Stefano Chitò
OEM Light Duty Business Development Manager,
Westport Fuel Systems

How to Reach Peak Performance With Hydrogen-engine & Fuel Cell Solutions

April 20, 3:45 PM, in Hall 13, Stand B51

Westport Global Value Proposition

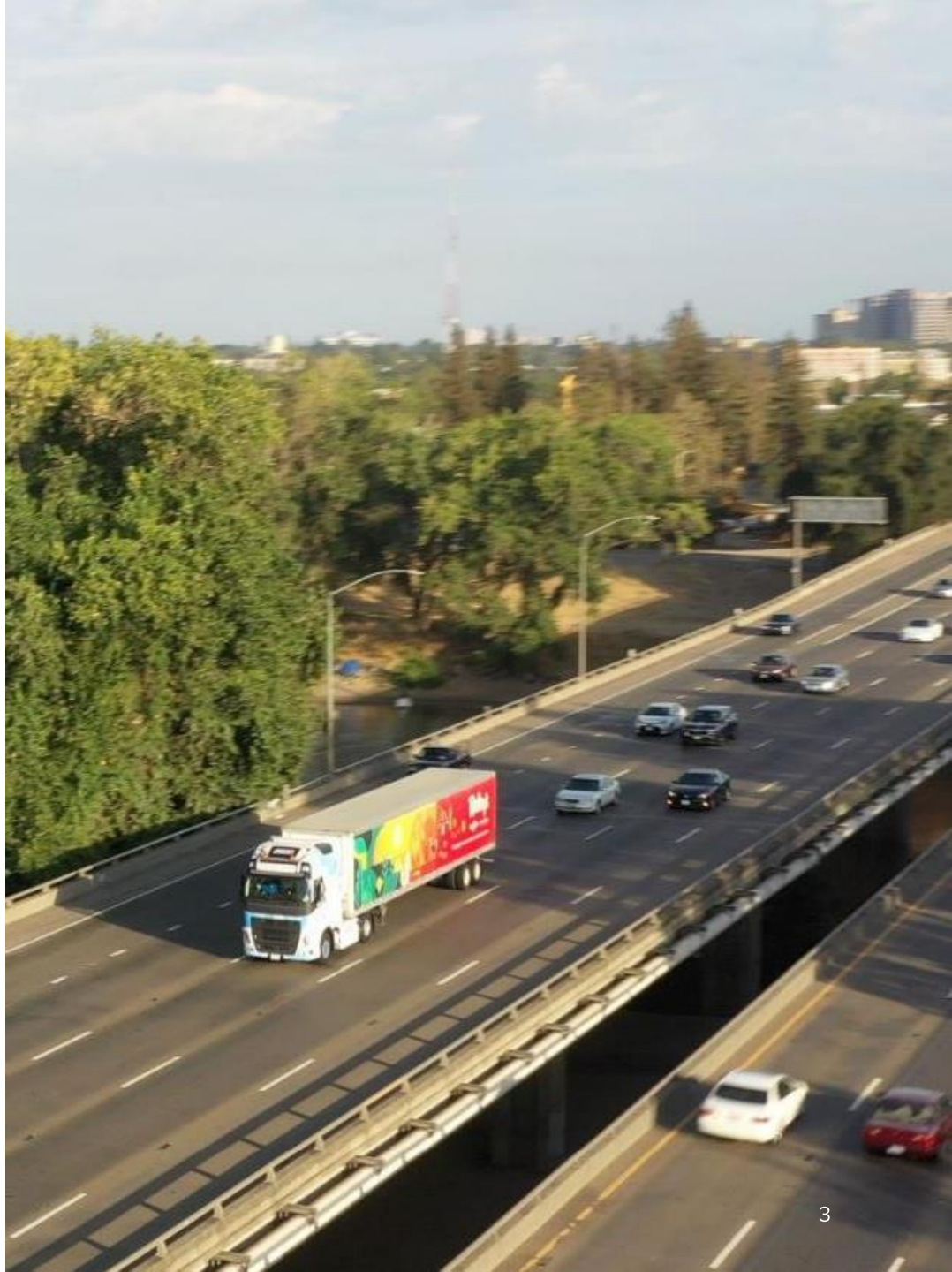
Driving Cleaner Performance

While others are searching for new ways in overcoming emissions, Westport has turned innovations into answers.

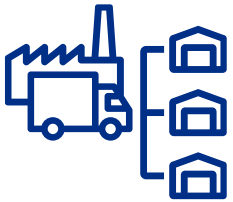
We’re constantly innovating new, cleaner ways for industry to keep moving. Driving cleaner performance without compromise.

Creating a path to carbon neutrality by way of less emissions, less cost, and less footprint, and by being more mindful, more pragmatic, and more in tune with what the world requires today.

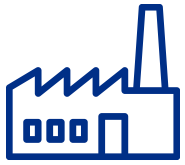
We are constantly seeking viable and valuable answers so that ALL can continue to drive forward and fuel the future.



We’re Changing the Way the World Moves



Tier 1
Transportation supplier with diverse business units



Manufacturing
7 global locations

Accessing
Full suite of renewable and alternative fuels

Sales in 70
countries, strong global footprint

>100
Global distributors worldwide

>1,400 Patents & Applications
Robust patent portfolio

We design, engineer & manufacture gaseous fuel systems & components to enable cleaner, affordable transportation

Diverse Product and Brand Portfolio – for a Variety of Applications, Markets and Alternative Fuels

- Business model sets company on a sustainable path forward
  - Components
  - Systems
  - Services

Breadth of Reach

Passenger Car & Light Truck

Bus

Heavy-Duty

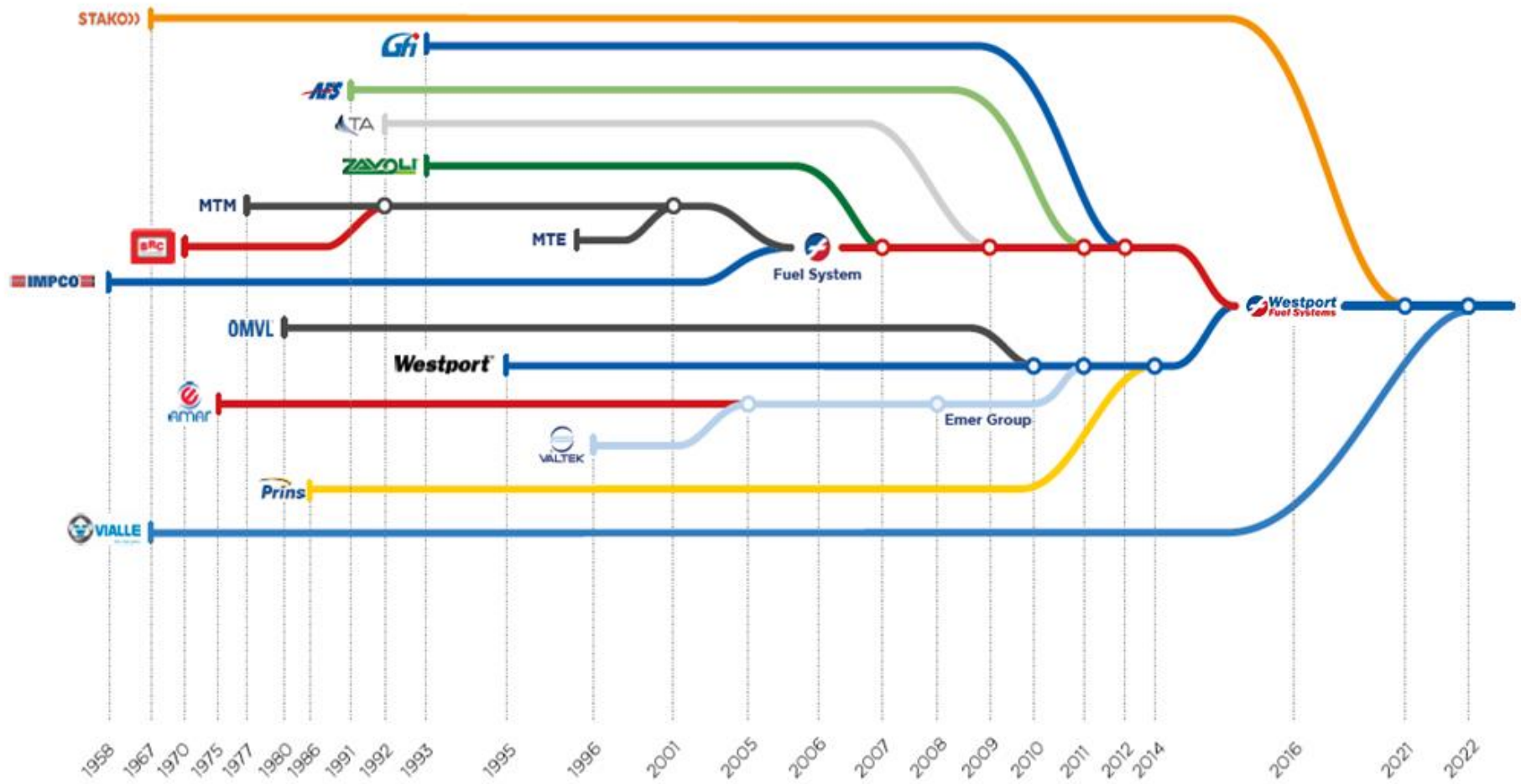
Industrial

OUR BRANDS

AFS BRC emer Gfi OMVL Prins STAKO TA VALTEK Westport ZAVOLI

LPG CNG LNG H_2

Westport Fuel Systems - Family Tree & Brand Acquisition



We Design, Develop and Manufacture Alternative Fuel Systems and Components

Fuel Tank Systems

Type 1 CNG Tank Systems

LPG Tank Systems

Fuel Tubes & Fittings

LPG Level Sensors

HPDI LNG Pump

HPDI LNG Tank Module

Valves

CNG Solenoid Tank Valves and PRDs

H2 Tank Valves and PRDs

Fill Valves

CNG Integrated Tank Valve Regulators

H2 Integrated Tank Valve Regulators

Regulators

CNG Pressure Regulators

H2 Pressure Regulators

LPG Pressure Reducers

HPDI Gas Conditioning Module

H2 Pressure Control Modules

Injectors

LP Gas Injectors

Injector Rails

HPDI Injector

Gas Filters

Electronics

Mono-Fuel Electronic Control Modules

Bi-Fuel Electronic Control Modules

LPG CNG LNG H_2

Hydrogen Components – Product Portfolio

Complete hydrogen fuel system solutions from high pressure tank valves to low pressure electronic fuel control at fuel cell or engine

High Pressure Regulators

Electronic Controls & Software

Low Pressure Fuel Control

Tank Valves

Integrated Tank Valve Regulators

Pressure Relief Devices


REACH YOUR PEAK
HPDi
Westport
Fuel Systems
Hydrogen Mobility

H_2 Tank Valves

MODEL	PRESSURE	SPECIFICATIONS	PHOTO	STATUS
H-TV3 series	350 bar	• Internal tank solenoid note1 • Internal tank temperature sensor • Manual shut off valve • 2 inch tank neck		In production EC79 certified HPRD1 certified GBT 35544 certified ECE R134 / PED certified
H-TV6 series	350 bar	• Internal tank solenoid note 1 • Manual shut off valve • Bleed valve • Excess Flow Valve & Filter • 1 1/8 inch tank neck		In production EC79 certified ECE R134 / PED certified
H-TV70 series	700 bar	• Internal tank solenoid note 1 • Internal tank temperature sensor • Manual shut off valve • Bleed valve • Excess Flow Valve & Filter • 1 ½ inch tank neck (M45 option)		Pre-series production EC79 certified ECE R134 pending; Q3-23

H_2 Integrated Tank Valve Regulators (H-ITVR)

MODEL	PRESSURE	SPECIFICATIONS	PHOTO	STATUS
H-ITVR-2xx	350 bar	• Internal tank solenoid • Internal tank temperature sensor • Manual shut off valve • 2 inch tank neck • Integrated filter • Integrated regulator – 2 stage or single stage depending on outlet pressure		In production HPRD1 certified GBT 35544 certified ECE R134/PED certified
H-ITVR70-xxx	700 bar	• Internal tank solenoid • Internal tank temperature sensor • Manual shut off valve • Bleed valve & Excess Flow Valve • 1 ½ inch tank neck • Integrated filter • Integrated regulator – 2 stage or single stage depending on outlet pressure		Under development

H_2 Pressure Relief Devices (PRD's)

MODEL	PRESSURE	SPECIFICATIONS	PHOTO	STATUS
H-PRD4 End Plug	350 bar	• Fast acting/high flow • Centre located vent port • 1 1/8", 2", M25 and other tank necks		In production EC79 certified HPRD1 certified GBT 35544 certified ECE R134/PED certified
H-PRD4 End Plug with Temperature Sensor	350 bar	• Same as H-PRD4 End Plug, plus • Internal tank temperature sensor		In production EC79 certified HPRD1 certified GBT 35544 certified ECE R134/PED certified
H-PRD4 Remote PRD	350 bar	• Same as H-PRD4 End Plug, except • Remote mounting packaging for long tanks or other unique applications		In production EC79 certified HPRD1 certified GBT 35544 certified ECE R134/PED certified
H-PRD70 PRD's	700 bar	• Same as the 350 bar variants above except for 700 bar rating • M25, 1.5", M45 and remote variants	 	Pre-series production EC79 certified ECE R134, Q3-23

H_2 High-Pressure Regulators

MODEL	PRESSURE	SPECIFICATIONS	PHOTO	STATUS
H-P35	350 bar	• Single stage, diaphragm • Balanced design • Integrated Filter, PRV, pressure sensor & SOV options • Up to 7 g/s H2		In production Outlet pressure factory configurable between 2 & 16 barg
H-P35-HP	350 bar	• Single stage piston • High flow • 10 to 100 barG outlet pressure (configured as per customer need) • Integrated pressure sensor and solenoid shut off valve options		Under development
H-P70	700 bar	• Dual piston, single piston or piston/diaphragm architecture • Up to 10 g/s H2 • 2 to 100 barG outlet pressure (configured as per customer need) • Integrated options such as filter, pressure sensor, PRV	 	Pre-series production EC79 & HGV3.1 certification pending (Q3, 2023)

H_2 Low-Pressure Fuel Control / Isolation

MODEL	PRESSURE	SPECIFICATIONS	PHOTO	STATUS
H-PCV	14 barG	• Electronic Pressure Control Valve • Stable, electronically controlled outlet pressure; 12V or 24V PWM • Inlet pressure up to 14 barg • Outlet pressure 0 to 2 barg • Flowrates up to 4.1 g/s H2		In production
H-IVL	24 barG	• Low pressure isolation valve • Up to 24 bar inlet pressure • 12V or 24V		In production EC79 certified
H-PCM	14 barG	• Combination of H-PCV and H-IVL • Integrated Filter, PRV and pressure sensor ports		In production
PRV	1.3 to 45 barG	• Pressure Relief Valve (PRV) • Factory configurable to crack pressures between 1.3 and 45 barG		In production EC79 certified
Fuel Injector	Up to 7.5 barG	• Up to 7.5 barG inlet pressure • Up to 2.9 g/s H2 flow		Pre-series production

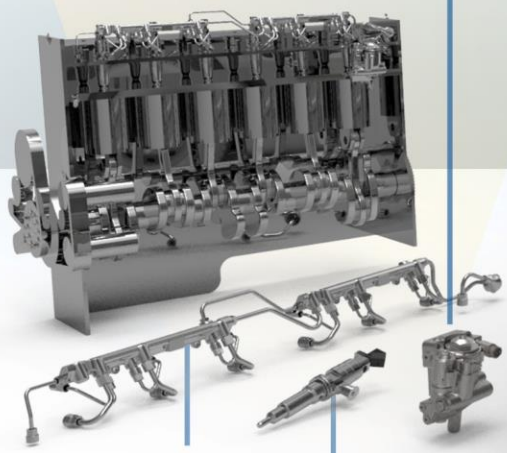
H_2 HPDI™

Fully Integrated Westport HPDI Heavy-Duty Truck Solution

HIGH CONTENT AND SIGNIFICANT WESTPORT FUEL SYSTEMS IP

ON ENGINE

Gas Conditioning Module (GCM)



Fuel Rail

HPDI Fuel Injector

HPDI FUEL SYSTEM

www.westport.com

OFF ENGINE

Tank Selection Control Manifold

Integrated Gas Module

Pump Control Manifold

HPDI Control Software

Cryogenic High Pressure Pump

Gas Temperature Sensor

Fuel Level Signal CANditioner

HPDI: Cost-effective

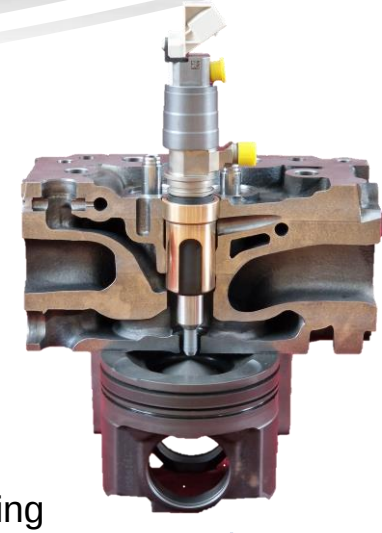
HPDI is the most cost-effective way to reduce CO_2 in long-haul trucking and other high-load, long-haul applications.

HPDI: LNG

- Same torque, efficiency, and reliability as diesel engines
- **20% CO_2 reduction tailpipe**
- **100% CO_2 reduction with bio-LNG**
- No change to vehicle or engine architecture

H_2 HPDI

- 20% more power, 15% more torque
- **Near Zero CO_2 emissions**
- **Lowest cost to CO_2 compliance**
- Preserve existing engine manufacturing



H_2 HPDI™: Game Changer

The world's first compression ignition HD H2 Truck

ICE second life

Near Zero $C0_2$ emissions

Cost-effective

Best in class efficiency


Westport
Fuel Systems
Thank You
Driving Cleaner Performance Together