Decarbonizing Heavy Duty Commercial Vehicles

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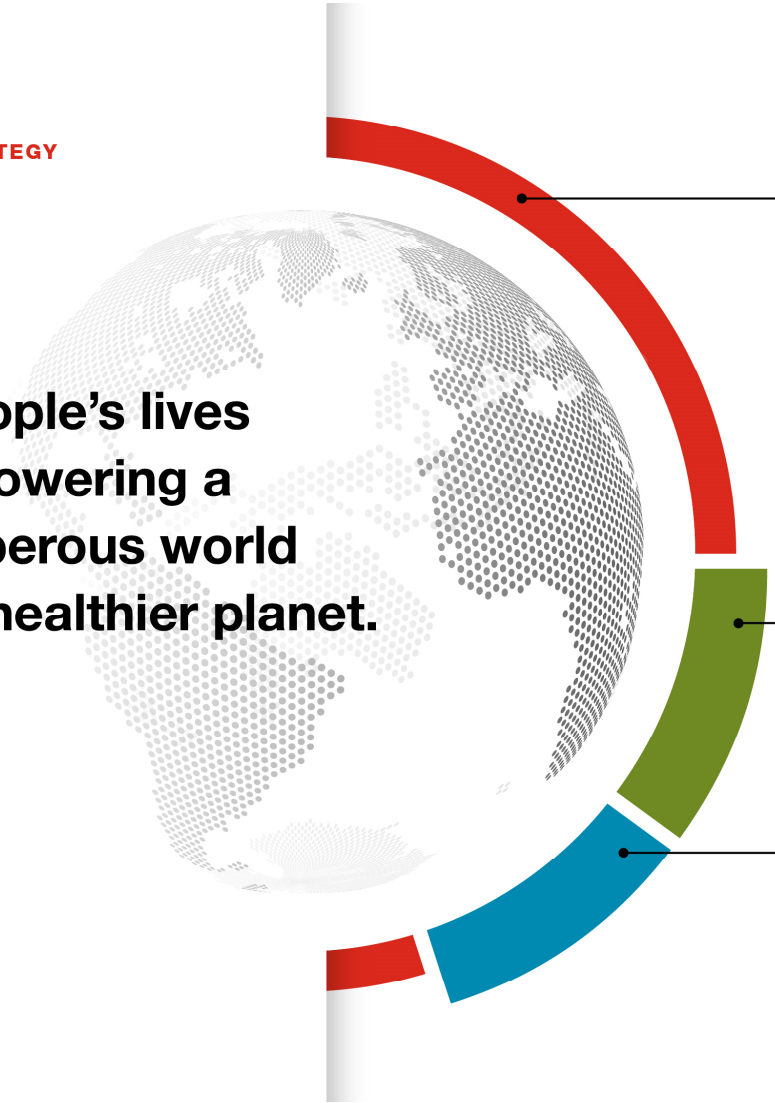
Nov - 11th - 2022

International Conference and Exposition, on Emissions Control Technologies by ECMA

OUR ENVIRONMENTAL
SUSTAINABILITY STRATEGY

Making people's lives better by powering a more prosperous world requires a healthier planet.



PLANET 2050

Leveraging our unique skills, experiences, and stakeholder relationships, we are committed to addressing climate change and air emissions, using natural resources in the most sustainable way, and ensuring our communities are better because of our presence in them. We have quantifiable goals for 2030 and visionary longer-term aspirations for 2050.

DESTINATION ZERO

Our strategy to go further, faster to reduce the greenhouse gas and air quality impacts of our products in a way that is best for our customers and all stakeholders.

CUMMINS WATER WORKS

Our initiative to address the global water crisis by strengthening communities through access to sustainable water.

Reducing well-to-wheels emissions

BY INNOVATION OF THE ENERGY SOURCES AND THE POWER SOLUTIONS

ENERGY SOURCES

Innovate and scale low carbon fuels

Decarbonize and improve resiliency of the grid

Develop and mature the green hydrogen economy

POWER SOLUTIONS

Increase adoption of fuel cell, battery electric and hybrids

Reduce GHGs from internal combustion engines

Addressing a wide range of applications

HEAVY-DUTY TRUCK

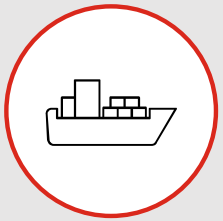
MEDIUM-DUTY TRUCK

BUS

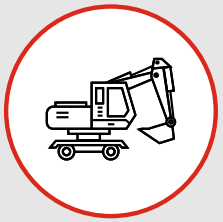
OIL AND GAS

FIRE AND EMERGENCY

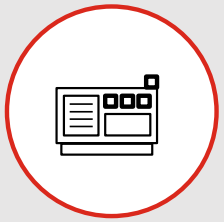
CONSTRUCTION



MARINE



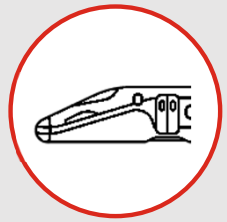
MINING



POWER GENERATION

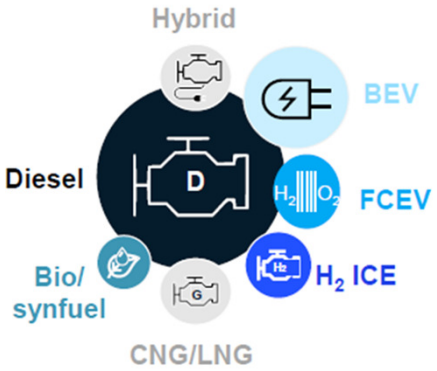
DEFENSE

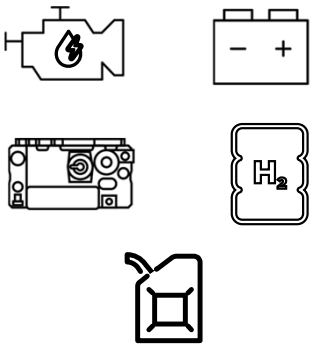
AGRICULTURE



RAIL

We can lower emissions faster





1.4 Gigatons
Additional reduction in carbon emissions

= **removing all trucks from the road for 3 years**

Lower emissions today with a mix of advanced ICE and zero-emissions solutions

Advance low-carbon technologies

Greater cumulative carbon reduction than waiting until 2035 with all ZEV

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.

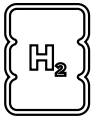
Action is required today

Progress requires partnership

Technology leadership is critical

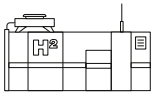
ENERGY SOURCES

LOW CARBON FUELS



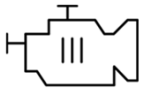
GREEN HYDROGEN ECONOMY

DECARBONIZED GRID



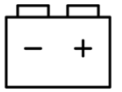
STORAGE

POWER SOLUTIONS

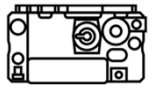


ADVANCED ENGINES

HYBRID



BATTERY ELECTRIC



FUEL CELL ELECTRIC

Where are we today??

Hydrema 10 tonne dumper

Objective

Provide a sustainable power source for Hydrema's latest 912 articulated dump truck to deliver superior, clean off-road performance. Support the customer needs for low machine weight reducing ground pressure and environmental impact plus high ground clearance and flexible maneuverability for site safety.

Solution

Cummins Stage V B4.5 Performance Series engine with high power, improved by 16% from previous model. Compact engine design enables excellent visibility from the cab.

01

Benefit #1
Near-zero NOx and PM emissions benefits of Cummins Stage V emissions technology including advanced aftertreatment.

02

Benefit #2
High power to weight ratio of the engine maintains productivity while minimizing the impact on the site.

Biogas bus fleet for a green capital

TALLINN, ESTONIA

Objective

Tallinn, capital of Estonia needed to invest in a new natural gas bus fleet to improve air quality in the city by taking old diesels off the road while also meeting a climate action goal to lower CO2.

Solution

During 2021 the first of 300 Solaris Urbino CNG buses arrived, powered by Cummins L9N Euro VI engines running on renewable biomethane gas produced at a local facility. The success of the new fleet contributed to Tallinn being awarded the title of European Green Capital for 2023.

The new bus fleet is estimated to lower GHG emissions by 25,000 tons a year running on gas made from biowaste

The bus and its L9N engine meet the operator's requirement to operate reliably 50,000 miles per year

Franklin Pierce Schools Electric Bus

TACOMA, WASHINGTON (USA)

Objective

Meet district's vision for sustainability and clean energy, utilizing the community's available 97% carbon-free electricity, replacing a pre-2007 diesel bus with older emissions controls.

Solution

A $330,000 grant reduced the cost of the bus purchase. Additional grant funds were used to install a charging station, and stakeholders developed feasible routes for the bus.

$8,000 in fuel savings
Buses in the district log about 12,000 to 15,000 miles per year, yielding an $8,000 savings by switching from diesel to electric.

Eliminated emissions while idling
School buses typically idle while waiting to pick up children. Electric buses eliminate tailpipe emissions.

On-track with the very light rail project

UK

Objective

UK Government and industry sponsored project aiming to apply the latest automotive technology to the very light rail sector focused on electrified powertrains, providing a low-cost alternative to traditional diesel trains on short, low-traffic routes.

Solution

Cummins is a key consortium member, providing design and engineering for the creation of a unique, twin F2.8 Euro VI diesel powered hybrid drive system.

Significantly reduced fuel consumption / CO2 by using small, light duty engines

Zero emissions in and around rail stations

Extended-range hybrids with geofencing

DUBLIN, IRELAND and BRIGHTON, UK

Objective

Provide a diesel power solution compatible with the latest ADL Enviro 400 extended-range hybrid powertrains, offering localized ‘zero-emissions’ bus operation in cities with geofencing. Providing a faster deployment, lower cost alternative to full BEV fleet conversion.

Solution

Cummins engaged in deep systems integration with the hybrid system supplier, delivering the vehicle environmental performance objectives with the B4.5 Euro VI engine.

Localized zero emissions for up to 3 miles with engine-off, zero tailpipe emissions

Smart geofencing capability to focus emissions reduction on specific city areas

Air Liquide Electrolyzer Plant

Becancour, Quebec, Canada

Objective

Generate green hydrogen, using hydropower energy to power electrolyzers that make up for a 20 MW installation, the largest PEM electrolyzer plant in operation globally.

Solution

Modular and scalable electrolyzer platform addresses utility-scale hydrogen production. Four HyLyzer 1000's produce over 3,000 tons of hydrogen annually, increasing Air Liquide's hydrogen production in Quebec by 50%.

Zero CO2 emissions
Using hydropower to power the electrolyzers, zero CO2 is produced.

Footprint
One of the highest power densities and the smallest plant footprint in the industry

Emissions
Remove annual emissions of 10,000 cars

Delivering zero emissions

TRONDHEIM, NORWAY

Objective

A pioneering hydrogen fuel cell truck pilot project by Cummins and ASKO, Norway's largest grocery distributor to prove that zero emissions can be delivered while working on commercial service,

Solution

Operating out of the Trondheim regional center, the electric drive Scania trucks can travel up to 500 km range on a single refuel using carbon-free green hydrogen on-site, taking just 15 minutes

Zero CO2
Zero NOx & PM
Water is the only by-product

90 kW fuel cell power module ensures no compromise on payload or on-road performance.

Conclusion

Why Cummins is well positioned and credible!!

- ✓ Starts lowering emissions today;
- ✓ It corporates well-to-wheels emissions reduction by matching technology readiness with infrastructure readiness;
- ✓ Drives wide scale adoptions due to affordability by using the right technology at the right time;
- ✓ Achieves net-zero emissions by 2050.


Cummins