government-sponsored technology development activities.

MEDIUM-TO-HEAVY DUTY TRUCKS, AND THE 21ST CENTURY TRUCK PARTNERSHIP

Launched in 2000, the 21st Century Truck Partnership (21CTP) explores a range of technology improvements in commercial and military trucks and buses. The aim of the program is to support research and development in five key areas: engine systems, heavy-duty hybrids, parasitic losses, idle reduction and safety. Other federal agencies in the 21st Century Truck Partnership include the Department of Defense, Department of Transportation, and the Environmental Protection Agency. The goal of 21CTP is to combine federal and industry resources to develop a balanced portfolio of heavy-duty truck research activities, coordinate research activities where appropriate, and make effective use of the nation's research universities and national laboratories. In addition to funding specific research projects, 21CTP also serves as a forum for information exchange across all government and industrial sectors related to heavy truck research.

Funding for the Partnership steadily increased from $45.6 million in Fiscal Year 1999 to $86.6 million in Fiscal Year 2002. However, despite the potential economic and environmental benefits of improvements in trucks and the considerable technical hurdles that remain, the 21st Century Truck Partnership started to see a decrease in funding in Fiscal Year 2003, and hit a low of $29 million in Fiscal Year 2008. Stakeholders in 21CTP contend that the previous administration's decision to shift the focus of federal research to the passenger vehicle market came at the expense of truck-related research.

In 2008, the National Academy of Sciences (NAS), at the request of the Department of Energy, released a report entitled "Review of the 21st Century Truck Partnership." In this report, the Academies panel examined the overall adequacy and balance of the program and made recommendations to improve the likelihood of 21CTP meeting its goals. Chief among these were recommendations that more manufacturers be recruited as participants; that funding be increased considerably to meet the technological challenge; that a clearer goal setting strategy be developed; and that DOE's leadership and oversight of the program be strengthened.

The power demands on trucks are as varied as the applications, and significant technical hurdles remain in areas such as hybridization. There is no one-size-fits-all solution for the entire sector. For example, through the course of an average drive cycle, the charging and discharging of a hybrid system on a refuse truck, with its frequent starts and stops, dumpster lifting, and trash compaction, will be considerably different than that of a utility truck which may sit idling in one place for several hours in order to operate the bucket lifting boom and other equipment. Long-haul tractor trailer rigs (Class 8) provide their own unique challenges, especially for hybridization since they seldom brake during a drive cycle, providing few opportunities for battery systems to recharge through regenerative braking.

While the total number of heavy trucks is small compared to passenger vehicles, their fuel consumption and emissions justifies the high costs of development of hybrid models and other advanced truck technologies. According to figures by the Oshkosh Truck Cor-

poration, there are approximately 90,000 refuse collection trucks in the U.S., but their collective fuel consumption is roughly equivalent to 2.5 million passenger vehicles (based on 10,000 gallons/year per truck). Estimates done by the Eaton Corporation show that as little as 10,000 hybrid electric trucks could reduce diesel fuel usage by 7.2 million gallons/year (approx. 1 million barrels of oil), reduce NO_X emissions by the amount equivalent to removing New York City's passenger cars for 25 days, and reduce carbon dioxide emissions by 83,000 tons.

IV. Hearing Summary

On Tuesday, March 24, 2009, the Subcommittee on Energy and Environment held a hearing to examine the Department of Energy's (DOE) Vehicle Technologies research and development programs. Witnesses discussed the role of federal research programs in light and heavy duty vehicle technology development, as well as future directions for FreedomCar and 21st Century Truck Partnerships at DOE, specifically, and proposals for programmatic changes to meet ever-changing market and public needs. The following witnesses testified at the hearing:

- Mr. Steven Chalk—Principal Deputy Assistant Secretary—Energy Efficiency and Renewable Energy—U.S. Department of Energy
- Dr. Kathryn Clay—Director of Research—Alliance of Automobile Manufacturers
- Mr. Anthony Greszler—Vice President of Government and Industry Relations—Volvo Powertrain North America; Member—21st Century Truck Partnership Executive Committee
- Dr. John H. Johnson—Presidential Professor of Mechanical Engineering—Michigan Technological University; Chair—National Academies Committee to Review the 21st Century Truck Partnership
- Mr. Thomas C. Baloga—Vice President of Engineering U.S.—BMW of North America

V. Committee Actions

On March 24, 2009, the Subcommittee on Energy and Environment held a hearing entitled "Examining Federal Vehicle Technology Research and Development Programs."

On July 17, 2009, Representative Gary Peters introduced H.R. 3246, the Advanced Vehicle Technology Act of 2009.

On July 21, 2009, The Subcommittee on Energy and Environment met to consider H.R. 3246. No amendments were offered, and H.R. 3246 was favorably reported to the Full Committee by Voice Vote.

On July 29, 2009, the Full Committee on Science and Technology met to consider H.R. 3246. The following amendments were offered:

- Mr. Peters offered an Amendment in the Nature of a Substitute to make several technical and clarifying changes. The amendment was adopted by Voice Vote.
- Ms. Johnson offered an amendment to the Amendment in the Nature of a Substitute to add an objective of developing cost-effective technologies for wide-scale utilization throughout the vehicle sector. The amendment was adopted by Voice Vote.

Mr. Peters offered a motion to favorably report H.R. 3246 to the House as amended. The motion was agreed to by Voice Vote.

VI. Summary of Major Provisions of the Bill, as Reported

H.R. 3246 requires the Secretary of Energy to conduct a program of basic and applied research, development, demonstration, and commercial application activities on materials, technologies, and processes with the potential to substantially reduce or eliminate petroleum use and the related emissions of the Nation's automotive and commercial vehicle sectors. The bill specifies that the areas of activities under this program will include: (1) hybridization or fuel electrification of vehicle systems; (2) batteries and other energy storage devices; (3) power electronics; (4) vehicle manufacturing technologies and processes; (5) engine efficiency and combustion optimization; (6) waste heat recovery; (7) transmission and drivetrains; (8) hydrogen fuel cells and hydrogen internal combustion engines, infrastructure, and related technologies; (9) aerodynamics, rolling resistance, and accessory power loads of vehicles and associated equipment; (10) vehicle weight reduction; (11) friction and wear reduction; (12) engine and component durability; (13) innovative propulsion systems; (14) advanced boosting systems; (15) hydraulic hybrid technologies; (16) engine compatibility with and optimization for nonpetroleum fuels; (17) predictive engineering, modeling and simulation of vehicle and transportation systems; (18) refueling and charging infrastructure for alternative fueled and electric or plug-in electric hybrid; (19) gaseous fuels storage system integration and optimization; (20) sensing, communications, and actuation technologies for vehicle, electrical grid, and infrastructure; (21) efficient use and recycling of rare earth materials, and reduction of precious metals and other high-cost materials in vehicles; (22) aftertreatment technologies; (23) thermal management of battery systems; (24) development of common standards, specifications, and architectures for both transportation and stationary battery applications; (25) other research areas as determined by the Secretary.

The bill requires that the Secretary ensure that the Department of Energy continues to support activities and maintain competency in mid-to-long-term transformational vehicle technologies with the potential to achieve deep reductions in petroleum use and emissions. This includes activities in the areas of: (1) hydrogen fuel cells, internal combustion engines, storage, infrastructure, and technology validation, and development of hydrogen safety codes and standards; (2) multiple battery chemistries and novel energy storage devices; (3) communication and connectivity among vehicles, infrastructure, and the electrical grid; and (4) other innovative technologies research and development, as determined by the Secretary.

Activities under the bill are to be carried out, to the maximum extent practicable, in partnership or collaboration with automotive manufacturers, heavy commercial and transit vehicle manufacturers, 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. In carrying out the program, the Secretary is required to:

(1) partner with a wide range of firms; (2) leverage the resources and capabilities of existing stakeholder organizations; (3) streamline processes for transferring technologies and research findings to industry and consumers; (4) give consideration to conversion of existing or former vehicle technology manufacturing facilities; and (5) make every effort to ensure that technologies developed under the bill are produced in the United States.

Under the bill, to the maximum extent possible, the Secretary is required to coordinate, and not duplicate, research, development, demonstration, and commercial application activities among relevant programs within the Department of Energy and other Federal agencies. The Secretary shall make information available to federal procurement programs regarding the demonstration of technologies funded under this program.

The bill requires the Secretary, in coordination with the relevant research programs of other Federal agencies, to conduct research, development, and demonstration activities on connectivity of vehicle and transportation systems.

The bill also requires the Secretary to carry out a research, development, demonstration, and commercial application program of advanced vehicle manufacturing technologies and practices, including innovative processes to: (1) increase the production rate and decrease the cost of advanced battery manufacturing; (2) vary manufacturing facility capability to accommodate different battery chemistries and configurations; (3) reduce waste streams, emissions, and energy-intensity of vehicle, engine, and component manufacturing processes; (4) recycle and remanufacture used batteries and other vehicle components for reuse in vehicles or stationary applications; (5) produce cost-effective lightweight materials; (6) produce storage systems for gaseous fuels; (6) design and manufacture purpose-built hydrogen and fuel cell vehicles and components; and (7) produce permanent magnets for advanced vehicles.

The Secretary is authorized to modify existing facilities, or construct new facilities, for research and testing of vehicles and components.

Under Title II of the bill, the Secretary is required to carry out a program of cooperative research, development, demonstration, and commercial application activities on advanced technologies for medium-to-heavy duty commercial and transit vehicles. This is to include activities in the areas of: (1) engine efficiency and combustion research; (2) on-board natural gas storage; (3) natural gas engine technologies; (4) waste heat recovery and conversion; (5) improved aerodynamics and tire rolling resistance; (6) energy and space-efficient emissions control systems; (7) 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 lightweight materials and vehicle designs; (14) increasing load capacity per vehicle; (15) thermal management of battery systems; (16) recharging infrastructure; (17) complete vehicle modeling and simulation; (18) hydrogen vehicle and infrastructure; (19) retrofitting advanced technologies onto existing truck fleets; and (20) integration of these and other advanced systems onto a single truck and trailer platform.

The bill requires the Secretary to appoint a full-time Director to coordinate research, development, demonstration, and commercial application activities in medium-to-heavy duty commercial and transit vehicle technologies. Under the bill, the Director is responsible for: (1) improving coordination and developing consensus between government agency and industry partners, and proposing new processes for program management and priority setting; (2) frequent convening of workshops, site visits, demonstrations, conferences, investor forums, and other events in which information and research findings are shared; (3) developing a budget for the Department's activities with regard to the interagency program, and providing consultation and guidance on vehicle technology funding priorities across agencies; (4) determining a process for reviewing program technical goals, targets, and timetables and proposing revisions in light of program progress, available funding, and rate of technology adoption; (5) evaluating ongoing activities of the program and recommending project modifications; and (6) recruiting new industry participants to the interagency program; (7) other responsibilities as determined by the Secretary in consultation with the interagency and industry partners. The bill requires an annual report describing activities undertaken in the previous year, active industry participants, efforts to recruit new participants, progress of the program in meeting goals and timelines, and a strategic plan for funding of activities across agencies.

H.R. 3246 requires the Secretary to conduct a competitive grant program to demonstrate the integration of multiple advanced technologies on long-haul Class 8 truck and trailer platforms with a goal of improving overall freight efficiency by 50 percent. The bill specifies that applicant teams may be comprised of truck and trailer manufacturers, engine and component manufacturers, fleet customers, university researchers, and other applicants as appropriate.

The bill further requires the Secretary, in coordination with the partners of the interagency research program, to 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; to evaluate heavy vehicle performance using metrics other than those based on miles per gallon; and authorizes the Secretary to construct heavy duty truck and bus testing facilities.

The bill further authorizes the Secretary to undertake a pilot program of research, development, demonstration, and commercial applications of technologies to improve total machine or system efficiency for heavy duty non-road equipment.

For research, development, demonstration, and commercial application of vehicles and related technologies, the bill authorizes $550 million for Fiscal Year 2010, $560 million for Fiscal Year 2011, $570 million for fiscal year 2012, $580 million for Fiscal Year 2013, and $590 million for Fiscal Year 2014.

VII. Section-by-Section Analysis (by Title and Section), as Reported

Section 1. Short title

Sec. 2. Findings—States that Congress finds that: the transportation sector accounts for a significant portion of U.S. and global energy use, emissions, and oil consumption; the U.S. is overly dependent on foreign oil; heavy vehicle fuel consumption will grow; domestic vehicle manufacturers have increasingly limited resources for R&D; engine and component manufacturers play an important role in technology development; Departmental priorities have shifted drastically in recent years; vehicle connectivity to other vehicles, infrastructure and electrical grid can improve efficiency; federal R&D programs should be balanced between long-term and near-term technology development.

Sec. 3. Objectives—States that the objectives of the program are to develop technologies that improve efficiency and emissions of vehicles, reduce reliance on petroleum; support vehicle manufacturing in the U.S; develop cost-effective vehicle technologies for wide-scale utilization; enhance commercial and passenger vehicle performance; allow for greater consumer choice; shorten technology penetration time; ensure balance and diversity in federal R&D investment; and strengthen public-private R&D partnerships.

Sec. 4. Definitions—Defines "Department" as the Department of Energy, and "Secretary" as the Secretary of Energy.

Sec. 5. Authorization of appropriations—Authorizes to be appropriated approximately $550 million per year for all vehicle technology programs at the Department over 5 years, increasingly incrementally for inflation. Of that annual total, approximately $200 million will be for the Medium and Heavy Duty Commercial Vehicles programs, $30 million will be for User Facilities, and $20 million will be for a Non-Road Pilot Program, over 5 years.

TITLE I—VEHICLE RESEARCH AND DEVELOPMENT

Sec. 101. Program

(a) Instructs the Secretary to conduct research, development, demonstration, and commercial application activities on advanced vehicle materials, technologies, and processes in the areas of: hybridization and electrification; batteries and energy storage devices; power electronics; manufacturing technologies; engine efficiency and combustion; waste heat recovery; transmission and drivetrains; hydrogen technologies; aerodynamics; rolling resistance; accessory power loads; weight reduction; friction and wear reduction; durability; innovative propulsion systems; compatibility with non-petroleum fuels; modeling and simulation; refueling and charging infrastructure; sensing and communications; rare earth and precious metals; aftertreatment; battery thermal management; common standards and specifications; and other areas as determined by the Secretary.

(b) Instructs the Secretary to maintain programs in mid-to-long term transformational vehicle technologies such as hydrogen, multiple battery chemistries, novel energy storage devices, vehicle connectivity, and other areas as determined by the Secretary.

(c) Specifies that activities should be carried out in partnership or collaboration with a diverse set of non-governmental, private and academic entities, including those which have not previously participated in government-sponsored R&D activities; that the Secretary shall utilize and support other organizations with expertise in vehicle technology development; that technology transfer mechanisms will be streamlined; that existing or former manufacturing facilities should be utilized; and that technologies developed by these programs will be produced in the U.S.

(d) Instructs the Secretary to better coordinate activities between relevant Departmental programs and offices, and other federal agencies.

(e) Instructs the Secretary to avoid duplication of activities to the maximum extent practicable.

(f) Instructs the Secretary inform other agencies of the potential for demonstrating technologies funded by this Act.

(g) Instructs the Secretary to support and utilize State and Local government initiatives in advanced vehicle technology development.

Sec. 102. Sensing and communication technologies—Instructs the Secretary to coordinate with other agencies in the development of sensing, communications, and actuation technologies to better integrate onboard vehicle systems, vehicle-to-vehicle, vehicle-to-infrastructure, and vehicle-to-electrical grid.

Sec. 103. Manufacturing—Instructs the Secretary to develop advanced vehicle manufacturing technologies and processes that: increase production rates and reduce costs; accommodate different battery chemistries and configurations; reduce waste streams and improve efficiency of manufacturing; recycle and reuse batteries for vehicles and stationary purposes; produce lightweight materials; produce gaseous fuel storage systems; produce hydrogen vehicles and technologies; produce permanent magnets for electric motors.

Sec. 104. User facilities—Allows the Secretary to construct, expand, or modify new or existing facilities for: testing and simulating the integration of various vehicle systems; subjecting vehicles to varying duty cycle and operating conditions; developing battery manufacturing technologies; and developing test cycles for non-petroleum fuels and other technologies.

TITLE II—MEDIUM AND HEAVY DUTY COMMERCIAL VEHICLES

Sec. 201. Program

(a) Instructs the Secretary to carry out a collaborative commercial and transit vehicle technology development program in partnership with a variety of industry and federal agency partners, and include activities in the areas of: engine efficiency; combustion; waste heat recovery; aerodynamics; rolling resistance; hybridization and electrification; drivetrains; friction and wear reduction; engine idle and parasitic energy loss; sensing and communications; lightweight materials; battery thermal management; recharging infrastructure; modeling and simulation; retrofitting of existing fleets with new technologies; and integration of multiple technologies onto a single platform.

(b) Instructs the Secretary to appoint a full-time director for medium-to-heavy duty truck technology development programs, and

specify that responsibilities of that director will include: improving coordination between program partners; convening of events for sharing information and research findings; developing a DOE budget and consulting on budget priorities across agency partners; determining a process for reviewing and revising program goals, targets and timetables; evaluating program activities; and recruiting new industry participants.

(c) Instructs the Secretary to provide a report describing the program activities, partners, and progress, and proposing a strategic plan for the interagency partnership.

Sec. 202. Class 8 truck and trailer systems demonstrations—Instructs the Secretary to conduct a program to demonstrate the integration of multiple advanced technologies on truck and trailer platforms.

Sec. 203. Technology testing and metrics—Instructs the Secretary, in coordination with interagency partners, to develop standard testing procedures and metrics that represent the unique task-specific operating conditions for the range of commercial vehicles.

Sec. 204. Nonroad systems pilot program—Authorizes the Secretary to undertake a pilot program in technology development for non-road equipment (such as construction, agricultural, or industrial mobile equipment) and to transfer relevant research findings between non-road and on-highway sectors.

VIII. Committee Views

Section 101(b) of the bill seeks to ensure that the Secretary continue to support activities and maintain a core competency in mid-to-long-term transformational technologies, and specifically lists both hydrogen technologies and battery and energy storage technologies as areas of focus. It is the Committee's view that the Department's vehicle research programs have been particularly susceptible to dramatic, and often costly, shifts in priorities through the years. As the Department stands prepared to reallocate resources to vehicle electrification technologies it should take all necessary steps to ensure that its very sizable multi-year investment in hydrogen vehicle-related technologies is not wasted, and that progress in this area continue. Likewise, it is the Committee's view that within vehicle electrification-related research the Department should maintain a diverse portfolio of activities to include a variety of battery chemistries and constructions, and even non-battery energy storage devices. For example, current lithium ion batteries represent a significant improvement over older technologies but are not without their limitations. Lithium sulfur chemistry has been shown to produce significantly higher energy density, while bipolar design and construction can allow batteries of varying chemistries to reduce resistance and improve power and energy performance dramatically. Other mechanical energy storage devices such as hydraulics and flywheels also show great promise for certain applications, but significant technical challenges remain. The Committee believes that the Department has a responsibility to maintain a comprehensive, far-reaching, and diverse research portfolio in short, medium and long-term vehicle technologies that industry is not likely to pursue alone.

Section 101(c)(2) instructs the Secretary to leverage the capabilities and resources, and formalize partnerships with, industry-led

stakeholder organizations, non-profits, and trade associations. A number of such organizations have formed to pool resources to pursue technology development goals that a single firm is not likely to achieve on its own. For example, the Hybrid Truck Users Forum includes a wide range of medium-to-heavy duty vehicle and component manufacturers, and has shown considerable success in disseminating technology, research, and commercialization-related information throughout the industry. It is the Committee's view that the Department would be well-served in utilizing these resources to meet common goals.

Section 101(e) specifies the Committee's intention that, in carrying out the activities under this Act, the Secretary shall seek to avoid duplicating activities of other programs within the Department or other research agencies. For example, funding for activities under Section 101(c)(4) and Section 103 should not be used for the conversion of facilities for non-research and development activities such as those already authorized in Sections 134, 135, and 136 of Title I of the Energy Independence and Security Act of 2007 (Public Law 110–140). Section 101(c)(4) is meant to encourage the Secretary to avoid spending limited research dollars on construction of new facilities where adequate and appropriate infrastructure may already exist, and instead convert existing or former manufacturing facilities for the new purpose of conducting basic and applied vehicle and manufacturing technology research and development related activities. Section 103 highlights the importance of manufacturing in the vehicle sector, and thus authorizes the Secretary to expand the research and technology development focus of the Department to include a range of manufacturing technologies and processes.

Section 102 instructs the Secretary to coordinate with relevant research programs of other Federal agencies in conducting technology development activities on sensing, communication, computation, and actuation technologies that allow for greater connectivity of vehicles and transportation systems. Other agencies have traditionally done the bulk of work in this area, and this section in no way is intended to shift the federal stewardship of these activities to the Department of Energy from those agencies. It is the Committee's view that the Department's unique and varied resources, personnel and facilities stand to provide significant contributions to this field.

The bill provides a comprehensive list of research areas the Committee believes would help to advance the goals of improving fuel efficiency and reduce reliance on petroleum-based fuels. However, the Committee does not intend language in the bill such as in sections 101, 102, 201 and 203 referencing " modeling and simulation of vehicle and transportation systems, communication and connectivity among vehicles, infrastructure and the electrical grid, onboard sensing and communications technologies, or evaluation using other than based on miles per gallon" to be interpreted to authorize research, development or demonstration of programs that charge consumers of petroleum based on vehicles miles traveled.

Title II of the bill authorizes a considerably more robust medium-to-heavy duty vehicle research program than currently exists. The Department of Energy serves as the lead coordinating agency for the 21st Century Truck Partnership (21CTP). Partners in 21CTP

include the Departments of Defense and Transportation, the Environmental Protection Agency, and a range of manufacturers and industry stakeholders. While the program has shown a number of successes and is generally well-regarded within the industry the current levels of funding and inadequate leadership structure are not likely to result in aggressive technical goals being met in the near-term. Given the tremendous opportunities for fuel savings in the medium-to-heavy duty vehicle sector it is the Committee's view that this interagency public-private partnership merits both considerable increases in resources and a more robust and coordinated leadership structure. The National Research Council 2008 Review of the 21st Century Truck Partnership provides a number of recommendations that Department and its interagency partners should work to implement.

IX. Cost Estimate

A cost estimate and comparison prepared by the Director of the Congressional Budget Office under section 402 of the Congressional Budget Act of 1974 has been timely submitted to the Committee on Science and Technology prior to the filing of this report and is included in Section X of this report pursuant to House Rule XIII, clause 3(c)(3).

H.R. 3246 does not contain new budget authority, credit authority, or changes in revenues or tax expenditures. H.R. 3246 does authorize additional discretionary spending, as described in the Congressional Budget Office report on the bill, which is contained in Section X of this report.

X. Congressional Budget Office Cost Estimate

August 25, 2009.

Hon. Bart Gordon,
Chairman, Committee on Science and Technology,
House of Representatives, Washington, DC.

Dear Mr. Chairman: The Congressional Budget Office has prepared the enclosed cost estimate for H.R. 3246, the Advanced Vehicle Technology Act of 2009.

If you wish further details on this estimate, we will be pleased to provide them. The CBO staff contact is Jeff LaFave.

Sincerely,

Douglas W. Elmendorf.

Enclosure.

H.R. 3246—Advanced Vehicle Technology Act of 2009

Summary: H.R. 3246 would authorize appropriations totalling $2.85 billion over the 2010–2014 period for the Department of Energy (DOE) to support research activities to reduce the use of vehicle fuels that generate high emissions. Assuming appropriation of the authorized amounts, CBO estimates that implementing the legislation would cost $2.43 billion over the 2010–2014 period and $423 million after 2014. Enacting the legislation would not affect direct spending or revenues.

H.R. 3246 contains no intergovernmental or private-sector mandates as defined by the Unfunded Mandates Reform Act (UMRA) and would impose no costs on state, local, or tribal governments.

Estimated cost to the Federal Government: The estimated budgetary impact of H.R. 3246 is shown in the following table. The costs of this legislation fall within budget function 250 (general science, space, and technology).

	By fiscal year, in millions of dollars—					
	2010	2011	2012	2013	2014	2010–2014
CHANGES IN SPENDING SUBJECT TO APPROPRIATION						
Title I: R&D for Passenger and Commercial Vehicles:						
Authorization Level	350	350	350	350	350	1,750
Estimated Outlays	161	301	336	350	350	1,498
Title II: R&D for Medium- and Heavy-duty Vehicles:						
Authorization Level	200	210	220	230	240	1,100
Estimated Outlays	92	177	205	223	233	930
Total Changes:						
Authorization Level	550	560	570	580	590	2,850
Estimated Outlays	253	478	541	573	583	2,428

Note: R&D = Research and Development.

Basis of estimate: For this estimate, CBO assumes that H.R. 3246 will be enacted near the end of fiscal year 2009 and that the entire amounts authorized will be appropriated for each fiscal year. Estimated outlays are based on historical spending patterns for DOE research and development programs.

Title I would authorize the appropriation of $1.75 billion over the 2010–2014 period to support the development of technologies that would improve fuel efficiency, promote the use of alternative fuels, and optimize traffic flow for passenger and commercial vehicles. Of that amount, $115 million would be used to construct facilities where new technologies would be tested.

Title II would authorize the appropriation of $1.1 billion over the 2010–2014 period to support a similar research and development program for medium- and heavy-duty vehicles. Of that amount, $60 million would be used to support a pilot program to transfer new technologies between the on-road and off-road vehicle sectors. Title II also would establish a grant program to fund research that would improve the efficiency of freight vehicles. Finally, Title II would require the Secretary of Energy to appoint a program director to oversee research and development activities for medium- and heavy-duty vehicles.

Based on information from DOE, CBO estimates that implementing H.R. 3246 would cost $2.43 billion over the 2010–2014 period and $423 million after 2014.

Intergovernmental and private-sector impact: H.R. 3246 contains no intergovernmental or private-sector mandates as defined in UMRA and would impose no costs on state, local, or tribal governments.

Estimate prepared by: Federal Costs: Jeff LaFave; Impact on State, Local, and Tribal Governments: Ryan Miller; Impact on the Private Sector: Amy Petz.

Estimate approved by: Theresa Gullo, Deputy Assistant Director for Budget Analysis.

XI. Compliance With Public Law 104–4

H.R. 3246 contains no unfunded mandates.

XII. Committee Oversight Findings and Recommendations

The oversight findings and recommendations of the Committee on Science and Technology are reflected in the body of this report.

XIII. Statement on General Performance Goals and Objectives

Pursuant to clause 3(c) of House Rule XIII, the goal of H.R. 3246 is to authorize a program of comprehensive research, development, demonstration and commercial application in vehicle technologies at the Department of Energy.

XIV. Constitutional Authority Statement

Article I, section 8 of the Constitution of the United States grants Congress the authority to enact H.R. 3246.

XV. Federal Advisory Committee Statement

H.R. 3246 does not establish nor authorize the establishment of any advisory committee.

XVI. Congressional Accountability Act

The Committee finds that H.R. 3246 does not relate to the terms and conditions of employment or access to public services or accommodations within the meaning of section 102(b)(3) of the Congressional Accountability Act (Public Law 104–1).

XVII. Earmark Identification

H.R. 3246 does not contain any congressional earmarks, limited tax benefits, or limited tariff benefits as defined in clause 9 of Rule XXI.

XVIII. Statement on Preemption of State, Local, or Tribal Law

This bill is not intended to preempt any state, local, or tribal law.

XIX. Committee Recommendations

On July 29, 2009, the Committee on Science and Technology favorably reported by voice vote the bill, H.R. 3246, as amended, to the House with the recommendation that the bill, as amended, do pass.

XX. PROCEEDINGS OF THE MARKUP BY THE SUBCOMMITTEE ON ENERGY AND ENVIRONMENT ON H.R. 3246, THE ADVANCED VEHICLE TECHNOLOGY ACT OF 2009

TUESDAY, JULY 21, 2009

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON ENERGY AND ENVIRONMENT,
COMMITTEE ON SCIENCE,
Washington, DC.

The Subcommittee met, pursuant to call, at 2:03 p.m., in Room 2318 of the Rayburn House Office Building, Hon. Brian Baird [Chair of the Subcommittee] presiding.

Chair BAIRD. The Subcommittee will now come to order. Pursuant to notice the Subcommittee on Energy and Environment meets to consider the following measures: H.R. 3246, the *Advanced Vehicle Technology Act of 2009,* H.R. 3165, the *Wind Energy Research and Development Act of 2009,* H.R. 3029, *To establish a research, development, and technology demonstration program to improve the efficiency of gas turbines used in combined cycle power generation systems,* and H.R. 3247, *To establish a social and behavioral sciences research program at the Department of Energy, and for other purposes.*

As I just mentioned, this afternoon our committee is considering those four bills. I will go into a bit more detail now.

H.R. 3246 is authored by Representative Peters and co-sponsored by Representative Biggert of our subcommittee. This legislation authorizes research and development on different classes of vehicles with the goal of reducing or eliminating petroleum fuel use and their associated emissions.

H.R. 3165, the *Wind Energy Research and Development Act of 2009,* is offered by our colleague, Mr. Tonko. This legislation authorizes several areas of research identified in a recent report outlining the needs for expanding the use of wind-powered electricity generation.

H.R. 3029 is also offered by the now prolific Mr. Tonko. This bill establishes an R&D program to improve the efficiency of gas turbines used in combined cycle power generation systems. Today 15 percent of electric power is produced from natural gas. This percentage is predicted to double over the next decade. The investment cost for new power plants are very high, and once built they operate for many decades. It is vital we build them to be as efficient as possible from the outset, and this legislation will help achieve that goal.

Finally, we will mark up H.R. 3247, a bill I introduced to authorize a social and behavioral research program at the Department of Energy. Technology development and investment are only part of the solution to our energy problem. The decisions each of us make every day have a significant impact on energy production and consumption. It is important that we understand why some technologies are more readily embraced than others, and it is impor-

tant that we know how to communicate effectively about the nature of our energy challenge and know how to empower individual citizens to participate in overcoming those challenges.

The four bills we will consider today address important energy technology needs and the need for more research on the human factors that determine their acceptance and success. I look forward to a productive markup. Thank you all for your attendance and participation this afternoon.

I now recognize Mr. Inglis to present opening remarks.

[The prepared statement of Chair Baird follows:]

PREPARED STATEMENT OF CHAIR BRIAN BAIRD

This afternoon the Subcommittee will consider four bills.

H.R. 3246, the *Advanced Vehicle Technology Act of 2009* is authored by Rep. Peters and co-sponsored by Rep. Biggert of our subcommittee. This legislation authorizes research and development on different classes of vehicles with a goal of reducing or eliminating petroleum fuel use and their associated emissions.

H.R. 3165, the *Wind Energy Research and Development Act of 2009* is authored by our colleague, Mr. Tonko. This legislation authorizes several areas of research identified in a recent report outlining the needs for expanding the use of wind powered electricity generation.

H.R. 3029, is also authored by Rep. Tonko. This bill establishes an R&D program to improve the efficiency of gas turbines used in combined cycle power generation systems. Today, 15 percent of our electric power is produced from natural gas. This percentage is predicted to double over the next decade. The investment costs for new power plants are very high and, once built they operate for many decades. It is vital that we build them to be as efficient as possible from the outset.

Finally, we will be marking up H.R. 3247. I introduced H.R. 3247 last week to authorize a social and behavioral research program at the Department of Energy. Technology development and investment are only part of the solution to our energy problem. The decisions each of us make every day have a significant impact on energy production and consumption. It is important that we understand why some technologies are more readily embraced than others. And it is important that we know how to communicate effectively about the nature of our energy challenges and know how to empower individual citizens to participate in overcoming them.

The four bills we will consider today address important energy technology needs and the need for more research on the human factors that determine their acceptance and success.

I look forward to a productive markup. Thank you all for your attendance and participation this afternoon.

Mr. INGLIS. Thank you, Mr. Chairman, and I am looking forward to discussing and improving the four pieces of legislation before us today.

The *Advanced Vehicle Technology Act of 2009* will authorize a vehicle technologies program at DOE. The bill realigns the program to approach a wide variety of critical transportation and technology research areas, with the goal of reducing petroleum use and the related emissions.

A balanced and robust research program is necessary to expand our mobility options, increase our national security, and establish the United States as a world leader in auto and truck design, manufacture, and transportation fuel development.

The second bill we will discuss today is the *Wind Energy Research and Development Act.* As the Department of Energy and the American Wind Energy Association have made clear, expanding our wind-power generating capacity will require a significant improvement in turbine technologies, forecasting capabilities, energy storage, and the transmission grid.

Strengthening the research effort in wind energy will help us move away from polluting fossil fuel energy, while creating jobs in wind energy design, manufacturing, and operation.

H.R. 3029 will implement a short-term research, development, and demonstration project at DOE to push gas turbine combine cycle generating power generation systems to 65 percent efficiency. Natural gas is a clean-burning fuel produced right here in the United States and is the fastest growing source of new electricity capacity. Increasing turbine efficiency will reduce fuel usage and corresponding emissions, optimize our use of this limited resource, and lower electricity costs.

Finally, H.R. 3247 establishes a social and behavioral sciences research program at the Department of Energy. This research is intended to help us better understand the way individual decisions impact energy markets and energy technology development.

I am aware of the National Science Foundation's work in this area. I understand the Chairman's desire to see this work become an emphasis of DOE. I look forward to hearing how that cross-pollenization may work, and I will have some questions about how it would work.

Thank you again for the opportunity to work with you on this legislation, Mr. Chairman.

[The prepared statement of Mr. Inglis follows:]

PREPARED STATEMENT OF REPRESENTATIVE BOB INGLIS

Good morning and thank you for holding this markup, Mr. Chairman. I'm looking forward to discussing and improving the four pieces of legislation before us today.

The *Advanced Vehicle Technology Act of 2009* will reauthorize the Vehicle Technologies Program at DOE. The bill realigns the program to approach a wide variety of critical transportation technology research areas with the goal of reducing petroleum use and the related emissions. A balanced and robust research program is necessary to expand our mobility options, increase our national security, and establish the United States as a world leader in auto and truck design and manufacturing and transportation fuel development.

The second bill we'll address today, is the *Wind Energy Research and Development Act*. As the Department of Energy and the American Wind Energy Association have made clear, expanding our wind power generating capacity will require significant improvement in turbine technologies, forecasting capabilities, energy storage, and the transmission grid. Strengthening the research effort in wind energy will help us move away from polluting fossil fuel energy while creating jobs in wind energy design, manufacturing, and operation.

H.R. 3029 will implement a short-term research, development, and demonstration program at DOE to push gas turbine combined cycle generating systems to 65 percent efficiency. Natural gas is a clean burning fuel produced right here in the United States and is the fastest growing source of new electricity capacity. Increasing turbine efficiency will reduce fuel usage and corresponding emissions, optimize our use of this limited resource, and lower electricity costs.

Finally, H.R. 3247 establishes a social and behavioral sciences research program at the Department of Energy. This research is intended to help us better understand the way individual decisions impact energy markets and energy technology development. I'm aware of the National Science Foundation's work in this area, and I understand the Chairman's desire to see this work become an emphasis at the DOE. I look forward to hearing how that cross-pollination might work.

Thank you again for the opportunity to work with you on this legislation, Mr. Chairman.

Chair BAIRD. Thank you, Mr. Inglis. Members may place statements in the record at this point.

We will now consider H.R. 3246, the *Advanced Vehicle Technology Act of 2009*. I will recognize myself for five minutes to describe the bill.

I am pleased to bring up H.R. 3246, which was introduced by our colleague from Michigan, Mr. Gary Peters, and co-sponsored by the distinguished gentlelady from Illinois, Ms. Biggert. Congressman Peters does not sit on this committee, so we will look forward to hearing from him on his bill in the Full Committee markup next week.

U.S. transportation sector accounts for over one-fourth of the primary energy use and greenhouse gas emissions domestically and almost a quarter of the total global oil demand. American consumers expect the freedom of mobility and availability of products and services that frankly are becoming harder to meet in light of the high economic and environmental costs of our addiction to oil.

A more sustainable transportation future will require the development and market penetration of a wide variety of vehicle technologies. Congressman Peters' bill authorizes both current and new activities within the Department of Energy's Vehicle Technology Program.

The bill highlights critical research needs in areas such as vehicle electrification, hydrogen technologies, manufacturing technologies, lightweight materials, combustion optimization, and vehicle sensing and communication. It also gives important policy guidelines in requiring the program to continue its focus on longer-term transformational technologies and to strengthen its outreach to a variety of companies and other government agencies.

The authorized funding levels are increased over current levels to support the important activities authorized in the bill. Title II of the bill emphasizes the federal research needs in medium- to heavy-duty commercial vehicles and seeks to make the DOE-led interagency program more robust through better leadership and coordination.

Mr. Peters and Ms. Biggert have a good bill. I encourage its passage, and I look forward to working with my colleagues as we take it to Full Committee.

I now recognize Mr. Inglis to present any remarks on the bill.

[The prepared statement of Chair Baird follows:]

PREPARED STATEMENT OF CHAIR BRIAN BAIRD

I am pleased to bring up H.R. 3246, which was introduced by our colleague from Michigan, Mr. Gary Peters and co-sponsored by our colleague from Illinois, Mrs. Biggert. Congressman Peters does not sit on this subcommittee. So we will look forward to hearing from him on his bill in the Full Committee markup next week.

The U.S. transportation sector accounts for over one-quarter of the primary energy use and greenhouse gas emissions domestically, and almost a quarter of the total global oil demand. American consumers expect a freedom of mobility and availability of products and services that, frankly, are becoming harder to meet in light of the high economic and environmental costs of our addiction to oil. A more sustainable transportation future will require the development and market penetration of a wide array of vehicle technologies.

Congressman Peter's bill provides an authorization of both current and new activities within the Department of Energy's Vehicle Technology program. The bill highlights critical research needs in areas such as vehicle electrification, hydrogen technologies, manufacturing technologies, lightweight materials, combustion optimization, and vehicle sensing and communications.

It also gives important policy guidance in requiring the program to continue its focus on longer-term transformational technologies, and to strengthen its outreach to a variety of companies and other governmental agencies. The authorized funding levels are increased over current levels, to support the important activities authorized in this bill.

Title II of the bill emphasizes the federal research needs in medium- to heavy-duty commercial vehicles and seeks to make the DOE-led interagency program more robust through better leadership and coordination.

Mr. Peters and Mrs. Biggert have a good bill. I encourage its passage and I look forward to working with my colleagues as we take it to Full Committee.

I now recognize Mr. Inglis to present any remarks on the bill.

Mr. INGLIS. Thank you, Mr. Chairman. This reauthorization legislation calls on DOE to develop a broad vehicle research portfolio and balance long-term breakthroughs with the immediate research needs in the transportation sector, with the goal of bringing new technologies and processes to the market that will help reduce our dependence on foreign oil.

The bill has a broad vision focusing on activities from hydrogen fuel cells to lightweight materials and advanced vehicle designs. I am happy to lend my support to this legislation which will enrich our federal research efforts, strengthen our competitive role in the international market for cutting-edge vehicle technologies, and improve our national security.

I yield back, Mr. Chairman.

[The prepared statement of Mr. Inglis follows:]

PREPARED STATEMENT OF REPRESENTATIVE BOB INGLIS

This reauthorization legislation calls on DOE to develop a broad vehicle research portfolio and balance long-term breakthroughs with the immediate research needs in the transportation sector with the goal of bringing new technologies and processes to the market that will reduce our dependence on foreign oil. The bill has a broad vision, focusing on activities from hydrogen fuel cells to lightweight materials and advanced vehicle designs. I'm happy to lend my support to this legislation, which will enrich our federal research efforts, strengthen our competitive role in the international market for cutting edge vehicle technologies, and increase our national security.

Chair BAIRD. Thank you, Mr. Inglis.

Does anyone else wish to be recognized on the legislation?

I am pleased to recognize the gentlelady, Ms. Biggert.

Ms. BIGGERT. Thank you, Mr. Chairman, for holding this markup today and thank you for bringing up this bill. I join Representative Peters today in support of H.R. 3246, the *Advanced Vehicle Technology Act of 2009*.

Bolstering research and ultimately deployment of advanced vehicle technologies is an important part of a national energy and environmental strategy. With increased R&D and demonstration we can deploy technologies and practices that improve these fuel efficiency and emissions reductions of all vehicles and equipment produced and used in the United States.

We can support and encourage domestic manufacturing of advanced vehicles such as Caterpillar's D7E, the first electric drive bulldozer, and we can move more people and goods with less energy and emissions, and we can enhance consumer choices in vehicles and fuels and most importantly cut down technology, development, and integration cycles in the vehicle industry.

The medium-, heavy-duty, and non-road provisions in H.R. 3246 are particularly important. Significant efficiency gains can be made in non- and off-road equipment relative to the way they perform on the job site.

However, a coordinated and comprehensive investment in R&D is necessary to meet this goal while optimizing performance, safety, and operational standards.

I urge my colleagues to support H.R. 3246, and yield back.

[The prepared statement of Ms. Biggert follows:]

PREPARED STATEMENT OF REPRESENTATIVE JUDY BIGGERT

Thank you, Mr. Chairman for holding this markup today and thank you for bringing up this bill.

I join Rep. Peters today in support of H.R. 3246, the *Advanced Vehicle Technology Act of 2009.*

Bolstering research—and ultimately deployment—of advanced vehicle technologies is an important part of a national energy and environmental strategy.

With increased R&D and demonstration, we can:

Deploy technologies and practices that improve the fuel efficiency and emissions reductions of all vehicles and equipment produced and used in the United States;

support and encourage domestic manufacturing of advanced vehicles, such as Caterpillar's D7E, the first electric drive bulldozer;

move more people and goods with less energy and emissions;

enhance consumer choice in vehicles and fuels; and

most importantly, cut down technology development and integration cycles in the vehicle industry.

The medium-, heavy-duty and non-road provisions in H.R. 3246 are particularly important.

Significant efficiency gains can be made in non- and off-road equipment relative to the way they perform on the job site. However, a coordinated and comprehensive investment in R&D is necessary to meet this goal while optimizing performance, safety, and operational standards.

I urge my colleague's support of H.R. 3246 and yield back.

Chair BAIRD. I thank the gentlelady for her leadership and her strong involvement with this committee. She always offers a thoughtful legislation, and I appreciate her involvement.

One slight correction. My children have a tiny electric drive bulldozer, but it won't push very much, and so something with more capacity is certainly welcome.

Ms. BIGGERT. If the gentleman would yield——

Chair BAIRD. Sure.

Ms. BIGGERT.—I might just say that I have driven a 10-ton frontloader, and I have gone forward, and I have gone backward, and the basket holds a million golf balls. I don't—I think that is going to be a little while before we get the electric involved in that size, 10 ton.

Chair BAIRD. I thank the gentlelady. It is remarkable what is being done, and this bill will move that forward much faster, and I applaud her for her contribution with Mr. Peters.

Are there any other Members who wish to speak to the legislation?

I then ask unanimous consent that the bill is considered as read and open to amendment at any point.

Without objection, so ordered.

Any other Members wishing to offer amendments?

If no, then the vote will occur on the bill H.R. 3246. All those in favor will say aye. All those opposed will say no. In the opinion of the Chair the ayes have it.

I recognize myself to offer a motion. I move that the Subcommittee favorably report H.R. 3246 to the Full Committee. Furthermore, I move that staff be instructed to prepare the Subcommittee report and make necessary technical and conforming changes to the bill in accordance with the recommendations of the Subcommittee.

The question is on the motion to report the bill favorably. Those in favor of the motion will signify by saying aye. Opposed, no. The ayes have it, and the bill is favorably reported.

Without objection the motion to reconsider is laid upon the table. Members will have two subsequent calendar days in which to submit supplemental Minority or additional views on the measure.

I want to thank Members for their attendance, staff for all their good work. This concludes our Subcommittee markup.

[Whereupon, at 2:41 p.m., the Subcommittee was adjourned.]

Appendix:

H.R. 3246, Section-by-Section Analysis

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(Original Signature of Member)

111TH CONGRESS
1ST SESSION

H. R. 3246

To provide for a program of research, development, demonstration and commercial application in vehicle technologies at the Department of Energy.

IN THE HOUSE OF REPRESENTATIVES

MR. PETERS (for himself and MRS. BIGGERT) introduced the following bill; which was referred to the Committee on _____

A BILL

To provide for a program of research, development, demonstration and commercial application in vehicle technologies at the Department of Energy.

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 "Advanced Vehicle Technology Act of 2009".

SEC. 2. FINDINGS.

Congress finds the following:

(1) According to the Energy Information Administration, the transportation sector accounts for approximately 28 percent of the United States primary energy demand and greenhouse gas emissions, and 24 percent of global oil demand.

(2) The United States transportation sector is over 95 percent dependent on petroleum, and over 60 percent of petroleum demand is met by imported supplies.

(3) United States heavy truck fuel consumption will increase 23 percent by 2030, while overall transportation energy use will decline by 1 percent.

(4) The domestic automotive and commercial vehicle manufacturing sectors have increasingly limited resources for research and development of advanced technologies.

(5) Vehicle, engine, and component manufacturers are playing a more important role in vehicle technology development, and should be better integrated into Federal research efforts.

(6) Priorities for the Department of Energy's vehicle technologies research have shifted drastically in recent years among diesel hybrids, hydrogen fuel cell vehicles, and plug-in electric hybrids, with little continuity among them.

1 (7) The integration of vehicle, communication,
2 and infrastructure technologies has great potential
3 for efficiency gains through better management of
4 the total transportation system.
5 (8) The Federal Government should balance its
6 role in researching longer-term exploratory concepts
7 and developing nearer-term transformational tech-
8 nologies for vehicles.

9 **SEC. 3. OBJECTIVES.**

10 The objectives of this Act are to—
11 (1) develop technologies and practices that—
12 (A) improve the fuel efficiency and emis-
13 sions of all vehicles produced in the United
14 States; and
15 (B) reduce transportation sector reliance
16 on petroleum-based fuels;
17 (2) support domestic research and manufac-
18 turing of advanced vehicles, engines, and compo-
19 nents;
20 (3) enable moving larger volumes of freight and
21 more passengers with less energy and emissions;
22 (4) allow for greater consumer choice of vehicle
23 technologies and fuels;
24 (5) shorten technology development and inte-
25 gration cycles in the vehicle industry;

1 (6) ensure a proper balance and diversity of
2 Federal investment in vehicle technologies; and
3 (7) strengthen partnerships between Federal
4 and State governmental agencies and the private
5 and academic sectors.

6 **SEC. 4. DEFINITIONS.**

7 For the purposes of this Act:
8 (1) DEPARTMENT.—The term "Department"
9 means the Department of Energy.
10 (2) SECRETARY.—The term "Secretary" means
11 the Secretary of Energy.

12 **SEC. 5 AUTHORIZATION OF APPROPRIATIONS.**

13 (a) IN GENERAL.—The following sums are author-
14 ized to be appropriated to the Secretary for research, de-
15 velopment, demonstration, and commercial application of
16 vehicles and related technologies, including activities au-
17 thorized under this Act:
18 (1) $550,000,000 for fiscal year 2010.
19 (2) $560,000,000 for fiscal year 2011.
20 (3) $570,000,000 for fiscal year 2012.
21 (4) $580,000,000 for fiscal year 2013.
22 (5) $590,000,000 for fiscal year 2014.
23 (b) MEDIUM AND HEAVY DUTY COMMERCIAL VEHI-
24 CLES.—From the amounts authorized in under subsection

1 (a), there are authorized to be appropriated for carrying
2 out title II—
3 (1) $200,000,000 for fiscal year 2010;
4 (2) $210,000,000 for fiscal year 2011;
5 (3) $220,000,000 for fiscal year 2012;
6 (4) $230,000,000 for fiscal year 2013; and
7 (5) $240,000,000 for fiscal year 2014.
8 (c) USER FACILITIES.—From the amounts author-
9 ized in under subsection (a), there are authorized to be
10 appropriated for carrying out section 104—
11 (1) $35,000,000 for fiscal year 2010;
12 (2) $30,000,000 for fiscal year 2011;
13 (3) $20,000,000 for fiscal year 2012;
14 (4) $15,000,000 for fiscal year 2013; and
15 (5) $15,000,000 for fiscal year 2014.
16 (d) NON-ROAD PILOT PROGRAM.—From the
17 amounts authorized in under subsection (a), there are au-
18 thorized to be appropriated for carrying out section 214—
19 (1) $20,000,000 for fiscal year 2010;
20 (2) $20,000,000 for fiscal year 2011; and
21 (3) $20,000,000 for fiscal year 2012.

TITLE I—VEHICLE RESEARCH AND DEVELOPMENT

SEC. 101. PROGRAM.

(a) ACTIVITIES.—The Secretary shall conduct a program of basic and applied research, development, demonstration, and commercial application activities on materials, technologies, and processes with the potential to substantially reduce or eliminate petroleum use and the related emissions of the Nation's automotive and commercial vehicle sectors, including activities in the areas of—

(1) hybridization or full electrification of vehicle systems;

(2) batteries and other energy storage devices;

(3) power electronics;

(4) vehicle manufacturing technologies and processes;

(5) engine efficiency and combustion optimization;

(6) waste heat recovery;

(7) transmission and drivetrains;

(8) hydrogen fuel cells and internal combustion engines, infrastructure, and related technologies;

(9) aerodynamics, rolling resistance, and accessory power loads of vehicles and associated equipment;

(10) vehicle weight reduction;

(11) friction and wear reduction;

(12) engine and component durability;

(13) innovative propulsion systems;

(14) engine compatibility with and optimization for nonpetroleum fuels;

(15) modeling and simulation of vehicle and transportation systems;

(16) refueling and charging infrastructure for alternative fueled and electric or plug-in electric hybrid vehicles;

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

(18) efficient use and recycling of rare earth materials, and reduction of precious metals and other high-cost materials in vehicles;

(19) aftertreatment technologies;

(20) thermal management of battery systems;

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

(22) consumer education and outreach; and

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

1 (b) TRANSFORMATIONAL TECHNOLOGY.—The Sec-
2 retary shall ensure that the Department continues to sup-
3 port activities and maintains competency in mid-to-long-
4 term transformational vehicle technologies with potential
5 to achieve deep reductions in petroleum use and emissions,
6 including activities in the areas of—
7 (1) hydrogen fuel cells, internal combustion en-
8 gines, storage, infrastructure, and technology valida-
9 tion, and development of hydrogen safety codes and
10 standards;
11 (2) multiple battery chemistries and novel en-
12 ergy storage devices;
13 (3) communication and connectivity among ve-
14 hicles, infrastructure, and the electrical grid; and
15 (4) other innovative technologies research and
16 development, as determined by the Secretary.
17 (c) INDUSTRY PARTICIPATION.—To the maximum
18 extent practicable, activities under this Act shall be carried
19 out in partnership or collaboration with automotive manu-
20 facturers, heavy commercial and transit vehicle manufac-
21 turers, vehicle and engine equipment and component man-
22 ufacturers, manufacturing equipment manufacturers, ad-
23 vanced vehicle service providers, fuel producers and energy
24 suppliers, electric utilities, universities, national labora-

1 tories, and independent research laboratories. In carrying
2 out this Act the Secretary shall—
3 (1) determine whether a wide range of domestic
4 manufacturers and suppliers are represented in on-
5 going public-private partnership activities and, where
6 possible, partner with firms that have not tradition-
7 ally participated in federally-sponsored research and
8 development activities;
9 (2) leverage the capabilities and resources of,
10 and formalize partnerships with, industry-led stake-
11 holder organizations, nonprofit organizations, indus-
12 try consortia, and trade associations with expertise
13 in the research and development of, and education
14 and outreach activities in, advanced automotive and
15 commercial vehicle technologies;
16 (3) streamline processes for transferring tech-
17 nologies and research findings to industry and con-
18 sumers;
19 (4) give consideration to conversion of existing
20 or former vehicle technology manufacturing facilities
21 for the purposes of this Act; and
22 (5) make every effort to ensure that tech-
23 nologies developed under this Act are produced in
24 the United States.

1 (d) INTERAGENCY AND INTRAAGENCY COORDINA-
2 TION.—To the maximum extent practicable, the Secretary
3 shall coordinate research, development, demonstration,
4 and commercial application activities among—
5 (1) relevant programs within the Department,
6 including—
7 (A) the Office of Energy Efficiency and
8 Renewable Energy;
9 (B) the Office of Science;
10 (C) the Office of Electricity Delivery and
11 Energy Reliability;
12 (D) the Office of Fossil Energy;
13 (E) the Advanced Research Projects Agen-
14 cy—Energy; and
15 (F) other offices as determined by the Sec-
16 retary; and
17 (2) relevant technology research and develop-
18 ment programs within other Federal agencies, as de-
19 termined by the Secretary or an officer of the Exec-
20 utive Office of the President.
21 (e) FEDERAL DEMONSTRATION OF TECH-
22 NOLOGIES.—The Secretary shall make information avail-
23 able to procurement programs of Federal agencies regard-
24 ing the potential to demonstrate technologies resulting
25 from activities funded through programs under this Act.

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

6 **SEC. 102. SENSING AND COMMUNICATIONS TECH-**
7 **NOLOGIES.**

8 The Secretary, in coordination with the relevant re-
9 search programs of other Federal agencies, shall conduct
10 research, development, and demonstration activities on
11 connectivity of vehicle and transportation systems, includ-
12 ing on sensing, computation, communication, and actu-
13 ation technologies that allow for reduced fuel use, opti-
14 mized traffic flow, improved freight logistics, and vehicle
15 electrification, including technologies for—

16 (1) onboard vehicle, engine, and component
17 sensing and actuation;

18 (2) vehicle-to-vehicle sensing and communica-
19 tion;

20 (3) vehicle-to-infrastructure sensing and com-
21 munication; and

22 (4) vehicle integration with the electrical grid.

23 **SEC. 103. MANUFACTURING.**

24 The Secretary shall carry out a research, develop-
25 ment, demonstration, and commercial application program

of advanced vehicle manufacturing technologies and practices, including innovative processes to—

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

(2) vary manufacturing facility capability to accommodate different battery chemistries and configurations;

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

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

(5) produce cost-effective lightweight materials such as advanced metal alloys and carbon fiber;

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

(7) produce permanent magnets for advanced vehicles.

SEC. 104. USER FACILITIES.

Activities under this Act may include construction, expansion, or modification of new and existing vehicle, engine, and component research and testing facilities for—

(1) testing or simulating interoperability of a variety of vehicle components;

(2) subjecting whole or partial vehicle platforms to fully representative duty cycles and operating conditions;

(3) developing and demonstrating a range of chemistries and configurations for advanced vehicle battery manufacturing; and

(4) developing and demonstrating test cycles for new and alternate fuels, and other advanced vehicle technologies.

TITLE II—MEDIUM AND HEAVY DUTY COMMERCIAL VEHICLES

SEC. 201. PROGRAM.

(a) IN GENERAL.—The Secretary, in partnership with relevant research and development programs in other Federal agencies, and diverse industrial stakeholders, shall carry out a program of cooperative research, development, demonstration, and commercial application activities on advanced technologies for medium-to-heavy duty commercial and transit vehicles, including activities in the areas of—

(1) engine efficiency and combustion research;

(2) waste heat recovery and conversion;

(3) improved aerodynamics and tire rolling resistance;

1 (4) energy and space-efficient emissions control
2 systems;
3 (5) heavy hybrid, hybrid hydraulic, plug-in hy-
4 brid, and electric platforms, and energy storage
5 technologies;
6 (6) drivetrain optimization;
7 (7) friction and wear reduction;
8 (8) engine idle and parasitic energy loss reduc-
9 tion;
10 (9) electrification of accessory loads;
11 (10) onboard sensing and communications tech-
12 nologies;
13 (11) advanced lightweight materials and vehicle
14 designs;
15 (12) increasing freight capacity per vehicle;
16 (13) thermal management of battery systems;
17 (14) recharging infrastructure;
18 (15) complete vehicle modeling and simulation;
19 (16) vehicle and driver management systems;
20 (17) retrofitting advanced technologies onto ex-
21 isting truck fleets; and
22 (18) integration of these and other advanced
23 systems onto a single truck and trailer platform.
24 (b) LEADERSHIP.—The Secretary shall appoint a
25 full-time Director to coordinate research, development,

1 demonstration, and commercial application activities in
2 medium-to-heavy duty commercial and transit vehicle
3 technologies. Responsibilities of the Director, reporting to
4 the Program Manager for Vehicle Technologies, include—
5 (1) improving coordination and developing con-
6 sensus between government agency and industry
7 partners, and proposing new processes for program
8 management and priority setting to better align ac-
9 tivities and budgets among partners;
10 (2) frequent convening of workshops, site visits,
11 demonstrations, conferences, investor forums, and
12 other events in which information and research find-
13 ings are shared among program participants and in-
14 terested stakeholders;
15 (3) developing a budget for the Department's
16 activities with regard to the interagency program,
17 and providing consultation and guidance on vehicle
18 technology funding priorities across agencies;
19 (4) determining a process for reviewing pro-
20 gram technical goals, targets, and timetables and,
21 where applicable, aided by life-cycle impact and cost
22 analysis, proposing revisions in light of program
23 progress, available funding, and rate of technology
24 adoption;

1 (5) evaluating ongoing activities of the program
2 and recommending project modifications, including
3 the termination of projects, where applicable; and
4 (6) recruiting new industry participants to the
5 interagency program, including truck, trailer, and
6 component manufacturers who have not traditionally
7 participated in federally-sponsored research and
8 technology development activities.
9 (c) REPORTING.—At the end of each fiscal year the
10 partnership shall submit to the Secretary and relevant
11 Congressional committees of jurisdiction an annual report
12 describing activities undertaken in the previous year, ac-
13 tive industry participants, efforts to recruit new partici-
14 pants, progress of the program in meeting goals and
15 timelines, and a strategic plan for funding of activities
16 across agencies.
17 **SEC. 202. CLASS 8 TRUCK DEMONSTRATION.**
18 The Secretary shall conduct a competitive grant pro-
19 gram to demonstrate the integration of multiple advanced
20 technologies on long-haul Class 8 truck and trailer plat-
21 forms with a goal of improving overall freight efficiency,
22 as measured in ton-miles per gallon, by 50 percent, includ-
23 ing a combination of technologies listed in section 201(a).
24 Applicant teams may be comprised of truck and trailer
25 manufacturers, engine and component manufacturers,

1 fleet customers, university researchers, and other appli-
2 cants as appropriate for the development and demonstra-
3 tion of integrated Class 8 truck and trailer systems.

4 **SEC. 203. TECHNOLOGY TESTING AND METRICS.**

5 The Secretary, in coordination with the partners of
6 the interagency research program described in section
7 201(a)—

8 (1) shall develop standard testing procedures
9 and technologies for evaluating the performance of
10 advanced heavy vehicle technologies under a range of
11 representative duty cycles and operating conditions,
12 including for heavy hybrid propulsion systems;

13 (2) may evaluate heavy vehicle performance
14 using metrics other than those based on miles per
15 gallon, including those based on units of volume or
16 weight transported for freight applications, and ap-
17 propriate metrics based on the work performed by
18 nonroad systems; and

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

21 **SEC. 204. NONROAD SYSTEMS PILOT PROGRAM.**

22 The Secretary is authorized to undertake a pilot pro-
23 gram of research, development, demonstration, and com-
24 mercial applications of technologies to improve total ma-
25 chine or system efficiency for heavy duty nonroad equip-

1 ment, and shall seek opportunities to transfer relevant re-
2 search findings and technologies between the nonroad and
3 on-highway equipment and vehicle sectors.

SECTION-BY-SECTION ANALYSIS OF
H.R. 3246, THE ADVANCED VEHICLE TECHNOLOGY ACT OF 2009

SECTION 1. SHORT TITLE

SEC. 2. FINDINGS—States that Congress finds that: the transportation sector accounts for a significant portion of U.S. and global energy use, emissions, and oil consumption; the U.S. is overly dependent on foreign oil; heavy vehicle fuel consumption will grow; domestic vehicle manufacturers have increasingly limited resources for R&D; engine and component manufacturers play an important role in technology development; Departmental priorities have shifted drastically in recent years; vehicle connectivity to other vehicles, infrastructure and electrical grid can improve efficiency; federal R&D programs should be balanced between long-term and near-term technology development.

SEC. 3. OBJECTIVES—States that the objectives of the program are to develop technologies that improve efficiency and emissions of vehicles, reduce reliance on petroleum; support vehicle manufacturing in the U.S.; enhance commercial and passenger vehicle performance; allow for greater consumer choice; shorten technology penetration time; ensure balance and diversity in federal R&D investment; and strengthen public-private R&D partnerships.

SEC. 4. DEFINITIONS—Defines "Department" as the Department of Energy, and "Secretary" as the Secretary of Energy.

SEC. 5. AUTHORIZATION OF APPROPRIATIONS—Authorizes to be appropriated approximately $550 million per year for all vehicle technology programs at the Department over five years, increasingly incrementally for inflation. Of that annual total, approximately $200 million will be for the Medium- and Heavy-Duty Commercial Vehicles programs, $30 million will be for User Facilities, and $20 million will be for a Non-Road Pilot Program, over five years.

TITLE I—VEHICLE RESEARCH AND DEVELOPMENT

SEC. 101. PROGRAM.

(a) Instructs the Secretary to conduct research, development, demonstration, and commercial application activities on advanced vehicle materials, technologies, and processes in the areas of: hybridization and electrification; batteries and energy storage devices; power electronics; engine efficiency and combustion; waste heat recovery; transmission and drivetrains; hydrogen fuel cells, internal combustion engines, and infrastructure; aerodynamics; rolling resistance; accessory power loads; weight reduction; friction and wear reduction; durability; innovative propulsion systems; compatibility with non-petroleum fuels; modeling and simulation; refueling and charging infrastructure; sensing and communications; rare Earth and precious metals; after-treatment; battery thermal management; common standards and specifications; and other areas as determined by the Secretary.

(b) Instructs the Secretary to maintain programs in mid- to long-term transformational vehicle technologies such as hydrogen, multiple battery chemistries, novel energy storage devices, vehicle connectivity, and other areas as determined by the Secretary.

(c) Specifies that activities should be carried out in partnership or collaboration with a diverse set of non-governmental, private and academic entities, including those which have not previously participated in government-sponsored R&D activities; that the Secretary shall utilize and support other organizations with expertise in vehicle technology development; that technology transfer mechanisms will be streamlined; that existing or former manufacturing facilities should be utilized; and that technologies developed by these programs will be produced in the U.S.

(d) Instructs the Secretary to better coordinate activities between relevant Departmental programs and offices, and other federal agencies.

(e) Instructs the Secretary inform other agencies of the potential for demonstrating technologies funded by this Act.

(f) Instructs the Secretary to support and utilize State and Local government initiatives in advanced vehicle technology development.

SEC. 102. SENSING AND COMMUNICATION TECHNOLOGIES—Instructs the Secretary to coordinate with other agencies in the development of sensing, commu-

nications, and actuation technologies to better integrate on-board vehicle systems, vehicle-to-vehicle, vehicle-to-infrastructure, and vehicle-to-electrical grid.

SEC. 103. MANUFACTURING—Instructs the Secretary to develop advanced vehicle manufacturing technologies and processes that: increase production rates and reduce costs; accommodate different battery chemistries and configurations; reduce waste streams and improve efficiency of manufacturing; recycle and reuse batteries for vehicles and stationary purposes; produce lightweight materials; produce hydrogen vehicles and technologies; produce permanent magnets for electric motors.

SEC. 104. USER FACILITIES—Allows the Secretary to construct, expand, or modify new or existing facilities for: testing and simulating the integration of various vehicle systems; subjecting vehicles to varying duty cycle and operating conditions; developing battery manufacturing technologies; and developing test cycles for non-petroleum fuels and other technologies.

TITLE II—MEDIUM– AND HEAVY–DUTY COMMERCIAL VEHICLES

SEC. 201. PROGRAM

(a) Instructs the Secretary to carry out a collaborative commercial and transit vehicle technology development program in partnership with a variety of industry and federal agency partners, and include activities in the areas of: engine efficiency; combustion; waste heat recovery; aerodynamics; rolling resistance; hybridization and electrification; drivetrains; friction and wear reduction; engine idle and parasitic energy loss; sensing and communications; lightweight materials; battery thermal management; recharging infrastructure; modeling and simulation; retrofitting of existing fleets with new technologies; and integration of multiple technologies onto a single platform.

(b) Instructs the Secretary to appoint a full-time director for medium- to heavy-duty truck technology development programs, and specify that responsibilities of that director will include: improving coordination between program partners; convening of events for sharing information and research findings; developing a DOE budget and consulting on budget priorities across agency partners; determining a process for reviewing and revising program goals, targets and timetables; evaluating program activities; and recruiting new industry participants.

(c) Instructs the Secretary to provide a report to Congress describing the program activities, partners, and progress, and proposing a strategic plan for the interagency partnership.

SEC. 202. CLASS 8 TRUCK AND TRAILER SYSTEMS DEMONSTRATIONS—Instructs the Secretary to conduct a program to demonstrate the integration of multiple advanced technologies on truck and trailer platforms.

SEC. 203. TECHNOLOGY TESTING AND METRICS—Instructs the Secretary, in coordination with interagency partners, to develop standard testing procedures and metrics that represent the unique task-specific operating conditions for the range of commercial vehicles.

SEC. 204. NON–ROAD SYSTEMS PILOT PROGRAM—Authorizes the Secretary to undertake a pilot program in technology development for non-road equipment (such as construction, agricultural, or industrial mobile equipment) and to transfer relevant research findings between non-road and on-highway sectors.

XXI. PROCEEDINGS OF THE FULL COMMITTEE MARKUP ON H.R. 3246, THE ADVANCED VEHICLE TECHNOLOGY ACT OF 2009

WEDNESDAY, JULY 29, 2009

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE,
Washington, DC.

The Committee met, pursuant to call, at 10:00 a.m., in Room 2318 of the Rayburn House Office Building, Hon. Bart Gordon [Chair of the Committee] presiding.

Chair GORDON. Good morning. The Committee will come to order.

Pursuant to notice, the Committee on Science and Technology meets to consider the following measures: H.R. 3246, the *Advanced Vehicle Technology Act of 2009;* H.R. 3165, the *Wind Energy Research and Development Act of 2009;* H.R. 3029, *To establish a research, development and technology demonstration program to improve the efficiency of gas turbines used in combined cycle power generation systems,* and H.R. 3247, *To establish a social and behavioral science research program at the Department of Energy, and for other purposes.* We will now proceed with the markup.

This morning the Committee will consider four bills. H.R. 3246, the *Advanced Vehicle Technology Act of 2009,* is authored by our colleague, Mr. Peters, and co-sponsored by Representative Biggert. I think we have a Michigan theme going here. H.R. 3246 authorizes research and development on vehicles with a goal of reducing or eliminating petroleum fuel base and its associated emissions.

We will also consider H.R. 3165, the *Wind Energy Research and Development Act of 2009,* and H.R. 3029, a bill to authorize R&D and to improve the efficiency of gas turbines, both of these bills authored by Mr. Tonko. H.R. 3165 authorizes R&D on wind power. The specific areas of R&D were identified in a recent report by the Department of Energy and the American Wind Energy Association describing the areas of improvements needed if we are to expand wind power electricity generation.

Currently, 15 percent of our electric power is produced from natural gas. Over the next decade, this percentage is predicted to double. The research and development authorized in H.R. 3029 is intended to improve the efficiency of turbines used in these combined cycle power generation systems.

Finally, we will be marking up H.R. 3247, a bill to establish a social and behavioral research program at the Department of Energy. H.R. 3247 was introduced by Dr. Baird, who has been a champion of these areas of research throughout his service on the Committee. It is important to understand why some technologies are more readily adopted than others, and it is important that we communicate to the public clearly about the challenges and opportunities of becoming a more energy-efficient society. H.R. 3247 will help us to accomplish these important goals.

tunities of becoming a more energy-efficient society. H.R. 3247 will help us to accomplish these important goals.

I now recognize Mr. Hall to present his remarks.

[The prepared statement of Chair Gordon follows:]

PREPARED STATEMENT OF CHAIR BART GORDON

This morning the Committee will consider four bills. H.R. 3246, the *Advanced Vehicle Technology Act of 2009,* is authored by our colleague, Mr. Peters, and co-sponsored by Representative Biggert. I think we have a Michigan theme going here. H.R. 3246 authorizes research and development on vehicles with a goal of reducing or eliminating petroleum fuel base and its associated emissions.

We will also consider H.R. 3165, the *Wind Energy Research and Development Act of 2009,* and H.R. 3029, a bill to authorize R&D and to improve the efficiency of gas turbines, both of these bills authored by Mr. Tonko.

H.R. 3165 authorizes R&D on wind power. The specific areas of R&D were identified in a recent report by the Department of Energy and the American Wind Energy Association describing the areas of improvements needed if we are to expand wind power electricity generation.

Currently, 15 percent of our electric power is produced from natural gas. Over the next decade, this percentage is predicted to double. The research and development authorized in H.R. 3029 is intended to improve the efficiency of turbines used in these combined cycle power generation systems. It is vital that utilities build new plants to be as efficient as possible since the investment costs are high and plants operate for many decades once they are brought online.

Finally, we will be marking up H.R. 3247, a bill to establish a social and behavioral research program at the Department of Energy. H.R. 3247 was introduced by Dr. Baird, who has been a champion of these areas of research throughout his service on the Committee. People determine the success or failure of new technologies. It is important to understand why some technologies are more readily adopted than others. And it is important that we communicate to the public clearly about the challenges and opportunities of becoming a more energy efficient society. H.R. 3247 will help us to accomplish these important goals.

The four bills we have before us today target several important energy research needs. I congratulate the Members for their work on these bills, and I look forward to a productive markup. Thank you all for your attendance and participation this morning.

I now recognize Mr. Hall to present his opening remarks.

Mr. HALL. I thank you, Mr. Chairman.

Today we do meet to mark up these bills that you set out there, and H.R. 3029 is to establish a research, development and technology demonstration program to improve the efficiency of gas turbines used in combined cycle power generation systems, and H.R. 3247, to establish a social and behavioral sciences research program at the Department of Energy, and I will have some things to say about that one a little bit later, especially about the author who is a very good friend of mine and may need this bill. I don't know. These two boys from California every now and then I think they need it, even Sensenbrenner sometimes. We are going to have to really look at this. Josh himself does now and then—I mean Roscoe, but he is too old to be up here anyway. I better yield my time back right now.

[The prepared statement of Mr. Hall follows:]

PREPARED STATEMENT OF REPRESENTATIVE RALPH M. HALL

Thank you Mr. Chairman. Today we meet to markup four bills. H.R. 3246, the *Advanced Vehicle Technology Act of 2009;* H.R. 3165, the *Wind Energy Research and Development Act of 2009;* H.R. 3029, *To establish a research, development, and technology demonstration program to improve the efficiency of gas turbines used in combined cycle power generation systems;* and H.R. 3247, *To establish a social and behavioral sciences research program at the Department of Energy, and for other purposes.*

I will not take up a lot of time talking about these bills in my opening statement but will instead make any necessary comments when each bill is brought up.

I would like to thank the staff on both sides for their hard work in getting these bills and their amendments together and ready in such a short period of time.

With that I yield back the balance of my time.

Chair GORDON. Are you sure you don't want to say something about Mr. Neugebauer here before we proceed?

Mr. HALL. He and Boone Pickens got the wind in their problem out in West Texas. Women complain about it blowing their hair.

Chair GORDON. Yes, sir, so here we go. Members can place statements in the record at any point.

[The prepared statement of Mr. Mitchell follows:]

PREPARED STATEMENT OF REPRESENTATIVE HARRY E. MITCHELL

Thank you, Mr. Chairman.

Today we will mark up four pieces of legislation: H.R. 3246, the *Advanced Vehicle Technology Act,* H.R. 3165, the *Wind Energy Research and Development Act,* H.R. 3029, legislation to establish a research, development, and technology demonstration program to improve the efficiency of gas turbines used in combined cycle power generation systems, and H.R. 3247, legislation to establish a social and behavioral sciences research program at the Department of Energy.

I am especially pleased that we are considering H.R. 3165, the *Wind Energy Research and Development Act.*

Wind energy, like solar energy, is a clean alternative energy source that could not only help meet our energy needs, but it could also be a boon to our economy.

According to a May 2008 report from the Department of Energy, current U.S. land-based and offshore wind resources are sufficient to supply the electrical energy needs of the U.S. several times over.

H.R. 3165 would take important steps in advancing wind energy research efforts. Specifically, this bill would require the DOE to focus research and development on improving the energy efficiency, reliability, and capacity of wind turbines, optimizing the design and adaptability of wind energy systems, and reducing the cost of wind energy systems. This legislation would also establish a wind demonstration program.

I urge my colleagues to support this important measure, and I yield back.

Chair GORDON. We will move on now to consider H.R. 3246, the *Advanced Vehicle Technology Act of 2009.*

[The prepared statement of Mr. Inglis follows:]

PREPARED STATEMENT OF REPRESENTATIVE BOB INGLIS

This reauthorization legislation calls on DOE to develop a broad vehicle research portfolio and balance long-term breakthroughs with the immediate research needs in the transportation sector with the goal of bringing new technologies and processes to the market that will reduce our dependence on foreign oil. The bill has a broad vision, focusing on activities from hydrogen fuel cells to lightweight materials and advanced vehicle designs. I'm happy to lend my support to this legislation, which will enrich our federal research efforts, strengthen our competitive role in the international market for cutting edge technologies, and increase our national security.

Chair Gordon. I recognize the gentleman from Michigan, Mr. Peters, to describe his bill.

Mr. PETERS. Thank you, Mr. Chairman. I have an amendment at the desk, or do you want me to describe it?

Chair GORDON. The Clerk will report the amendment.

The CLERK. Amendment in the nature of a substitute to H.R. 3246 offered by——

Chair GORDON. You are recognized to discuss the bill.

Mr. PETERS. Well, thank you, Mr. Chairman.

It is no secret that the global economic crisis has had a devastating impact on the automobile industry. Our automobile and

truck manufacturers and parts suppliers around the globe are struggling to deal with substantially decreased demand in vehicle sales. At the same time, we are in the midst of a transformation to a more energy-independent economy which will require the production of new vehicle technologies that will increase fuel efficiency and reduce emissions. Development of advanced technologies for both heavy-duty trucks and passenger vehicles is a vital national investment and requires a coordinated effort at the federal level.

That is why I am proud to have worked with Chairman Gordon to introduce the *Advanced Vehicle Technology Act of 2009.* This legislation will build upon the current research efforts of the Department of Energy and the private sector by providing an increased federal investment in passenger and heavy-duty vehicle research and development. By directing the Department of Energy to partner with industry stakeholders and agencies across the Federal Government, the bill will ensure that our investment leverages the maximum amount of talent and innovation and leads to faster development of new technologies that will help us meet our energy challenges and promote American innovation in advanced vehicle technology fields.

Ultimately, this legislation will support job retention and creation in this critical high-paying field in companies around the country. I represent a state and a region that has been particularly hard hit by this economic crisis, so I certainly understand very well that every job will be saved and created by this bill is extremely valuable. This legislation is supported by Chrysler, which is headquartered in my Congressional District, and also by General Motors, Ford Motor Company, the UAW, the Motor and Equipment Manufacturers Association, and industry trade groups representing auto parts suppliers as well as key suppliers in my District like ArvinMeritor, Magna International and Bosch.

[The prepared statement of Mr. Peters follows:]

PREPARED STATEMENT OF REPRESENTATIVE GARY C. PETERS

Thank you Mr. Chairman.

It is no secret that the global economic crisis has had a devastating impact on the automobile industry. Automobile and truck manufacturers and parts suppliers around the globe are struggling to deal with substantially decreased demand in vehicle sales.

At the same time, we are in the midst of a transformation to a more energy independent economy, which will require the production of new vehicle technologies that will increase fuel efficiency and reduce emissions. Development of advanced technologies for both heavy-duty trucks and passenger vehicles is a vital national investment and requires a coordinated effort at the federal level.

That is why I am proud to have worked with Chairman Gordon to introduce the *Advanced Vehicles Technology Act of 2009.* This legislation will build upon the current research efforts of DOE and the private sector by providing an increased federal investment in passenger and heavy-duty vehicle research and development.

By directing the Department of Energy to partner with industry stakeholders and agencies across the Federal Government, the bill will ensure that our investment leverages the maximum amount of talent and innovation, and lead to faster development of new technologies that will help us meet our energy challenges and promote American innovation in the advanced vehicle technologies field.

Ultimately, this legislation will support job retention and creation in this critical, high paying field at companies around the country. I represent a state and a region that has been particularly hard hit by this economic crisis, so I understand that each and every job that will be saved or created by this bill is valuable.

This legislation is supported by Chrysler, which is headquartered in my Congressional District, and also by General Motors, Ford, the UAW, the Motor & Equip-

ment Manufacturers Association, which is the industry trade group representing auto parts suppliers, as well as by key suppliers in my District like ArvinMeritor, Magna International and Bosch.

Mr. PETERS. Mr. Chairman, I do have an amendment in the nature of a substitute. Would it be appropriate to discuss that now?

Chair GORDON. Not at this time, but we will get to you.

Mr. PETERS. Thank you.

Chair GORDON. Mr. Hall is recognized.

Mr. HALL. Mr. Chairman, I am generally supportive of H.R. 3246. The cost of the bill gives me some problems but I also understand the cost associated with the level, degree and scope of the bill. The purpose is to help reduce our dependence on foreign imports of oil through advanced technologies to make our vehicles not only more efficient but also competitive by using alternative fuels and technologies, and I know we need to do that. As well, the bill targets research for medium- to heavy-duty commercial and transit vehicles and aims to advance technologies in long-haul class A truck and trailer platforms.

I would like to thank Mr. Peters for working with us to incorporate some suggestions that my folks had made and others on my side here had made in this substitute amendment including the natural gas vehicle addition. We support the bill, and I yield back my time. I thank you.

[The prepared statement of Mr. Hall follows:]

PREPARED STATEMENT OF REPRESENTATIVE RALPH M. HALL

H.R. 3246, the Advanced Vehicle Technology Act of 2009

Mr. Chairman, I am generally supportive of H.R. 3246, the *Advanced Vehicle Technology Act.* The cost of the bill gives me pause, but I also understand the costs associated with the level, degree and scope of this bill. The purpose is to help reduce our dependence on foreign imports of oil through advanced technologies to make our vehicles not only more efficient, but also competitive while using alternative fuels and technologies. As well, the bill targets research for medium- to heavy-duty commercial and transit vehicles and aims to advance technologies on long-haul Class 8 truck and trailer platforms I would like to thank Mr. Peters for working with me to incorporate suggestions made by my side in his substitute amendment including the natural gas vehicle additions.

With that I yield back the balance of my time.

Chair GORDON. Ms. Biggert was a co-sponsor and helped to form this bill. Ms. Biggert, would you like to be recognized?

Ms. BIGGERT. Thank you, Mr. Chairman. I think I will wait until the Manager's Amendment and speak at that time.

Chair GORDON. Does anyone else wish to be recognized? Mr. Neugebauer.

Mr. NEUGEBAUER. I thank the gentleman, and I just wanted to yield some time to Mr. Peters. You know, at a time when we are, for every dollar we spend we are having to borrow 50 cents. I think it is important that we make sure that we are not having any duplication in the process and that our research dollars are focused so that the American people get, you know, the best bang for their bucks, and so I guess the question to you would be, what steps in this bill are we taking to make sure that we are not duplicating efforts that are already underway and we are not, I guess, piling on and that this is coordinated. I will yield to the gentleman.

Mr. PETERS. Thank you. I think that is a very important point and this bill does coordinate that but also expands the scope of

stakeholders or companies that can get involved in research and development. In the past, a lot of that R&D has been done primarily by the OEMs, the large companies, Chrysler, Ford, General Motors, others. This bill expands it to understand that a lot of the real creative energy, the creative talent that exists is in the smaller companies, the auto suppliers that provide equipment to those companies and so it'll be coordinated through that but also expand the reach of research and development into those smaller companies that have talent, that will add considerable amount of ingenuity to what is already being done with the OEMs.

The other thing that is different in this bill than in the past is there is more of a focus on the heavy-trucks, the medium- and heavy-duty trucks, which has been part of efforts in the past but it has always been kind of a stepchild. It hasn't had the kind of attention that it deserves, and if you are looking for your best bang for your dollar, of your research dollar, there is a lot of low-hanging fruit when it comes to increased efficiency of heavy trucks. This bill now puts focus on that as a direct effort to make sure that we are coordinating those research dollars appropriately and making sure that truck manufacturers get research dollars that they didn't have before because again that is going to be an area where we think we can great efficiencies and lower the cost of transportation to the economy as a whole, so I am certainly very conscious as well of the cost of government being involved in these programs, and to me, this is kind of like seed corn. You want to put in those R&D dollars because you are going to have a great return on your investment. I know you agree with that as well, but we do have to make sure it is coordinated and going to the right companies, and that has been a major focus of the bill.

Mr. NEUGEBAUER. And I thank the gentleman, and I think he does make a good point about the commercial and off-road equipment. A lot of the technologies that are appropriate for the automobile industry that we have already developed are not technologies that transfer to that other sector of our economy, an important sector of our economy, and so I think it does make sense to make sure that we are developing technology for off-road and heavy-equipment utilization as well. Again, I am, as I think others are, concerned with the deficit so we just want to make sure that we are targeting the money and rewarding where we are having success, so I thank the gentleman for his time. I yield back, Mr. Chairman.

Chair GORDON. Thank you, Mr. Neugebauer. You raise an excellent point. Let me also point out, this is an authorization so it will have to compete with other programs to determine whether it is worthy for those limited dollars.

Mr. Inglis, did you wish to be recognized?

Mr. INGLIS. To speak on the substitute.

Chair GORDON. So if no one else wishes to be recognized, then I ask unanimous consent that the bill is considered as read and open to amendment at any point and that the Members proceed with amendments in the order of the roster. Without objection, so ordered.

The first amendment on the roster is an amendment in the nature of a substitute offered by the gentleman from Michigan, Mr. Peters. Are you ready to proceed with your amendment?

Mr. PETERS. I am, Mr. Chairman. I have the amendment at the desk.

Chair GORDON. The Clerk will report the amendment.

The CLERK. Amendment in the nature of a substitute to H.R. 3246, amendment number 016, offered by Mr. Peters of Michigan.

Chair GORDON. I ask unanimous consent to dispense with the reading. Without objection, so ordered.

I recognize the gentleman for five minutes to explain the amendment.

Mr. PETERS. Thank you, Mr. Chairman. Today I am offering an amendment in the nature of a substitute which makes a series of mostly minor and clarifying changes to the bill and is the product of considerable discussion with a variety of stakeholders. Mr. Hall, Mr. Inglis and Mrs. Biggert and Minority staff were particularly helpful in improving this legislation and provided valuable input, especially in the areas of natural gas vehicles and I appreciate all of your comments and help.

The substitute includes the following notable changes. In section 101, we added to the list of research areas the programs should pursue hydraulic hybrid energy storage component and subsistence to manufacturer turbo boosting, predictive engineering, natural gas storage systems and non-chemical energy storage devices. We sought to ensure that the Department reaches out to a broad spectrum of industry stakeholders with research and development capabilities in the United States.

We also sought to ensure the Secretary will develop more efficient processes for transferring technologies to industry and in coordinating activities among the various DOE and interagency partners. The Secretary would not duplicate the activities of various partners to make sure that coordination is there, as was raised.

In section 103, we added the production of lightweight composites and high-pressure natural gas storage tanks to the list of manufacturing R&D areas. Title II pertains to technology development for medium- to heavy-duty commercial and transit vehicles, and the amendment adds both natural gas and hydrogen technologies to the list of critical research areas. It also further recognizes the difficulty in establishing performance metrics with a wide range of medium and heavy truck platforms which operate under some very unique conditions and clarifies that the Secretary should consider these operating conditions when testing and evaluating vehicles.

Again, I would like to thank the Chairman and his staff for their leadership and their hard for both this amendment and substitute and the underlying legislation. I would also like to thank in particular my Republican counterparts and especially Mrs. Biggert for working with me to provide for this very important bill, and I appreciate the Committee's consideration of this amendment in the nature of a substitute and encourage its passage as well as the passage of the underlying bill. Mr. Chairman, I yield back the balance of my time.

[The prepared statement of Mr. Peters follows:]

PREPARED STATEMENT OF REPRESENTATIVE GARY C. PETERS

Today I will be offering an Amendment in the Nature of a Substitute which makes a series of mostly minor and clarifying changes to the bill, and is the product of considerable discussions with a variety of stakeholders. Mr. Hall, Mr. Inglis, Mrs. Biggert and the Minority staff were particularly helpful in improving this legislation and provided valuable input, especially in the areas of natural gas vehicles.

The substitute includes the following notable changes:

- In section 101, we added to the list of research areas the program should pursue, hydraulic hybrid energy storage, component and subsystem manufacturing, turbo-boosting, predictive engineering, natural gas storage systems, and novel non-chemical energy storage devices.
- We sought to ensure that the Department reaches out to a broad spectrum of industry stakeholders with research and development capabilities in the U.S.
- We also sought to ensure that the Secretary would develop more efficient processes for transferring technologies to industry and, in coordinating activities amongst the various DOE and interagency partners, the Secretary would not duplicate the activities of the various partners.
- In section 103, we added the production of lightweight composites and high pressure natural gas storage tanks to the list of manufacturing R&D areas.
- Title II pertains to technology Development for Medium- to Heavy-Duty Commercial and Transit Vehicles, and the amendment adds both natural gas and hydrogen technologies to the list of critical research areas.
- It also further recognizes the difficulty in establishing performance metrics for the wide range of medium- and heavy-duty truck platforms which operate under very unique conditions, and clarifies that the Secretary should consider these operating conditions when testing and evaluating vehicles.

Again, I want to thank the Chairman and his staff for their leadership and hard work on both this amendment and the underlying legislation. I would also like to thank my Republican counterparts, and especially Mrs. Biggert, for working with me to improve this important bill. I appreciate the Committee's consideration of this amendment in the nature of a substitute and I encourage its passage, as well as the passage of the underlying bill.

I yield back the balance of my time.

Chair GORDON. Ms. Biggert is recognized.

Ms. BIGGERT. Thank you, Mr. Chairman, and thank you, Mr. Peters, for your help and cooperation and assistance with the manager's amendment before us today. I really appreciate it. As the original co-sponsor of the bill, I certainly urge my colleagues to support the manager's amendment before us.

This amendment includes important industry and research supported changes to the bill that will foster constructive collaboration and cooperation between the public and the private sectors needed to support the deployment of new standards and technologies for autos, trucks and heavy equipment. I think we can make significant strides in transformational areas such as hybrid electrical vehicles, advanced batteries, energy storage, hydrogen and fuel cells with coordinated and consistent research efforts.

The *Advanced Vehicle Technology Act* will facilitate this technology transformation for vehicles, and more importantly, the heavy-equipment sector. As I said in last week's markup, the medium- and heavy-duty and non-road provisions in H.R. 3246 are particularly important. I have had the opportunity to drive a 10-ton front loader and I think that that basket will carry one million golf balls, and I had driven it forward and backward but I think I will stick to on-road driving from now on.

Significant efficiency gains can be made in non- and off-road equipment relative to the way that they perform on job sites all the

while optimizing performance, safety and operational standards. So with increased R&D, we will be able to increase manufacturing flexibility to adapt and produce new and different forms of equipment needed to meet future demands. So this will be achieved through a total systems approach to equipment productivity and efficiency with a focus on components and structures, not just the engine itself.

So, again, I thank Representative Peters and urge my colleagues to support the manager's amendment and the underlying bill, and yield back.

[The prepared statement of Ms. Biggert follows:]

PREPARED STATEMENT OF REPRESENTATIVE JUDY BIGGERT

Thank you Mr. Chairman. And thank you Representative Peters for your cooperation and assistance with the manager's amendment before us today.

As an original co-sponsor of H.R. 3246, I urge my colleagues to support the manager's amendment before us.

The manager's amendment includes important industry and research supported changes to H.R. 3246 that will foster constructive collaboration and cooperation between the public and private sectors needed to support the deployment of new standards and technologies for autos, trucks and heavy equipment.

We can make significant strides in transformational areas such as hybrid-electrical vehicles, advanced batteries, energy storage, hydrogen engines and fuel cells with coordinated and consistent research support.

The *Advanced Vehicle Technology Act* will facilitate this technology transformation for vehicles and more importantly, the heavy equipment sector.

As I said in last week's markup, the medium-, heavy-duty and non-road provisions in H.R. 3246 are particularly important.

Significant efficiency gains can be made in non- and off-road equipment relative to the way they perform on the job site, all while optimizing performance, safety, and operational standards.

With increased R&D, we will be able to increase manufacturing flexibility to adapt and produce new and different forms of equipment needed to meet future demand.

This will be achieved through a total systems approach to equipment productivity and efficiency with a focus on the components and structure, not just the engine itself.

I urge my colleagues support for the manager's amendment and underlying bill and I yield back.

Chair GORDON. Thank you, Ms. Biggert, and thank you for your important contributions to the bill. By the way, did you parallel park that big truck?

Ms. BIGGERT. I didn't run over anybody.

Chair GORDON. That is a success.

Does anyone else wish to be recognized?

Mr. ROHRABACHER. Yes, Mr. Chairman.

Chair GORDON. Mr. Rohrabacher.

Mr. ROHRABACHER. I am supporting this bill but I do want to call attention to what we are accomplishing by bills like this. In California, we have a major problem of trucks on the road, and when I say trucks, we are talking about bumper to bumper, and in fact, through my district, which covers about half of America's commerce, and I represent both the ports of Los Angeles and Long Beach, we have identified about 50 percent of all the air pollution in southern California comes from those trucks and that operation. We need to perfect our technology but we must know if we perfect the truck, we also are making it more competitive with other modes of transportation for containers, and perhaps we don't want to have a system in the United States any longer where containers

are taken long haul on our freeways, which of course have a lot of weight on the freeways and cause the degeneration of those roads. This legislation, while making trucks more efficient, which is a good thing, has an impact on over areas, and that is, do we want to have more or just as many trucks on the road hauling containers or do we want to try to develop container movement systems that will not put that strain on the roads, et cetera.

Today, by passing this, we are bolstering the argument, bolstering the alternative of having more truck delivery containers long haul in our country, so I will support this. I do believe moving forward in making those alternatives available is not necessarily a bad thing, but I myself am trying to find a way of developing container movement systems that will get those trucks off the road.

So I thank you very much, Mr. Chairman.

Chair GORDON. Thank you, Mr. Rohrabacher. Mr. Hall and I have a suggestion on that, and that is to move some of those plants to Texas and Tennessee and then you would have to have less coming through your District, so we would welcome that.

Does anyone—okay, Mr. Bilbray.

Mr. BILBRAY. Mr. Chairman, I guess you hear from the surfing caucus this morning, as always. In all fairness to my colleague, maybe this committee should be briefed on the different plans that the South Coast Air Base has for addressing these emission issues because there is a lot of this technology that is now being required to be phased in. I think the biggest issue that Mr. Rohrabacher is pointing out that we do have a technology that is very antiquated, very dirty, which is train locomotives. We are working off 60-, 70-year-old technology diesel electric, and the life expectancy of these vehicles are for another 100 years. So the concept of using natural gas, using cleaner fuel rather than diesel is absolute essentially but I have to remind my colleague that the off-road component here is very compatible to the use of natural gas because you have fleet operations where refueling is very efficient, very clean and it is just sad that that technology hasn't been moved forward or encouraged more. It has sort of been a blind side for us, and I think that as we move forward we need to address it.

I would just like to bring up one of the items that we always need to talk about when we talk about alternative fuels, and a practical application of it is the creation of the infrastructure to provide the fuel itself. One of the things we have overlooked when we talk about natural gas is that the overwhelming majority of homes in urban areas are now plumbed with natural gas but we never think about more research and more encouragement of home dispensing, of people being able to fuel up while they sleep in their home, not having to create a whole new separate infrastructure as you do with other fuels but utilizing the ones in there, and that home dispensing is something that I think we need to be looking at more and more. In 1990 when I drove a natural gas vehicle, at-home dispensing was available but the cost of it hadn't been brought down to a level where a lot of people would prefer, so I just bring that up again. Don't look right past your own water heater when you are looking for alternative energies, and I yield back, Mr. Chairman.

Chair GORDON. Thank you, Mr. Bilbray, and I would suggest that you might get with Elizabeth Chapel and Chris King and talk about that and see if, you know, there is some research or something that we want to do in that area.

Does anyone else wish to be recognized? Mr. Inglis is recognized.

Mr. INGLIS. Thank you, Mr. Chairman. I would like to voice my support for the substitute and thank Mr. Peters for including language that ensures that all domestic manufacturers including those owned by companies based abroad can participate in this vehicle R&D program. It is a wonderful opportunity to engage all automotive manufacturers who are developing vehicle technology and employing people all over the United States.

You will recall that we had testimony from a representative of BMW. BMW is doing fabulous work at Clemson University's National Center of Automotive Research in the upstate of South Carolina and advancing vehicle technology in a number of ways, working hard to bring us products like the H7, BMW's car that runs on both hydrogen and gasoline, the same internal combustion engine.

So I want to commend Mr. Peters for his interest in including these partnerships in this program and thank him for the change in the substitute, and I yield back, Mr. Chairman.

[The prepared statement of Mr. Inglis follows:]

PREPARED STATEMENT OF REPRESENTATIVE BOB INGLIS

Mr. Chairman, I would like to voice my support for this amendment. Mr. Peters included language that ensures all domestic manufacturers including those owned by companies based abroad can participate in this vehicle R&D program. This is an opportunity to engage all automotive manufacturers that are developing cutting edge vehicle technology and employing people all over the United States. In the Upstate, BMW is doing great work at Clemson's ICAR campus to advance vehicle technology in a number of ways and they're working hard to bring us the Hydrogen 7 sedan. I want to commend Mr. Peters for his interest in including these partnerships in this program.

Chair GORDON. Does anyone else wish to be recognized? All right.

The second amendment on the roster is an amendment offered by the gentlelady from Texas, Ms. Johnson. Are you ready to proceed with your amendment?

Ms. JOHNSON. Yes, Mr. Chairman, I have an amendment at the desk.

Chair GORDON. The Clerk will report the amendment.

The CLERK. Amendment to the amendment in the nature of a substitute to H.R. 3246, amendment number 082, offered by Ms. Eddie Bernice Johnson of Texas.

Chair GORDON. I ask unanimous consent to dispense with the reading. Without objection, so ordered.

I recognize the gentlelady for five minutes to explain the amendment.

Ms. JOHNSON. Thank you very much, Mr. Chairman. My amendment adds an additional objective to the *Advance Vehicle Technology Act of 2009*. The objective is to develop cost-effective advanced technologies for wide-scale utilization through the passenger, commercial, government and transit vehicle sectors. H.R. 3246 states that the United States transportation sector is over 95 percent dependent upon petroleum and over 60 percent of petro-

leum demand is met by imported supplies. It costs less to buy oil from Saudi Arabia and use it in petroleum-burning vehicles than it does to innovate. Right now it is cost-prohibitive to build new vehicles that are more fuel efficient, so we need to make that the technologies and the processes developed as a result of this bill are attractive to industry. As Subcommittee Chairman of Water and Transportation Committee, I do care deeply about how well we are innovating, especially when it comes to our passenger, commercial and transit vehicles. It is great to develop new technologies that improve fuel efficiency and fewer greenhouse gas emissions. However, we must ensure that investments in advanced vehicle technologies yield results that translate into broad utilization by the transportation sector.

My amendment sharpens the focus on these points. Texas has more state highway miles than anywhere in the Nation. We have more than 79,000 miles of road with a center strip painted down the middle. I have four interstates that come through my district. Texas has much to be gained and lost by research and development funded by H.R. 3246 as we all do. We simply must reduce the amount of petroleum we use. It is my hope that this legislation will help spur new technologies to accomplish that goal.

Thank you for considering my amendment, and I yield back the balance of my time.

Chair GORDON. Thank you, Ms. Johnson, and thank you for sharing your knowledge from the Transportation Committee with us here.

Is there further discussion on the amendment? If no, the vote occurs on the amendment. All in favor, say aye. Those opposed, no. The ayes have it and the amendment is agreed to.

Are there any further amendments to the amendment in the nature of a substitute? If no, the vote occurs on the amendment. All in favor, say aye. Those opposed, no. The ayes have it. The amendment is agreed to.

The vote is on the bill, H.R. 3246 as amended. All those in favor will say aye. All opposed, no. In the opinion of the Chair, the ayes have it.

I now recognize Mr. Peters for a motion.

Mr. PETERS. Thank you, Mr. Chairman. I move the Committee favorably report H.R. 3246 as amended to the House with the recommendation that the bill do pass. Furthermore, I move that staff be instructed to prepare the legislative report and make necessary technical and conforming changes and that the Chairman take all necessary steps to begin to bring the bill before the House for consideration.

Chair GORDON. The question is on the motion to report the bill favorably. Those in favor of the motion will signify by saying aye. Opposed, no. The ayes have it, and the bill is favorably reported.

Without objection, the motion to reconsider is laid upon the table. Members will have two subsequent calendar days in which to submit supplemental Minority or additional views on the measure.

Thank you, Mr. Peters, Ms. Biggert and Ms. Johnson for a good bill.

This concludes our Committee markup.

[Whereupon, at 12:53 p.m., the Committee was adjourned.]

Appendix

Amendment Roster

COMMITTEE ON SCIENCE AND TECHNOLOGY
FULL COMMITTEE MARKUP
July 29, 2009

AMENDMENT ROSTER

H.R. 3246, the Advanced Vehicle Technology Act of 2009

No.	Sponsor	Description	Results
1	Mr. Peters (016)	Amendment in the Nature of a Substitute makes several technical and clarifying changes. Amends Section 101 to: • Add the following new areas to the list of activities required of the vehicle research and development program: (1) advanced boosting systems; (2) hydraulic hybrid technologies; (3) predictive engineering of vehicle and transportation systems; and (4) gaseous fuels storage system integration and optimization; • Replace "domestic manufacturers and suppliers" with "companies that manufacture or assemble vehicles of components in the United States" with respect to industry participants in partnerships or collaborations under the bill; specifies that, where possible, these companies partner with firms that conduct significant and relevant research and development activities in the United States; • Add "develop more efficient processes for transferring research findings and technologies to industry" to the list of activities required of the Secretary under subsection (c); and • Add a new subsection to require that the Secretary ensure, to the maximum	Agreed to by voice vote.

		extent practicable, that activities do not duplicate those of other programs within the Department of Energy or other relevant research agencies. Amends Section 103 to add "produce lightweight high pressure storage systems for gaseous fuels" to the list of activities to be carried out under the vehicle manufacturing technologies and practices program. Amends Section 201 to: • Add the following areas to the list of activities required of the medium and heavy duty commercial and transit vehicle program: (1) on board storage technologies for compressed and liquefied natural gas; (2) development and integration of engine technologies designed for natural gas operation of a variety of vehicle platforms; and (3) hydrogen vehicle technologies, including fuels cells and internal combustion engines, and hydrogen infrastructure; and • Add "other responsibilities as determined by the Secretary, in consultation with interagency and industry partners" to the list of responsibilities required of the Director of the program. Amends Section 203 to specify that the Secretary "shall" (rather than "may") evaluate heavy duty vehicle performance using metrics other than those based on miles per gallon. Amends Section 204 to specify that the Secretary is required to (rather than is authorized to) undertake a pilot program of research, development, demonstration, and commercial applications of technologies to	

		improve total machine or system efficiency for heavy duty non-road equipment.	
2	Ms. Johnson (082)	Amends Section 3 to add "develop cost-effective advanced technologies for wide-scale utilization throughout the passenger, commercial, government, and transit vehicle sectors" to the list of objectives of the bill.	Agreed to by voice vote.

AMENDMENT IN THE NATURE OF A SUBSTITUTE TO H.R. 3246 OFFERED BY MR. PETERS OF MICHIGAN

Strike all after the enacting clause and insert the following:

1 **SECTION 1. SHORT TITLE.**

2 This Act may be cited as the ''Advanced Vehicle
3 Technology Act of 2009''.

4 **SEC. 2. FINDINGS.**

5 Congress finds the following:

6 (1) According to the Energy Information Ad-
7 ministration, the transportation sector accounts for
8 approximately 28 percent of the United States pri-
9 mary energy demand and greenhouse gas emissions,
10 and 24 percent of global oil demand.

11 (2) The United States transportation sector is
12 over 95 percent dependent on petroleum, and over
13 60 percent of petroleum demand is met by imported
14 supplies.

15 (3) United States heavy truck fuel consumption
16 will increase 23 percent by 2030, while overall trans-
17 portation energy use will decline by 1 percent.

1 (4) The domestic automotive and commercial
2 vehicle manufacturing sectors have increasingly lim-
3 ited resources for research and development of ad-
4 vanced technologies.
5 (5) Vehicle, engine, and component manufactur-
6 ers are playing a more important role in vehicle
7 technology development, and should be better inte-
8 grated into Federal research efforts.
9 (6) Priorities for the Department of Energy's
10 vehicle technologies research have shifted drastically
11 in recent years among diesel hybrids, hydrogen fuel
12 cell vehicles, and plug-in electric hybrids, with little
13 continuity among them.
14 (7) The integration of vehicle, communication,
15 and infrastructure technologies has great potential
16 for efficiency gains through better management of
17 the total transportation system.
18 (8) The Federal Government should balance its
19 role in researching longer-term exploratory concepts
20 and developing nearer-term transformational tech-
21 nologies for vehicles.
22 **SEC. 3. OBJECTIVES.**
23 The objectives of this Act are to—
24 (1) develop technologies and practices that—

1 (A) improve the fuel efficiency and emis-
2 sions of all vehicles produced in the United
3 States; and
4 (B) reduce vehicle reliance on petroleum-
5 based fuels;
6 (2) support domestic research, development,
7 demonstration, and commercial application and man-
8 ufacturing of advanced vehicles, engines, and compo-
9 nents;
10 (3) enable vehicles to move larger volumes of
11 goods and more passengers with less energy and
12 emissions;
13 (4) allow for greater consumer choice of vehicle
14 technologies and fuels;
15 (5) shorten technology development and inte-
16 gration cycles in the vehicle industry;
17 (6) ensure a proper balance and diversity of
18 Federal investment in vehicle technologies; and
19 (7) strengthen partnerships between Federal
20 and State governmental agencies and the private
21 and academic sectors.
22 **SEC. 4. DEFINITIONS.**
23 For the purposes of this Act:
24 (1) DEPARTMENT.—The term ''Department''
25 means the Department of Energy.

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

3 **SEC. 5. AUTHORIZATION OF APPROPRIATIONS.**

4 (a) IN GENERAL.—The following sums are author-
5 ized to be appropriated to the Secretary for research, de-
6 velopment, demonstration, and commercial application of
7 vehicles and related technologies, including activities au-
8 thorized under this Act:
9 (1) $550,000,000 for fiscal year 2010.
10 (2) $560,000,000 for fiscal year 2011.
11 (3) $570,000,000 for fiscal year 2012.
12 (4) $580,000,000 for fiscal year 2013.
13 (5) $590,000,000 for fiscal year 2014.
14 (b) MEDIUM AND HEAVY DUTY COMMERCIAL VEHI-
15 CLES.—From the amounts authorized under subsection
16 (a), there are authorized to be appropriated for carrying
17 out title II—
18 (1) $200,000,000 for fiscal year 2010;
19 (2) $210,000,000 for fiscal year 2011;
20 (3) $220,000,000 for fiscal year 2012;
21 (4) $230,000,000 for fiscal year 2013; and
22 (5) $240,000,000 for fiscal year 2014.
23 (c) USER FACILITIES.—From the amounts author-
24 ized under subsection (a), there are authorized to be ap-
25 propriated for carrying out section 104—

(1) $35,000,000 for fiscal year 2010;

(2) $30,000,000 for fiscal year 2011;

(3) $20,000,000 for fiscal year 2012;

(4) $15,000,000 for fiscal year 2013; and

(5) $15,000,000 for fiscal year 2014.

(d) NON-ROAD PILOT PROGRAM.—From the amounts authorized under subsection (a), there are authorized to be appropriated for carrying out section 204—

(1) $20,000,000 for fiscal year 2010;

(2) $20,000,000 for fiscal year 2011; and

(3) $20,000,000 for fiscal year 2012.

TITLE I—VEHICLE RESEARCH AND DEVELOPMENT

SEC. 101. PROGRAM.

(a) ACTIVITIES.—The Secretary shall conduct a program of basic and applied research, development, 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 Nation's passenger and commercial vehicles, including activities in the areas of—

(1) hybridization or full electrification of vehicle systems;

(2) batteries and other energy storage devices;

(3) power electronics;

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

(5) engine efficiency and combustion optimization;

(6) waste heat recovery;

(7) transmission and drivetrains;

(8) hydrogen vehicle technologies, including fuel cells and internal combustion engines, and hydrogen infrastructure;

(9) aerodynamics, rolling resistance, and accessory power loads of vehicles and associated equipment;

(10) vehicle weight reduction;

(11) friction and wear reduction;

(12) engine and component durability;

(13) innovative propulsion systems;

(14) advanced boosting systems;

(15) hydraulic hybrid technologies;

(16) engine compatibility with and optimization for a variety of transportation fuels including liquid and gaseous fuels;

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

1 (18) refueling and charging infrastructure for
2 alternative fueled and electric or plug-in electric hy-
3 brid vehicles;
4 (19) gaseous fuels storage system integration
5 and optimization;
6 (20) sensing, communications, and actuation
7 technologies for vehicle, electrical grid, and infra-
8 structure;
9 (21) efficient use and recycling of rare earth
10 materials, and reduction of precious metals and
11 other high-cost materials in vehicles;
12 (22) aftertreatment technologies;
13 (23) thermal management of battery systems;
14 (24) development of common standards, speci-
15 fications, and architectures for both transportation
16 and stationary battery applications; and
17 (25) other research areas as determined by the
18 Secretary.
19 (b) TRANSFORMATIONAL TECHNOLOGY.—The Sec-
20 retary shall ensure that the Department continues to sup-
21 port activities and maintains competency in mid- to long-
22 term transformational vehicle technologies with potential
23 to achieve deep reductions in petroleum use and emissions,
24 including activities in the areas of—

1 (1) hydrogen vehicle technologies, including fuel
2 cells, internal combustion engines, hydrogen storage,
3 infrastructure, and activities in hydrogen technology
4 validation and safety codes and standards;
5 (2) multiple battery chemistries and novel en-
6 ergy storage devices, including electromechanical
7 batteries and other nonchemical batteries;
8 (3) communication and connectivity among ve-
9 hicles, infrastructure, and the electrical grid; and
10 (4) other innovative technologies research and
11 development, as determined by the Secretary.
12 (c) INDUSTRY PARTICIPATION.—To the maximum
13 extent practicable, activities under this Act shall be carried
14 out in partnership or collaboration with automotive manu-
15 facturers, heavy commercial and transit vehicle manufac-
16 turers, vehicle and engine equipment and component man-
17 ufacturers, manufacturing equipment manufacturers, ad-
18 vanced vehicle service providers, fuel producers and energy
19 suppliers, electric utilities, universities, national labora-
20 tories, and independent research laboratories. In carrying
21 out this Act the Secretary shall—
22 (1) determine whether a wide range of compa-
23 nies that manufacture or assemble vehicles or com-
24 ponents in the United States are represented in on-
25 going public private partnership activities, including

1 firms that have not traditionally participated in fed-
2 erally-sponsored research and development activities,
3 and where possible, partner with such firms that
4 conduct significant and relevant research and devel-
5 opment activities in the United States;
6 (2) leverage the capabilities and resources of,
7 and formalize partnerships with, industry-led stake-
8 holder organizations, nonprofit organizations, indus-
9 try consortia, and trade associations with expertise
10 in the research and development of, and education
11 and outreach activities in, advanced automotive and
12 commercial vehicle technologies;
13 (3) develop more efficient processes for trans-
14 ferring research findings and technologies to indus-
15 try;
16 (4) give consideration to conversion of existing
17 or former vehicle technology manufacturing facilities
18 for the purposes of this Act; and
19 (5) promote efforts to ensure that technologies
20 developed under this Act are produced in the United
21 States.
22 (d) INTERAGENCY AND INTRAAGENCY COORDINA-
23 TION.—To the maximum extent practicable, the Secretary
24 shall coordinate research, development, demonstration,
25 and commercial application activities among—

1 (1) relevant programs within the Department,
2 including—
3 (A) the Office of Energy Efficiency and
4 Renewable Energy;
5 (B) the Office of Science;
6 (C) the Office of Electricity Delivery and
7 Energy Reliability;
8 (D) the Office of Fossil Energy;
9 (E) the Advanced Research Projects Agen-
10 cy—Energy; and
11 (F) other offices as determined by the Sec-
12 retary; and
13 (2) relevant technology research and develop-
14 ment programs within other Federal agencies, as de-
15 termined by the Secretary.
16 (e) COORDINATION AND NONDUPLICATION.—In co-
17 ordinating activities the Secretary shall ensure, to the
18 maximum extent practicable, that activities do not dupli-
19 cate those of other programs within the Department or
20 other relevant research agencies.
21 (f) FEDERAL DEMONSTRATION OF TECH-
22 NOLOGIES.—The Secretary shall make information avail-
23 able to procurement programs of Federal agencies regard-
24 ing the potential to demonstrate technologies resulting
25 from activities funded through programs under this Act.

1 (g) INTERGOVERNMENTAL COORDINATION.—The
2 Secretary shall seek opportunities to leverage resources
3 and support initiatives of State and local governments in
4 developing and promoting advanced vehicle technologies,
5 manufacturing, and infrastructure.

6 **SEC. 102. SENSING AND COMMUNICATIONS TECH-**
7 **NOLOGIES.**

8 The Secretary, in coordination with the relevant re-
9 search programs of other Federal agencies, shall conduct
10 research, development, and demonstration activities on
11 connectivity of vehicle and transportation systems, includ-
12 ing on sensing, computation, communication, and actu-
13 ation technologies that allow for reduced fuel use, opti-
14 mized traffic flow, and vehicle electrification, including
15 technologies for—

16 (1) onboard vehicle, engine, and component
17 sensing and actuation;

18 (2) vehicle-to-vehicle sensing and communica-
19 tion;

20 (3) vehicle-to-infrastructure sensing and com-
21 munication; and

22 (4) vehicle integration with the electrical grid.

23 **SEC. 103. MANUFACTURING.**

24 The Secretary shall carry out a research, develop-
25 ment, demonstration, and commercial application program

1 of advanced vehicle manufacturing technologies and prac-
2 tices, including innovative processes to—
3 (1) increase the production rate and decrease
4 the cost of advanced battery manufacturing;
5 (2) vary the capability of individual manufac-
6 turing facilities to accommodate different battery
7 chemistries and configurations;
8 (3) reduce waste streams, emissions, and en-
9 ergy-intensity of vehicle, engine, and component
10 manufacturing processes;
11 (4) recycle and remanufacture used batteries
12 and other vehicle components for reuse in vehicles or
13 stationary applications;
14 (5) produce cost-effective lightweight materials
15 such as advanced metal alloys, polymeric composites,
16 and carbon fiber;
17 (6) produce lightweight high pressure storage
18 systems for gaseous fuels;
19 (7) design and manufacture purpose-built hy-
20 drogen and fuel cell vehicles and components; and
21 (8) produce permanent magnets for advanced
22 vehicles.

SEC. 104. USER TESTING FACILITIES.

Activities under this Act may include construction, expansion, or modification of new and existing vehicle, engine, and component research and testing facilities for—

(1) testing or simulating interoperability of a variety of vehicle components and systems;

(2) subjecting whole or partial vehicle platforms to fully representative duty cycles and operating conditions;

(3) developing and demonstrating a range of chemistries and configurations for advanced vehicle battery manufacturing; and

(4) developing and demonstrating test cycles for new and alternative fuels, and other advanced vehicle technologies.

TITLE II—MEDIUM AND HEAVY DUTY COMMERCIAL AND TRANSIT VEHICLES

SEC. 201. PROGRAM.

(a) IN GENERAL.—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-

1 to heavy-duty commercial and transit vehicles, including
2 activities in the areas of—
3 (1) engine efficiency and combustion research;
4 (2) on board storage technologies for com-
5 pressed and liquefied natural gas;
6 (3) development and integration of engine tech-
7 nologies designed for natural gas operation of a vari-
8 ety of vehicle platforms;
9 (4) waste heat recovery and conversion;
10 (5) improved aerodynamics and tire rolling re-
11 sistance;
12 (6) energy and space-efficient emissions control
13 systems;
14 (7) heavy hybrid, hybrid hydraulic, plug-in hy-
15 brid, and electric platforms, and energy storage
16 technologies;
17 (8) drivetrain optimization;
18 (9) friction and wear reduction;
19 (10) engine idle and parasitic energy loss reduc-
20 tion;
21 (11) electrification of accessory loads;
22 (12) onboard sensing and communications tech-
23 nologies;
24 (13) advanced lightweighting materials and ve-
25 hicle designs;

1 (14) increasing load capacity per vehicle;
2 (15) thermal management of battery systems;
3 (16) recharging infrastructure;
4 (17) complete vehicle modeling and simulation;
5 (18) hydrogen vehicle technologies, including
6 fuel cells and internal combustion engines, and hy-
7 drogen infrastructure;
8 (19) retrofitting advanced technologies onto ex-
9 isting truck fleets; and
10 (20) integration of these and other advanced
11 systems onto a single truck and trailer platform.
12 (b) LEADERSHIP.—The Secretary shall appoint a
13 full-time Director to coordinate research, development,
14 demonstration, and commercial application activities in
15 medium- to heavy-duty commercial and transit vehicle
16 technologies. Responsibilities of the Director shall be to—
17 (1) improve coordination and develop consensus
18 between government agency and industry partners,
19 and propose new processes for program management
20 and priority setting to better align activities and
21 budgets among partners;
22 (2) regularly convene workshops, site visits,
23 demonstrations, conferences, investor forums, and
24 other events in which information and research find-

1 ings are shared among program participants and in-
2 terested stakeholders;
3 (3) develop a budget for the Department's ac-
4 tivities with regard to the interagency program, and
5 provide consultation and guidance on vehicle tech-
6 nology funding priorities across agencies;
7 (4) determine a process for reviewing program
8 technical goals, targets, and timetables and, where
9 applicable, aided by life-cycle impact and cost anal-
10 ysis, propose revisions or elimination based on pro-
11 gram progress, available funding, and rate of tech-
12 nology adoption;
13 (5) evaluate ongoing activities of the program
14 and recommend project modifications, including the
15 termination of projects, where applicable;
16 (6) recruit new industry participants to the
17 interagency program, including truck, trailer, and
18 component manufacturers who have not traditionally
19 participated in federally sponsored research and
20 technology development activities; and
21 (7) other responsibilities as determined by the
22 Secretary, in consultation with interagency and in-
23 dustry partners.
24 (c) REPORTING.—At the end of each fiscal year the
25 partnership shall submit to the Secretary and relevant

1 Congressional committees of jurisdiction an annual report
2 describing activities undertaken in the previous year, ac-
3 tive industry participants, efforts to recruit new partici-
4 pants, progress of the program in meeting goals and
5 timelines, and a strategic plan for funding of activities
6 across agencies.

7 **SEC. 202. CLASS 8 TRUCK AND TRAILER SYSTEMS DEM-**
8 **ONSTRATION.**

9 The Secretary shall conduct a competitive grant pro-
10 gram to demonstrate the integration of multiple advanced
11 technologies on Class 8 truck and trailer platforms with
12 a goal of improving overall freight efficiency, as measured
13 in tons and volume of freight hauled or other work per-
14 formance-based metrics, by 50 percent, including a com-
15 bination of technologies listed in section 201(a). Applicant
16 teams may be comprised of truck and trailer manufactur-
17 ers, engine and component manufacturers, fleet cus-
18 tomers, university researchers, and other applicants as ap-
19 propriate for the development and demonstration of inte-
20 grated Class 8 truck and trailer systems.

21 **SEC. 203. TECHNOLOGY TESTING AND METRICS.**

22 The Secretary, in coordination with the partners of
23 the interagency research program described in section
24 201(a)—

1 (1) shall develop standard testing procedures
2 and technologies for evaluating the performance of
3 advanced heavy vehicle technologies under a range of
4 representative duty cycles and operating conditions,
5 including for heavy hybrid propulsion systems;
6 (2) shall evaluate heavy vehicle performance
7 using work performance-based metrics other than
8 those based on miles per gallon, including those
9 based on units of volume and weight transported for
10 freight applications, and appropriate metrics based
11 on the work performed by nonroad systems; and
12 (3) may construct heavy duty truck and bus
13 testing facilities.

14 **SEC. 204. NONROAD SYSTEMS PILOT PROGRAM.**

15 The Secretary shall undertake a pilot program of re-
16 search, development, demonstration, and commercial ap-
17 plications of technologies to improve total machine or sys-
18 tem efficiency for heavy duty nonroad equipment, and
19 shall seek opportunities to transfer relevant research find-
20 ings and technologies between the nonroad and on-high-
21 way equipment and vehicle sectors.

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AMENDMENT TO THE AMENDMENT IN THE NATURE OF A SUBSTITUTE OFFERED BY MS. EDDIE BERNICE JOHNSON OF TEXAS

In section 3, after paragraph (3), insert the following new paragraph (and redesignate the subsequent paragraphs accordingly):

1 (4) develop cost-effective advanced technologies
2 for wide-scale utilization throughout the passenger,
3 commercial, government, and transit vehicle sectors;