

NILS-GUNNAR VÅGSTEDT, PHD
HEAD OF INNOVATION, R&D
SCANIA

KEY NOTE, CERV 2020, PARK CITY

**EUROPEAN
PERSPECTIVE
ON HEAVY DUTY
ELECTRIFICATION PROGRESS**





“ZERO CARBON EMISSIONS BY 2050”

An aerial photograph of a vast, densely packed urban area, likely Tokyo, Japan. The image shows a multitude of skyscrapers and smaller buildings, a winding river, and several bridges. The overall scene is a testament to high population density and urban development.

**“BY 2030 TWO-THIRDS OF WORLD
POPULATION WILL LIVE IN CITIES”**

THE NEW LANDSCAPE OF HDV OEM



ELECTRIFICATION WILL COME IN MANY COLOURS





**'Business as usual soon
means no business at all'**

Peter F. Drucker



ELECTRIC HDV

WHY?



ELECTRIC, NO!



BEV FOR HEAVY DUTY LONG HAUL

2017



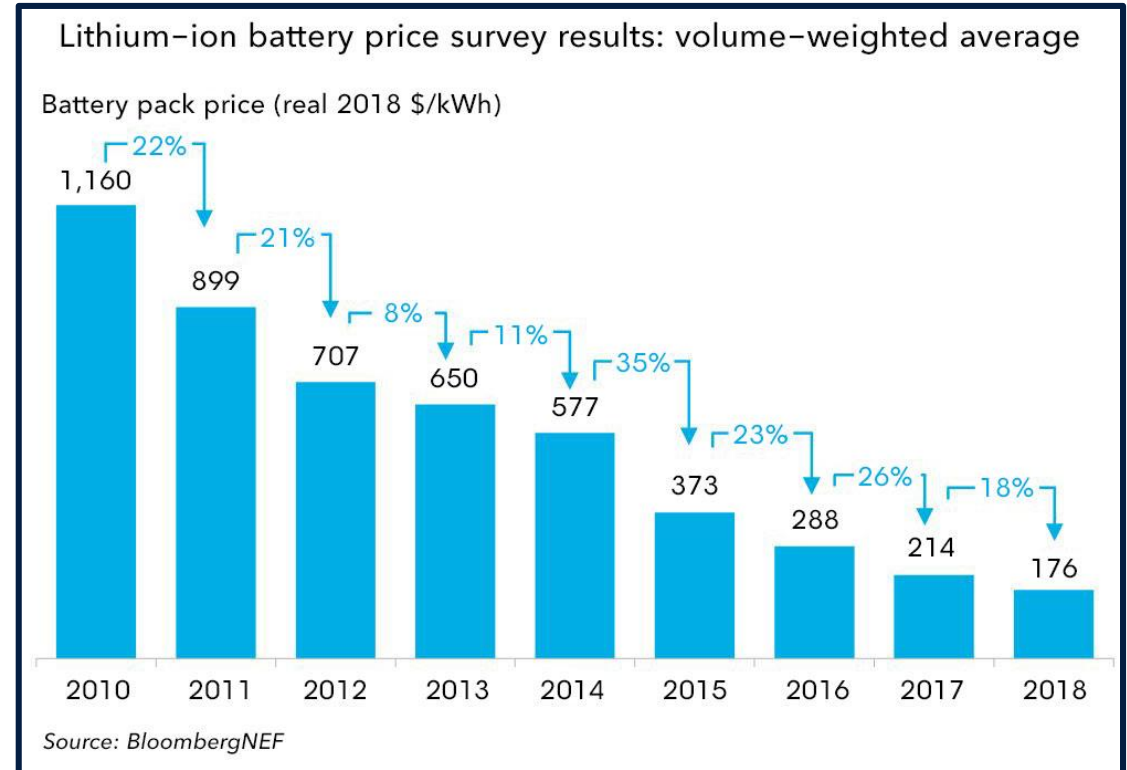
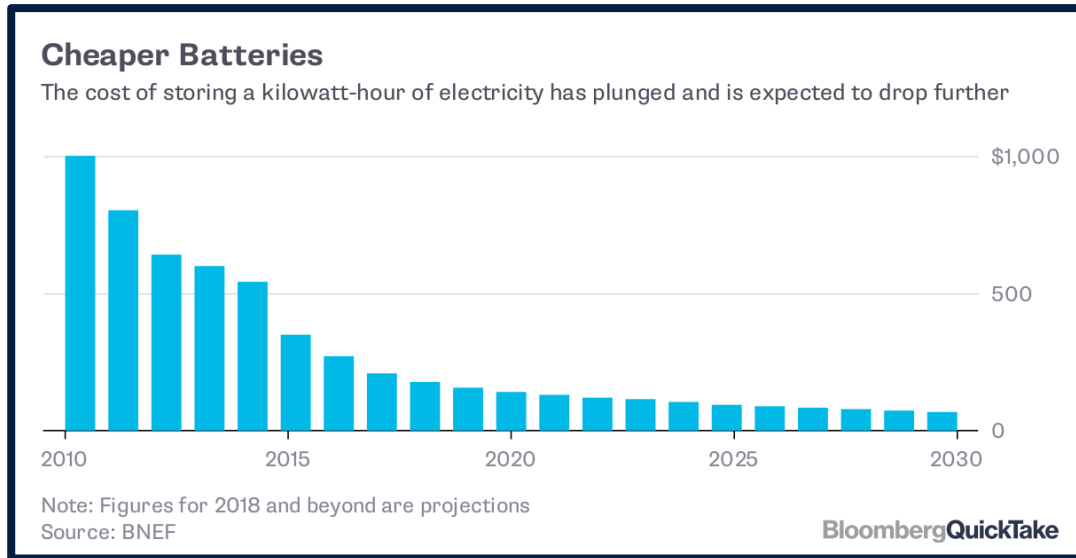
ELECTRIC, ?



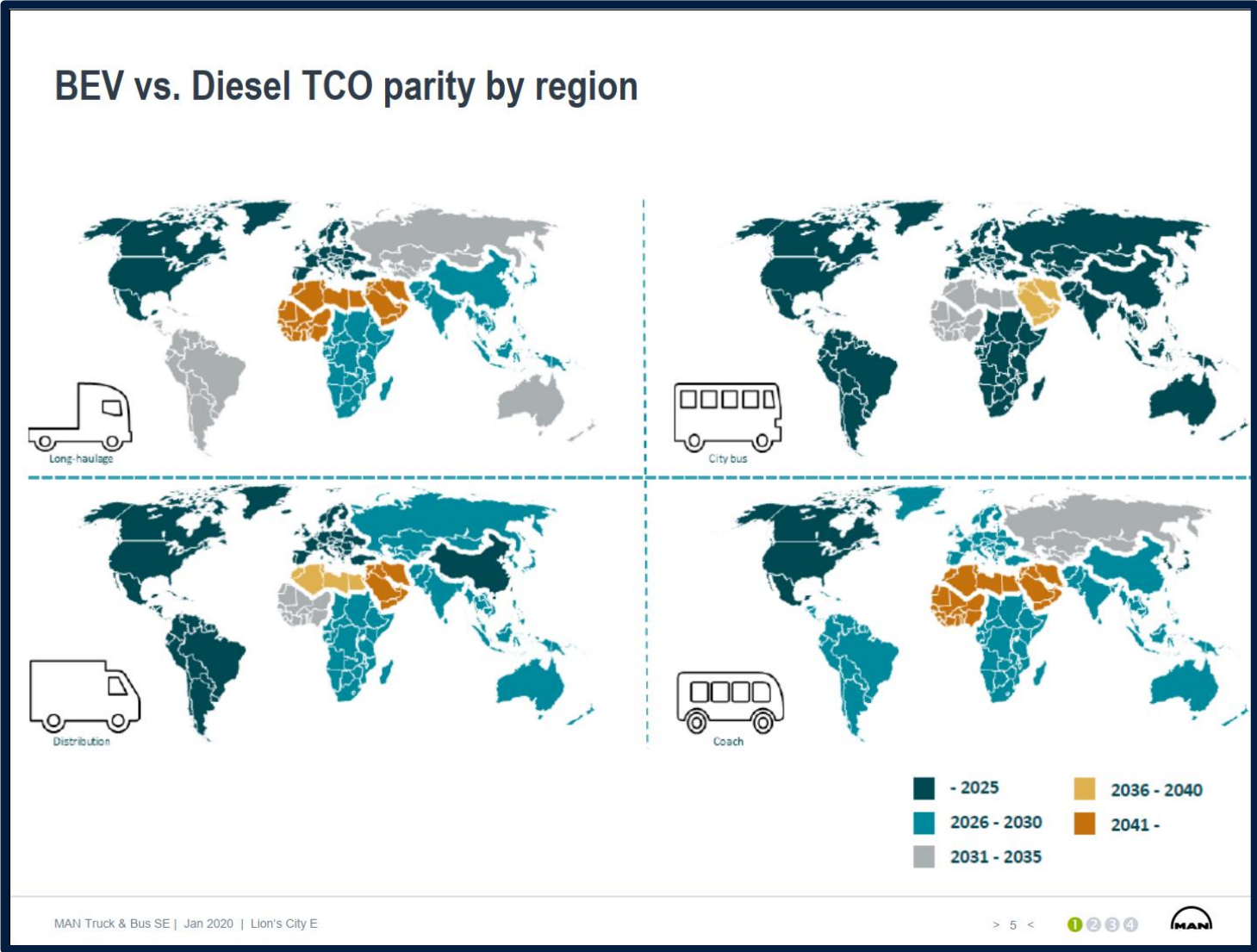
BEV FOR HEAVY DUTY LONG HAUL

2030

BATTERY PACK COST DEVELOPMENT & FORECAST €/KWH



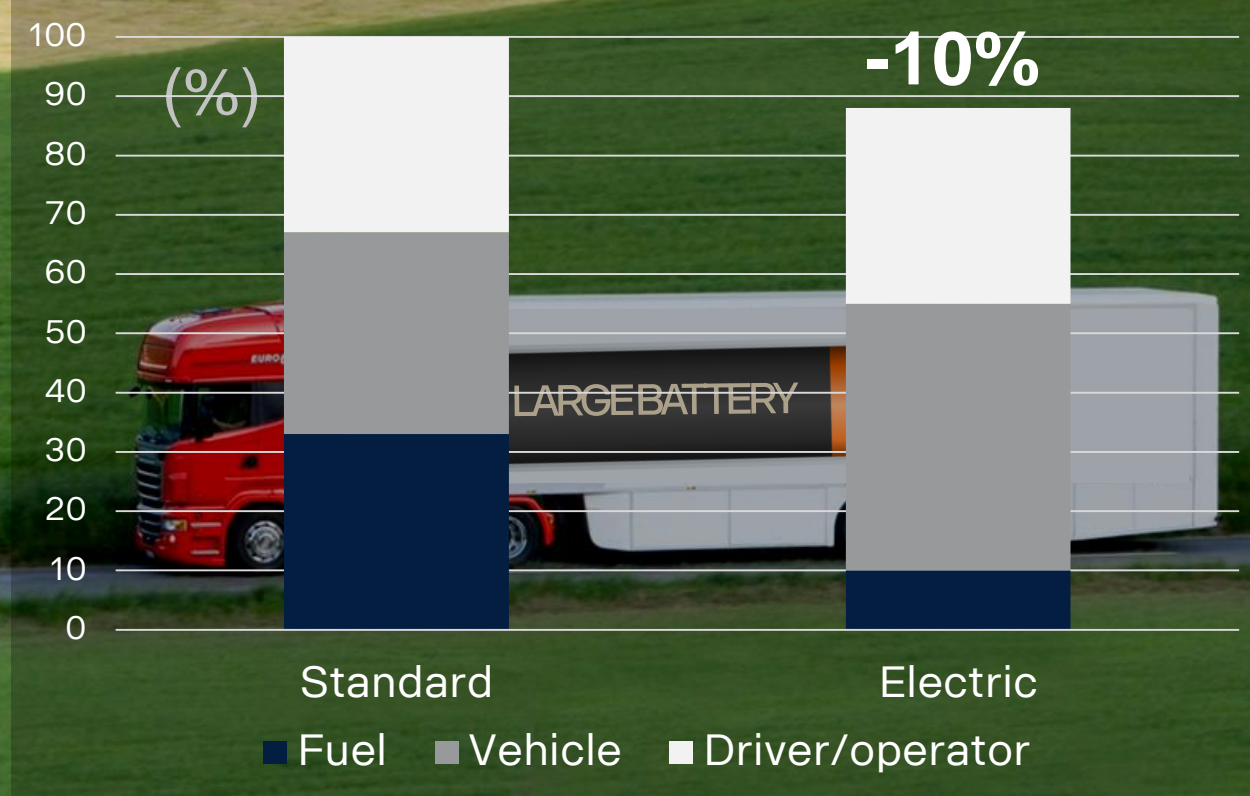
TOTAL COST OF OWNERSHIP, ESTIMATED YEAR OF PARITY BETWEEN BEV/ICE



Source: MAN, Kratz presented at AABC, Jan 2020.



TOTAL COST OF OWNERSHIP BEV LONG HAUL



2030



AUTONOMOUS HDV

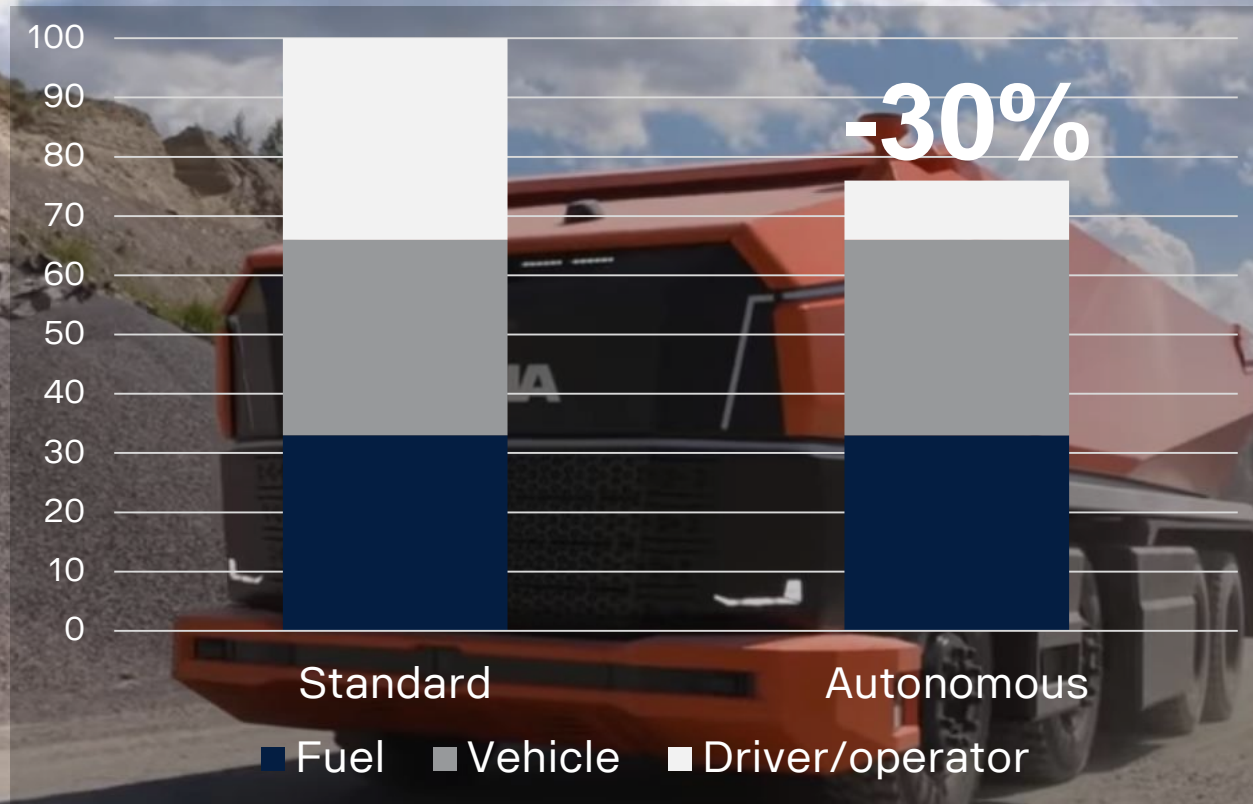
WHY?

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2030

AUTONOMOUS HEAVY DUTY VEHICLE

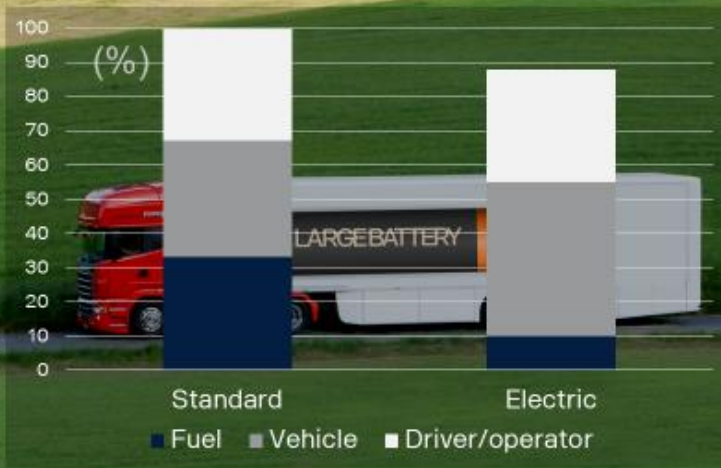


2030

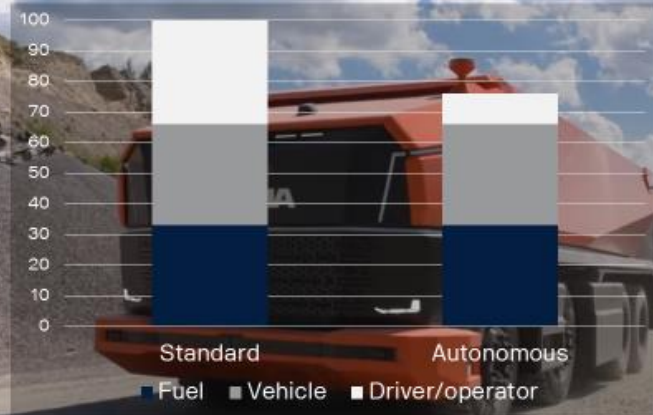


ELECTRIC & AUTONOMOUS ?

THE ECONOMY SPEAKS FOR ITSELF!



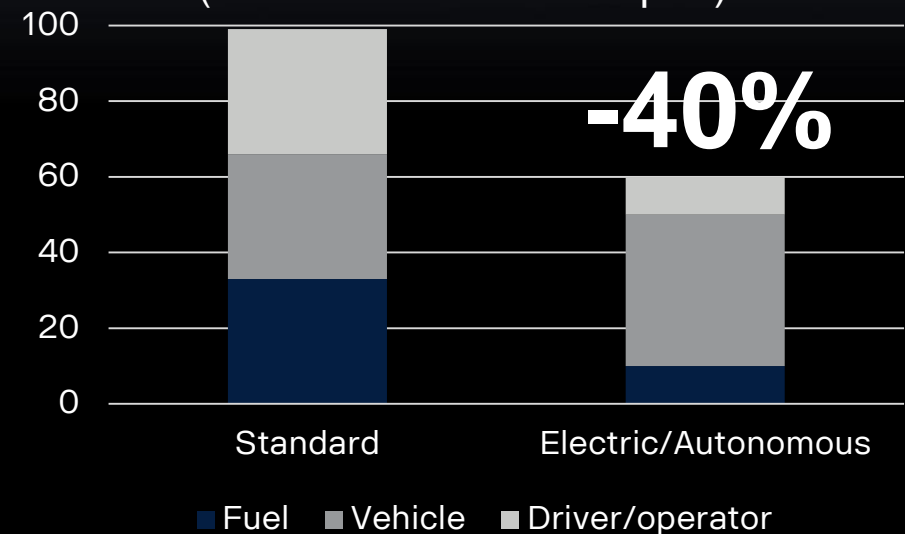
ELECTRIC



AUTONOMOUS



(Total Cost of Ownership %)



2030

Source: data from PWC report 2018.

Electric

Connected

Autonomous



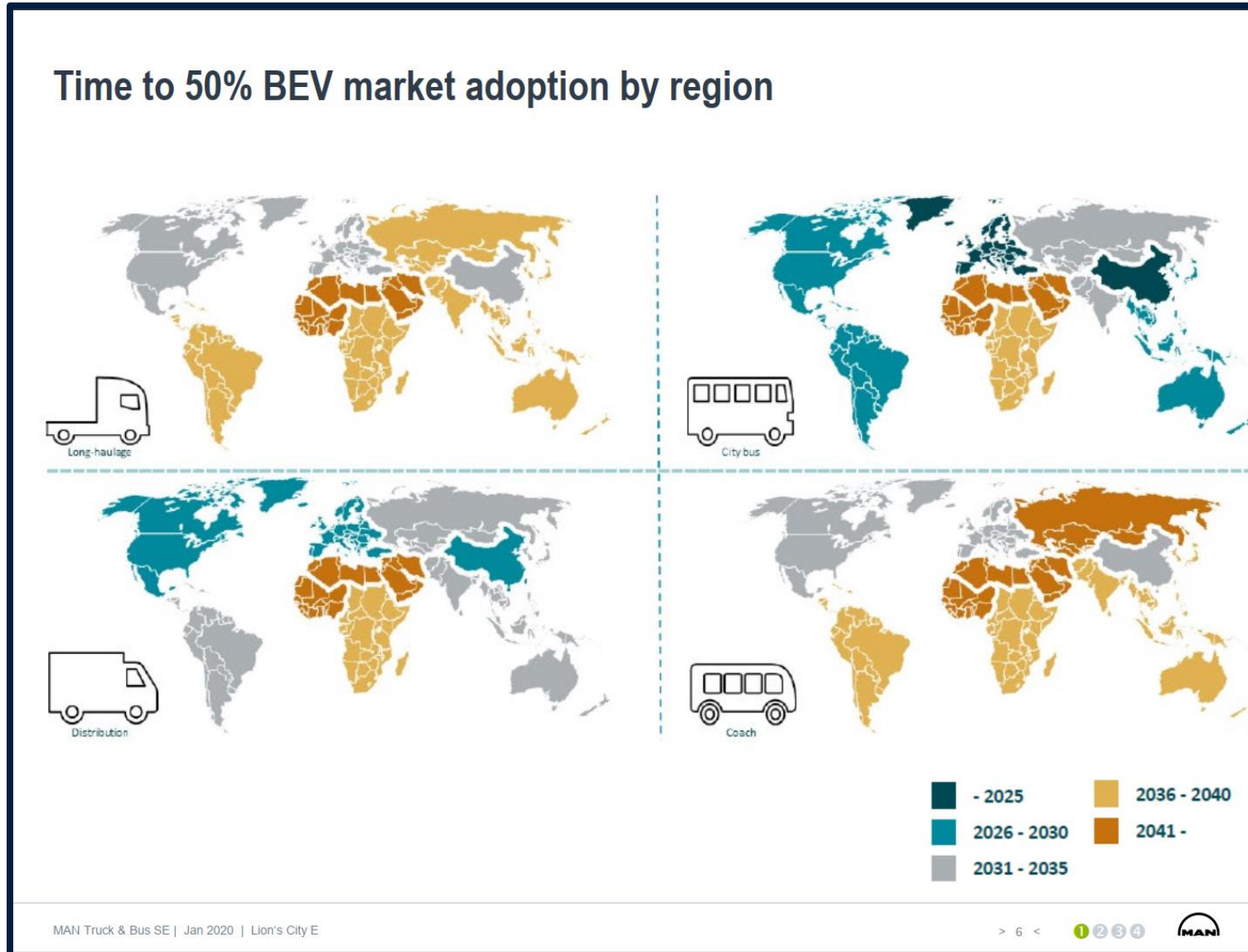
ELECTRIC & AUTONOMOUS HDV

PROGRESS

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ESTIMATED MARKET ADOPTION – EV EXPECTED TO EXCEED 50% NEW SALES WITHIN ~15 YEARS IN EU



Accelerators

- The change towards electrification in pass car industry will push the development of batteries.
- Success and rapid adoption of AV in closed operation, inspires Others to take action and shift earlier for large ramp in more general operation.
- Standardisation in AV, AI and EV boost the industry.
- Grid limitations will not be that present assisted by massive stationary battery storages.
- The global change towards the Sustainable society moves fast due to the “Greta effect”.

Slowdown factors

- The electrification of pass cars slows down, cost of batteries is kept high.
- Grid limitations hinder ramp up of EV fleets.
- Conservatism delay breakthrough within mining and other niche applications.
- Delayed development of H2 infrastructure.
- Lag in EU governmental decision making, or taking wrong decisions, eg;
 - which tech for charging / ERS?
 - what level of autonomy can be deployed and where?
- Further development of competing technologies (ICE) show breakthrough,
 - power to liquid develops
 - ICE cost vs performance still improves
 - local emissions solved
- Global slow down of economical development.



Nils-Gunnar Vågstedt, Head of Innovation R&D, Scania
nils-gunnar.vagstedt@scania.com