



## The Secretary of Energy

Washington, DC 20585

November 8, 2021

Mr. J. Larry Nichols  
Chair  
National Petroleum Council  
1625 K Street, NW  
Washington, DC 20006

Dear Mr. Nichols:

To meet the world's need for affordable energy while reducing greenhouse gas (GHG) emissions to net zero by 2050 will require deploying a variety of technologies. One essential set of technologies encompasses Carbon Capture, Use, and Storage (CCUS). I have been impressed by the recent National Petroleum Council (NPC) report that provides a roadmap for deployment of CCUS at scale. Hydrogen energy involves another essential set of technologies presenting opportunities and challenges for deployment at scale.

Hydrogen has the potential to decarbonize a variety of energy market sectors for energy, including industrial, power, residential, commercial, and transportation, and serve as a renewable energy storage mechanism. Technologies exist today to produce low-carbon and renewable hydrogen at reasonable scale, but economically supplying these market sectors at significant scale poses commercial, logistical, regulatory, and technical challenges. Meeting these challenges will require collaboration from multiple industries, academia, government institutions, and other stakeholders to conduct additional research and to define the needed policy frameworks, market mechanisms, production pathways, and delivery systems.

Petroleum, chemical, industrial gas, infrastructure, and power companies have experience developing and deploying the technologies required to deliver hydrogen energy. Accordingly, I request the NPC conduct a study on the deployment of low and zero carbon hydrogen energy at scale through the entire value chain, including production, storage, liquefaction, transportation, and end uses. This effort should focus on production and delivery (both from fossil fuel and renewable sources); the potential impact on the power generation, industrial process, residential, commercial, and transportation sectors; and the needed infrastructure and storage requirements. Policy, regulatory, and technical challenges to the use of hydrogen should be identified and recommendations provided to enable use at scale.

Key questions to be addressed by the study include:

- What policy, regulatory, and other actions are needed to move technically ready hydrogen technologies into deployment to enable this energy system transition?
- What are the range and key drivers of hydrogen demand forecasts (including forecasts that are tied to a rapid decarbonization objective, such as the Paris Agreement) to use in evaluating infrastructure needs, technology opportunities, and relevant policy aspects?
- What integration and infrastructure requirements are needed to maximize hydrogen deployment for the identified market sectors and across the value chain?
- What hydrogen transportation carrier alternatives exist or could be developed and deployed, e.g., ammonia or other hydrogen carriers, in addition to the liquefaction, transportation, and use of elemental hydrogen?
- What health, safety, and environmental concerns need to be addressed to facilitate the acceptance of hydrogen in various market sectors or geographic regions?
- What are the environmental and economic footprints of hydrogen versus alternatives? Which end uses and technologies are most advantaged in GHG and other pollutant reductions, environmental justice, and job creation?
- What research gaps exist and what is the path to address those gaps, including potential research roles for industry, academia, government, and national laboratories?

For the purposes of the study, I am designating Deputy Secretary David Turk to represent me. As my designee, in coordination with you, as the NPC Chair, he can approve the establishment and membership of subcommittees or working groups, as well as designate Government employees as Cochairs for any subcommittees or working groups, as required. The Assistant Secretary for Fossil Energy and Carbon Management will work with Deputy Secretary Turk to identify Government Cochairs.

Sincerely,

A handwritten signature in black ink, appearing to read 'J. Granholm', with a stylized, cursive script.

Jennifer M. Granholm