Union of Concerned Scientists
Citizens and Scientists for Environmental Solutions

STATEMENT OF:
THE UNION OF CONCERNED SCIENTISTS

BEFORE THE:
SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES

BY
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Mr. Chairman and Members of the Committee, I appreciate the opportunity to testify before you today. I am a research director and senior engineer with the Union of Concerned Scientists (UCS). UCS is a leading science-based nonprofit that has been working for a healthy environment and a safer world for over 40 years.

By 2050 we can effectively end the use of oil and other petroleum products to fuel the cars, trucks, and buses that drive on the nation's highways. We cannot end our addiction to oil overnight and it will take significant investment on the part of industry, consumers and government, but we don't really have any other choice. The disaster in Gulf of Mexico is only the most recent reminder of the cost of our oil dependence on our economy. Oil prices spiked 5 times in last 40 years and each time our economy suffered either a recession or a significant drop in growth. Oil was not always the sole cause, but it was always a significant contributor, including in the case of our most recent economic turmoil. In 2008 we were facing record high oil prices and the resulting expense of sending more than one billion dollars a day to other countries just to buy oil and other petroleum products. Our dependence on products made from oil also harms our health and our economy through everything from local gasoline leaks to poor regional air quality and global climate change. The stress on our nation will only grow worse as the world economy recovers and demand for petroleum products accelerates, along with rising oil prices.

Electric drive vehicles, such as plug-in hybrids, battery electric vehicles, and fuel cell electric vehicles must be part of a path that effectively ends our addiction to oil by at least 2050. But these technologies are not silver bullets. The problem of our oil dependence and its associated impacts are too big and too complex to be addressed by anything but a mix of vehicle technologies, low-carbon fuels, and better travel choices for consumers.

If we look only at vehicles and fuels, effectively ending oil addiction for highway vehicles by 2050 means that nearly every car and truck on the road must run on renewable electricity, hydrogen, or sustainable, low-carbon biofuels. That in turn means that, by 2040, at the latest, nearly every new light duty car or truck and most heavy duty trucks sold must run on electricity, hydrogen, or biofuels. Figure 1 shows one example of a similar roadmap from the International Energy Agency. In this case, worldwide progress is about 10 years behind where the United States could be if we take a leadership role. Figure 2 shows an example of a technology portfolio

from recent work by the National Academy of Sciences. In this case, gasoline use is dramatically reduced and ultimately eliminated by 2050 through the combination of improved vehicle efficiency from conventional technology and hybrids, aggressive adoption of biofuels, and vehicle electrification. While it will take many decades to address our oil addiction and our changing climate, policies must be put in place today if a future without oil is to become a reality.

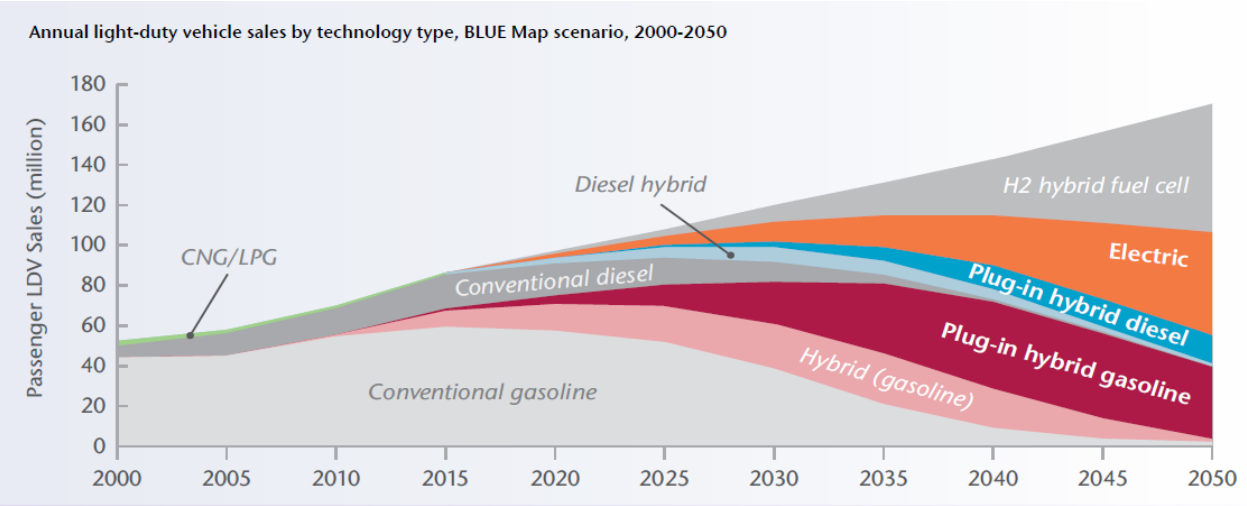

Figure 1. Worldwide Electrification Scenario from the International Energy Agency. (http://www.iea.org/roadmaps/plug_in_electric_vehicles.asp)

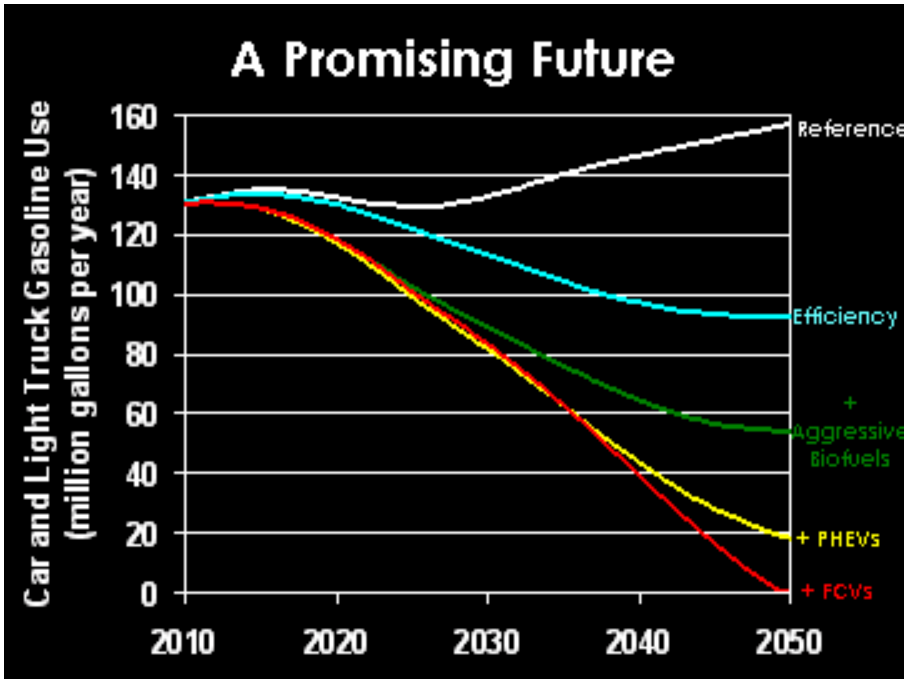

Figure 2. Ending Car and Truck Gasoline Use with the National Academies Technology Portfolio. (based on data from http://www.nap.edu/catalog.php?record_id=12222)

All of these technologies have suffered from our lack of a comprehensive, long term set of policy solutions. The result has been a mix of policy approaches over the past forty years that has shifted from synthetic fuels to methanol to batteries to corn ethanol to hydrogen fuel cells to cellulosic biofuels and now back to batteries. This cycle of shifting policy prescriptions must be broken. The rise in financial and policy support for one technology typically comes with a fall for the others, stranding investments and making it difficult for industry and venture capitalists to make long term investments of their own. Breaking this cycle will require at least two major steps:

1. A comprehensive set of energy and climate policies that put a price on carbon and establish national requirements to effectively end America's oil addiction and cut the emissions of heat trapping gases by at least 80 percent by 2050.
2. Sufficient funding for research, development, and large-scale deployment of technologies that require little or no petroleum and are responsible for little or no heat-trapping emissions.

The Electric Vehicle Deployment Act of 2010 is a significant down payment on the second step. This bill builds on tax credits, grants and other resources provided under the American Recovery and Reinvestment act to support plug-in hybrid vehicles and battery electric vehicles. Senators Dorgan, Alexander and Merkley are to be commended for working with the Electrification Coalition on a bill that provides many of the resources needed to move these vehicles into the deployment fast lane:

- By increasing the funding available for research, vehicles and infrastructure, the Electric Vehicle Deployment Act of 2010 will help address many of the technology and market hurdles that still need to be overcome. Upcoming plug-in hybrid and battery electric vehicles will cost $15,000 to $20,000 more than comparable cars, with home recharging costing $1,000 to $2,000 per household. While these vehicles will be able to save their owners as much as $8,000 over the vehicle life by purchasing electricity at a cost equivalent to less than $1 per gallon (compared to today's nearly $3 per gallon for gasoline), consumers will still face a significant cost gap that will make them less likely to try the new technology. The upfront costs can come down, but only with added research and with increased production volumes, both of which will be more limited without this bill. Increasing the amount of money available and making tax credits refundable or transferable opens the door to more resources to increase those production volumes.
- By directing efforts to support training of service and safety personnel, and changing local codes, standards and zoning requirements, the bill will help remove non-financial barriers. Further, the bill's focus on a limited number of deployment areas helps ensure that taxpayer dollars will be used more efficiently. If the deployment of electric vehicles—even plug-in hybrids that require less support—is more spread out, more infrastructure will be needed, more people will need to be trained in service and safety, and more state and local codes, standards, and zoning requirements will need to be changed. All of these needs require money, and it simply makes more sense to spend that money in an area that will serve tens of thousands instead of tens or hundreds of vehicles.

- By opening the door to longer term national technology deployment goals, the bill will help provide increased certainty to industry, investors, utilities, fuel providers, and local, state and regional policymakers.

To give us a better chance of getting on a path that can effectively end our oil addiction and cut heat-trapping gas emissions 80% by 2050, some changes can be made to the Electric Vehicle Deployment Act of 2010 and it's House companion, the Electric Drive Vehicle Deployment Act of 2010. These bills must also be integrated into a comprehensive national climate and energy policy that puts a price on carbon. The needed steps should include:

- Expanding vehicle and infrastructure support for fuel cell electric vehicles in Phase 1 of the program. Fuel cells do have some existing support, thanks in large part to leadership from Senator Dorgan, and the Senate bill clearly leaves the door open to additional support for these vehicles in Phase 2, but without additional support for deployment by then state efforts on hydrogen risk atrophy while international efforts begin to accelerate. An industry survey by the California Fuel Cell Partnership points to plans to deploy nearly 3,500 fuel cell vehicles, mainly in southern California. The vehicle levels are expected to rise to about 25,000 between 2015 and 2017. But at the same time, tax credits for fuel cell cars were cut in half this year and, along with hydrogen infrastructure tax credits, they expire by 2014, just as efforts are ramping up. Meanwhile, Japan, Germany, and South Korea have all announced efforts to significantly ramp up fuel cell vehicle production in the coming years.[1] If we are to compete across the spectrum of electric drive vehicles that will be needed,[2] the Senate bill should be modified to provide an even playing field for all electric drive technologies including:
    1. Expanding the coverage of the deployment community funds to include fuel cell electric vehicles and the necessary hydrogen infrastructure in Phase 1. Delaying support for hydrogen and fuel cell electric vehicles will guarantee that they will always be the "technology of the future." Had we expanded funding for plug-in vehicles five years ago when hydrogen had the buzz, we would be must better prepared for upcoming deployment. We should not make the same mistake now that the media attention is focused on batteries.
    2. Eliminating the cut in the fuel cell vehicle tax credit and shifting it from an expiration date of 2014 to a per-manufacturer cap of 300,000 vehicles as provided for plug-in vehicles.

[1] Japan is targeting about 2 million fuel cell vehicles by 2025. Given that their market is about 1/3rd of ours, that would be equivalent to about 6 million fuel cell vehicles by 2025 in the US. Hyundai-Kia report plans to reach 100,000 fuel cell vehicles in 2020, the sales equivalent of about 1 million fuel cell vehicles in the US. Reports also indicate Germany is targeting around 600,000 fuel cell vehicles by 2020, or the U.S. equivalent of about 2 million vehicles.

[2] Without dramatic breakthroughs, battery electric vehicles will be best suited to smaller vehicles and vehicles that primarily drive for relatively short distances in stop and go traffic. Plug-in hybrids dramatically expand the applicable range, but also benefit most from more urban driving and will continue to require petroleum until breakthroughs are achieved in biofuels. Fuel cell electric vehicles are well suited to filling in the gaps left by today's batteries, though progress is still needed to bring down costs and develop infrastructure.

3. Shifting the expiration date for hydrogen infrastructure tax credits to at least 2017 to coincide with the charging infrastructure tax credits.
4. Adopting the refundable and transferable provisions included for plug-in vehicles.

- Further limiting the number of deployment communities, at least for the first few years. As with the House companion, the Senate bill can help the set aside financial resources be used more effectively by limiting the total number of deployment communities. By allowing for up to 15 deployment communities, the Senate bill risks cutting the available funds for an individual community in half and losing some of the advantages of the bill's cluster approach. Further, starting with a smaller number of communities allows more learning, reducing the number of mistakes that would be repeated in parallel by so many different deployment attempts.
- Integrating the Senate and House electrification bills into a comprehensive national climate and energy policy that includes a price on carbon, creates a national oil savings plan, and provides strong incentives to deploy renewable electricity above current projections, including a robust national renewable electricity standard.
    1. Financing the electrification of transportation will require significant resources and tying much of that financing to the annual appropriations cycle risks significant funding uncertainty, especially with the current focus on deficits. Industry will be less likely to partner with communities if the funding needed for even larger scale deployment is left in doubt. Putting a cap on carbon will not only spur investments in cleaner technology and changes in the way we use energy, but it will provide revenues that we can invest in clean energy jobs. Covering the transportation sector can generate $20-$40 billion each year that can be returned to consumers to help them purchase electric drive vehicles and home recharging or refueling infrastructure, among other investments in transportation.
    2. If our ultimate goal is to end our oil addiction, we cannot continue the cycle of passing a new energy bill every few years. To provide certainty to industry and to empower agencies across the federal government, the Senate should establish a national oil savings plan that requires savings of at least 7 million barrels per day by 2030 and that requires the effective elimination of oil use by 2050. This plan should provide the President with sufficient authority to achieve these goals.
    3. The success of electric drive is inherently tied to moving our grid to renewable electricity. Recent analysis from the Argonne National Laboratory shows that, with today's electricity mix, plug-in hybrid and battery electric vehicles do not deliver reductions in heat-trapping gases compared to a conventional hybrid.[3] Because these vehicles do provide reductions compared to today's cars, their expansion in the next decade or two will yield carbon benefits. But, if the grid is not significantly cleaner by 2030, when conventional hybrids will need to be ubiquitous, plug-in vehicles won't deliver carbon benefits. A strong cap on carbon and a robust renewable electricity standard can help ensure that plug-in vehicles will not only cut oil use but also help to dramatically lower emissions. Further, the

[3] Elgowainy, et. al., "Well-to-Wheels Analysis of Energy Use and Greenhouse Gas Emissions of Plug-In Hybrid Electric Vehicles," AND/ESD/10-1, June 2010.

> expansion of renewable electricity can go hand in hand with the creation of a supply of renewable hydrogen for fuel cell electric vehicles. Hydrogen can be used to buffer intermittent renewables to both lower the cost of clean electricity and expand the fuel mix.

The U.S. needs to move away from a piecemeal approach to transportation, energy, and environmental policy and instead adopt a comprehensive set of policies that will tap into both the near term and long term solutions that are available now or on the drawing boards. This will require a longer term perspective and a combination of consistent, significant, and sustained policies. Yes, we do need to rethink our transportation system, but in doing so, we will not only dramatically lower global warming pollution, we will save consumers billions, create new jobs in America and ultimately cut our addiction to oil. The Electric Vehicle Deployment Act of 2010 is an important part of this comprehensive set of policies.