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Self Excited Induction Generator (SEIG): Wind-to-H_2

Overview: With no costly connection to, nor energy delivery to, the electricity Grid, Hydrogen fuel for nascent fleets of fuel cell cars, buses, trucks may be produced from wind turbines equipped with common, rugged, low-cost induction motors-as-generators, operating in novel SEIG mode, close-coupled to electrolysis stacks, at lower cost. Relieves Grid.

IP: SEIG tech is public domain. We will develop IP via novel controls and power electronics enabling close-coupling of wind turbines + windplants to electrolysis stack array, in optimized, integrated system designs.

Development Stage: TRL 3-4 Proof-of-concept SEIG mode on a turbine at AASI's Palm Springs windplant. Ready for wind-to-H2 custom SEIG

Alaska Applied Sciences, Inc. (AASI)

Mission: R&D to transform global energy system from fossil to CO2-emission-free sources. Low-embodied-energy structures: thin-shell concrete. Wind-to-Hydrogen via novel generation, electrolyzer coupling. Public science education and informed energy policy decisionmaking.

Founded: 1990, Juneau, AK. C-corp. Privately held.

Number of Employees: 2: founders Leighty and Waterman; none paid

Facility Description: 13-turbine windplant in Palm Springs, CA for R&D on novel SEIG gen system for lower-cost Hydrogen fuel production.

Product Sales: 1991, computer-guided telescope, Hyatt Regency Maui

R&D and Demonstration Need

In 2050, California (CA) demand for Hydrogen (H2) transport fuel CO2-emission-free energy will exceed Grid electricity demand. Wind and solar plants will produce H2 fuel at lower cost if dedicated, with no costly Grid connection. AASI has partnered with an NREL team to design + build a novel proof-of-concept SEIG system, of controls + power electronics, for demo at its Palm Springs windplant. With NREL we have unsuccessfully applied for ARPA-E (twice) and Small Business Voucher (SBV) funding, at both $3 M (complete 13-turbine windplant) and $250 K (pilot plant). We need the extraordinary tech capability at NREL, or perhaps Auburn Univ, to design a complete wind-to-H2 system of integrated, optimized, controls and power electronics by which turbines equipped with common, rugged, low-cost induction motors, operating in SEIG mode, close-coupled to electrolysis stacks, may prove H2 production at lower cost, MW scalable.

OPPORTUNITY

Need/Problem: Large nascent demand for H2 fuel, for transport and stationary CHP, from wind + solar, relieving Grid of costly looming costs of storage and backup generation for "variable" and "distributed" sources

Target Customer: Transportation H2 fueling, retail and fleets, for fuel cell car, bus, truck. New utility business models. Oil + gas majors, for de-carbonizing total energy supply, quickly, prudently, profitably.

Value Proposition: At 50 kWh / kg H2 fuel, $4.00 / kg at windplant gate, wind-source electricity is worth $0.08 / kWh: ~ 2x new windplant PPA

Market Opportunity: (1) Fuel cell vehicles, especially larger ones, will replace BEV's, as H2 fueling infrastructure expands, including H2 pipelines (2) H2 stored at annual scale at ~ $0.20 / kWh, in salt caverns

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