



VOLVO GROUP JOURNEY TO SUSTAINABILITY: HYDROGEN SOLUTIONS

Mission Innovation Hydrogen Fuel Cell Virtual Workshop, September 22-24, 2021

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Ray Gallant Biography

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What we do

Volvo Group offers trucks, buses, construction equipment, power solutions for marine and industrial applications, financing and services that increase our customers' uptime and productivity.

We contribute to the development of electrified and autonomous solutions for the benefit of customers, society and for the environment.

Environmental Care is a long-standing core value for Volvo Group



THE FUTURE...



DIGITIZATION / A.I.

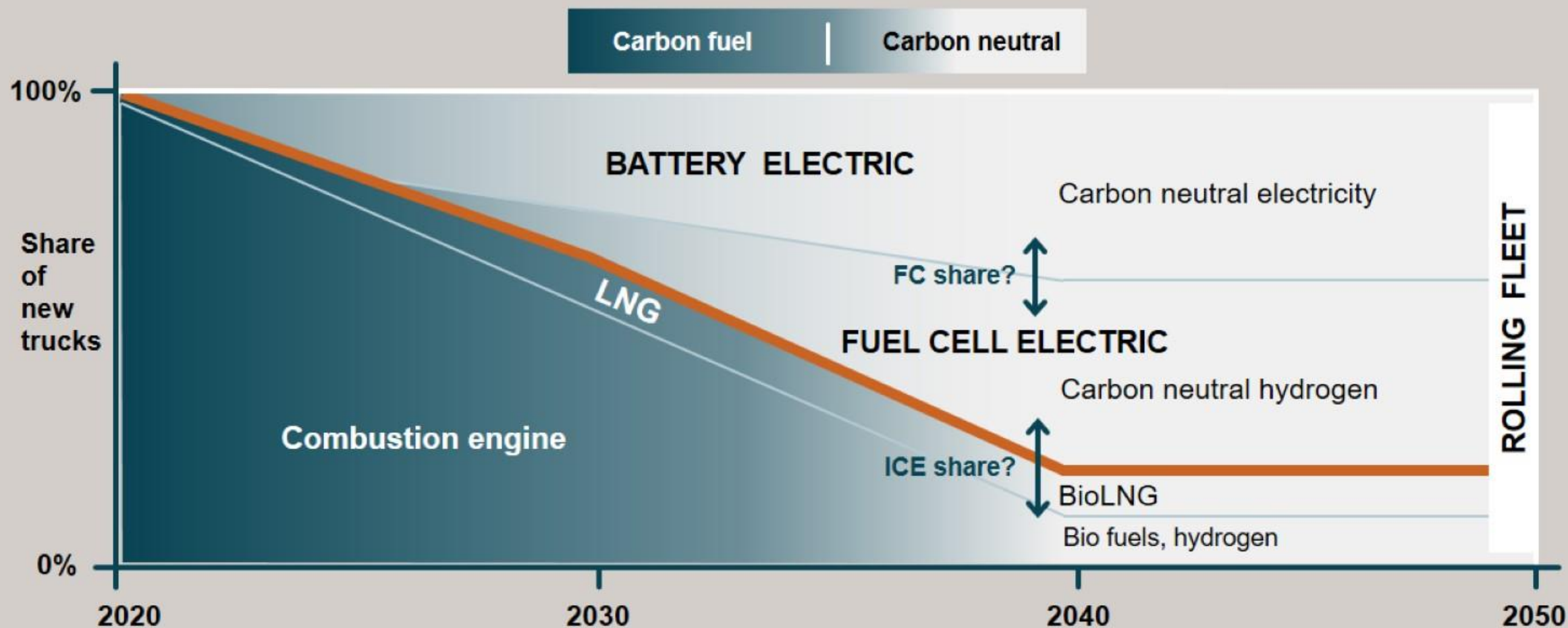


SUSTAINABLE POWER



AUTOMATION

100% fossil free Volvo Group vehicles from 2040



Why Hydrogen ICE?

- Zero emission solution for heavy/high energy consumption machines
- Range improvement compared to battery
- Weight advantage vs battery
- Short Re-fueling (vs battery recharge)
- Synergy with electro-mobility strategy
- Improved environmental foot print due to high level of recycling potential
- Enables zero emissions with combustion engine and conventional drive line



Hydrogen Fuel Cell (FCEV)

- Fuel cells chemically combine hydrogen and oxygen and produce electricity and water (and heat)
- Compressed hydrogen is easily transportable to off-road sites without the need for additional infrastructure
- Rapid refueling possible
- Hydrogen fuel cells can be combined for higher voltages/capacity in heavy equipment and long-haul trucks

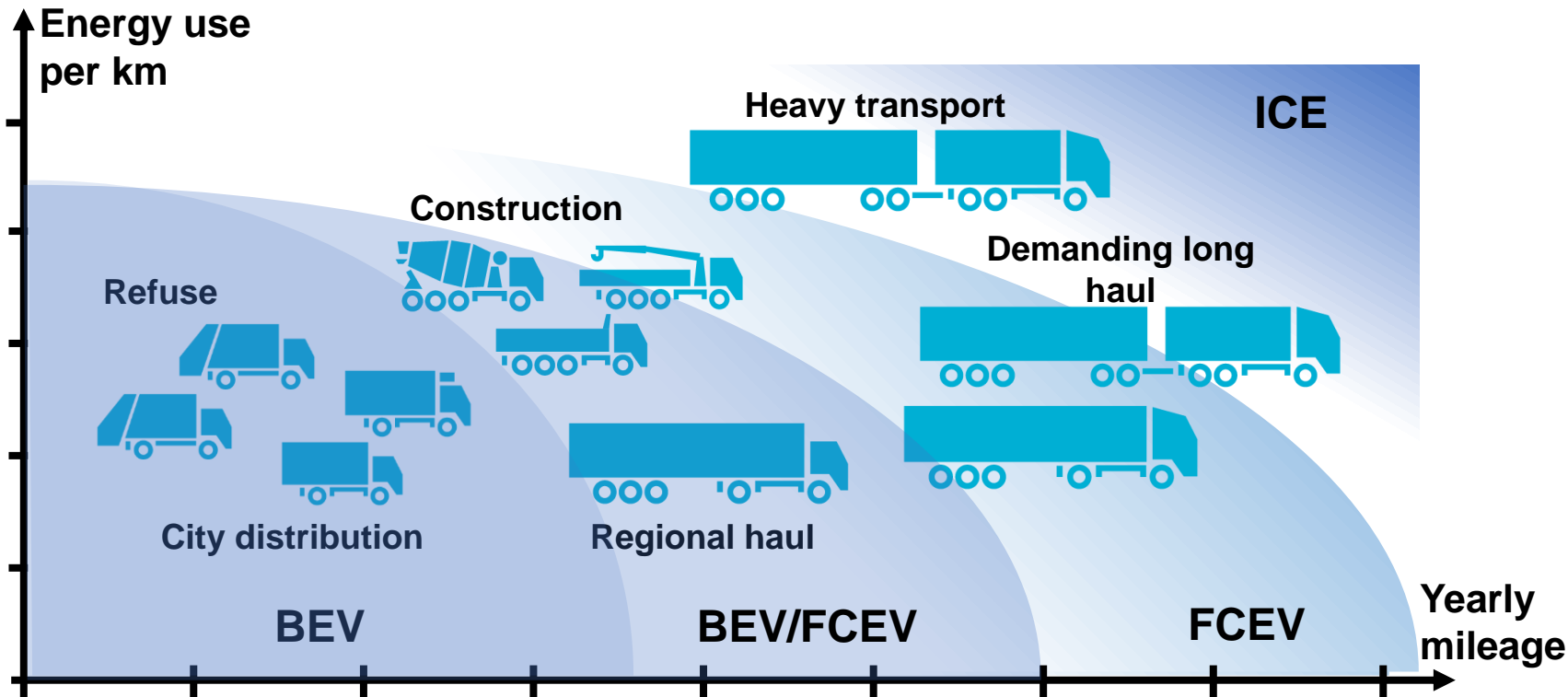


Cellcentric – New fuel cell joint venture with Daimler



- Volvo Group/Daimler JV to become a leading global manufacturer of fuel cells for heavy equipment
- Enable a major step towards climate-neutral and sustainable transport solutions by 2050
- Will develop, produce and commercialize fuel cell systems for use in heavy-duty applications as the primary focus

Technology positioning for Trucks



- FCEV focus on longer distance between filling and more energy consuming than BEV
- Target segments: Demanding long haul, Interregional haul, Regional haul, Heavy Construction and lower part of Heavy Transport.



Volvo CE electrification roadmap

Heavy



Energy recuperation

Electrification

Large



Energy recuperation

Electrification

Medium



Energy recuperation

Electrification

Compact

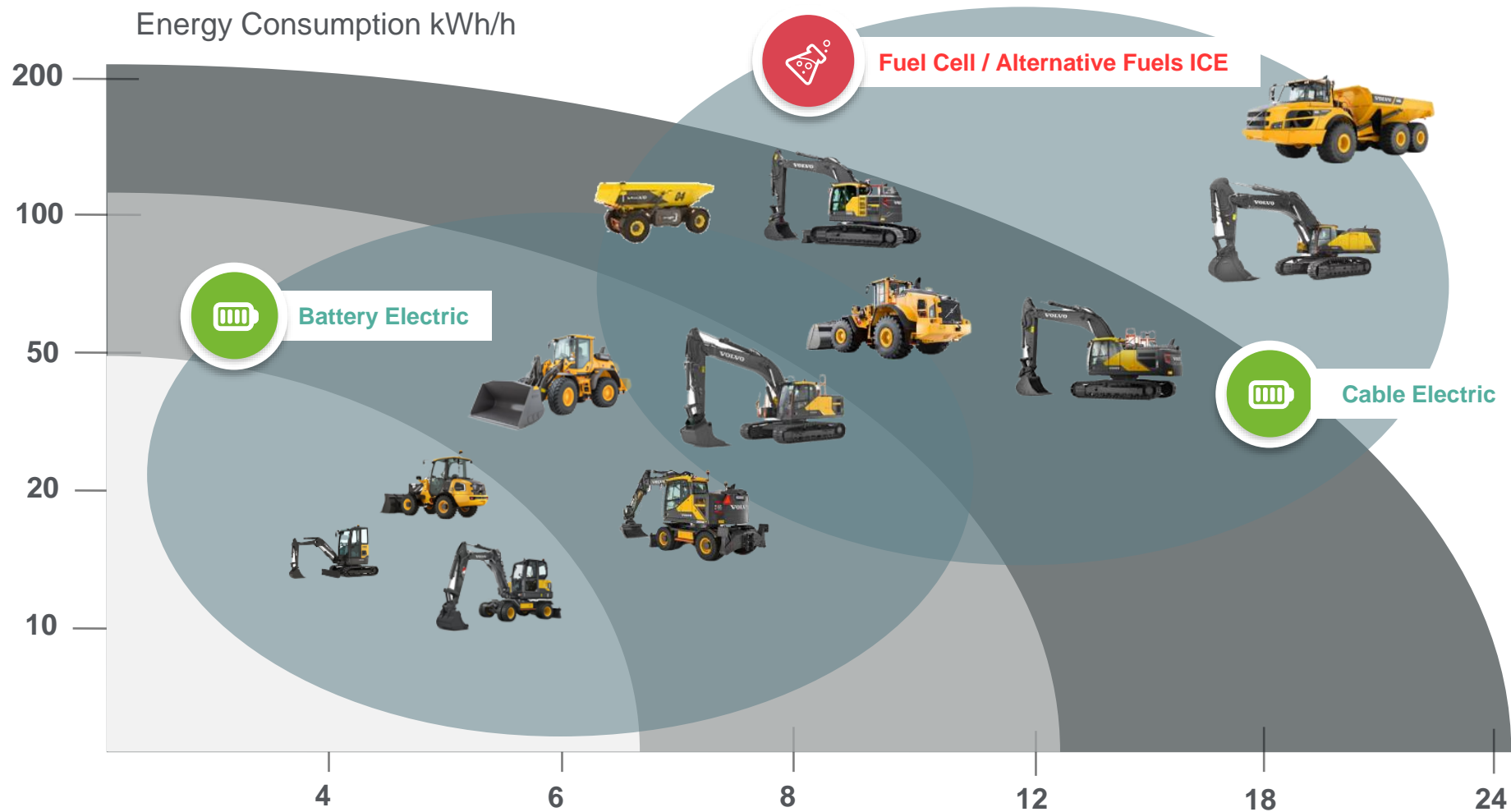


Electrification

2020

2025

Technology Positioning for Construction Equipment



Volvo Construction Equipment

Daily Usage hrs



Remaining Main Challenges with Hydrogen

- Technology
 - Maturity and cost efficiency
 - Installation challenges
- Availability
 - “Green” vs “Blue” and “Grey” Hydrogen
 - Infrastructure / Logistics
- Customers
 - Sustainability commitments/requirements
 - TCO (Total Cost of Ownership)



Lower “Well to Wheel” efficiency vs battery



Q & A

