

DAIMLER TRUCK



*Daimler Trucks Zero Emission Vehicles.
From Evolution to Revolution*

DAIMLER
TRUCK



FREIGHTLINER

FUSO

YOUR PRESENTER

Romesh Rodrigo, Senior Manager Homologation, VPC and Regulatory Affairs

- Bachelor of Mechanical Engineering from University of Melbourne
- Responsible for teams that look after Daimler Truck product homologation and VPC's
- 20 plus years experience in truck industry across various OEMs
- 6th year of second stint at Daimler
- Holder and user of MC license for over 20 years



SOME KEY CONSIDERATIONS

Challenges for the ZEV transformation

- **ZEV's** are heavier
 - Resulting in reduced payload
 - Axle masses need to align more with Europe
- **Range anxiety** is a thing
- Build **in-service ability** now such as repair, breakdown and importantly insurance for commercial ZEV's
- Tomorrow's net zero transportation **will look different** to today
- Transition of some **essential applications** is challenging
- Remember it's **Net Zero** not Absolute Zero!!! (intermodal discussion)



*“We are consistently pursuing our technology strategy for the electrification of our trucks. We want to offer our customers the best **locally CO2-neutral trucks** — powered by either batteries or hydrogen-based fuel-cells, depending on the use case.”*

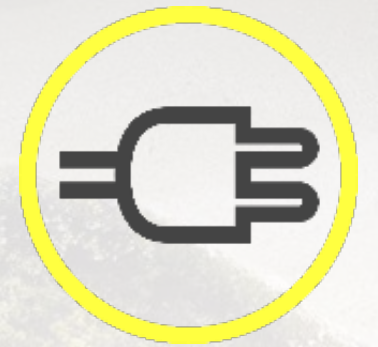
Martin Daum Chairman of the Board of Management of Daimler Truck AG and Member of the Board of Management of Daimler AG



WE'RE SHAPING THE FUTURE OF CO₂ NEUTRAL TRANSPORTATION

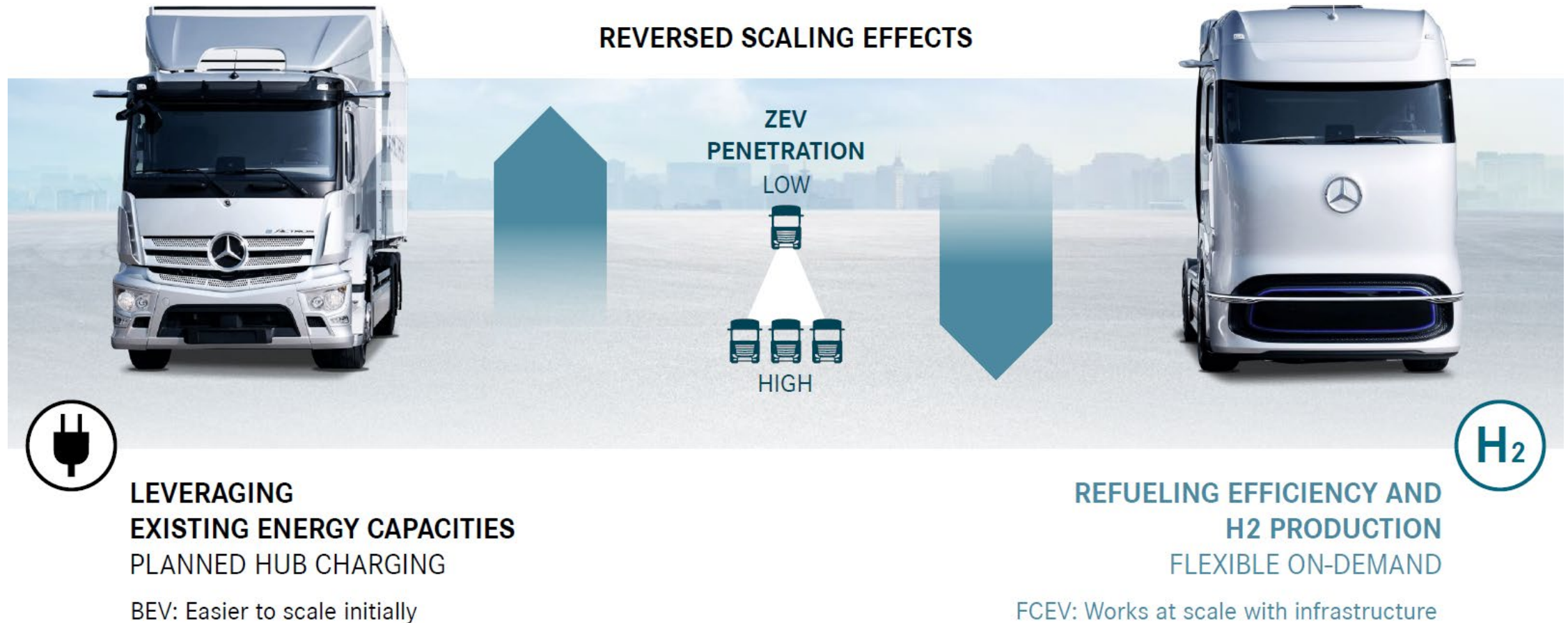
Truly CO₂-neutral transport works only on the basis of CO₂-neutral drives –
We're focusing on electric batteries and hydrogen

This enables us to support
our customers' entire range of applications.



INFRASTRUCTURE REQUIRES A DUAL ZERO-EMISSION STRATEGY

Battery Electric and fuel-cell electric technologies are needed



PIONEER'S IN HYDROGEN

Daimler commercial bus trials in our region from 2004 to 2007 in Western Australia

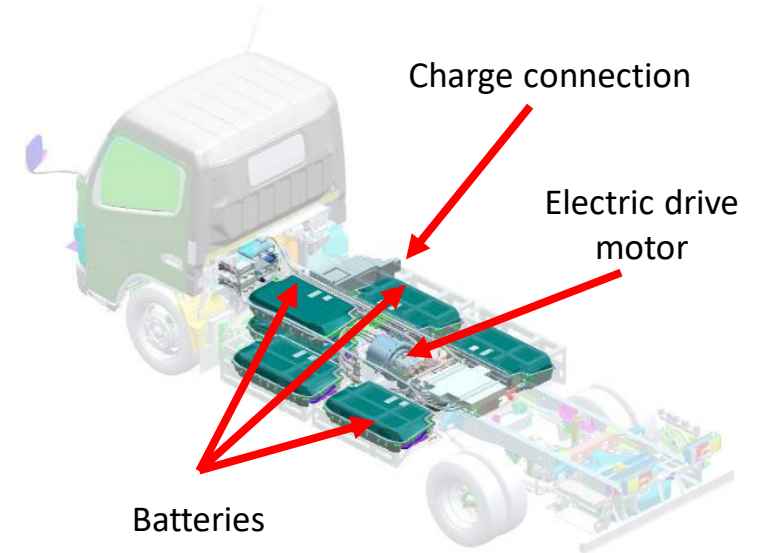
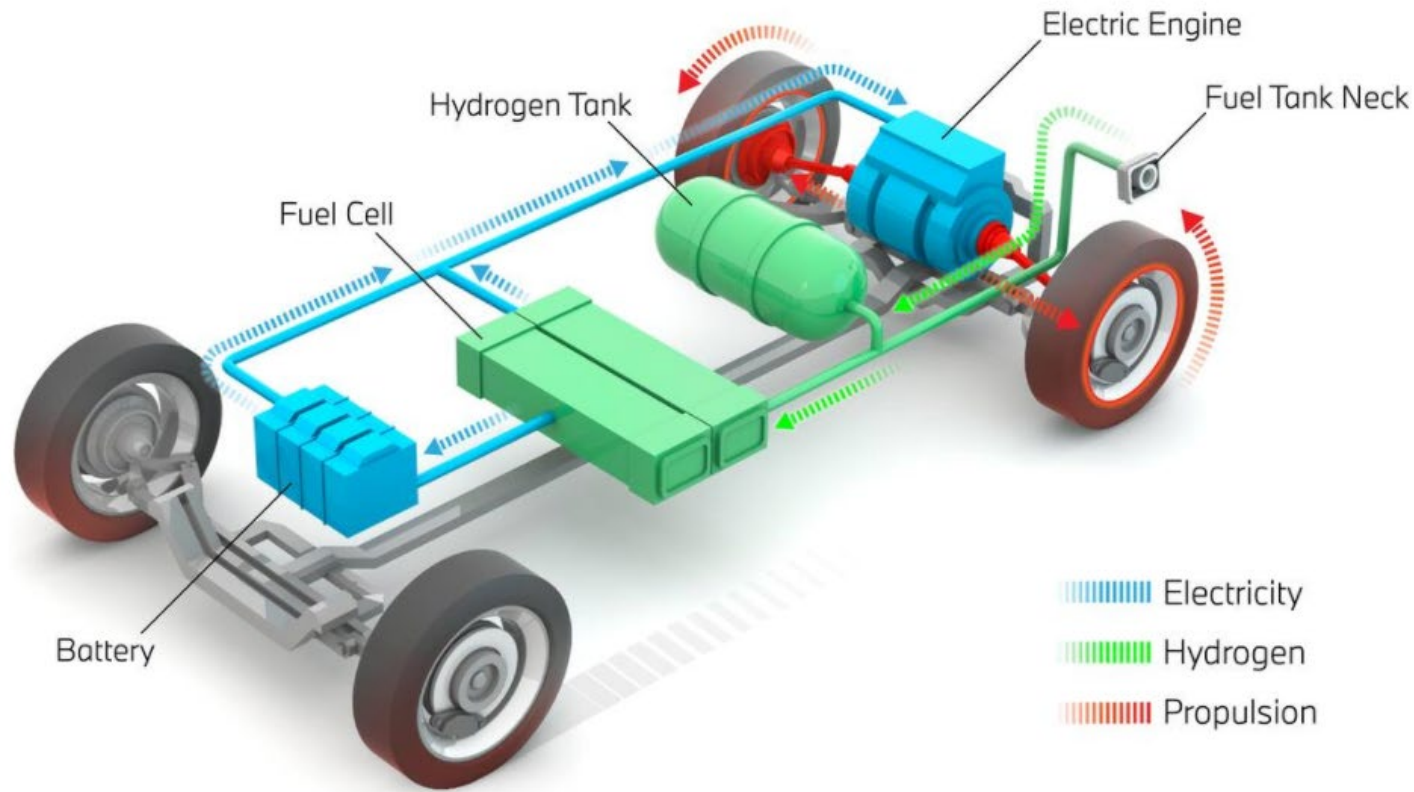


First of 3, H₂FC Buses unloading at the Fremantle port in Western Australia



THE BASICS FCEV vs BEV

Both are Intrinsically **Electric** Vehicles



In the fuel cell of an FCEV, hydrogen and oxygen generate electrical energy. This energy is directed into the electric motor and/or the battery, as needed.

FUSO eCanter

Released 2021



Main application: inner city distribution applications within 110km range*.

* At rated GVM

Safety is Paramount:



- Fully equipped with a suite of Safety Features, AEBS, LDWS and ESP.
- Driver and Passenger Airbags

Charging:



- DC Charging 50kw 1 – 1.5hrs
- AC Charging 7.2kw 8 – 10hrs



Local evaluation vehicle accumulating 50,000+ kms in the Australian environment.

First series production trucks **now in market**



Mercedes-Benz eEconic

For CO₂-neutral waste-collection & metro distribution

Australian Release 2023



Application: waste-collection vehicle in urban areas with planned routes of about 100 kilometers, Metro distribution up to 250 kilometers

For unrivalled safety:



- Low-positioned “**DirectVision cab**” with panoramic windscreen and glazed passenger door
- Multiple **active safety** systems such as Sideguard Assist supporting the driver
- Suitable for multitude of applications
- **Silent** powertrain operation



Mercedes-Benz eActros:

Heavy-duty distribution in urban areas
Australian Release 2023



Battery-electric truck with a range
300km



Innovation fleet: Intensive
customer tests with everyday
transport operations since 2018



Series production has commenced
in Wörth Future Truck Factory



Part of holistic ecosystem with
Consulting services for electric mobility



LIQUID HYDROGEN ON THE VEHICLE

Optimal Solution for range and efficiency



MAWP (Maximum Allowable Working Pressure) between 2.0 MPa(a) to 2.5 MPa(a)

Vacuum insulated lines between receptacle and tank for simultaneous filling of multiple vehicle tanks

Low design pressures allow the use of stainless steel containers without additional reinforcement

No data communication to fueling station needed for safe fueling process, e. g. stop of filling at 1.6 MPa(a)



MERCEDES-BENZ GEN H2 TRUCK; Fully Dedicated to Heavy-Duty Long-Haul Transport



Total weight: 40t, payload: 25t



Range of 1,000 km +
Re-fuel ~10 minutes

LH₂

Two liquid hydrogen tanks, each 40kg



CO₂ Impact: Locally emission free



Fuel-cell system with 300 kW power and high-voltage battery with average output of 400 kW

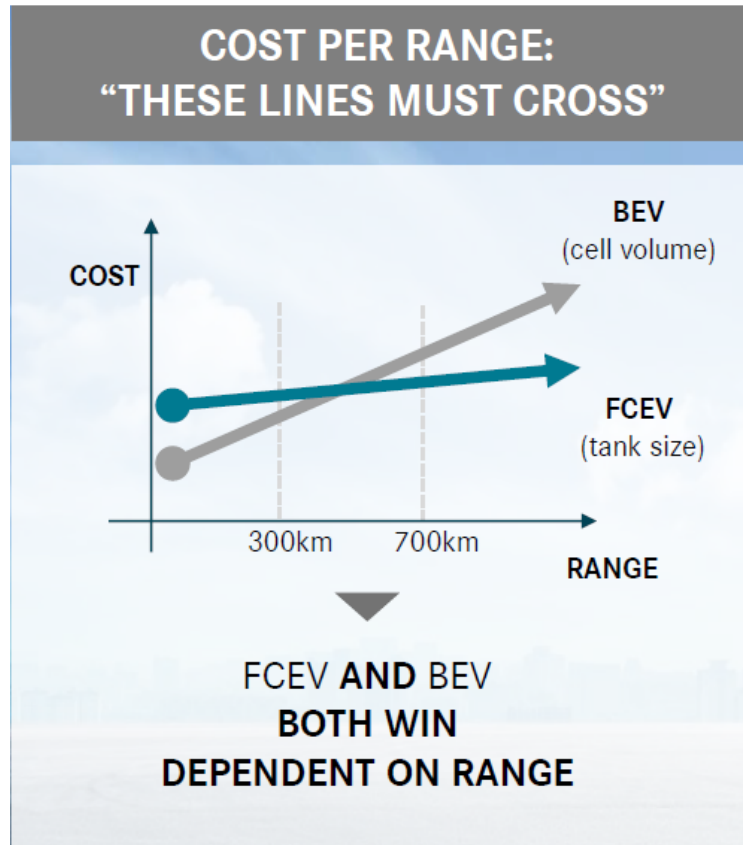


Customer trials will begin in 2023,
series production in 2nd half of the decade



DUAL ZEV TECHNOLOGY STRATEGY IS KEY

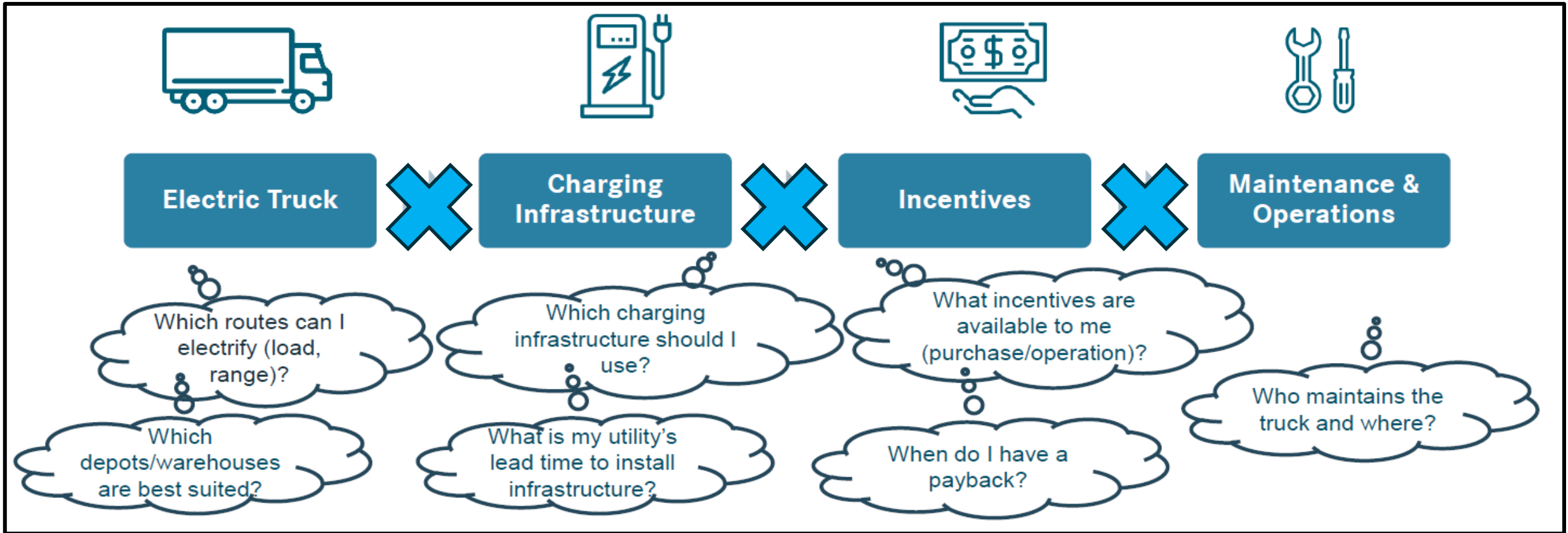
Factors influencing our dual strategy approach



Generation of certifiable **GREEN** energy key to meet ESG goals and obligations both locally and for export

THE CRITICAL MULTIPLICATION EQUATION

Many factors must be addressed to allow the industry's powertrain transition

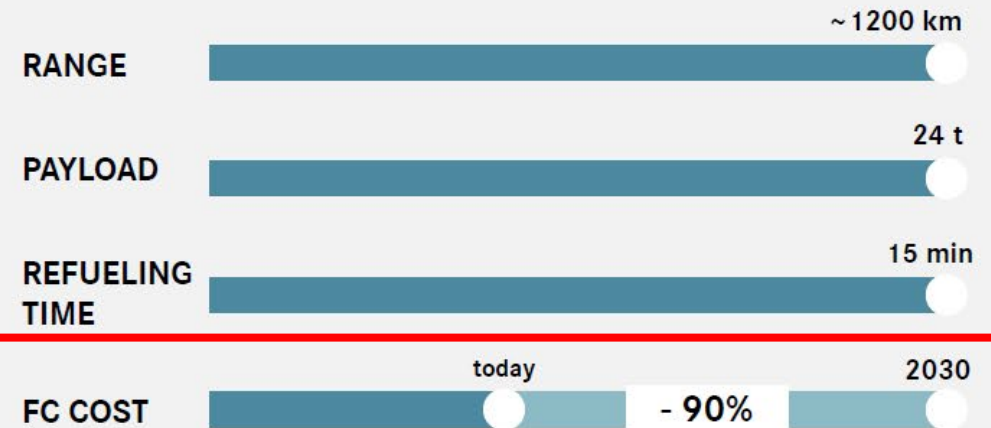


HYDROGEN IS AT THE CENTRE OF OUR FUTURE ZEV STRATEGY

The GenH2 Truck has clear range and cost milestones



2027 GENH2 TRUCK AMBITIONS ARE SET



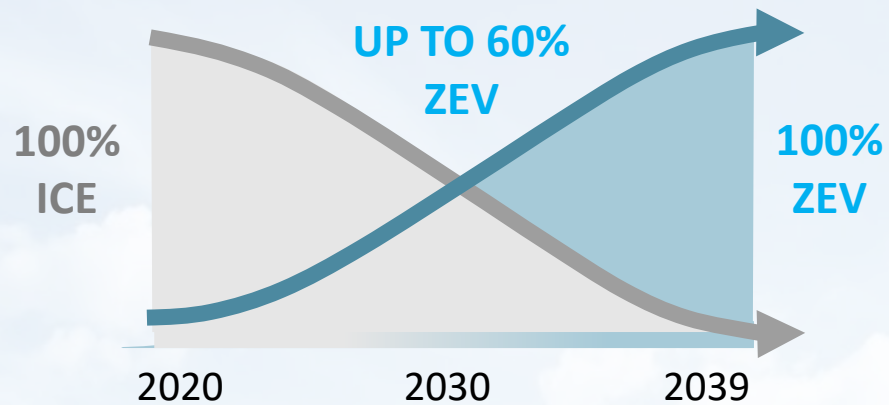
INFRASTRUCTURE IS KEY

Strategic investment NOW is required to support a seamless ZEV transition in the FUTURE



POWER TRAIN TRANSITION TIMELINE

Gradual change has begun and will accelerate by mid decade



Daimler Truck KEY 2030 ASSUMPTIONS

- ▶ Governmental support incl. carbon pricing & infrastructure
- ▶ Zero emission PT cost driven down further
- ▶ H₂ cost €4/kg, with infrastructure buildout
- ▶ Electricity cost: €0.15/kwh

TCO OUTCOMES

- ▶ Parity for BEV possible after 2025
- ▶ Parity for FCEV possible after 2027
- ▶ Significant variations likely by region

NEEDED NOW

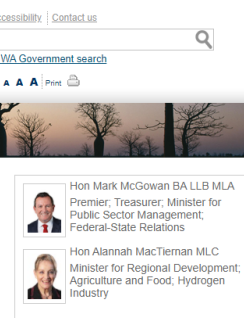
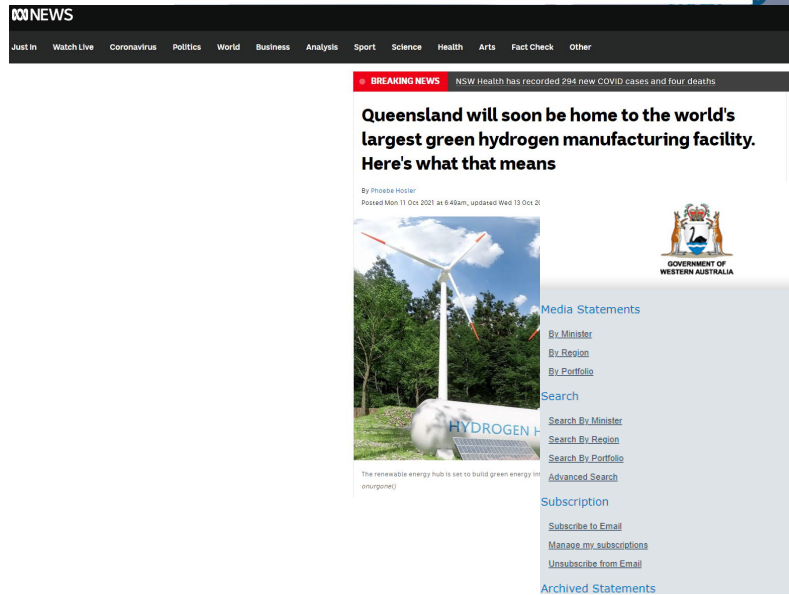
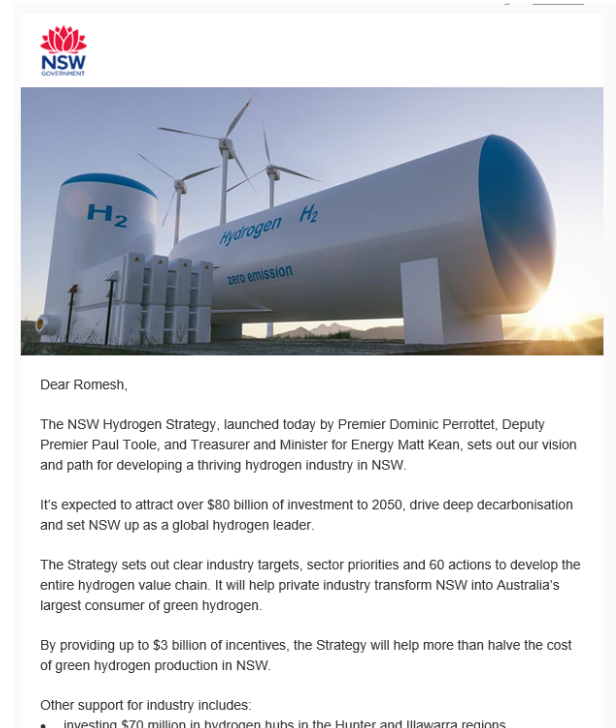
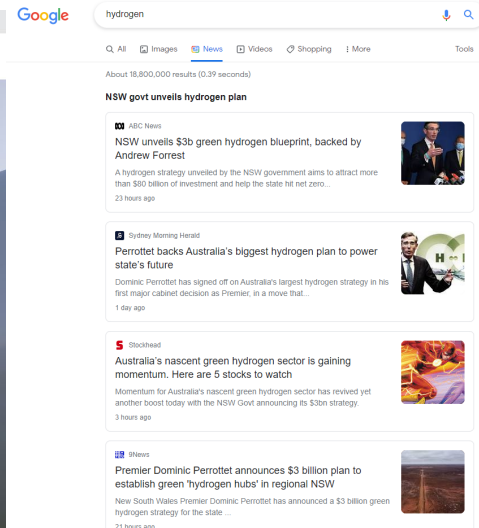
Policy key driver of confidence for future investment

- Enact policy for **new** road and bridge construction to **support more mass**
- Acknowledgment, direction and policy to harness **OUR green energy potential**
- Invest in liquid hydrogen for **export**
- Design and implement “**cradle to cradle**” policies and mindset
- Aggressively pursue the **energy security** potential model for our nation
- Invest NOW in **training** of the workforce for the coming transition
- Consider **every** possibility



TRANSFORMATION IS UPON US

Our region is currently in midst of Hydrogen revolution



OUR COMMITMENT TO DRIVING OUR FUTURE POWERTRAIN STRATEGY

We're committed to the next generation of electric and fuel-cell powered vehicles



**WE WILL
RAMP DOWN
CURRENT ICE
POWERTRAIN**

Manage the ICE ramp-down while staying technology competitive

**WE ARE COMMITTED
TO BOTH BEV &
HYDROGEN
SOLUTIONS**

BEV and FCEV are complementary and both will be needed

**WE WILL MOVE
RAPIDLY TO WIN
THE PROPULSION
TECHNOLOGY RACE**

We have the right levers to accelerate ZEV



THANK YOU

Contact:

Daniel Whitehead ~ CEO Daimler Truck Australia
daniel.whitehead@daimlertruck.com

Romesh Rodrigo ~ Senior Manager Regulatory Affairs
romesh.rodrigo@daimlertruck.com