

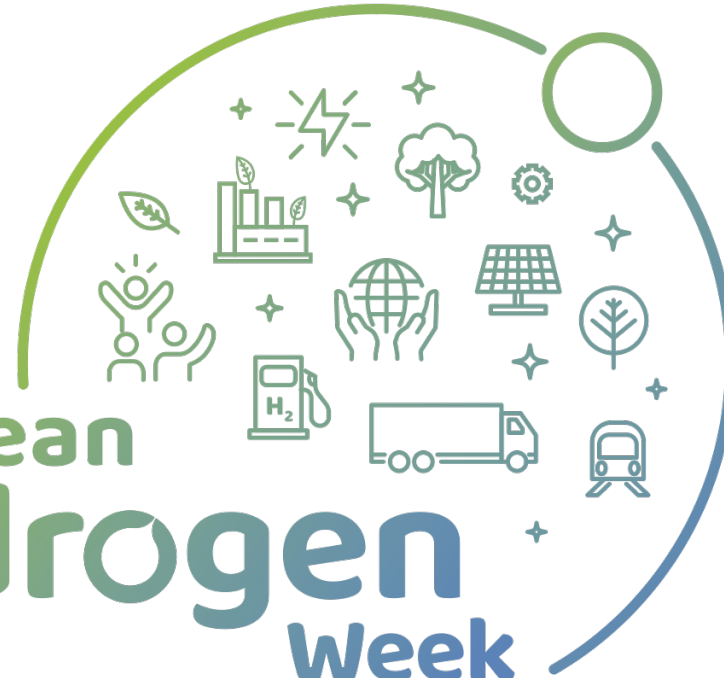
StasHH

Standard-Sized Heavy-duty Hydrogen



Towards a standardised fuel cell module

European
Hydrogen
Week



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#EUResearchDays
#PRD2022
#CleanHydrogen

Project Overview

- Call year: 2020
- Call topic: FCH-01-4-2020, Standard Sized FC module for Heavy Duty applications
- Project dates: January 2021 - June 2024
- % stage of implementation 01/11/2022: 50%
- Total project budget: 14,5 million €
- Clean Hydrogen Partnership max. contribution: 7,5 million €
- Other financial contribution: N/A

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Partners



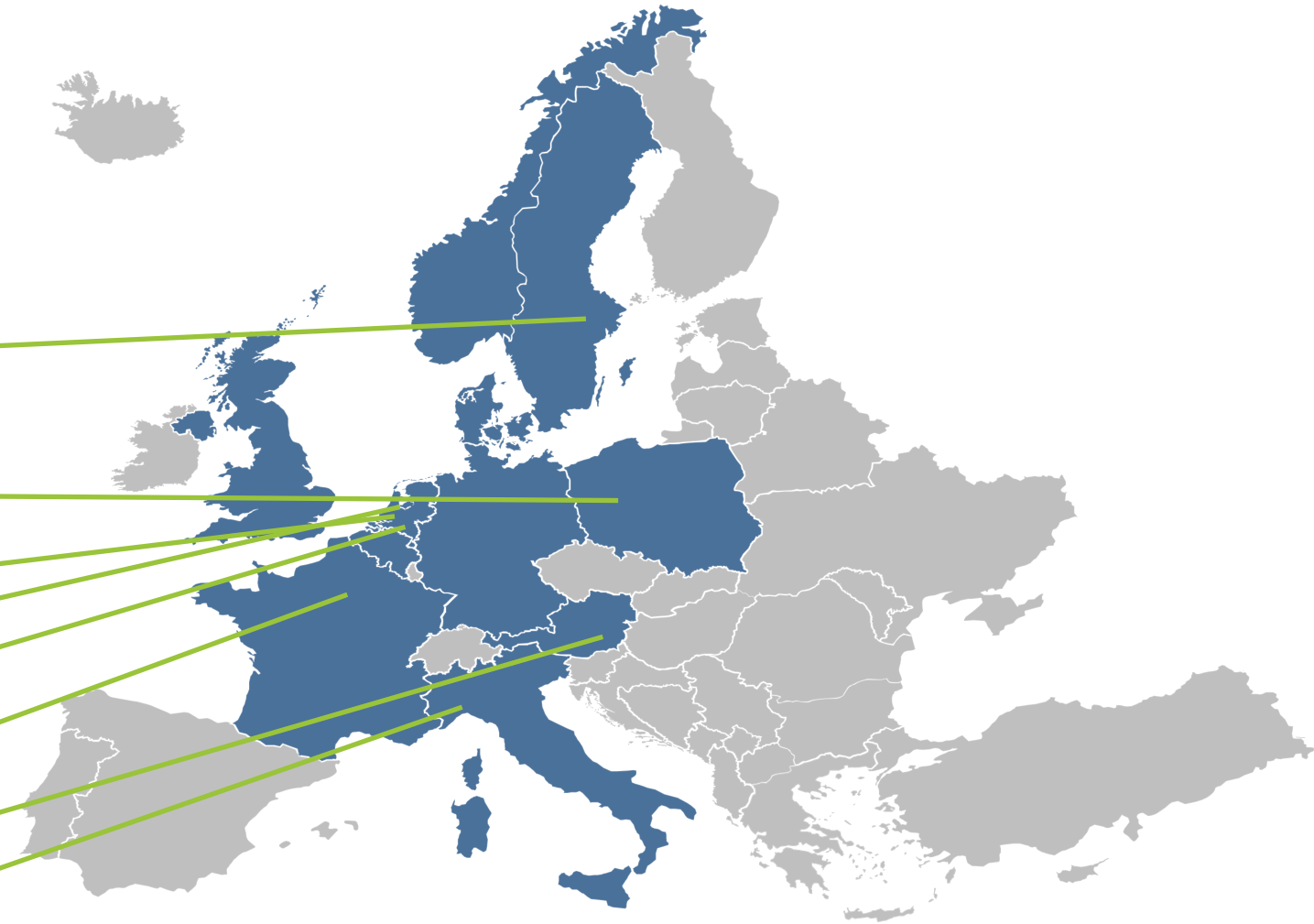
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Co-funded by
the European Union

Partners

OEMs:



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Partners

OEMs:

-  VOLVO
-  SOLARIS
A DAF GROUP COMPANY
-  DAMEN
-  FutureProof Shipping
-  VDL
-  ALSTOM
-  AVL
-  CETENA

FCM suppliers:

-  BALLARD
-  Intelligent Energy
-  TOYOTA
-  HYUNDAI
-  FREUDENBERG
INNOVATING TOGETHER
-  PM
Fuel Cells · Power Systems
-  PLASTIC OMNIUM
-  NUVERA



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Partners

Research institutes:



FCM suppliers:



OEMs:

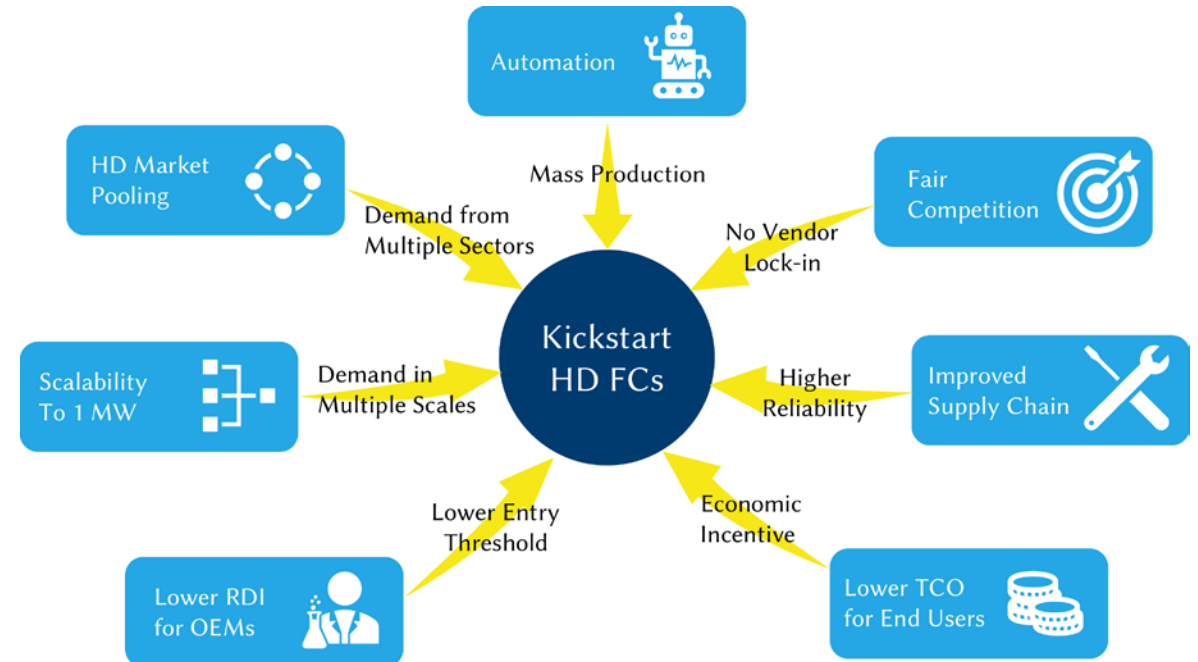


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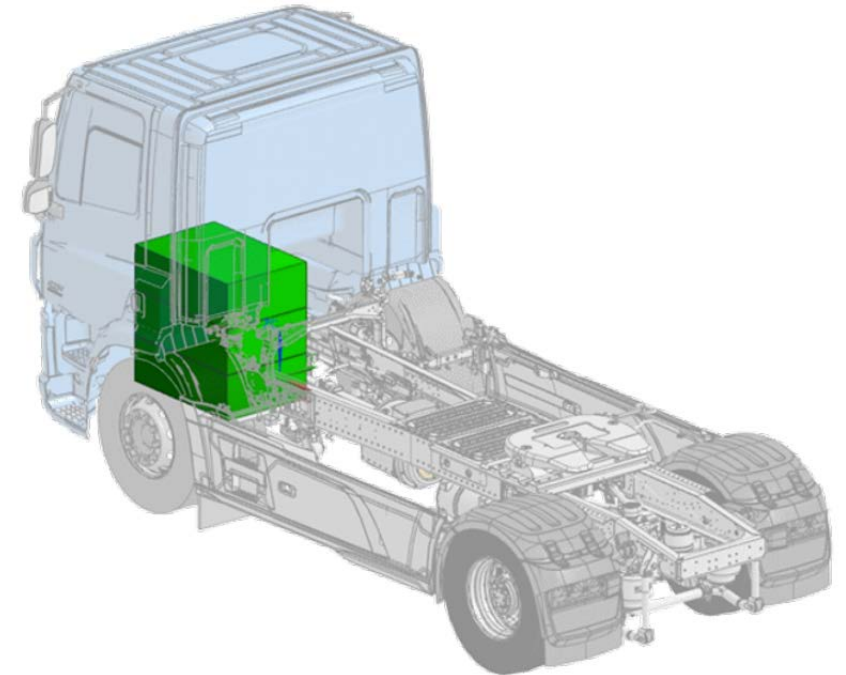
Project Summary: Motivation & Objectives

- More focus on hydrogen in heavy-duty sector
- Fragmented markets, and smaller than for cars
- Wider range of requirements
- Incompatible FC modules require re-engineering
- Barriers to competition
- *A standard FC module can solve a lot of these problems!*



Project Summary: Concept

- Define standards for:
 - Module size(s), max 3
 - Flow interfaces (hydrogen, air, coolant...)
 - Digital interface (control, diagnostics, etc.)
- Build & commission 9 modules from 8 companies
- Test modules at independent institutes TNO & FEV
- Other activities
 - Demonstration of FCM in field operation
 - "Best practices" manual for OEM deployment
 - RCS overview
 - Dissemination & industry adoption of the standard

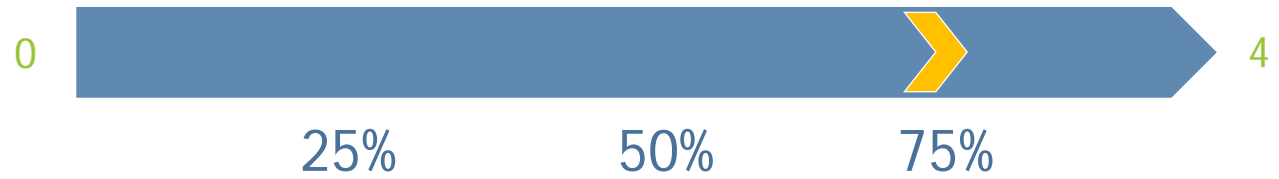


Available volume in the engine bay of a European truck

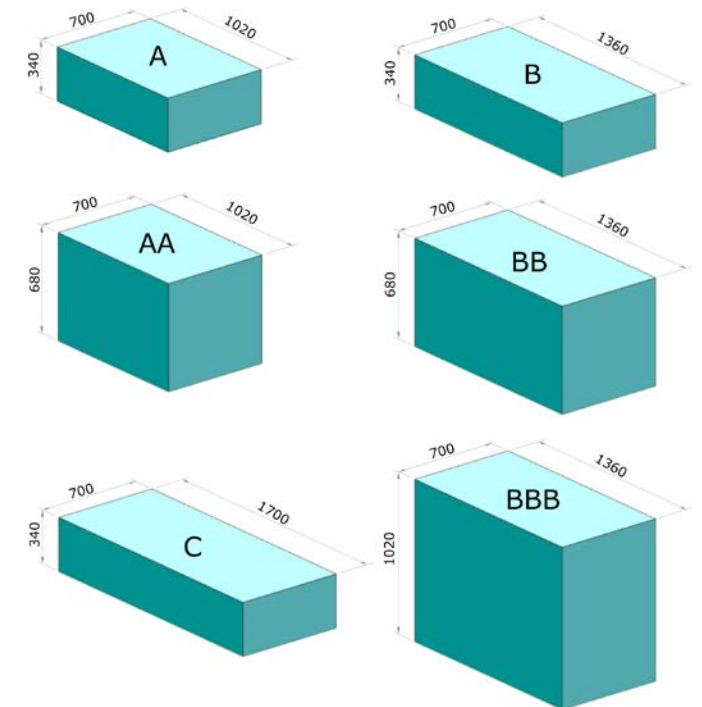
Project Progress/Actions - Aspects

Standard Documents

Achievement to-date



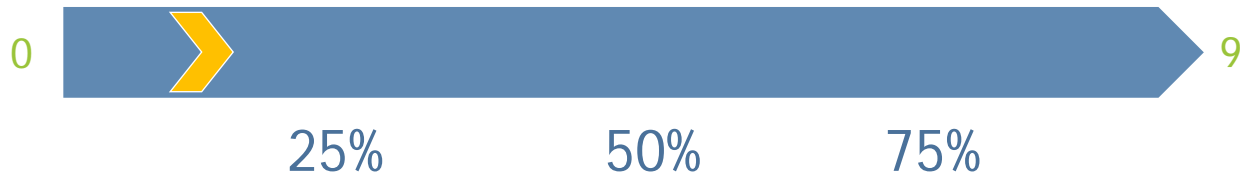
- Delivered 3 standard documents (sizes, interfaces, digital)
- Last document at project end (updated standard)
- 3 main sizes (A, B, C), composite units allowed
 - Sizes mainly determined by European truck requirements
- Flow interfaces on one or two sides (if two, redundant)
 - Only interface area specified, not exact connector location or type
- Digital interface defined on top of CAN bus (Ethernet also possible)
 - Signals according to SAE J1939
 - 18 pins connector



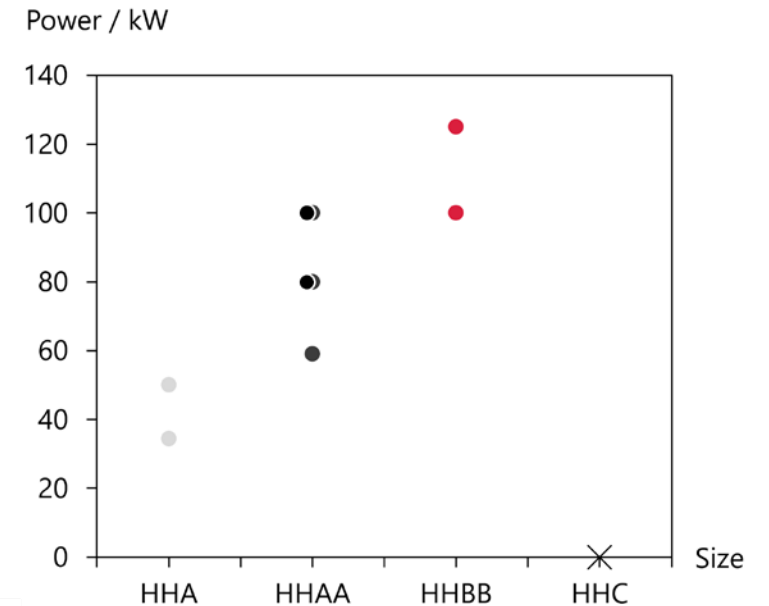
Project Progress/Actions - Aspects

Commissioned FC Modules

Achievement to-date



- Initially, 11 FCM suppliers - now 8 (with 9 modules)
 - 4 SMEs left, Hyundai joined in 2022
- Plastic Omnium "ahead of the pack"
 - Other FCM expected about monthly in Q1-Q2 2023
 - Some delays due to post-covid supply-chain issues
- All designs have some minor deviations
 - Almost all easily remedied

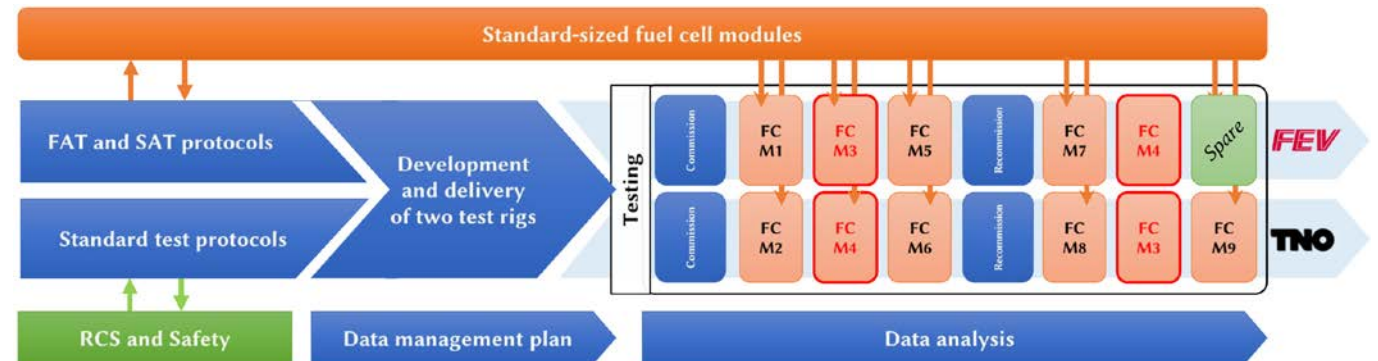
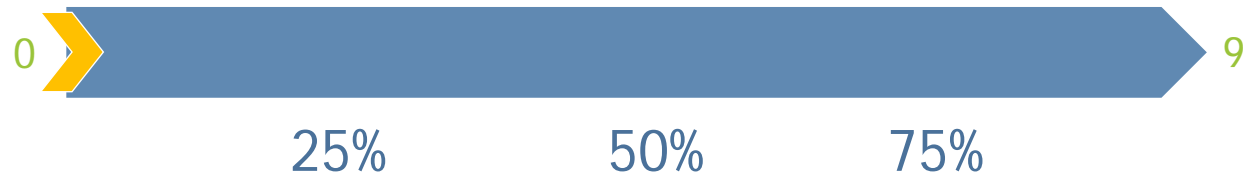


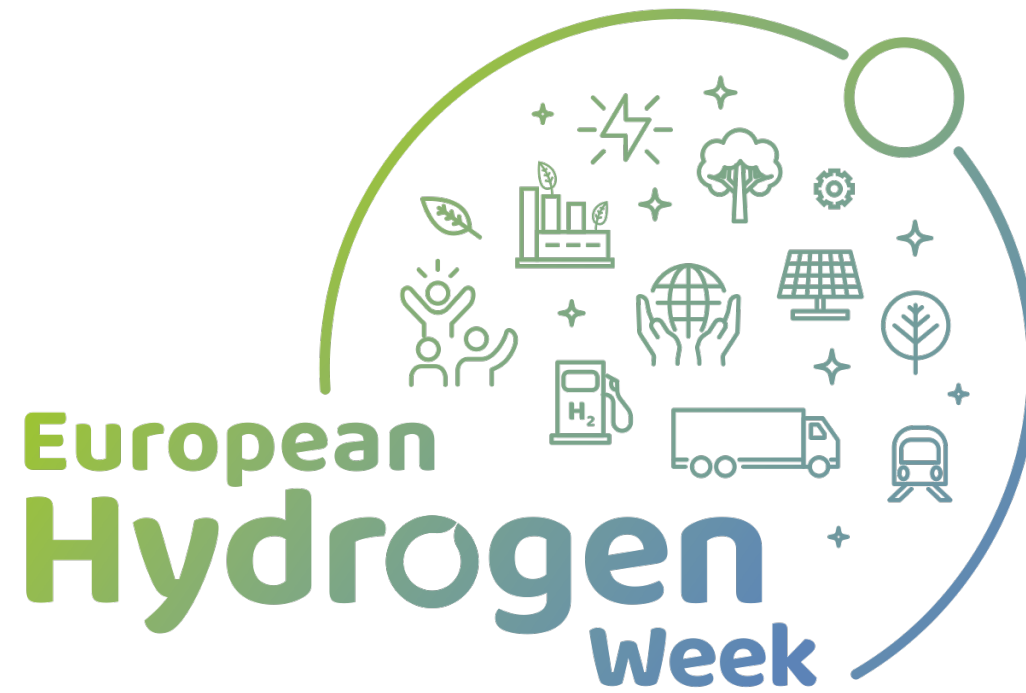
Project Progress/Actions - Aspects

Testing Campaign

Achievement to-date

- 2 identical, mobile test rigs at FEV & TNO
 - Max 200 kW, with 2-axis tilting device
- 2 separate campaigns foreseen
 - Recommissioning halfway
 - 2 FCMs to be tested twice





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