

GreenGT presentation R&I collaboration between Canada - Switzerland - Wallonia

Frédéric Veloso - Business Development Director Virtual matchmaking event, September 29th, 2021



About GreenGT

Expertise

GreenGT is a designer and integrator of innovative technologies, dedicated to the development of electrichydrogen propulsion systems for high-power mobility.

Operations

- Integration of hydrogen systems
- Customized development of :
 - Fuel-cell systems
 - Battery systems
 - Powertrains
- Manufacture and supply of:
 - Prototypes
 - Pre-series
 - Limited series

Areas of application

Road • Maritime • Air • Rail

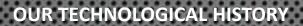
Establishment 2008 Shareholding Private group Number of employees 45

Switzerland

Head office at EPFL Innovation Park in Lausanne and factory in Collombey

France

Le Castellet











H24

Pays: France

Sports partner: ACO

Operator: Ecurie H24 racing

Industry: Auto racing

Vehicle: Le Mans Prototype

Year: 2018 - 2025



Customer requirement:

High-power electric-hydrogen propulsion solution, in the context of the development of an LMP prototype and the regulations for the future hydrogen category of the 24 Hours of Le Mans 2025

GreenGT solution:

- Design, development and manufacture of a 250 kW multi-stack hydrogen fuel cell system
- Design, development and manufacture of a 3.1 kWh high-energy-density battery system
- Design, development and integration of a 737 hp (550 kW) hydrogen-electric powertrain into an ADESS carbon LMP chassis

Benefits for the customer:

- Refueling time: 3 minutes
- Range at 700 bar refueling: 45 km (similar to diesel)
- Brake energy recovery system
- Top speed: >300 km/h
- 0 to 100 km/h: 3.4 seconds
- No clutch, differential or gear shift



Technical features

Number of stacks: 4

Fuel-cell system weight: 230 kg

Battery capacity: 3,1 kWh

C rate batterie: 90 C/150 C

(charge/discharge)

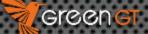
Number of engines: 2

Number of tanks: 3

Charging pressure: 700 bar

On board hydrogen: 8,6 kg





CATHyOPE

Pays: France

Vehicle OEM: Kamaz

Operator: Carrefour

Industry: Large scale

distribution

Vehicle: 44 tons truck

Year: 2021



Customer requirement:

A high-powered, long-range, silent propulsion solution, with zero CO2 or fine particle emission, for a refrigerated logistics application aimed at large and medium-sized stores.

GreenGT solution:

- Development and approval of a demonstration truck and an 85 kW hydrogen fuel cell system
- Design and integration of a 520 hp (390 kW) hydrogen-electric powertrain into a new Kamaz chassis
- Triple redundancy (battery and two 85 kW H2 fuel cell systems)

Benefits for the customer:

- Refueling time: equivalent to diesel
- Range at 350 bar refueling: 450 to 480 km
- Carrying capacity (with or without trailer): between 19 and 34 Euro-type pallets
- CO2 , P100, hydrocarbon, NOx emissions: 0 g
- Engine noise level: low



Technical features

Fuel cell power: 170 kW

Battery capacity: 60 kWh plug in

Max battery power: 250 kW peak

Max engine torque: 90° C/150° C

(charge/discharge)

Number of tanks: 12

Charging pressure: 350 bar

On board hydrogen: 46 kg

H2 consumption: 7/9 kg / 100km





	Topics	Desired progress
1	High Temperature Fuel Cell	Simplified cooling, high efficiency
2	Composites plates	Durability, cost, weight.
3	Supercapacitor	Efficiency and performance (Motorsport)
4	Cryogenics* (Hydrogen engine/storage)	Efficiency, storage density (kg/kg)
5	Simulation CFD*	Aerodynamic cooling efficiency
6	Durability models	Control of degradation, warranty, costs



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