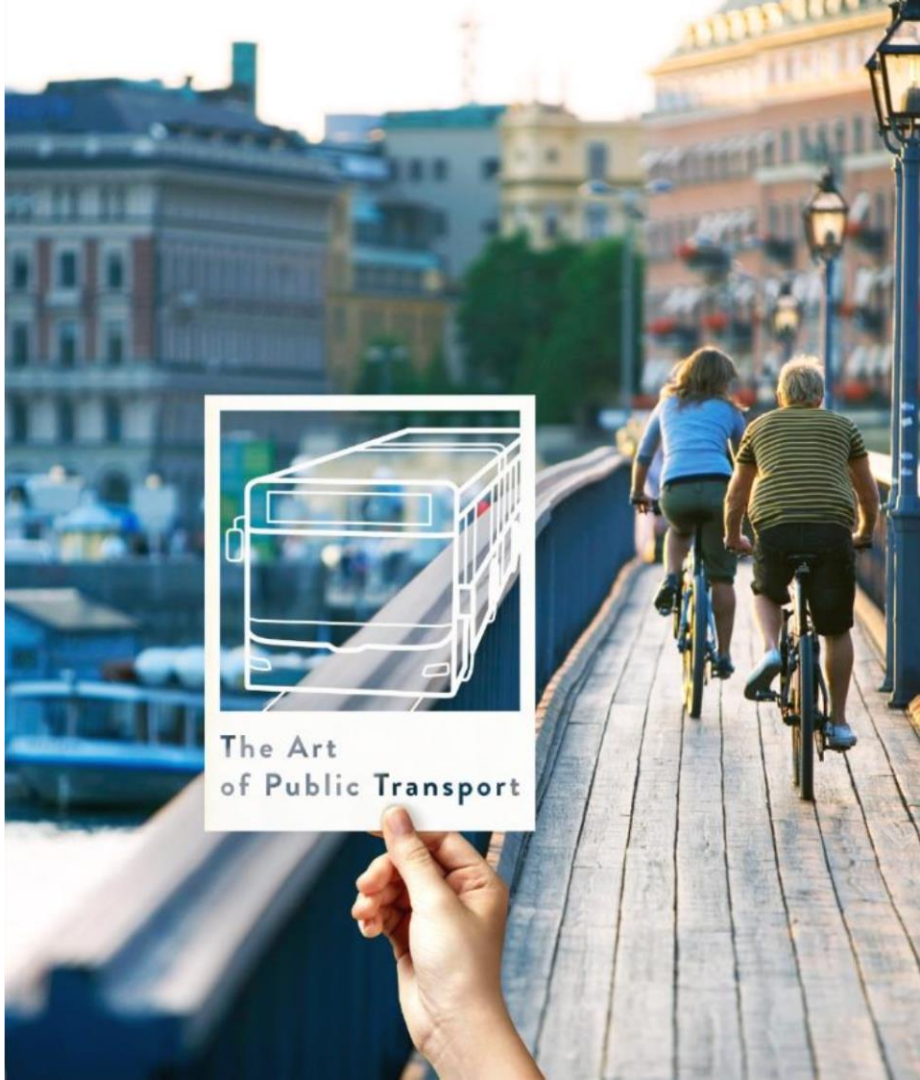
9-12 JUNE
STOCKHOLM 2019
GLOBAL PUBLIC TRANSPORT SUMMIT

Insights
in large scale deployment of Fuel Cell buses

Geert Van Hecke
Head of Sales Public Transport
Company Van Hool



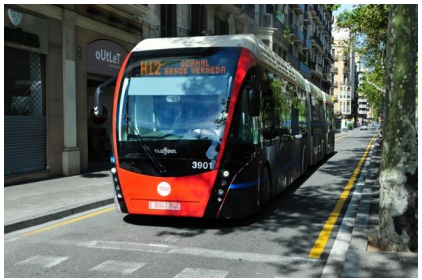
INTRODUCTION VAN HOOL

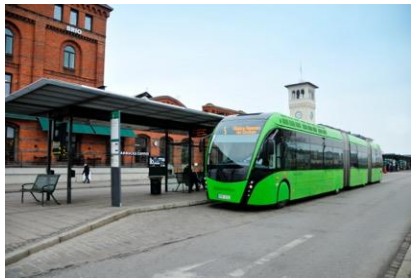
- 70 Years Bus Experience (design, production, service)
- Family owned and managed
- 90% Exports Worldwide
- 4.900 Employees in two production facilities
- 1.200 Output Buses and Coaches yearly
- 4.000 Industrial vehicles yearly
- Flexibility in Design and Market requirements
- Innovator in technologies

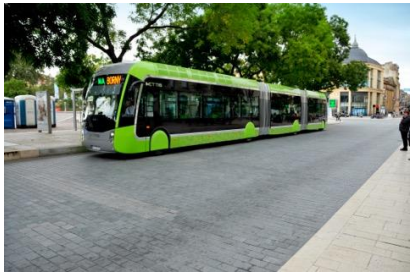
EXAMPLE : DOUBLE ARTICULATED BRT BUSES

EXQUI.CITY

174 x ExQui.City 24m







3 # to TMB Barcelona, Spain
24 m Electric Hybrid Diesel

27 # to Metz Métropole, France
24 m Electric Hybrid Diesel

5 # to Luxemburg, Luxemburg
24 m Electric Hybrid Diesel

15 # to Nobina Malmö, Sweden
24 m Electric Hybrid CNG

2 # to SKYSS Bergen, Norway
24 m Electric Hybrid CNG

14 # to Martinique, French Antilles
24 m Electric Hybrid Diesel

20 # to Linz, Austria
24 m Trolley Hybrid Battery

58 # to Trondheim
24 m Electric Hybrid Diesel

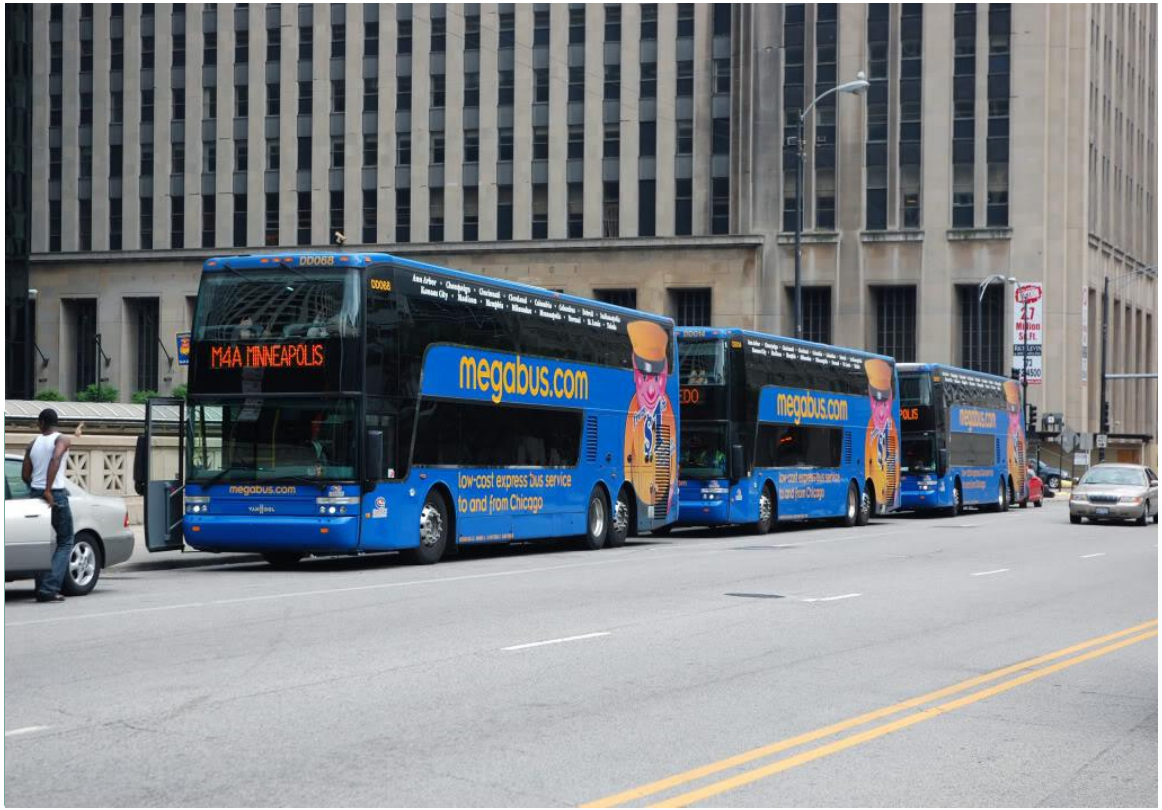
16 # Nîmes
24 m Electric Hybrid CNG

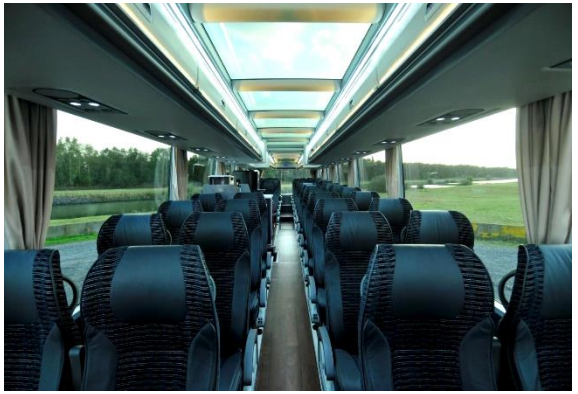
14 # Brussels
24 m Electric Hybrid Diesel

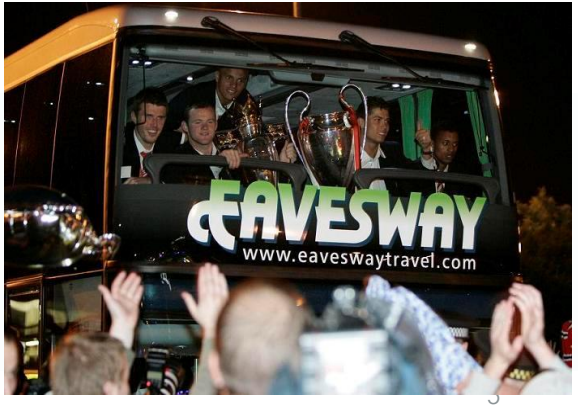
INTRODUCTION VAN HOOL

- Van Hool North-Macedonia, Skopje
- 1200 employees
- 100 % Exports to Europe and North-America
- Export to new markets : New Zealand, Australia, Japan
- Production capacity : 800 coaches/year

EXAMPLE : COACH PRODUCTION





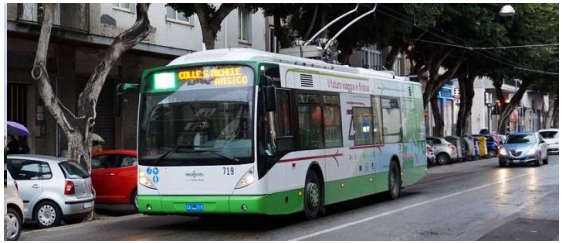


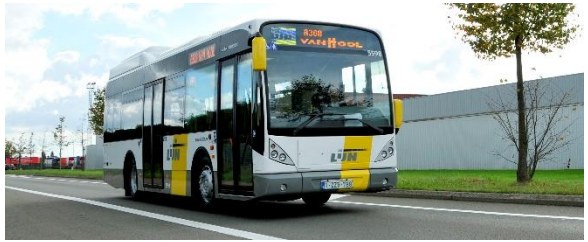
ZERO EMISSION SOLUTIONS

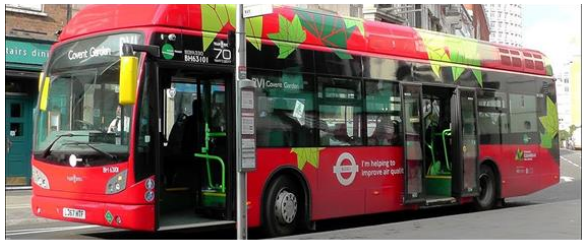
9-12 JUNE
UITP STOCKHOLM 2019
GLOBAL PUBLIC TRANSPORT SUMMIT

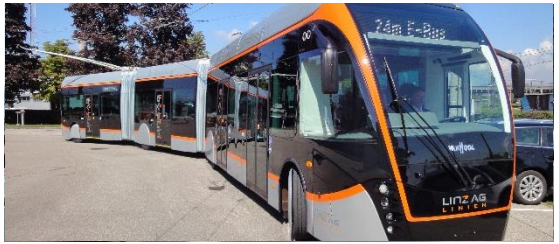
With regard to zero-emission solutions Van Hool is technology neutral, thus **all solutions are being developed.**

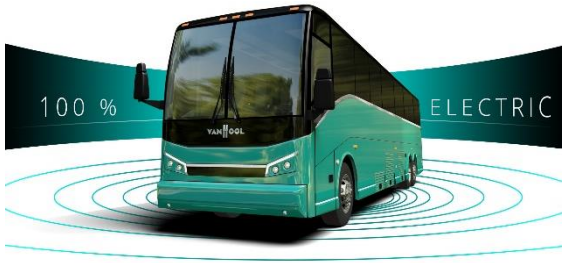
Trolley solutions (IMC battery)	Battery electric solutions	Fuel cell electric solutions

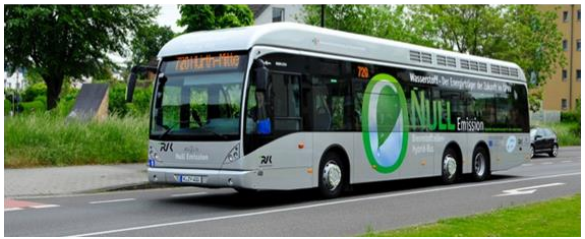






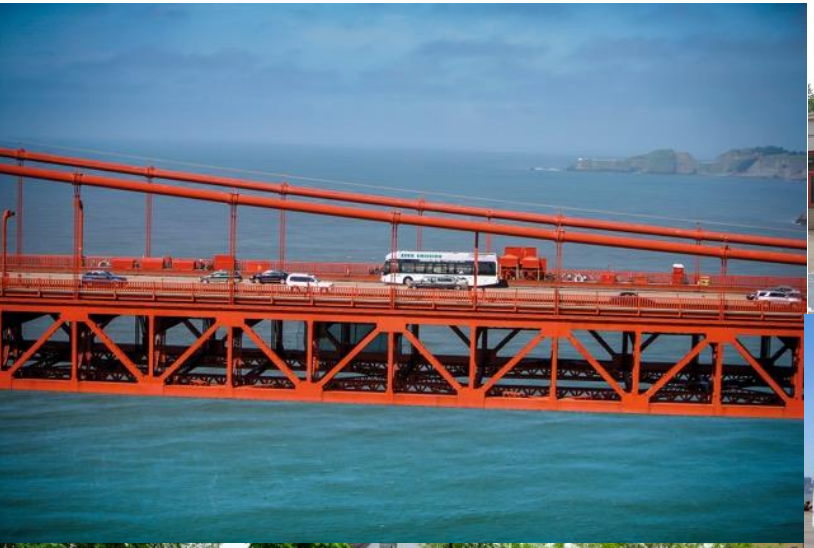


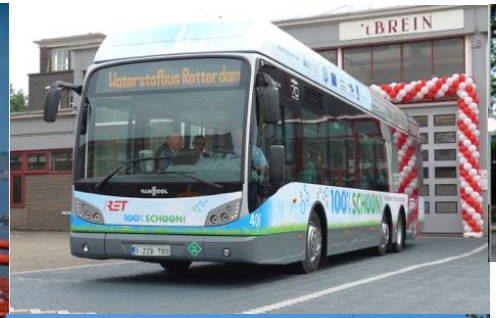


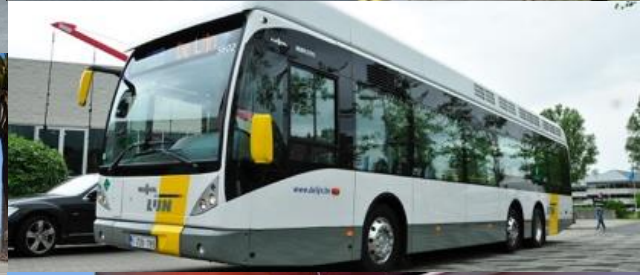


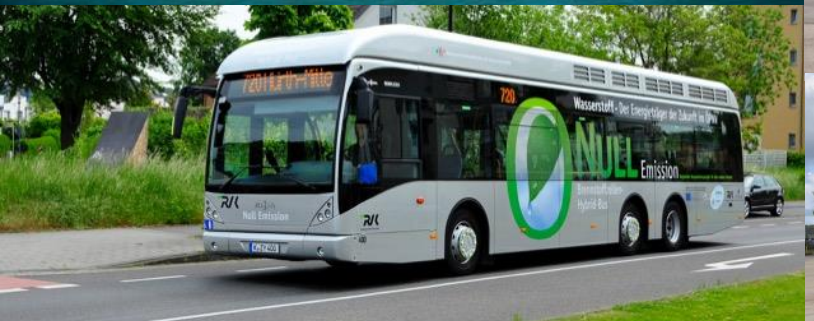
FUEL CELL BUS REFERENCE PROJECTS

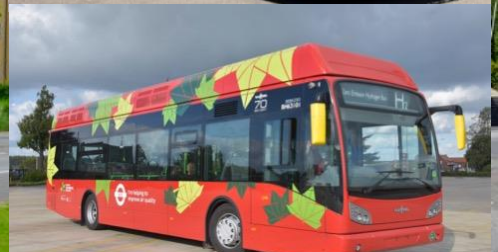
9-12 JUNE
UITP STOCKHOLM 2019
GLOBAL PUBLIC TRANSPORT SUMMIT

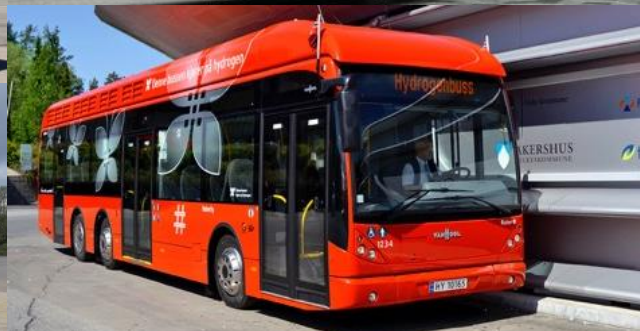












PHYSICS DRIVING THE SOLUTION

Hydrogen has most potential to become the disruptive technology driving large scale zero emission deployment.

It is physics driving the solution

		Battery electric Bus	Fuel cell electric Bus	
Usable energy on the bus	Energy density H2 = 33 kWh/kg	250 kWh	600 kWh Assumed 5 stacks H2:(36 kg usable H2 or 1.200 kWh) x 50% efficiency	X 2,4 MORE
Time to charge	H2 = Gaz/liquid	1 hour Assumed 250 kW charging power	7 minutes Standard filling process	X 8,5 FASTER

FUEL CELL BUS DEVELOPMENT ROADMAP

9-12 JUNE STOCKHOLM 2019 GLOBAL PUBLIC TRANSPORT SUMMIT

Time >	2005-06	2007	2008-09	2011	2012-15	2016+
Series	1. gen. USA 2-axle	1. gen. Europe 3-axle	2. gen. USA. 2-axle	CHIC	High VLOCity HyTransit Cologne	3EMotion JIVE
1						
2						
3						
4				2. gen. Europe 3-axle		
5					3. gen. Europe 3-axle	
6						3. gen. Europe 2-axle
Number Buses	5	16	1	5	22	59

- 13 years of building experience
- Running over several development phases
- Small scale projects
- Higly supported by FCH JU

READY FOR LARGE SCALE PRODUCTION

Standardised technical definition for Low Floor City Bus

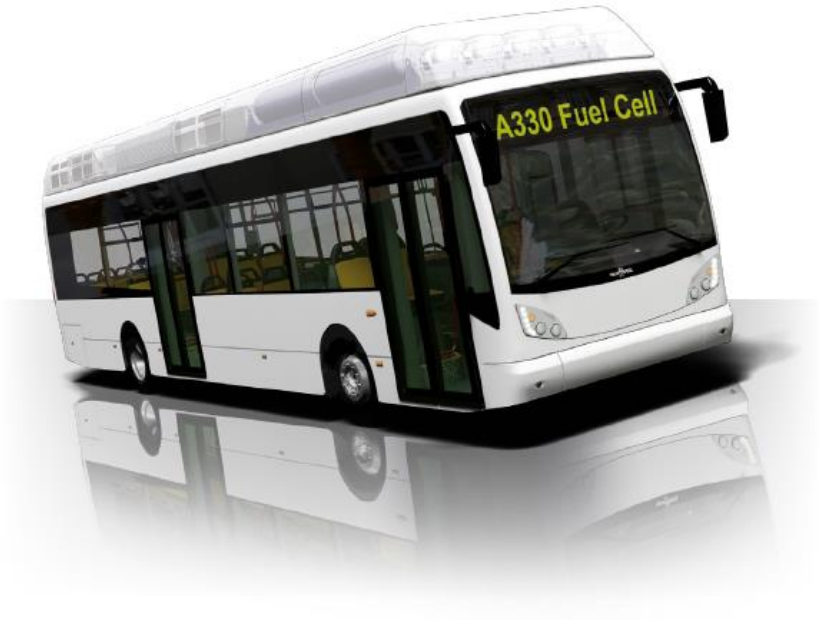
- **Flat Urban Service Line**
  24 kWh traction battery and 85 kW hydrogen fuel stack
- **Regional and hilly City Service Line**
  36 kWh traction battery and 85kW hydrogen fuel stack

Standardised service concept

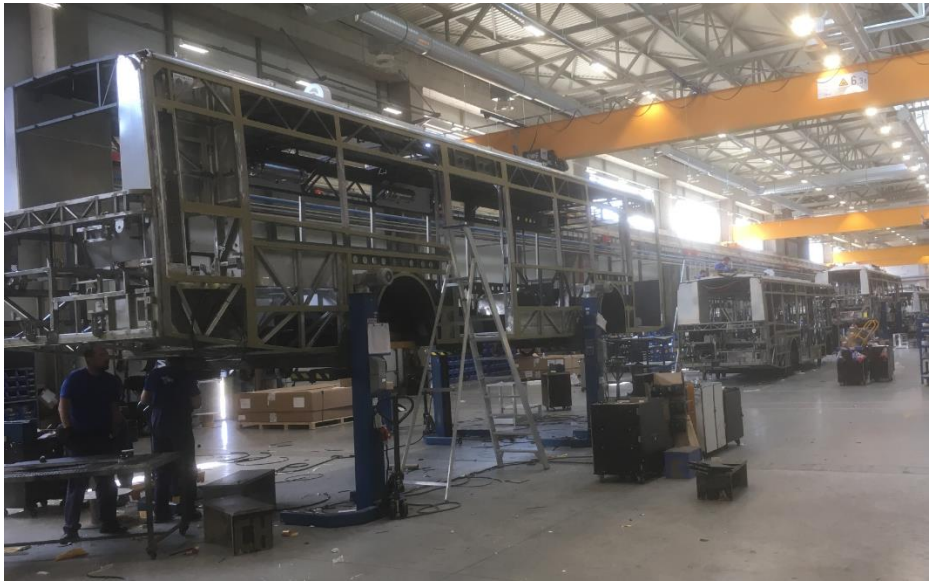
- Spare parts management
- Dedicated service technicians
- SLA contracts with main suppliers

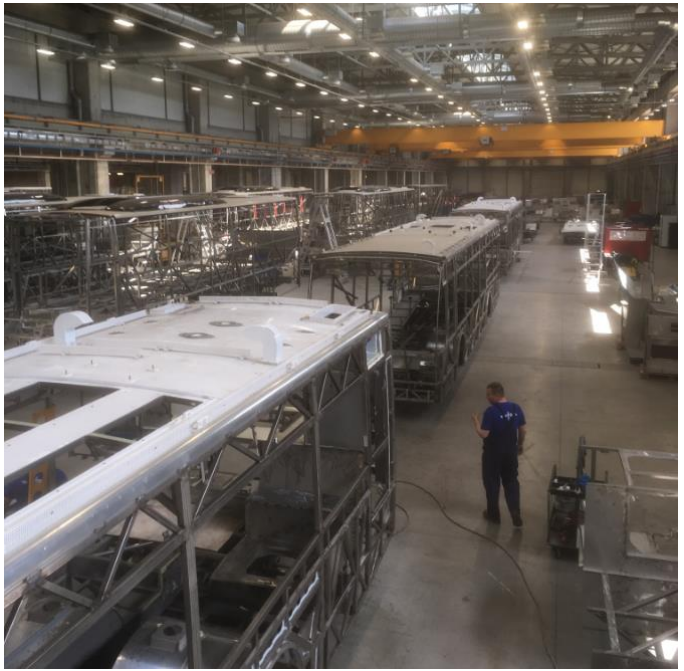
Standardised documentation

- Manuals, service documents
- Training packages



FUEL CELL BUS SERIES PRODUCTION





INAUGURATION AT UITP STOCKHOLM

Inauguration of the first fuel cell bus for RVK Cologne

First fuel cell bus of a lot of 30 buses

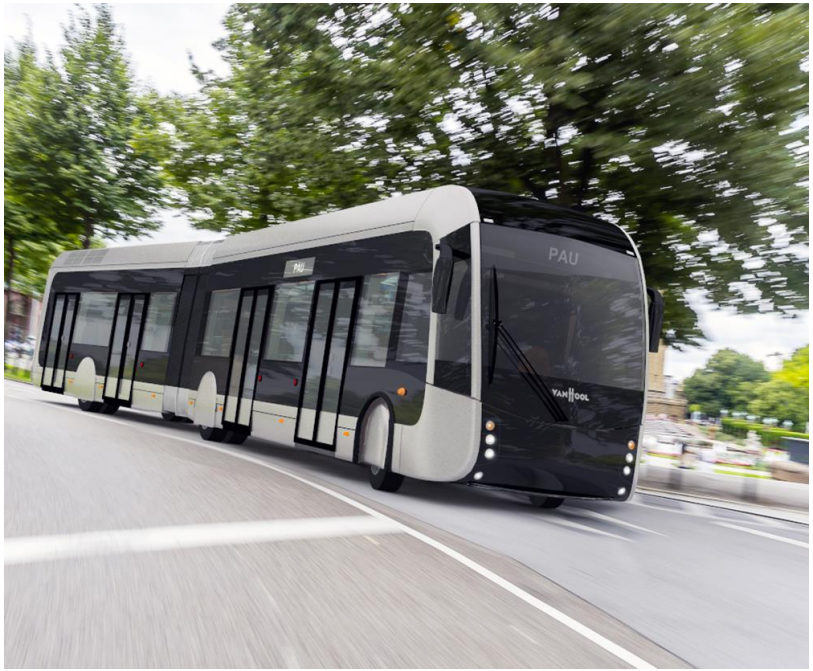
First bus produced in a standardised series production @ Van Hool

NEXT STEPS IN FUEL CELL BUS DEPLOYMENT

First BRT system in Europe running on hydrogen
Launch end of 2019 in Pau, France

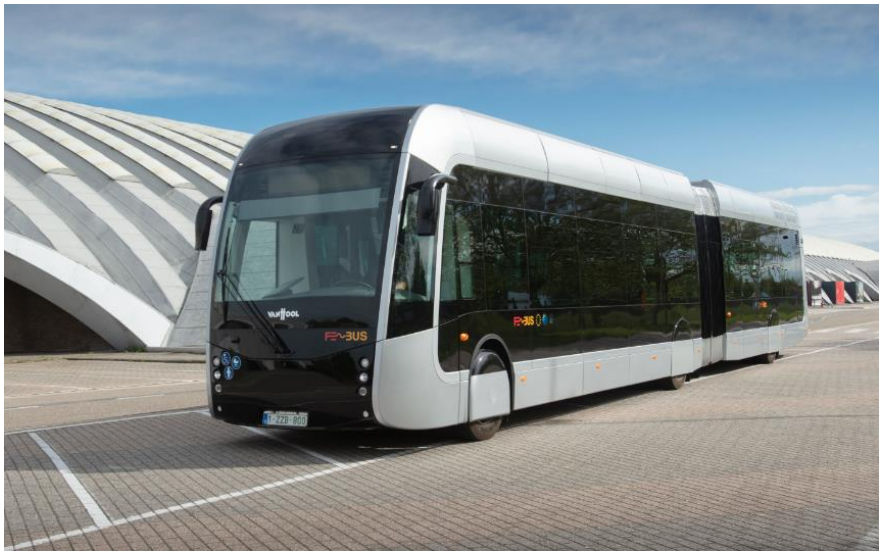
8 Vehicles type Van Hool Exqui.City 18 FC
- Full day autonomy
- No catenary wiring, no rails
- Smooth and silent
- Zero emission without compromises

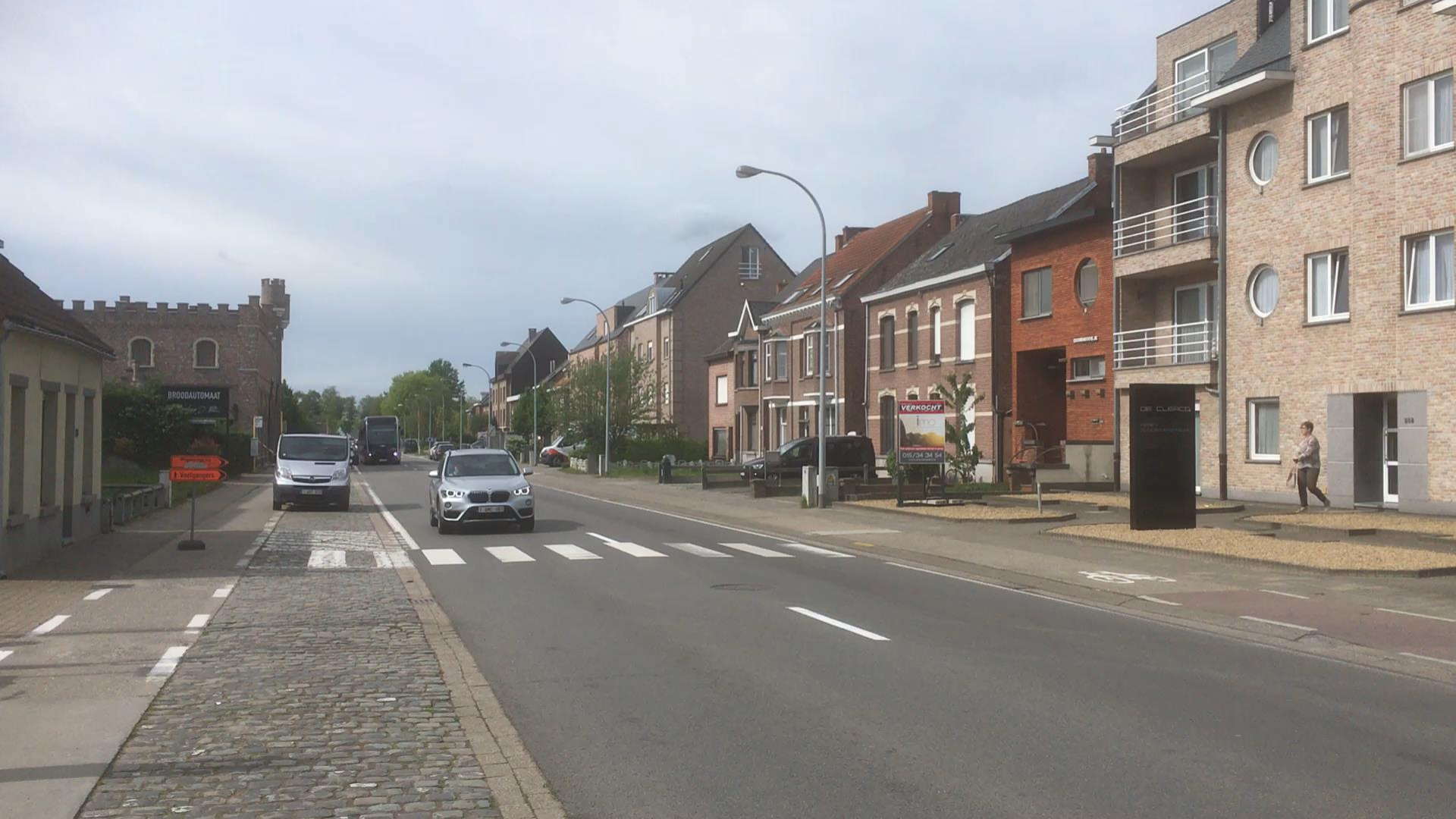
Tender won in consortium with Engie and ITM
- Bus and infrastructure in one package



FUEL CELL BRT BUS TURN KEY SOLUTIONS

Film Pau Test Project




BROODAUTOMAAT
VERKOCHT

Thank you for your attention

and…

during this presentation 2 fuel cell buses have been refuelled !