



HYDROGENICS

SHIFT POWER | ENERGIZE YOUR WORLD

Fuel Cells For Maritime

October 9, 2018

Our Recent Wins



7.8M Fuel Cell Order in China

- Supply fuel cell power systems for zero-emission vehicles in China
- Shipments are expected to be made over the next twelve months



Fuel Cells for Marine

- First high speed hydrogen powered fuel cell marine vessel in the U.S.
- 360 kW of Hydrogenics' fuel cell power modules



Multi-MW Power-to-Gas Facility

- 2.5MW facility providing grid balancing for the IESO
- Designed and built on a 5MW scalable platform

CEC Drayage Truck Project

Project Details:

- Delivery of one Fuel Cell Drayage Truck in a Daimler Freightliner chassis integrated with **CelerityPlus** – Hydrogenics' medium and heavy duty fuel cell power system technology combined with Siemens' ELFA electric drive
- One year demonstration with data collection by TTSI in ports of Long Beach, Port of LA and Alameda Corridor

Project Partners:

- Hydrogenics: Lead integrator, project manager and fuel cell supplier
- Daimler/VVG : Truck OEM and truck dealer
- Siemens: Electric drive supplier
- ACTIA: Battery supplier
- TTSI: Truck operator for demonstration



SIEMENS



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ACTIA®

SIEMENS

DAIMLER

TTSI

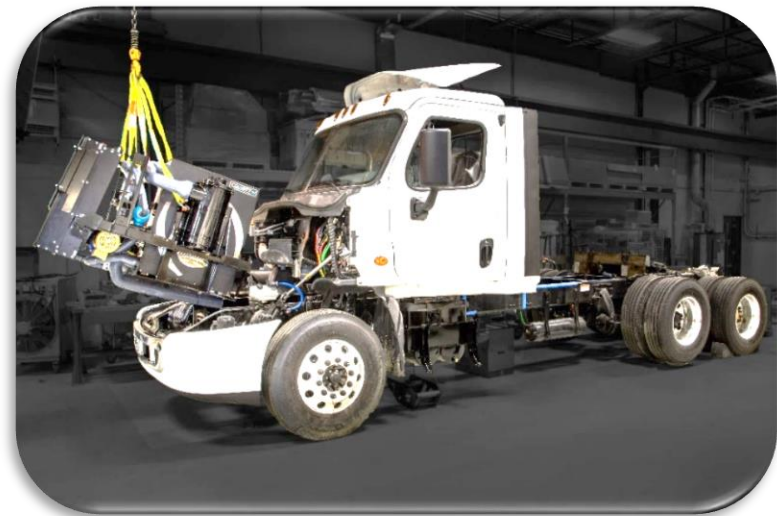
News & Updates

Sep 26, 2018

Hydrogenics to Provide Fuel Cells for Heavy Duty Trucks in California

San Diego, California – September 26, 2018 – Hydrogenics Corporation (NASDAQ: HYGS; TSX: HYG) (“Hydrogenics” or “the Company”), a leading developer and manufacturer of hydrogen generation and hydrogen fuel cell power systems, today announced that it will supply six heavy-duty fuel cell power modules to GTI and TransPower for a set of Class 8 Navistar drayage trucks scheduled to be deployed in Southern California early next year. The trucks are part of the California Air Resources Board’s “California Climate Investments” program, meant to enable the acceleration of low-carbon technology in commercial trucking applications. For this project, GTI is the program manager, TransPower the vehicle integrator, Navistar the chassis provider, and Total Transportation Services Inc. (TTSI) will serve as operator. Hydrogenics’ fuel cells are expected to be shipped in the fourth quarter of 2018; additional terms were not disclosed.

“GTI is excited to be a part of this consortium, including Hydrogenics, that brings leadership and experience in their respective fields to propel the transition to a post-petroleum, heavy-duty trucking economy,” stated Ted Barnes, Research & Development Director at GTI. “In California we are starting to see numerous examples of heavy-duty vehicle platforms moving successfully to zero-emission by adopting fuel cell technology.”



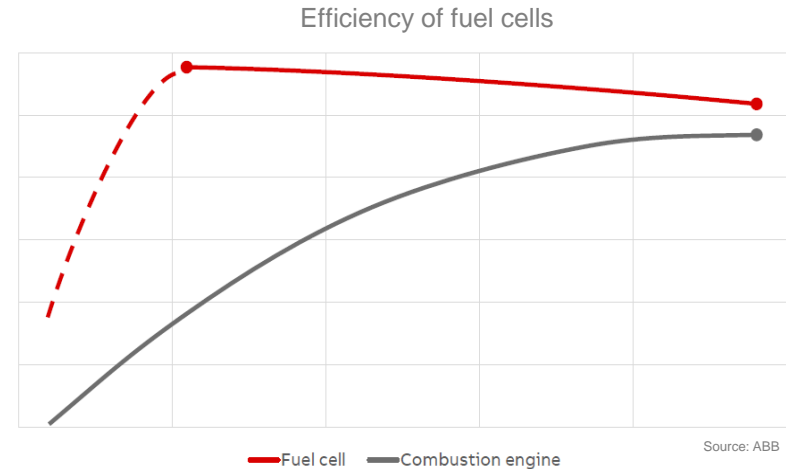


MARITIME

Feasibility of Fuel Cell Systems

Fuel cells operate at high efficiency and their life cycle cost is getting closer to combustion engines

- Life cycle costs are decreasing due to commercial volume and improved stack durability
- Greater predictability in maintenance and operational costs
- Improved hydrogen fuel infrastructure and distribution
- Increased harnessing of renewable energy for fuel (P2G) and incentives for carbon free fuel
- Fuel cells have a high efficiency at a wider operating range, translating to greater operational flexibility
- Favourable operating range for fuel cells is between 30% and 80%
- Efficiency of fuel cells decrease moderately towards the end of life



Safety Strategy for Fuel Cell Systems

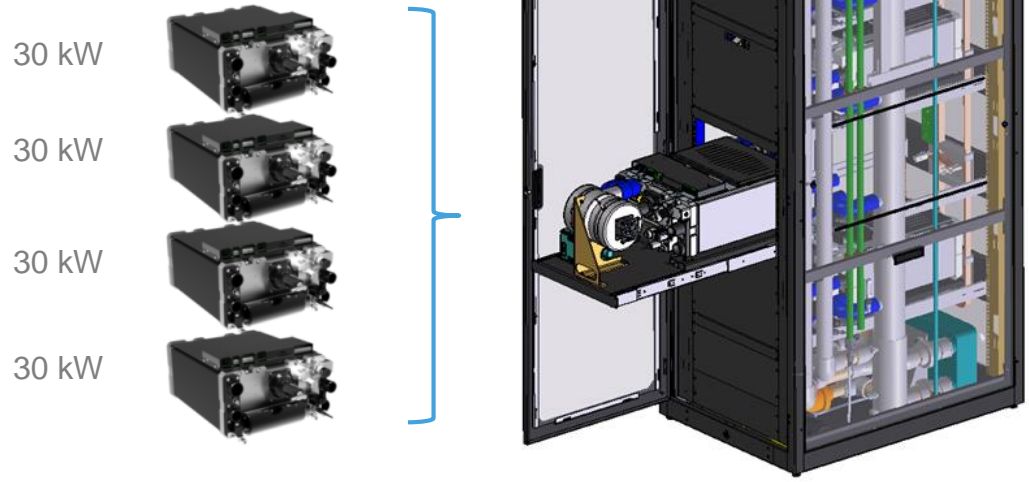


Mirroring the Battery Solution Architecture



Source: Corvus Energy

HyPM™-R120 Fuel Cell Power Rack



Leveraging Experience

MarFC (Maritime fuel cell) – Sandia 100kW FC

- System design leveraging applicable land safety standards with modification for maritime conditions
- Given approval to be operated on a water vessel within US

SF-BREEZE

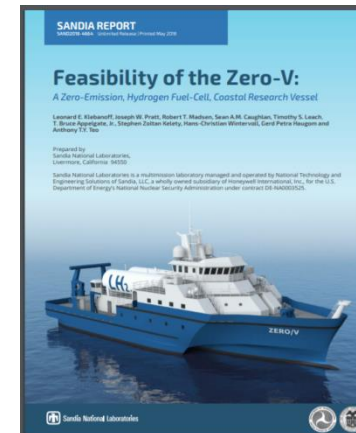
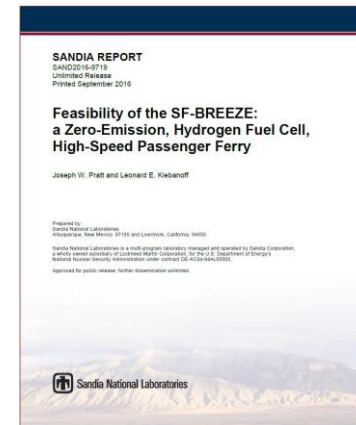
- Feasibility study - A high-speed passenger fuel cell ferry
- Review technical, regulatory, and economic aspects
- Funded by the US Department of Transportation's Maritime Administration

Zero - V

- Feasibility study - Zero Emissions Research Oceanographic Vessel (ZERO/V) powered by zero-emission hydrogen fuel cells
- Review design with maritime stakeholders to identify potential barriers for technology adoption
- DNV-GL Conditional Approval
- Funded by the US Department of Transportation's Maritime Administration



Source: www.sandia.gov



August, 2018: Alstom iLINT trains receives Type Approval by the German EBA
September 17, 2018: Alstom starts 2 zero-emission train **Coradia iLint** trains in regular service



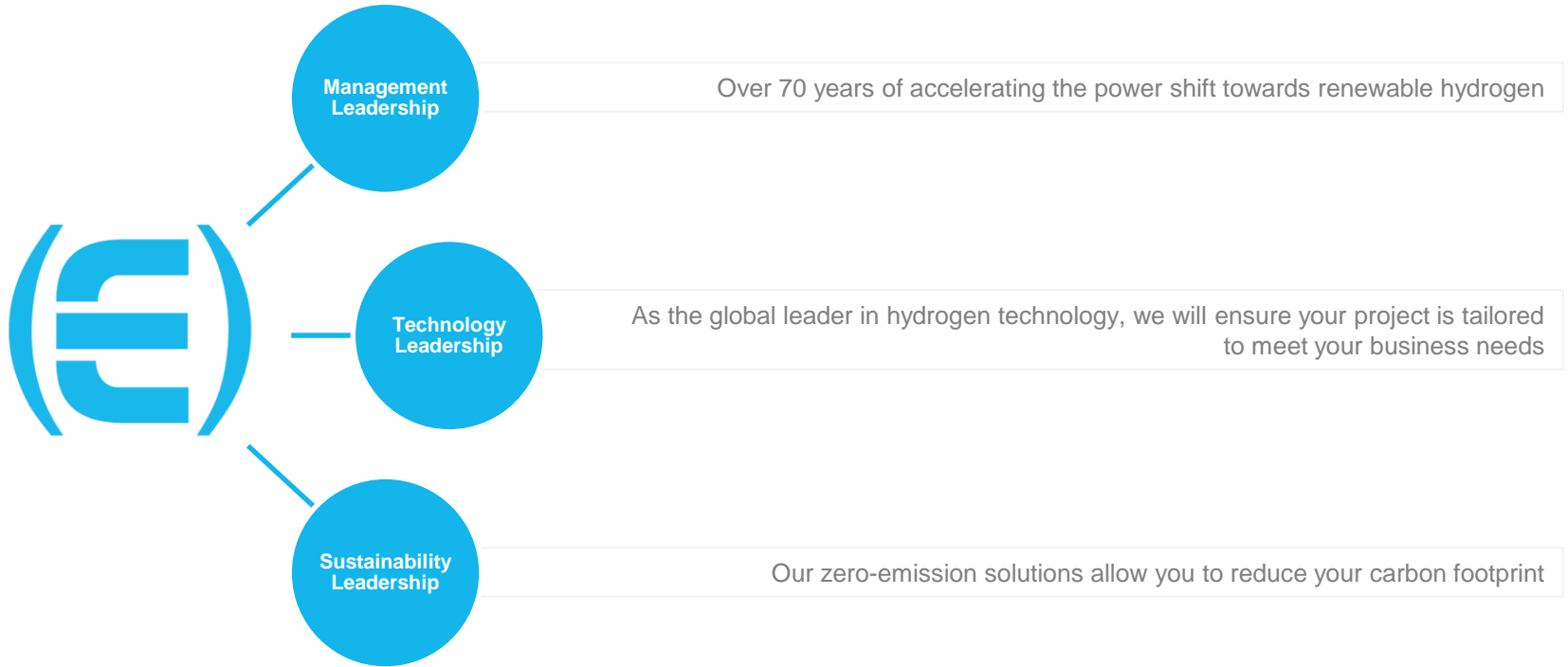
800
Km/tankful

300
PASSENGERS

150
SEATED

140 km/h

Moving Forward as Partners in Clean Technology



We're Ready