

DOUGLAS E. TRUE
*Senior Vice President and
Chief Nuclear Officer*

1201 F Street, NW, Suite 1100
Washington, DC 20004
P: 202.739.8083
det@nei.org
nei.org



July 7, 2021

Dr. Sunita Satyapal
Director, Hydrogen and Fuel Cells Technology Office
Office of Energy Efficiency and Renewable Energy
U.S. Department of Energy
1000 Independence Ave., S.W.
Washington, DC 20585

Subject: HFTO RFI - Response to DOE Hydrogen Program Request for Information #DE-FOA-0002529

Dear Dr. Satyapal:

The Nuclear Energy Institute (NEI)¹ is pleased to provide comments in response to the Department of Energy's (DOE) Hydrogen Program's Request for Information. The Biden Administration and the DOE deserve praise for their creation of the Hydrogen "Earthshot" Program. Decarbonizing our economy will require many technologies, and slashing the production cost of hydrogen in the next decade will speed our nation toward the goal of achieving net zero carbon dioxide emissions by 2050.

Nuclear energy is the second largest source of electricity on the grid, accounting for nearly 20 percent of America's electricity last year. Nuclear energy also accounts for more than half of the nation's carbon-free electricity – more than all other clean sources combined. Leading voices in science, industry and the environmental community have all come to the same conclusion: if we are to reduce carbon emissions in time to avoid a climate crisis, nuclear carbon-free energy must be part of the answer.

But in order for nuclear-generated hydrogen to play a broader role in decarbonization, we believe that the Biden Administration and the DOE need to keep the following factors in mind:

- Urgency of funding decisions decarbonizing the energy sector – the industry appreciates the various funding opportunity announcements from the DOE which help de-risk the deployment of hydrogen generation technologies at commercial nuclear plants. The various DOE offices must approach contracting with a strong sense of urgency to reduce the time to review applications and finalize contracts after issuing awards. Contracts should be finalized within 6 months of awards. Delaying contract finalization disincentivizes private investment, which is ready to participate now.

¹ The Nuclear Energy Institute (NEI) is the organization responsible for establishing unified industry policy on matters affecting the nuclear energy industry, including the regulatory aspects of generic operational and technical issues. NEI's members include entities licensed to operate commercial nuclear power plants in the United States, nuclear plant designers, major architect/engineering firms, fuel cycle facilities, nuclear materials licensees, and other organizations and entities involved in the nuclear energy industry.

- Hydrogen as mechanism to hit 2050 decarbonization goals – many utilities have made aggressive promises to get to net zero emissions by 2050, targets that are only reachable if they are able to integrate sufficient amounts of hydrogen into their energy mix. Production of hydrogen at the scale that nuclear reactors can provide would allow it to be used as an energy storage medium and utilized for electricity generation, in addition to existing baseload generation, to balance the increasing quantity of renewables that will be added to the grid. Fossil-burning generators that have years of life left in them could continue to operate with reduced emissions, running on a “hythane” blend of hydrogen and methane. This reduces the cost to energy consumers of the national effort to decarbonize.
- Production efficiency – hydrogen can be made cleanly by using low temperature electrolysis, but starting out with high-temperature steam reduces the amount of electricity needed by about one-third. The operating reactor fleet is a ready source of heat as well as electricity and advanced reactors, soon to be deployed, will be able to provide higher temperature heat, which would further reduce the amount of electricity needed per kilo of hydrogen produced. Furthermore, the economics of hydrogen generation are best suited to the 24/7/365 generating capacity that only nuclear can provide, to get full use from the significant investment in electrolyzers. As a follow-on, DOE should also foster the domestic production of electrolyzers – especially high temperature electrolyzers.
- Hydrogen transportation and storage infrastructure – the current paradigm in hydrogen distribution, by truck, simply isn’t sustainable if we’re to foster the economy-wide production and use of hydrogen. The government will need to either encourage construction of pipeline capacity to get the hydrogen from producers to consumers, or encourage large industrial users to locate near the new sources of hydrogen production. As hydrogen production increases, hydrogen will likely be used as a long-term energy storage medium for electricity generation. Hydrogen storage has potential advantages compared to shorter duration battery storage. However, government support will be needed to encourage the development of longer-term hydrogen storage for electricity generation.
- Maximizing the use of scarce carbon-free energy – a significant number of nuclear plants may be at risk of closing in the next 10 years (currently seven reactors have announced premature closure by 2025). These closures will significantly impact the ability of the U.S. to decarbonize and will also impact the ability of the U.S to ramp up generation of hydrogen using carbon-free energy. Focused efforts must be made to preserve the fleet and preserve the option for significant nuclear generated hydrogen. Demonstrating hydrogen production with nuclear is developing the model of the grid for the 2030s and beyond – when electrolyzers can be mass produced and installed. Eventually, the revenue stream from hydrogen generation can help assure the future of legacy assets that are crucial to climate stability, and which will help ensure the U.S. meets its decarbonization goals.
- Environmental justice – production of affordable hydrogen from nuclear reactors has benefits beyond climate stability, including substituting for diesel and gasoline motor fuel in a way that will improve urban air quality and thus the respiratory health of vulnerable populations.

There is another reason that the Department of Energy should follow through with a nuclear energy approach to carbon-free hydrogen: a diversity of approaches to the climate problem improves our chances of success. The world is in a period of rapid change in two key building blocks of a hydrogen economy: technologies for generating energy, and for making hydrogen. Several combinations will likely be technically

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and economically viable, but it is not possible to say now which those will be. A key role of government is to encourage a variety of approaches while helping to de-risk investment in new technologies, and allow innovation and human ingenuity to scale to the challenge.

NEI and the nuclear energy industry are excited about the future potential for hydrogen generation and use. We look forward to continuing to work with the Department of Energy and the Biden Administration to advance hydrogen generation with nuclear power and to achieve net zero carbon dioxide emissions by 2050.

Sincerely,

A handwritten signature in black ink, appearing to read "Doug True", with a stylized flourish extending to the right.

Douglas E. True