

Testimony for the U.S. Senate Committee on Finance
Subcommittee on Energy, Natural Resources and Infrastructure
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Good morning Mr. Chairman and members of the committee. Thank you for the invitation to testify today. I am Phillip Baxley, President of Shell Hydrogen LLC, with responsibility for Shell's hydrogen business activities in North America. Additionally, I chair the National Hydrogen Association, whose membership includes energy providers, universities, automakers and many industries in the growing hydrogen business.

My testimony today will focus on Shell's progress in developing hydrogen as a transportation fuel and the infrastructure required for its growth.

First, let me begin with a description of how Shell sees hydrogen fitting into its energy portfolio. Shell Hydrogen is part of the larger Shell Renewables, Hydrogen, CO₂ and Power Group within Royal Dutch Shell. Shell believes that fossil fuels will continue to be the most affordable and accessible energy source, fueling economic growth and powering our lives for decades to come. It has been estimated that with current rates of growth, the global energy demand may double by 2050. It is also estimated that alternative energies can provide approximately 30 percent of that energy mix. At Shell, we see our ability to manage CO₂ emissions to be important to the delivery of energy products and fundamental to future growth.

Hydrogen can be an important part of that path forward. Hydrogen should be considered part of a broad energy portfolio Shell is developing to meet the energy challenge before us all.

Before I go further into hydrogen, I would like to mention that on a global basis, Shell is also investing in wind energy, thin-film solar energy, second-generation biofuels and synthetic fuels from coal and gas. We are a major importer of liquefied natural gas. We continue to be a world leader in oil and gas exploration.

Shell is a leader in the hydrogen market. More than 50 million tons of hydrogen are produced, transported and used by a wide variety of industries around the world each year. Within the industry, hydrogen is used to produce cleaner and better fuels. That is why most of the hydrogen available today is used to produce clean gasoline, and why we will use even more of it as we develop more carbon-intensive fuels like oil shale and tar sands. According to our internal analysis, hydrogen is so common that most Americans live within 60 miles of a hydrogen production facility. So, in answer to the perennial question "When is the hydrogen economy coming?" I would say that in some respects, it is already here.

Shell Hydrogen is building hydrogen infrastructure in three key markets – the United States, Europe and Asia. We introduced Tokyo's first hydrogen refueling station; opened the first combined hydrogen and gasoline station in Washington, D.C. and provided funding and project management support for the first hydrogen refueling stations in Luxembourg and Amsterdam. In the United States, we are working to introduce hydrogen-fueling stations in the Los Angeles and New York City metro areas. We are working with key automakers to support this endeavor.

Our experience shows us that we can supply and deliver hydrogen today – safely and reliably. Our aim now is to move quickly to the next level – from single stations to urban mini-networks, with market demand driving the consumer interest. We will continue to coordinate the availability of our hydrogen stations with the automakers’ rollout of the first small-scale mass production of hydrogen vehicles, within the 2015 – 2025 timeframe. If they can be ready, we can be ready. Let me identify two challenges I see in rolling out a hydrogen retail network. First, station siting and permitting. We are talking about building stations in dense, urban areas where land is scarce and at a premium. We are also talking about getting permits for a new form of energy, a process that’s proving to take much longer than permits for gasoline stations. Second, equipment for hydrogen stations can be fairly expensive. The storage and compression equipment is particularly expensive. The cost of this equipment may slow the deployment of hydrogen stations in some areas.

We have a big jump ahead of us. We dream about and talk about a future when cars are powered by hydrogen and we are almost ready to make that leap. We can do it in the next decade. But in order for this transition to be successful, it must be carefully coordinated. Governments, energy companies like Shell and automakers must work closely together to minimize the financial risk and ensure a positive experience for consumers.

Shell believes any rollout of a hydrogen retail network should be focused on regions of the country where the cars will be deployed. That is why we are now focused on New York and California. We are working with the California Fuel Cell Partnership and automakers to coordinate a California rollout. We are building a similar network in New York, which appears to be moving along a similar path as California. We believe that a massive rollout of fuel cell vehicles (FCVs) with the proper hydrogen infrastructure is an immense task, which is too large for any single industry. Again, Shell believes that the successful introduction of these new vehicles and new fuel depends on coordination between government, energy companies and automakers in these formative stages.

In order to make hydrogen more available and more affordable, Shell is looking for new feedstocks. Right now, most of the hydrogen that is produced for industrial applications comes from steam reformation of natural gas. Given its tight supply and volatile prices, natural gas can be an expensive source for making hydrogen. Hydrogen from natural gas also has a carbon component. In a world increasingly sensitive to carbon emissions, we are looking for ways to either produce hydrogen with less carbon or store the carbon associated with hydrogen production, as well as secure feedstocks readily available in this country.

We are investing in novel technologies to produce “green” hydrogen. We are working to form alliances and joint ventures to develop technologies that will produce hydrogen from sources like bioethanol and solar energy.

Shell is also exploring the production of hydrogen from other hydrocarbons besides natural gas. However, these processes would require the successful capture of CO₂ on a

large scale. Shell is developing technologies for carbon capture and storage with several large-scale projects under development worldwide.

Energy companies and automakers are working hard to make hydrogen transportation a reality in the next decade. But we need the federal government's help. We need to help promote education of the American consumers about hydrogen transportation; we need the federal government to help set an example through vehicle fleets and other applications; and we need your help in preparing for and coordinating the rollout. Let me outline five ways I think the government can engage to make the hydrogen economy a bigger reality than it is today.

- Public acceptance does not happen overnight and an enhanced education and outreach program directed at students, consumers, and permitting authorities will aid in the challenges of siting and permitting stations.
- Harmonize station permitting processes at the state and local level to ensure that permitting officials/processes adhere to a common baseline to eliminate interpretation and variability (coordinate federal, state & local hydrogen permitting processes)
- Early adoption by large governmental organizations of fuel cell-based portable and backup power systems. As well as fuel cell vehicles for fleet applications.
- Provide support to municipalities to lease or purchase hydrogen-fueled auto and bus fleets.
- Cooperate with automakers and hydrogen suppliers to develop ways to coordinate vehicle and infrastructure rollout, e.g. in the form of public private partnerships.

This is an exciting time to be in the energy business. And it is an exciting time to be in the transportation business. We are at a crossroads very similar to where this country stood a century ago when cars replaced the horse and buggy. We are shaping the future with our choices. If we do this right, our children and our grandchildren may one day look back in wonder at a time when people thought only gasoline and diesel could power their cars. I look forward to working with you in building the hydrogen economy. Thank you for allowing me to speak to you today. I will be happy to answer any questions you may have.