



# Powering a sustainable future for heavy-duty

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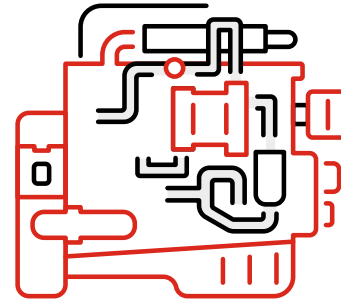
Public

## A HISTORY ROOTED IN INNOVATION



Founded in 1919 by inventor Clessie Cummins and banker W.G. Irwin with a shared vision of what ingenuity and hard work could achieve.

## 100 YEARS OF TECHNOLOGY LEADERSHIP



Cummins took the available engine technology and transformed diesel into a reliable, everyday power source and today a broad portfolio of power solutions.

# Powering a World that's Always On in a more sustainable way



Heavy-duty Truck



Medium-duty  
Truck & Bus



Agriculture



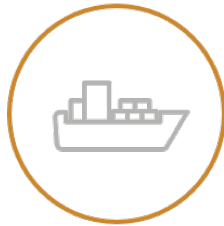
Construction



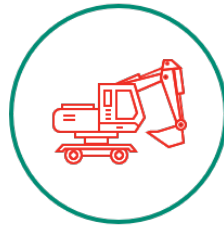
Oil & Gas



Fire & Emergency



Marine



Mining



Light-duty Automotive  
& Recreational Vehicle



Defense



Power Generation



Rail

# Disruptive Trends

**1**

## **Zero Emissions**

**Zero emissions  
vehicle trends drive  
future technology**

**2**

## **Energy Diversity**

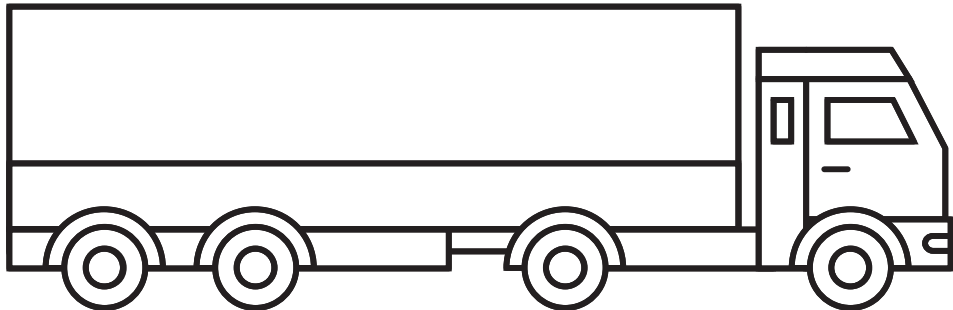
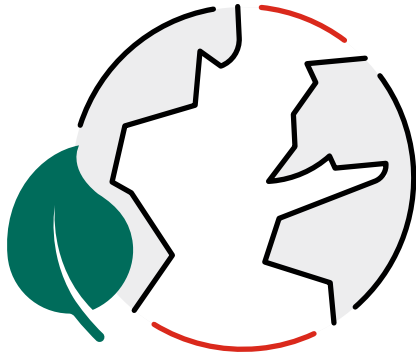
**There's high  
demand for various  
energy/energy  
conversion  
options.**

**3**

## **Connectivity**

**Powering the future  
requires energy  
systems that  
communicate  
efficiently.**

## BROAD PORTFOLIO OF POWER SOLUTIONS: ULTRA-CLEAN DIESEL



- ✓ Highly reliable and mature technology
- ✓ Particulate emissions have been reduced by 90 percent
- ✓ NOx emissions have been reduced by more than 95% in the past 25 years
- ✓ Ideally suited for a low CO<sub>2</sub> future

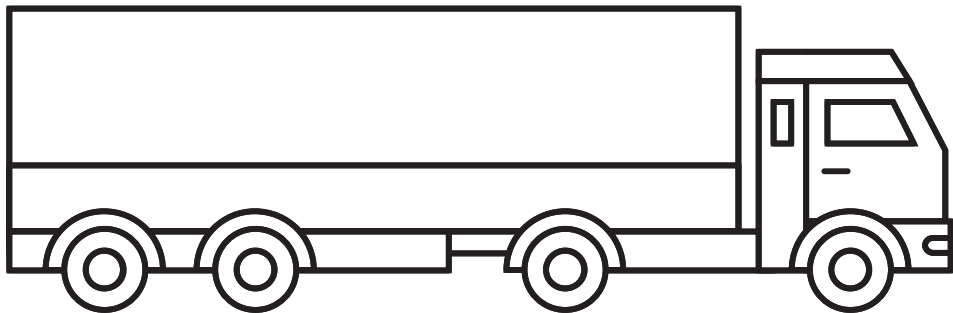
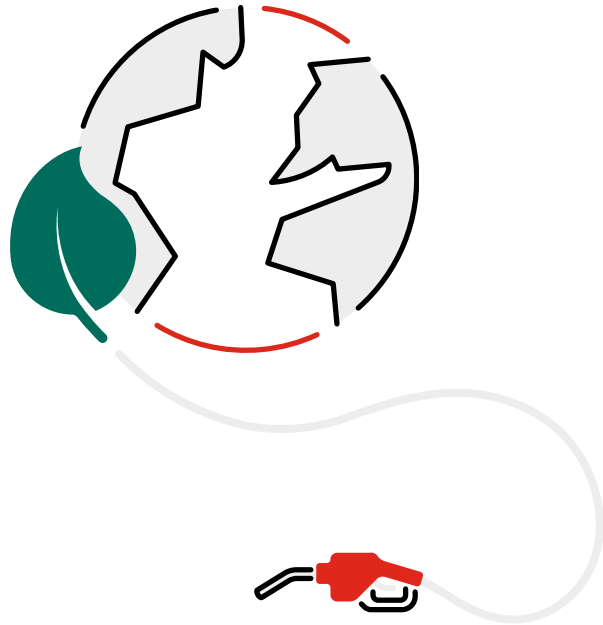
↑<sub>+</sub> Power and torque

↓<sub>-</sub> Cost of operation

↑<sub>+</sub> Efficiency

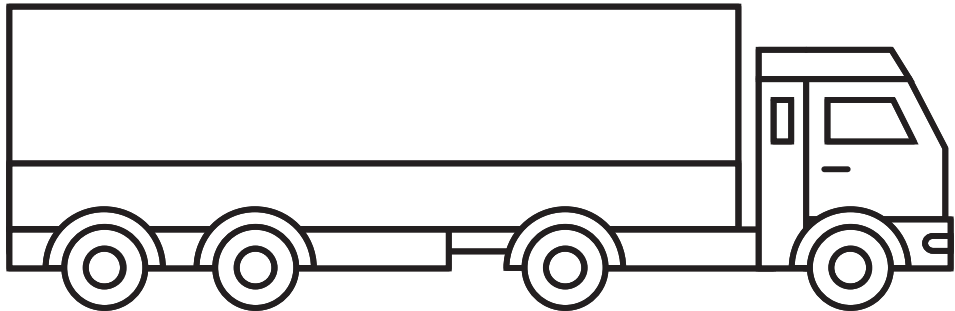
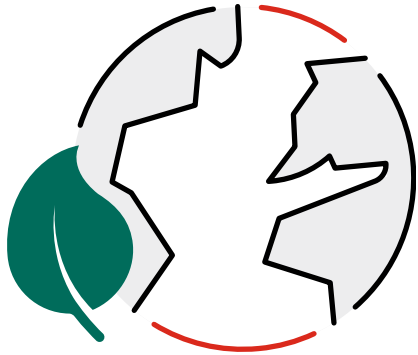
↓<sub>-</sub> Emissions

## BROAD PORTFOLIO OF POWER SOLUTIONS: NATURAL GAS



- ✓ Lower fuel costs and biofuel capable
- ✓ Near-zero emissions and net-zero with renewable natural gas
- ✓ Ideally suited for a low NO<sub>x</sub> and low CO<sub>2</sub> future
- ✓ Maintenance free simple aftertreatment system
- ✓ Quiet engine operation
- ✓ Delivers on energy independence initiatives
- ✓ Stable fuel pricing
- ❑ Natural Gas Infrastructure
- ❑ Competitive Vehicle Pricing
- ❑ Comparable System Weight

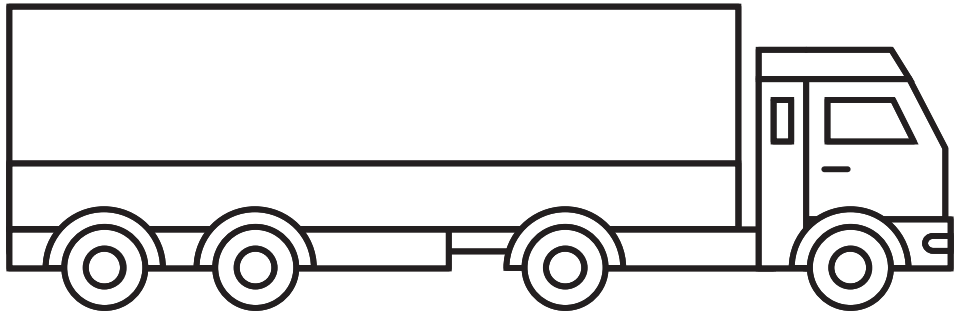
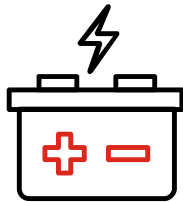
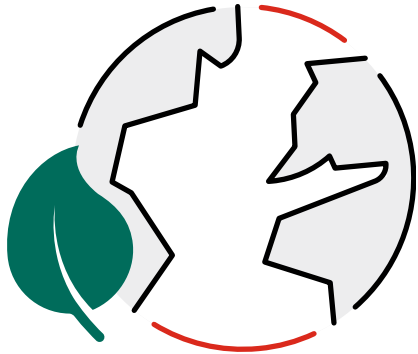
## BROAD PORTFOLIO OF POWER SOLUTIONS: **HYBRID**



- ✓ Improved fuel efficiency
- ✓ Instantaneous torque and improved drivability
- ✓ No range anxiety
- ✓ Limited zero tailpipe emissions mode
- ✓ Ideally suited for a low NO<sub>x</sub> and low CO<sub>2</sub> future

- ❑ Electrical Infrastructure for Plug In Hybrids
- ❑ Competitive Vehicle Pricing
- ❑ Competitive Battery Weight

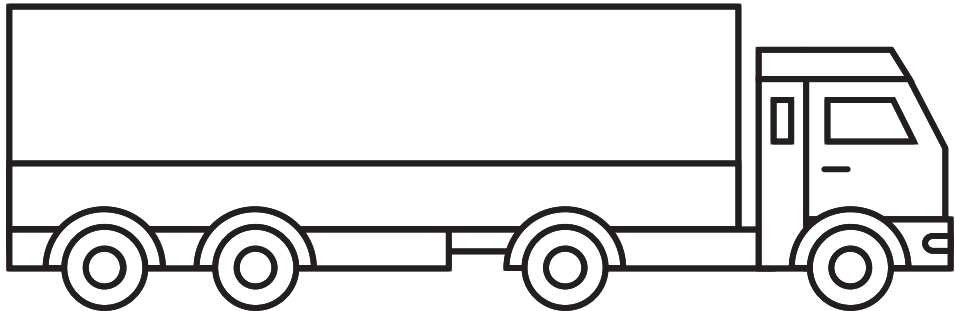
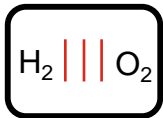
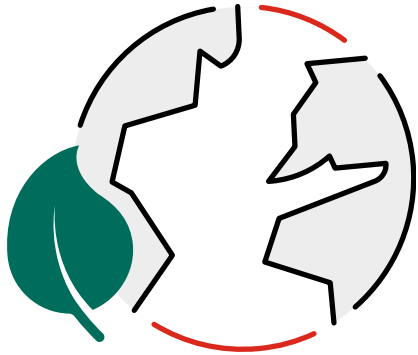
## BROAD PORTFOLIO OF POWER SOLUTIONS: **ELECTRIC**



- ✓ Higher operational efficiencies than a conventional internal combustion engine
  - ✓ Quieter, simpler powertrain with fewer mechanical parts than diesel and natural gas
  - ✓ Zero tailpipe emissions
- 
- ❑ Electrical Charging Infrastructure
  - ❑ Charge time equal to diesel or natural gas fill time
  - ❑ Competitive Battery Weight & Pricing
  - ❑ No Impact on Cargo Carrying Capacity



## BROAD PORTFOLIO OF POWER SOLUTIONS: FUEL CELL



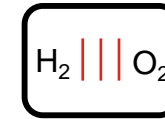
- ✓ Instantaneous torque
  - ✓ Excellent range and refueling time
  - ✓ Zero tailpipe emissions
  - ✓ Advancements in solid oxide and PEM fuel cells are making technology more feasible
- 
- ❑ Hydrogen Infrastructure
  - ❑ Competitive hydrogen fuel pricing
  - ❑ Competitive fuel cell pricing

# Delivering the Power of Choice for Heavy-Duty Customers



Diesel  
powertrain

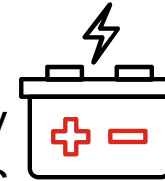
Fuel cell



Natural gas  
powertrain



Battery  
electric



Hybrid  
electric



