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Transition of future energy system Infrastructure; through power to gas pathways

Power-to-gas is a promising option for storing interment renewables, excess nuclear baseload power, and distributed energy. Thus it is a novel concept for the transition to an increased renewable content of current fuels with an ultimate goal of transition to a sustainable low-carbon future energy system that interconnects power, transportation sectors, and thermal energy demands. The aim of this presentation is to introduce different Power-to-gas "pathways", including Power to Hydrogen, Power to Natural Gas End-users, Power to Renewable Content in Petroleum Fuel, Power to Power, Seasonal Energy Storage to Electricity, Power to Zero Emission Transportation, Power to Seasonal Storage for Transportation, Power to Microgrid, Power to Renewable Natural Gas (RNG) to Pipeline ("Methanation"), and Power to Renewable Natural Gas (RNG) to Seasonal Storage. In order to compare the different pathways, the review of key technologies of Power-to-gas systems are studied and the qualitative efficiency and benefits of each pathway are investigated from the technical points of view. Power-to-gas pathways are discussed as an energy policy option that can be implemented to transition to a zero-emission energy future.

Biography

Michael Fowler is a Professor in the Department of Chemical Engineering at the University of Waterloo with a research interest in electrochemical power sources. Specifically, his research focuses on fuel cell system design and reliability, fuel cell and battery materials durability and green power systems. His research includes modeling of hydrogen production and distribution systems, including Power-to-Gas. With the University of Waterloo Alternative fuel team he is the co-advisor of the development and building of a number of the fuel cell (FCV) and plug-in hybrid vehicles (PHEV) as part of the Advanced Vehicle Technology Competition (see http://ecocar3.org/). As a Faculty Advisor for student teams, he has been involved with over seven teams that have won international or national competitions including winning the National Hydrogen Association H2U Student Design Competition three times. He has over 200 peer-reviewed publications mostly related to 'Hydrogen Economy' issues.

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