

# Bryan Pivovar

Fuel Cell/Electrolysis Group Manager

National Renewable Energy Laboratory (NREL)



## *The Growing Importance of H2 in our Evolving Energy System (my journey from CEMS to the National Lab system) How in the World did I become a Renewable H2 advocate?*

The emissions from the world's current energy system have significant side-effects that are manifesting themselves in larger and larger ways. While multiple options are being explored, the recognized importance of H2 is growing at an astounding rate. This is being driven by a few key societal megatrends: 1) Renewable energy (and natural gas) is getting cheaper, and penetration levels are increasing at an exponential pace; 2) the costs of GHG emissions (climate change) and criteria pollutants (health concerns) are being acknowledged and are reaching a point where society is demanding change (renewable portfolio and zero emission vehicle standards); and 3) commercial viability of fuel cell vehicle technology has been demonstrated (commercial vehicles being sold). Today represents a truly remarkable time for H2 as the benefits and importance of H2 have moved beyond academic studies into the marketplace (fuel cell vehicles, forklifts) and become central pillars of long-term industrial strategy (the Hydrogen Council). This presentation will present a brief overview of US activities supporting H2@Scale, a US DOE initiative to improve the economics of making, moving, storing and using hydrogen through targeted R&D efforts – and the areas of R&D that will be critical for the next generation of science including some of the efforts currently underway at NREL. National Labs as a career path and overview information relevant to NREL and the presenter's background will also be presented. Including musings over ending up in the National Lab system and as a renewable energy scientist, two outcomes that weren't even on the radar as an incoming PhD student at Minnesota.

**Bryan Pivovar** is Fuel Cell/Electrolysis Group Manager at the National Renewable Energy Laboratory (NREL) in Golden, CO where he oversees NREL's electrolysis and fuel cell R&D with an annual budget of ~\$10M. He has been a pioneer in several areas of fuel cell development for vehicle applications, taking on leadership roles and organizing workshops for the Department of Energy in the areas of sub-freezing effects, alkaline membranes, and extended surface electrocatalysis. Starting in June of 2015, he led a multi-National Laboratory team pursuing 'Hydrogen at Scale' as a pathway for energy system-wide benefits of increased H2 implementation, currently a multi-million-dollar DOE program supported by multiple program offices. He received his Ph.D. in Chemical Engineering from the University of Minnesota (2000) and led fuel cell R&D at Los Alamos National Laboratory (LANL) prior to joining NREL. He is one of twelve NREL Senior Research Fellows (as of Sept 2019) and received the 2012 Tobias Young Investigator Award from the Electrochemical Society. He has co-authored over 150 papers with nearly 10,000 citations in the general area of fuel cells and electrolysis.

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*In person only; no Zoom*

Questions? Contact [allison.macknick@northwestern.edu](mailto:allison.macknick@northwestern.edu) and  
[megan.ray@northwestern.edu](mailto:megan.ray@northwestern.edu)