



ON TRACK - Refuelling infrastructure for fuel cell vehicles in Europe

LeadIng.


THE LINDE GROUP

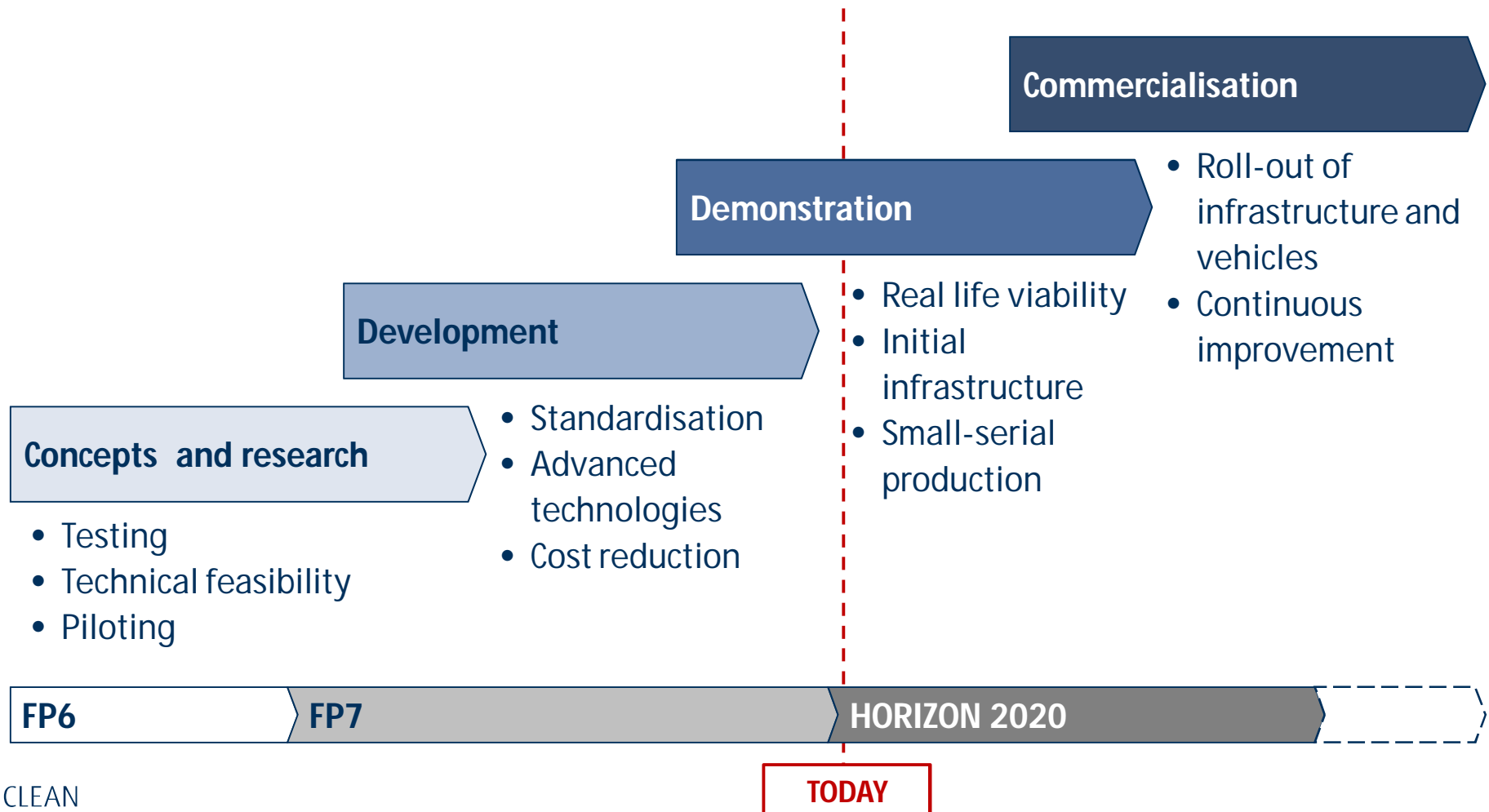
Dr. Andreas Opfermann
FCH JU Stakeholder Forum 2014
Brussels, 12th November 2014

CLEAN
TECHNOLOGY
BY LINDE







FCH JU stakeholders in Europe create a strong foundation



Development phases of FCEV & HRS

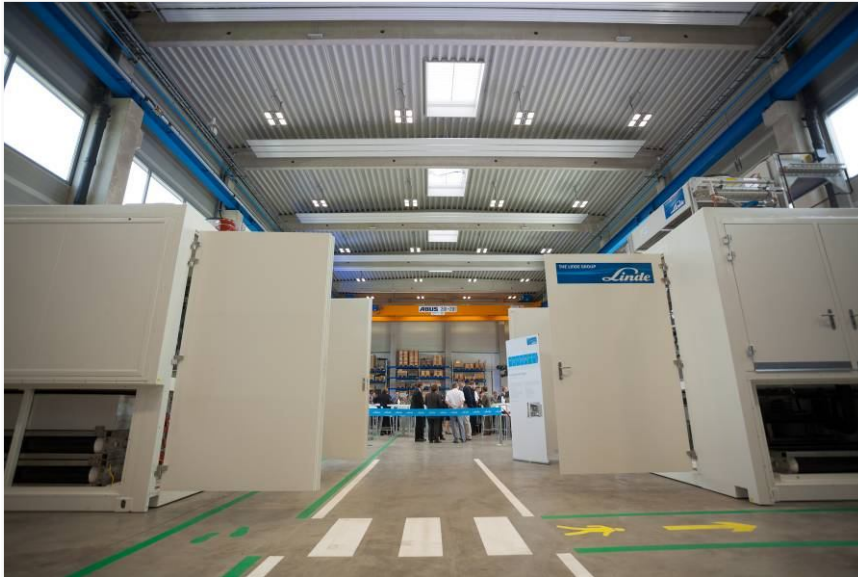


Levers for the rollout of the infrastructure are addressed

	Task	Status	
 Codes & Standards	<ul style="list-style-type: none"> Standardised fuelling interfaces Safety of H2 refuelling 	<ul style="list-style-type: none"> SAE J 2799 in place SAE J 2601 in place 	<input checked="" type="checkbox"/>
 Sustainability	<ul style="list-style-type: none"> Range of scalable, renewable H2 production pathways 	<ul style="list-style-type: none"> Certification of production from biogenic sources Grid-scale Power-to-Gas facility under construction 	<input checked="" type="checkbox"/>
 Metering	<ul style="list-style-type: none"> Reliable measurement for accurate billing of customers 	<ul style="list-style-type: none"> Adjusted metering device currently under factory testing 	<input checked="" type="checkbox"/>
 Footprint	<ul style="list-style-type: none"> Minimal land use for technology 	<ul style="list-style-type: none"> Land use reduced from 40 ft containers to 14 ft Underground storage demonstrated at different sites 	<input checked="" type="checkbox"/>
 Availability	<ul style="list-style-type: none"> Provide reliable refuelling infrastructure for customers 	<ul style="list-style-type: none"> Refuelling stations availability beyond 95% demonstrated 	<input checked="" type="checkbox"/>
 CAPEX	<ul style="list-style-type: none"> Reduction of hardware & installation cost 	<ul style="list-style-type: none"> High level of standardization as basis for scaling effect Opening of small-serial production facility 	<input checked="" type="checkbox"/>

Opening of first small-serial production of hydrogen refuelling stations

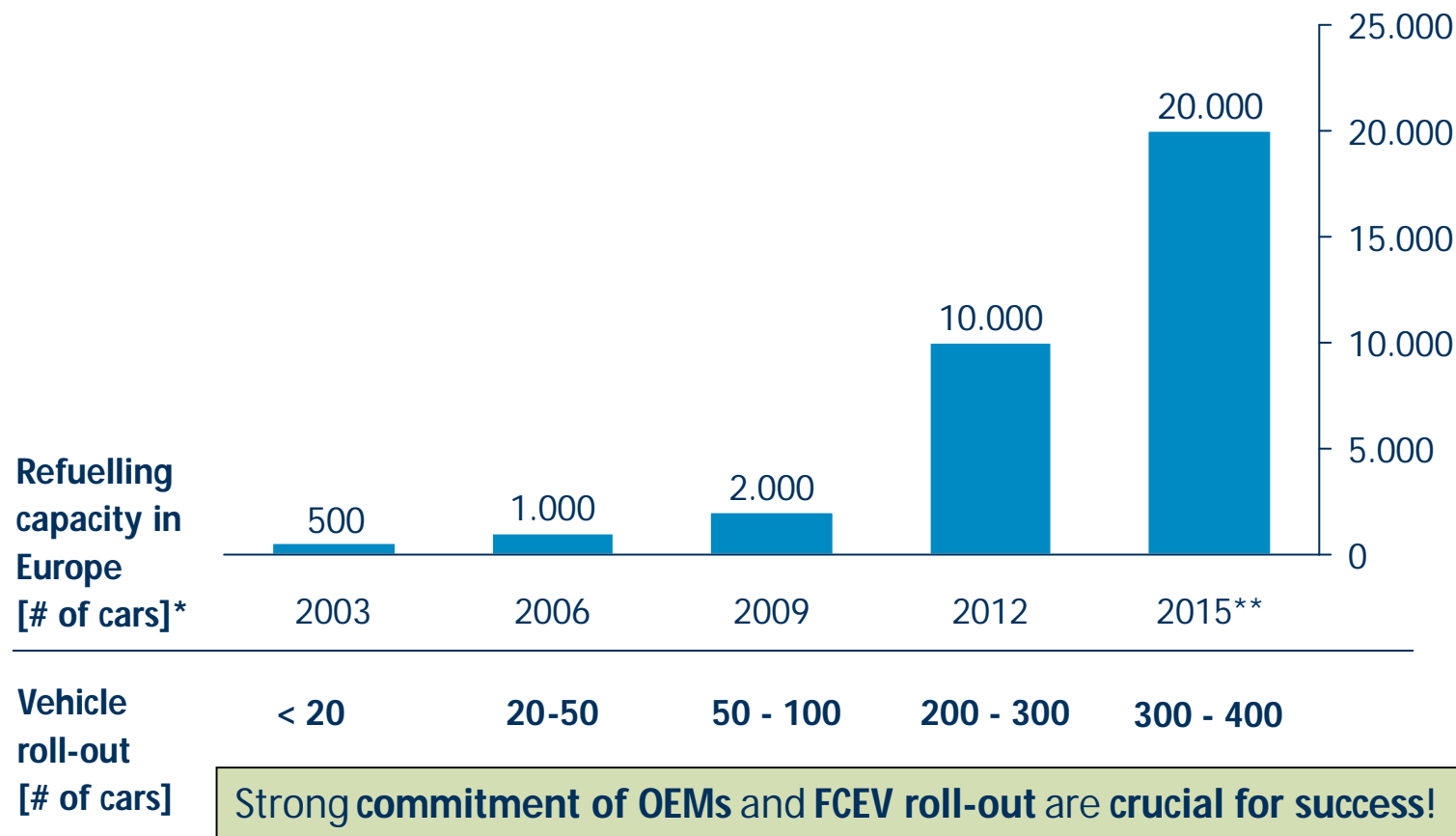

THE LINDE GROUP



Upfront investment in infrastructure for the FCEV roll-out



Development of 700 bar HRS car servicing capacity in Europe



Political framework for hydrogen mobility critical

European & National Framework

Support in place

- ✓ Clear CO2 reduction targets in transport...
- ✓ Support from government decision makers...
- ✓ Funding for R&D + Demonstration...
- ✓ Guiding legal framework ...

Closing the remaining gap

- ❑ ... limited incentives for roll-out of FCEV in EU (compared to US and Japan).
- ❑ ... aligned approach between EU and member states.
- ❑ ... specific levers for capital intensive infrastructure roll-out.
- ❑ ... enforceable target for infrastructure build-up.

It is our choice...

The Economist
November 2023 theeconomist.com

Governments fail to deliver strict CO2 targets.
Fossil fuels continue to dominate transport sector.

Why the transition in the transport sector failed...



... and hydrogen will remain the fuel of the future.

VS.

The Economist
November 2023 theeconomist.com

Spotlight on Europe: Reduced energy imports, Emission of Europe's transport sector hit all time low



THEY DID IT

Success story hydrogen

