



HyWICE

Hydrogen Water Internal Combustion
Engine

DECARBONISING HEAVY MOBILITY
AT A REDUCED COST AND CREATING
THOUSANDS OF JOBS IN THE
CIRCULAR ECONOMY

RH2 winner of the BPI's i-Lab
innovation competition in 2024

i-Lab **bpi**france
concours d'innovation

Current
decarbonization
solutions cost 4 to 5
times the price of a
diesel solution

Heavy mobility

1

Primary source of
emissions

2

Carbon neutrality
objective

3

6.5 Million Vehicles

4

Rapidly transformable
market

With the simple RH₂ process,
Decarbonization becomes possible
in the short term



RH2 Technology: Decarbonizing Existing Engines

1

Engine Modification

Conversion of existing diesel engines to hydrogen via a mechatronic spacer mechanism.

2

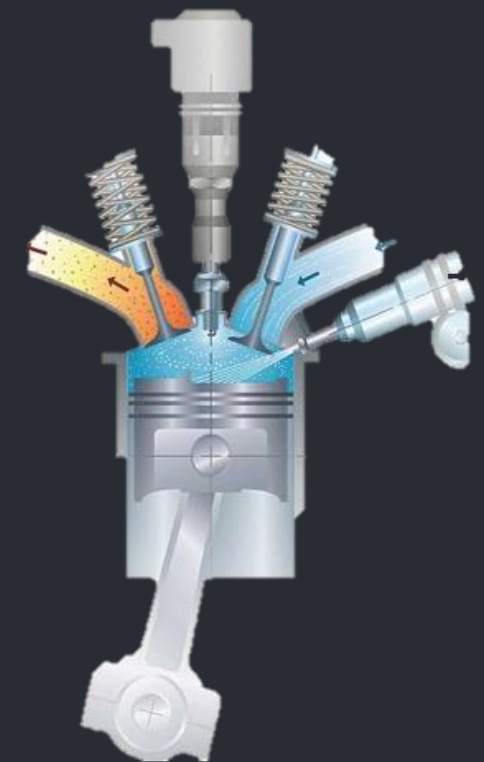
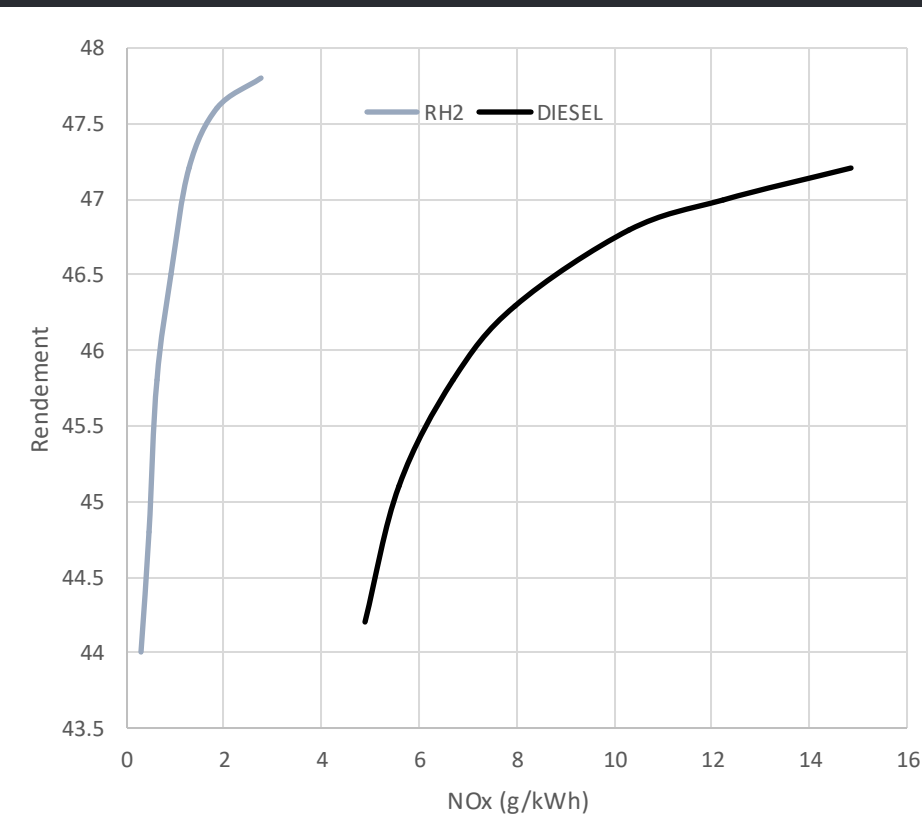
Zero Emissions

No CO₂. The retrofitted engine is now Green.

3

Validated Tests

Results demonstrated by major players in the sector.



The efficiency is much higher than diesel and NO_x is reduced (before post-treatment)

Results

49,2% yield

Equivalent to the best engines on the market.

NOx divided by 10

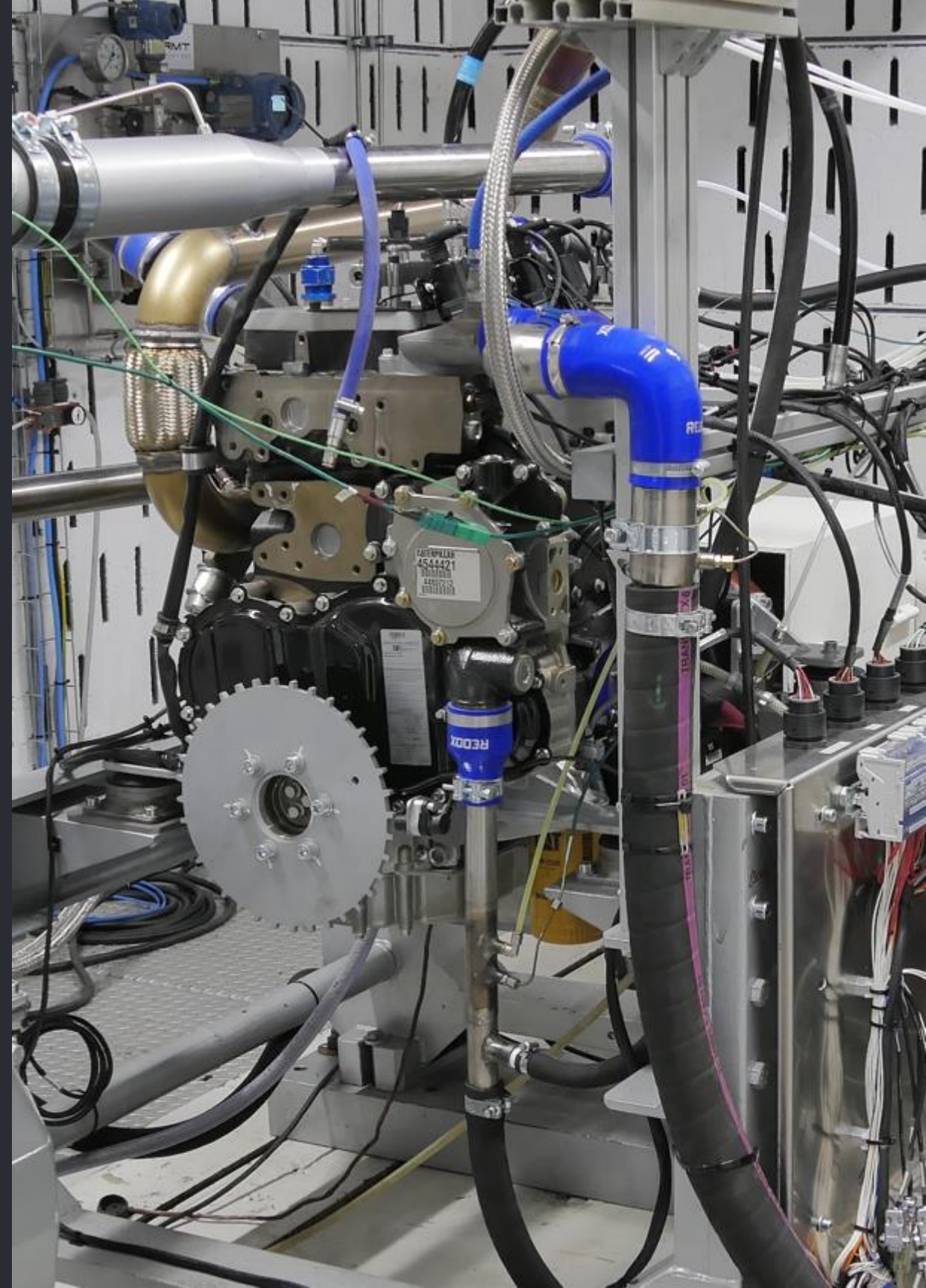
NOx heavily reduced before post-treatment

Zero CO₂

Right away

+25% performance

Reduced H₂ consumption

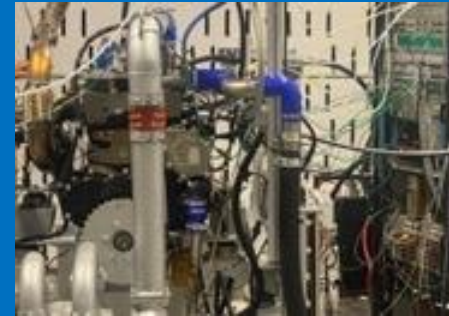


DIESEL IS REPLACED BY HYDROGEN → ZERO EMISSION

The results are demonstrated on 3 different engines

2023: V0 - CATERPILLAR C4.4

- Zero CO₂
- Power and torque ~ same as diesel engine
- ~ Zero NO_x thanks to direct water injection



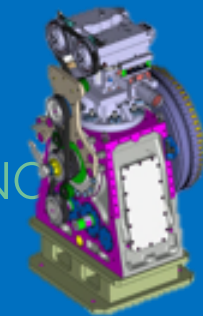
June 2024: V1 - IVECO 6.7 l

- Design and patents of the Mechatronic Spacer
- Development of injection/combustion maps
- Studies and definition of the retrofit kit



Sept 2024: V2 – Demonstrated results of HyWICE

- **Benefits of H₂ + H₂O injection demonstrated** on a high-performance single-cylinder:
- Water injection improves the indicated efficiency **>48% to 49.3%**, **torque +19%** and **reduced NO_x** a factor of 3 vs H₂ without water to 10 vs Diesel: Euro 6 Euro 7 with simple SCR
- Next step: **↑**compression ratio, **↑**efficiency (target 52-55% of R.I.), **↓**H₂ consumption

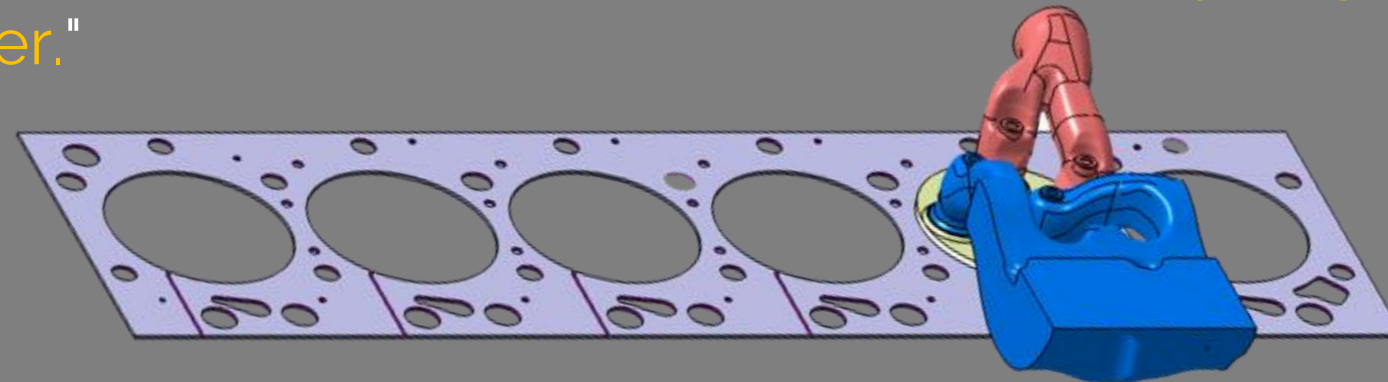


→ **Technical validity established**

RH2 TECHNOLOGY: IN CONCRETE TERMS?



"Thanks to a mechatronic spacer mechanism, RH2 replaces diesel fuel with a **double direct injection of hydrogen and water.**"



The results were awarded at the **BPI's i-Lab innovation competition in 2024**



RH2 is supported by **FEDER funds** as well as by **major equipment manufacturers**



The offer: A retrofit kit

The diesel-to-hydrogen conversion work is made possible thanks to a kit developed by RH2



Made-to-measure component
Mechatronic spacer.



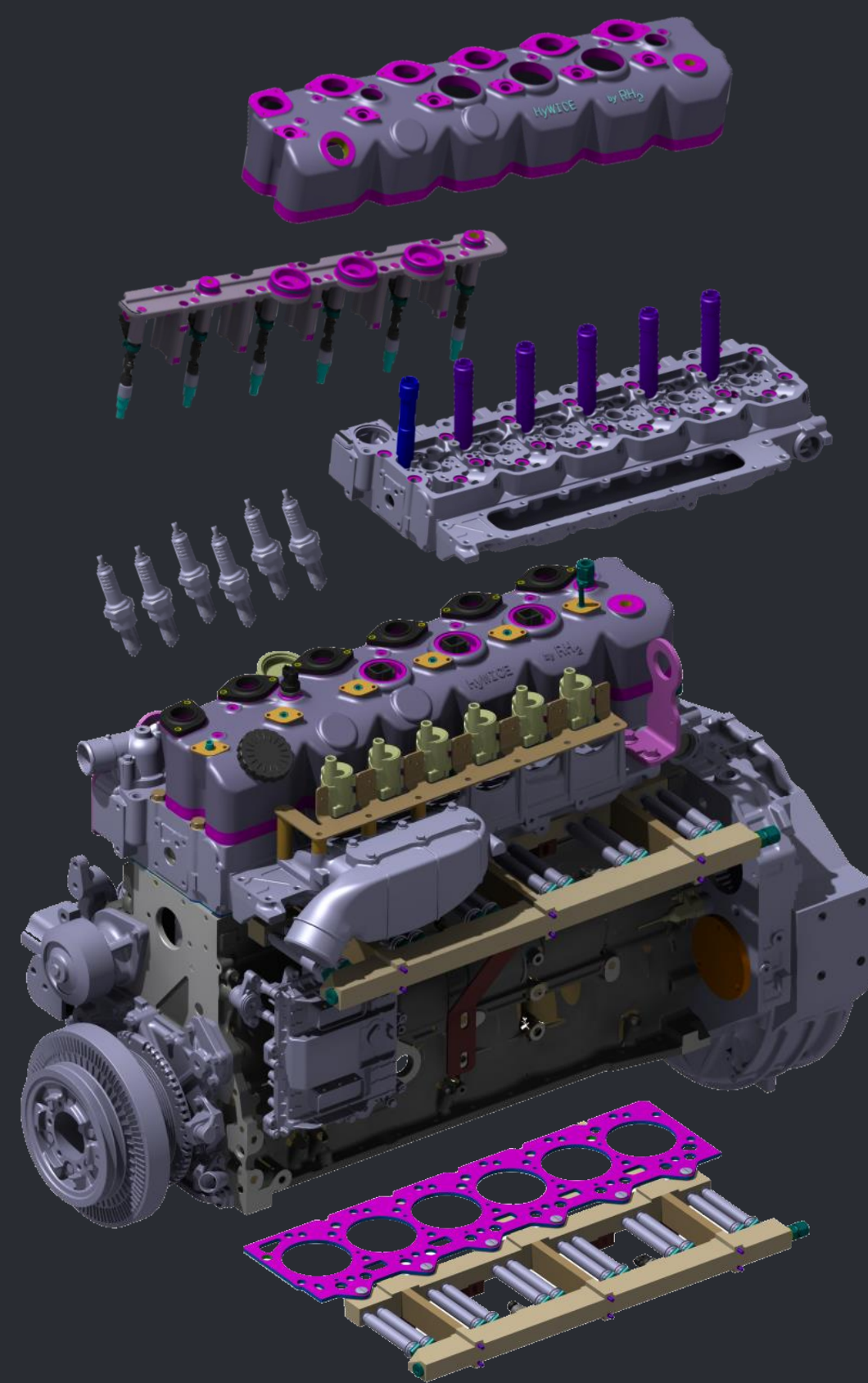
Ignition
Injectors and spark plugs.



Dedicated electronics
Dedicated ECU and beam for
optimal integration.



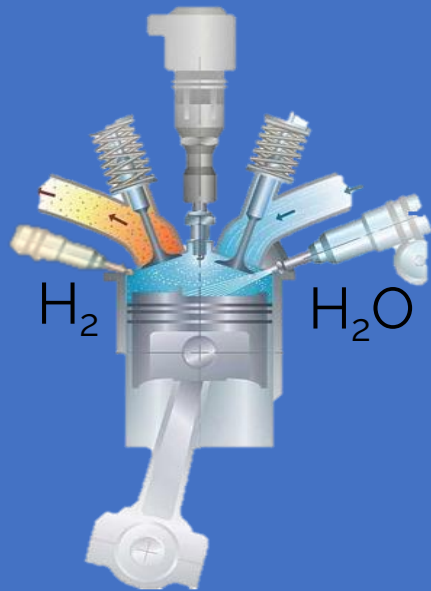
Made in France
All the elements are made in France,
reinforcing national sovereignty.



Roadmap 2022-2029

2022

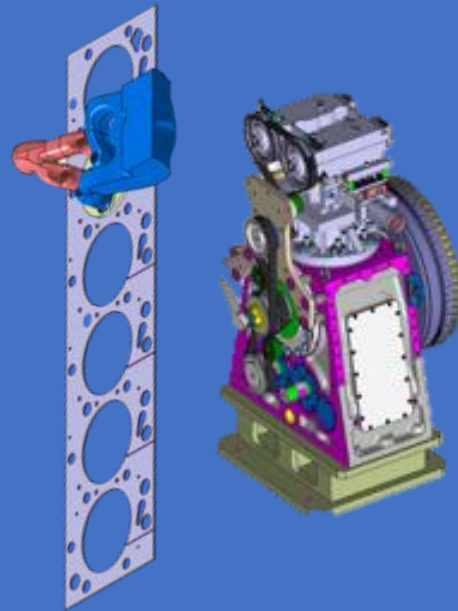
- Creation
- Acquisition of exclusive rights to exploit intellectual property



Value 2M €
1st fundraising done
500k€

2023-2024

- 1st Caterpillar Retrofit + 1st Iveco truck
- New patent spacer
- Single cylinder



Value 5,8 M€

2025-2026

- 2nd round of fundraising €2M
- 3 Rolling demonstrators



2026-2028

- Retrofitting of fleet
- License Technology
- Industrialize Kits



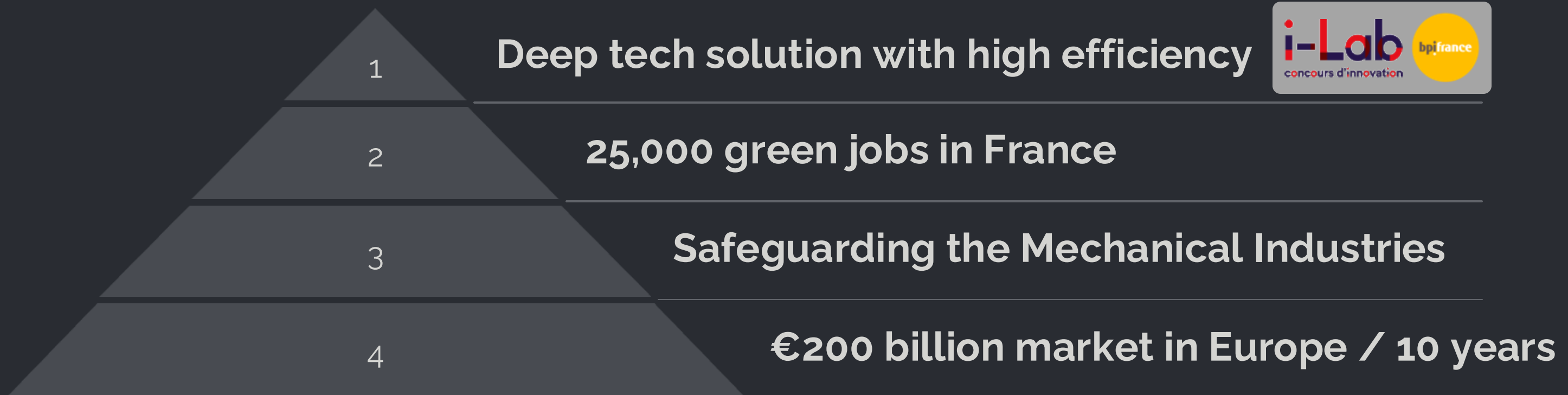
2029

- Engine Licensing Agreements



Industrialisation : 3rd
fund raising 10M€

Major economic interests





An opportunity for Europe

Reallocation of CO₂ gains

Direct benefits for manufacturers and transporters at no cost to the State.

Accounting recognition

Make it possible to integrate the cost of retrofits into companies' depreciation.

Regulatory Support

Adaptation of the legal provisions for the recognition of hydrogen combustion engines.

Hydrogen sector

Strengthening investments in green hydrogen production.



The RH2 solution is the pragmatic transition alternative

Immediate decarbonization

Immediate economic solution towards 100% decarbonization and job creation.

Ideal transition

Alternative for the next 15-20 years, while waiting for the maturity of other technologies.

Near-zero emissions

Traces that are well below current and future standards (Euro 7)



Advantage of nuclear power plants and renewable energies for H₂ production

1

H₂ production balances electricity production grids

2

Energy sovereignty

3

Hydrogen-nuclear-renewable energy synergy



Team RH2

Strategy & Sales

David Mourre
CEO



Tbd
Sales & Marketing

Tbd
Finance

Bertand Florentz
Ex-CTO Hutchinson
Strategy Advisor



Technical management

Jacques Bouvy
CTO



Michel Lantin
Supplier
management



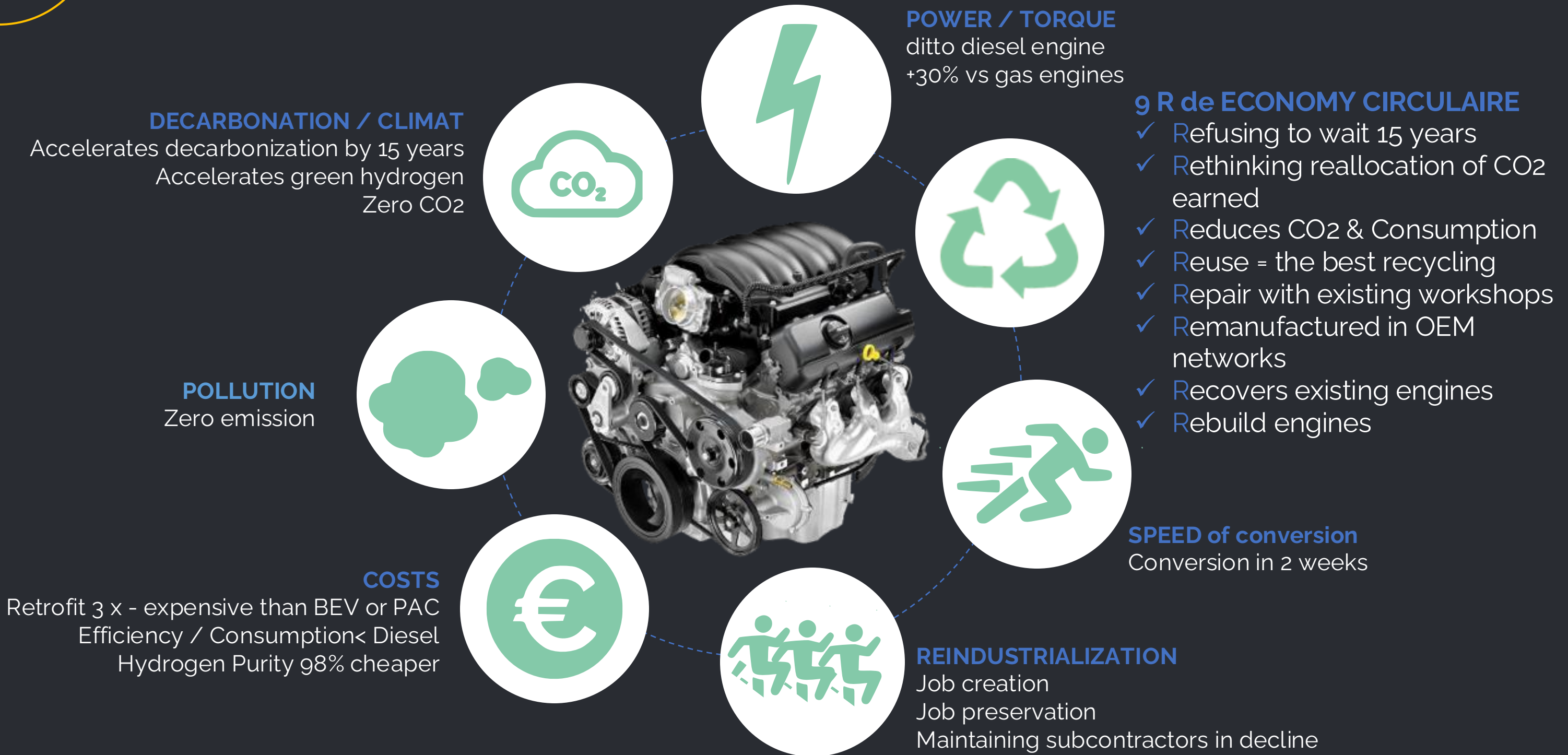
Hugo Pancin
Combustion
expert



Luis Lemoyne
Lecturer-researcher, University of
Burgundy
Scientific Advisor



The Hywice retrofit is **THE BEST SOLUTION** for heavy mobility



THANK YOU FOR YOUR ATTENTION

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