Testimony on the R & D Needs for the 21st Century Truck Partnership Program
based on the Review of the Program by the National Academies
U.S. House Subcommittee on Energy & Environment
of the Committee on Science & Technology,
March 24, 2009
By Dr. John Johnson

My name is John Johnson; I am a Presidential Professor of Mechanical Engineering at Michigan Technological University. My expertise is in diesel engines, including R & D management. After completing my PhD degree, I spent 2 years as a 1st Lieutenant in the U.S. Army at the Tank-Automotive Center in Warren, Michigan managing engine research projects. I then worked as Chief Engineer of Applied Engine Research at International Harvester which is now Navistar. In 1970, I came to Michigan Technological University. I have participated in 12 different National Academies Committees since 1980. I was the Chair of the Committee that wrote the report published in June 2008 entitled "Review of the 21st Century Truck Partnership." The opinions I will give today are my personal ones although they draw on the findings and recommendations in the report. The first part of my testimony will give a brief review of the 21st Century Truck Partnership including the members of the Partnership and the approach used in our review – these figures came directly from the report. I am also a member of the Academies Committee on Light-Duty Vehicle Fuel Economy and the Committee on Medium- and Heavy-Duty Vehicle Fuel Economy.

The Committee on Medium and Heavy-Duty Fuel Economy was formed based on the mandate that the National Highway Traffic Safety Administration (NHTSA), an agency of the U.S. Department of Transportation, under Section 108 of the Energy Independence and Security Act (EISA) of 2007, enter into an agreement with the National Academies to evaluate medium- and heavy-duty truck fuel economy. The Academy report must be completed by March 2010. The legislation, under Section 102, also (1) mandates that NHTSA itself conduct a study on the fuel efficiency of commercial medium- and heavy-duty on highway vehicles and work trucks and (2) mandates that NHTSA then conduct a rulemaking to implement a commercial medium- and heavy-duty on-highway and work-truck fuel efficiency improvement program.

Figure 1 reviews some important facts about the Partnership. It shows the history of the program, including Federal Agency, National laboratory, and industrial partner participants.

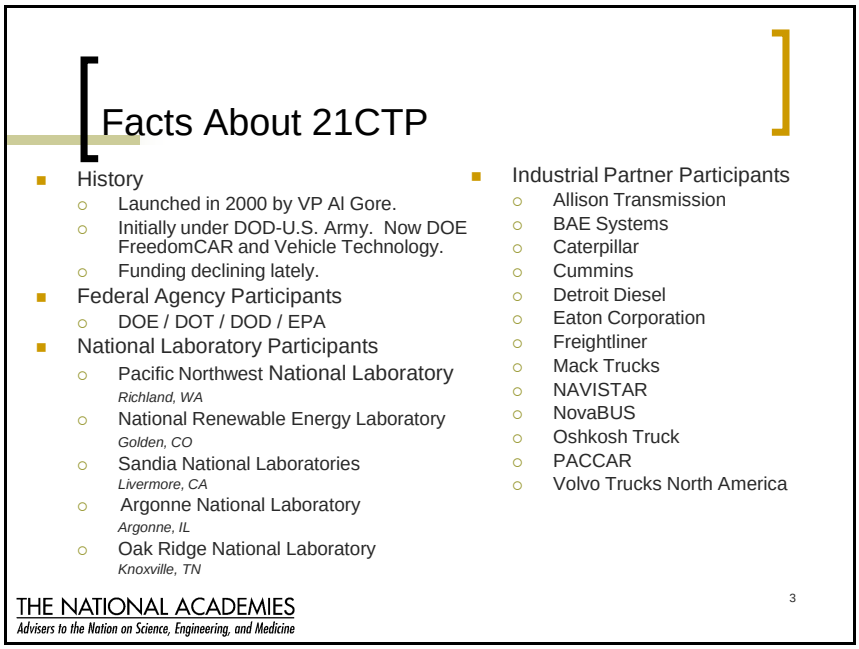

Figure 1

Figure 2 shows the DOE R&D funding for heavy and light vehicles in the years FY 03- FY 08.

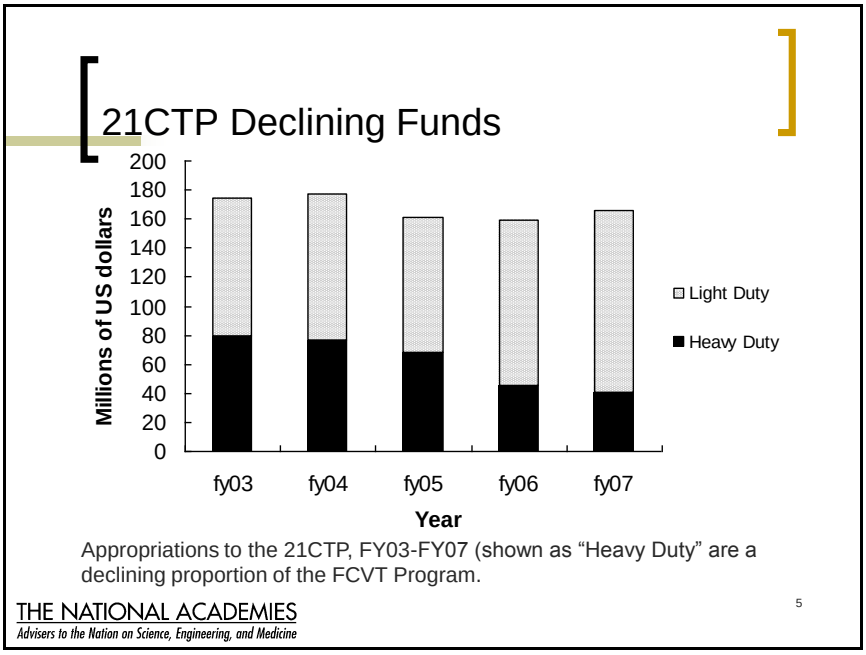

Figure 2

Figure 3 shows the 21st Century Partnership Strategic Approach to the Program.

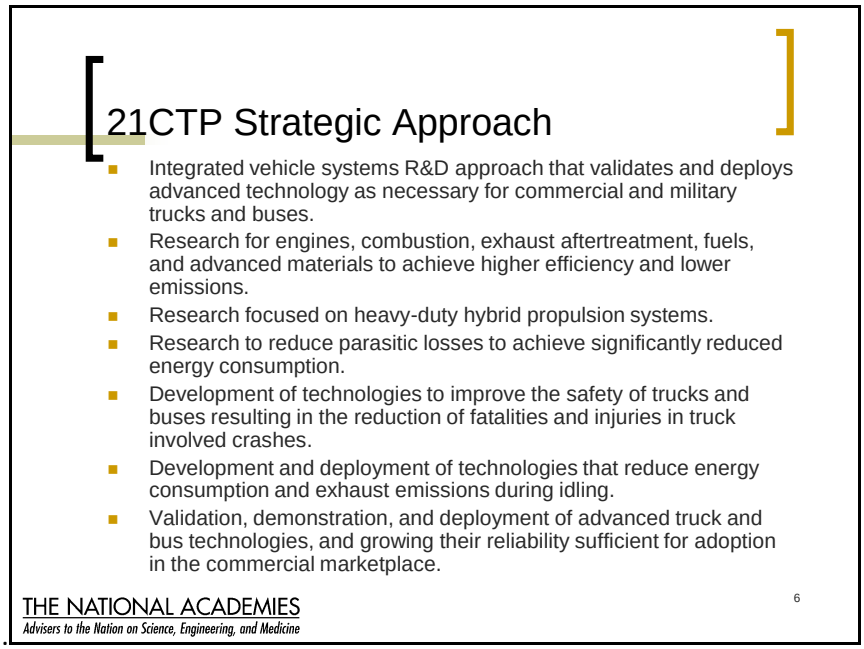

Figure 3

Figure 4 shows the committee activities that were undertaken to review the program – the meetings took place in the period from February through August 2007.

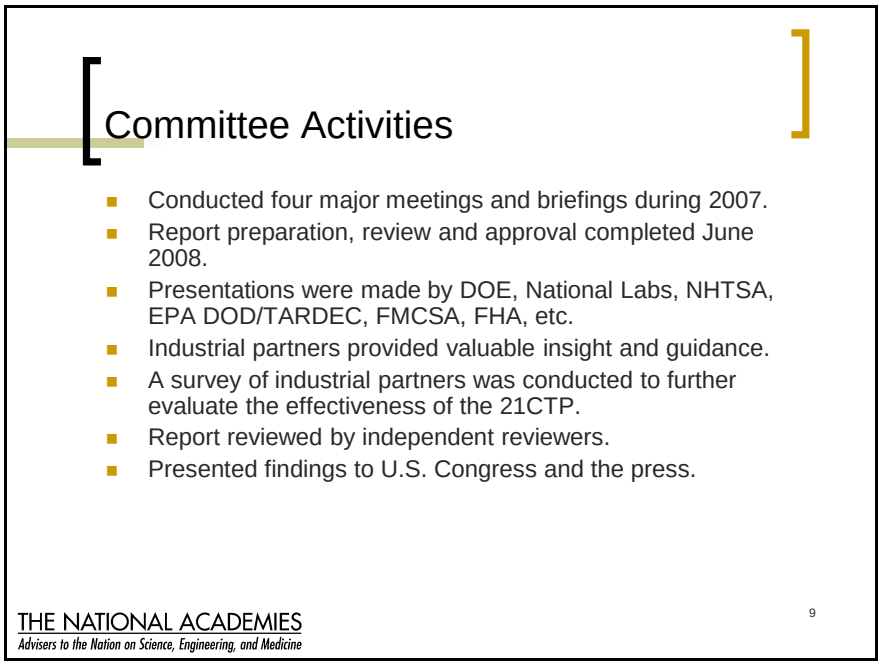

Figure 4

Finally, Figure 5 shows the report contents.

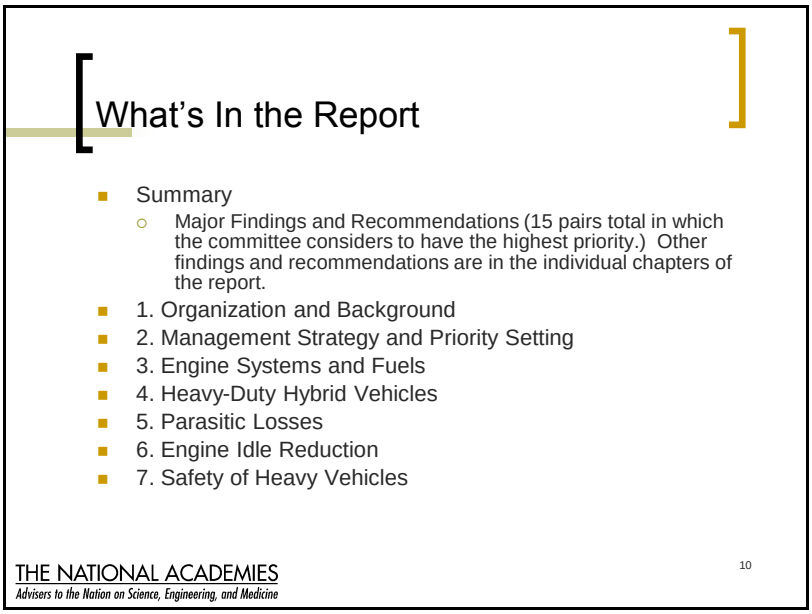

Figure 5

The staff members from the various committees dealing with energy in the House and Senate have copies of the report. I came to Congress in June 2008 to meet with several staff members of the Subcommittee and again March 5, 2009 to meet with a broader group of staff members from the various House and Senate committees.

Despite the many benefits of the Partnership, including helping the engine industry meet the EPA 2007 particulate and 2010 NO_x standards, the program suffered from the dwindling resources devoted to the program by DOE. Funds were about $87 million in FY 2002 and decreased to $30 million in FY 2008. This funding pattern does not reflect the number of productive R&D opportunities. It also does not reflect the economic weight of the industry. According to the report: In the 2002 Economic Census, "The truck transportation industry consisted of more than 112,698 separate establishments, with total revenues of $165 billion. These establishments employ 1,437,259 workers, who take home an annual payroll of $47 billion. Truck and bus manufacturing also account for a significant share of national income. According to the same census, light-truck and utility-vehicle manufacturers have total shipments of $137 billion. Heavy-duty-truck manufacturing had sales of $16 billion. Another way to look at the trucking industry's economic contribution is to compare the revenue from trucks with other sectors in the transportation industry, in which case trucks account for about one-fourth of the industry's total revenues."

This industry is made up of 10 major truck manufacturers, 10 trailer manufacturers, 18 refuse truck and 5 bus manufacturers, and 6 major engine suppliers along with over 20 major supplier companies that supply transmissions, cooling system components, turbochargers, brakes, tires, electrical and electronic components, hybrid systems, emission aftertreatment systems, and other parts.

Because of the low level of funding from DOE, the 21st Century Truck Partnership chose to focus its R&D effort on the Class 8 long-haul type of vehicle, which consumes 75% of the petroleum in the heavy- and medium-truck sector. It was forced to cancel many projects originally in the 21CTP roadmap, including light-weighing vehicles, all-electric components on vehicles, aerodynamic modeling and design, and low rolling resistance tires. Federal, state, and local governments and commercial trucking firms, such as utility and delivery operations that use medium-duty trucks, are also interested in the fuel economy of their vehicles since it also affects their operating costs – they want advanced technology such as hybrid vehicles.

In light of the potential fuel economy regulations by NHTSA as required by Section 102 of EISA, it is important that the Federal government fund the DOE program at levels such as $200 million/year with $90 million/year for engine, emission control systems, and biodiesel fuels research. The program should be funded for 5-10 years at this level so that the industry will have the technology in the 2015-2020 timeframe to meet potential fuel economy regulations. Safety is an important part of the program with support in the past from DOE and DOT, with DOT providing the majority of the budget. As crash protection measures have not substantially reduced highway fatalities during the past decade, the main objective going forward will be to prevent crashes using crash avoidance technologies and in-vehicle communications systems. There is need for $25 million per year for safety related research which should be designated for DOT by line item for the 21st Century Truck Partnership.

The next decade needs R&D programs to decrease medium- and heavy-duty truck petroleum fuel consumption by the use of advanced diesel engine and aftertreatment technologies, advanced truck and trailer aerodynamic designs, and low rolling resistance tires. The use of hybrid systems in applications that have duty cycles that can reduce the fuel consumption, including advanced cooling systems and engine components that use less energy, light weighing of vehicles and trailers so that more payload can be carried which reduces the fuel consumption in gallons/ton of payload-miles are needed. A major effort must be carried out to develop biodiesel fuels that meet ASTM specifications, are energy and greenhouse gas efficient in the production of the bio component and make good use of the land without compromising the food supply and the price of food. It is important that the price

differential between gasoline and diesel fuel does not increase more than the 60-70 cents per gallon that has existed in the past few years. Decreasing the truck petroleum fuel consumption with lower fuel consumption vehicles should help this diesel fuel market demand condition that now exists. More biodiesel fuel use should help decrease the demand for the petroleum fuel if the research program is aggressive.

One of our findings on the management strategy and priority setting pointed out that the program operated as a virtual network of agencies and government labs with an unwieldy structure and budget process. This would be significantly improved if heavy truck funds for EPA, DOE and DOT were designated by line items that are directed at this program. I know that this is very difficult because each of these agencies go to different Congressional Committees for their funds. Our findings and recommendations also stated that there is a need for an Executive that crosses agencies to manage this program.

I am very supportive of a bill that commits the United States Government to a research program that results in the development of fuel efficient and safe heavy-duty trucks. The U.S. has always been a world leader in developing advanced trucks – the heavy-duty diesel engine has always been cutting edge technology in durability, reliability, low fuel consumption, and now in 2010 low in emissions. This product development and manufacturing base in the U.S. must be maintained if we as a country are to be strong in the global economy. This industrial base is also important to the military, particularly to the Army and Marines since diesel powered vehicles and diesel fuels are critical elements of our ground forces. We must maintain this base which will happen with an aggressive R & D program in the commercial sector that includes maintaining National Laboratories and Universities as strong components in the program.

Thank you for giving me the opportunity to discuss with you the 21st Century Truck Partnership Program including my personal opinions of what is needed to maintain the United States as a world leader. I also think the Partnership would benefit in the future from an external, independent review, as was done by the National Academies in their Review of the 21st Century Truck Partnership in 2007-2008.

I would be happy to answer your questions.