

# Fuel cell Electric Bus: It works and it's ready!





# 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





# ZERO EMISSION SOLUTIONS

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













YAN HOOL

FUEL CELL BUS REFERENCE PROJECTS

131 FC buses sold







# 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

Usable energy Energy density on the bus H2 = 33 kWh/kg

250 kWh

Battery electric Bus

Time to charge

H2 = Gaz/liquid

1 hour

Assumed 250 kW charging power

Fuel cell electric Bus

600 kWh

Assumed 5 stacks H2:(36 kg usable H2 or 1.200 kWh) x 50% efficiency

7 minutes

Standard filling process

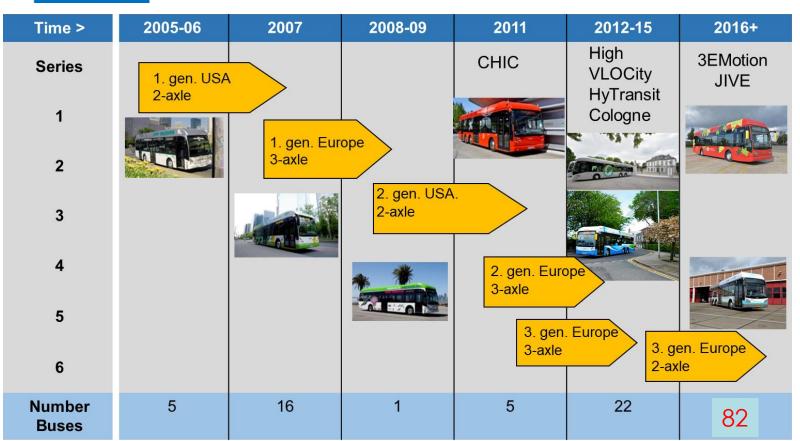
X 8,5 **FASTER** 

X 2,4

**MORE** 



# FUEL CELL BUS DEVELOPMENT ROADMAP



- 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 35 buses

First bus produced in a standardised series production @ Van Hool

Current capacity of fuel cell bus production line: 2,5 buses/week.





# FOLLOW-ON ORDER IN THE NETHERLANDS

Follow-on order of Qbuzz (operator in the Netherlands) after first successfull experience with 2 hydrogen buses of Van Hool (photo)





### **PERSBERICHT**

datum

25 juli 2019

Waterstoftankstation en 20 waterstof bussen voor busconcessie Groningen Drenthe

Nieuwe fase in gebruik waterstof als voertuigbrandstof



# 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





# Q&A





Thank you for your attention

(during this presentation 2 fuel cell buses have been refuelled!)