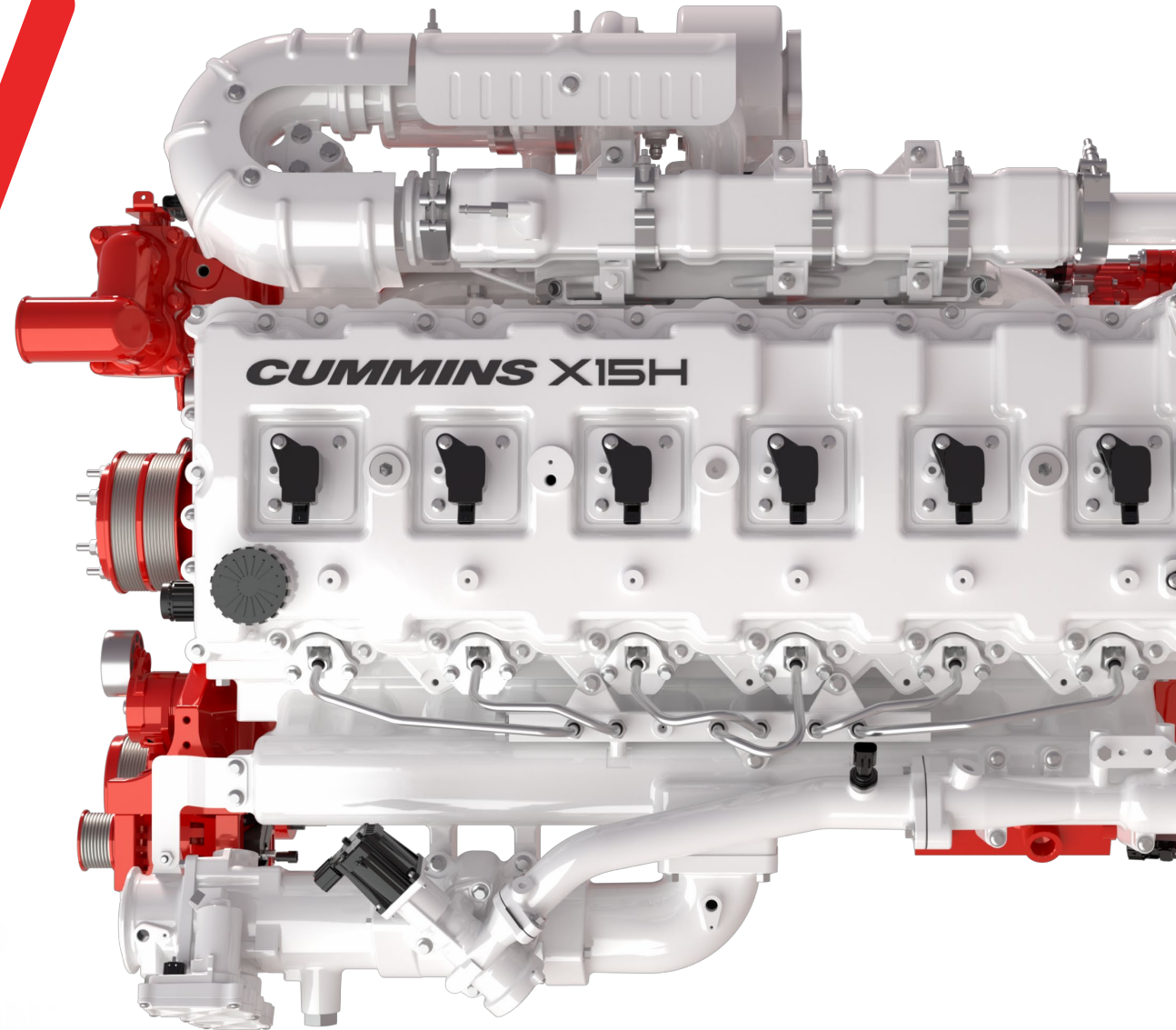


Hydrogen Internal Combustion Engines (ICE)

A PRACTICAL SOLUTION FOR
DECARBONIZATION

Jim Nebergall

General Manager - Hydrogen Engines
Cummins Inc.



Accelerating toward Destination Zero

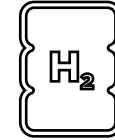
Cummins will continue to innovate and invest as we advance along the path to zero, but we can't do it alone.

- Action is required today.
- Progress requires partnership.
- Technology leadership is critical.

ENERGY SOURCES



**LOW CARBON
FUELS**

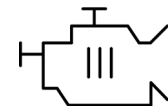


**GREEN HYDROGEN
ECONOMY**



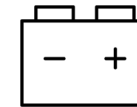
**DECARBONIZED
GRID**

POWER SOLUTIONS

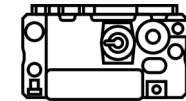


**ADVANCED
ENGINES**

diesel | natural gas
| hydrogen



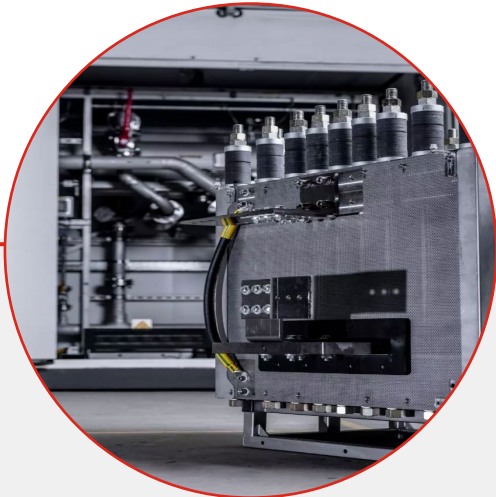
**BATTERY
ELECTRIC**



**FUEL CELL
ELECTRIC**

OUR COMMITMENT TO HYDROGEN

CUMMINS IS INVESTING IN THE FULL HYDROGEN ECO-SYSTEM



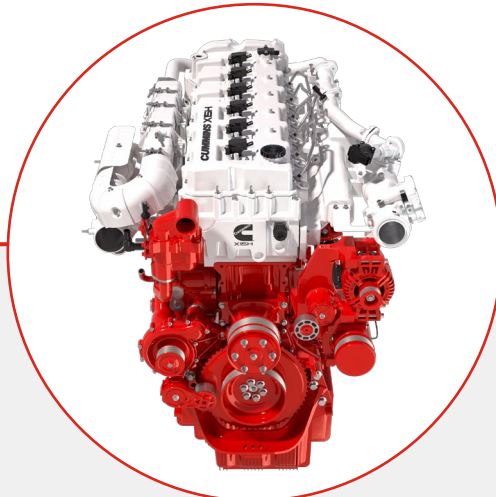
PRODUCTION



STORAGE



FUEL CELLS



HYDROGEN ICE

HYDROGEN ICE IS WITHIN REACH

THE EVOLUTION OF AN EXISTING CONCEPT IS CREATING A REVOLUTION IN SUSTAINABILITY

Supports decarbonization of the commercial vehicle industry

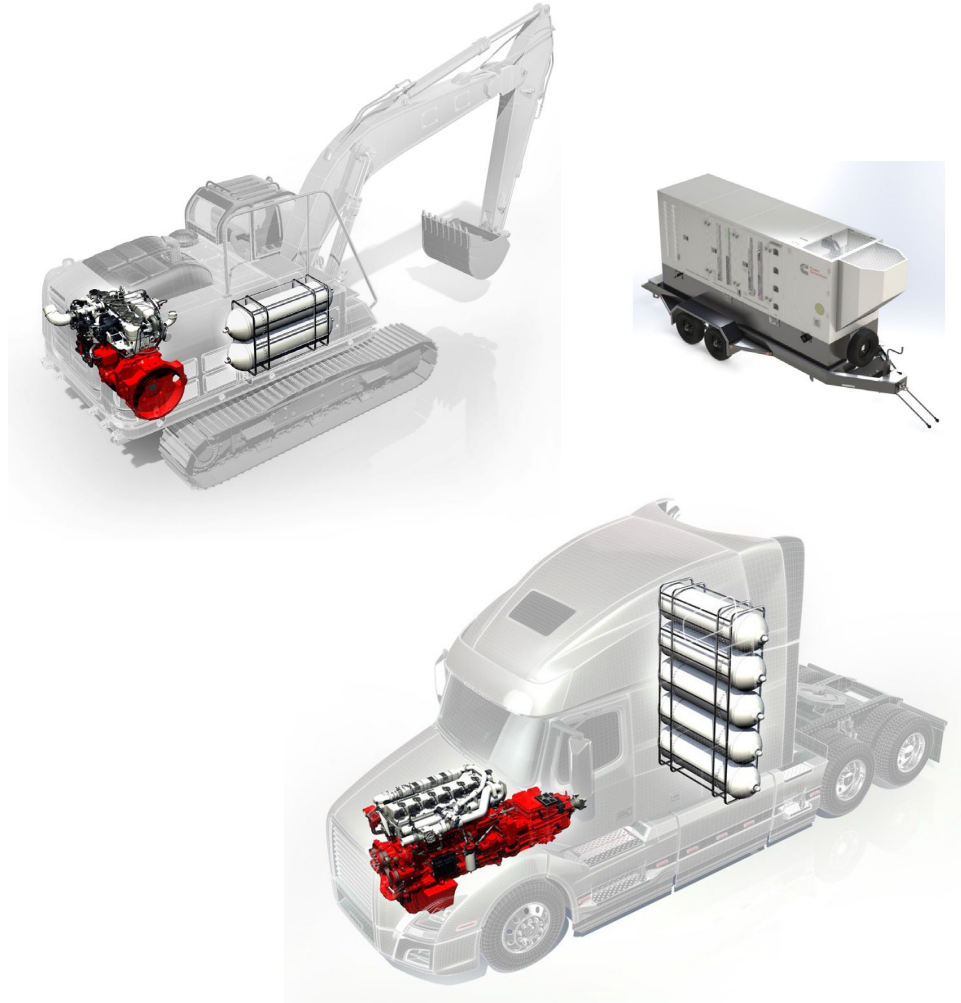
- Zero-carbon well-to-wheel with green hydrogen
- Scale production can begin within the decade

Benefits to end users

- Competitive initial cost
- Familiar powertrain technology, vehicle technology and maintenance practices
- Single fuel supply switch across a range of duty cycles

Complementary to hydrogen fuel cell

- Builds scale for hydrogen storage tanks on vehicle
- Drives hydrogen fueling infrastructure
- Common hydrogen service and support infrastructure



INITIAL TARGET HYDROGEN ICE APPLICATIONS

PERFORMS EFFICIENTLY IN DIVERSE APPLICATIONS AND DUTY CYCLES ACROSS MANY MARKETS



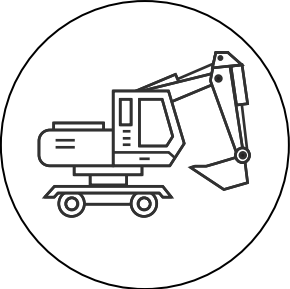
Regional Haul



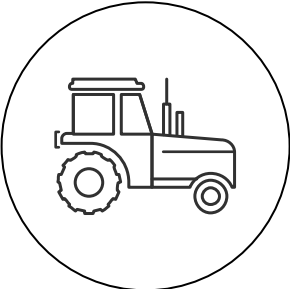
Line Haul



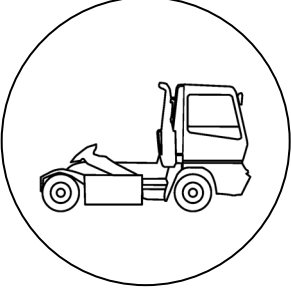
Vocational



Construction



Agriculture



Terminal Tractor



Power Generation

...AND MORE

THANK YOU!

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ONLINE:

www.cummins.com/engines/hydrogen-engines

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Utility Expo BOOTH E715

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