



Cummins Destination Zero:

Our company strategy to achieve zero emissions by reducing greenhouse gas (GHG) emissions and supporting the transition to decarbonized power



**Lower
emissions today**



**Reduce well-to-
wheels emissions**



**Drive wide-scale
customer adoption**

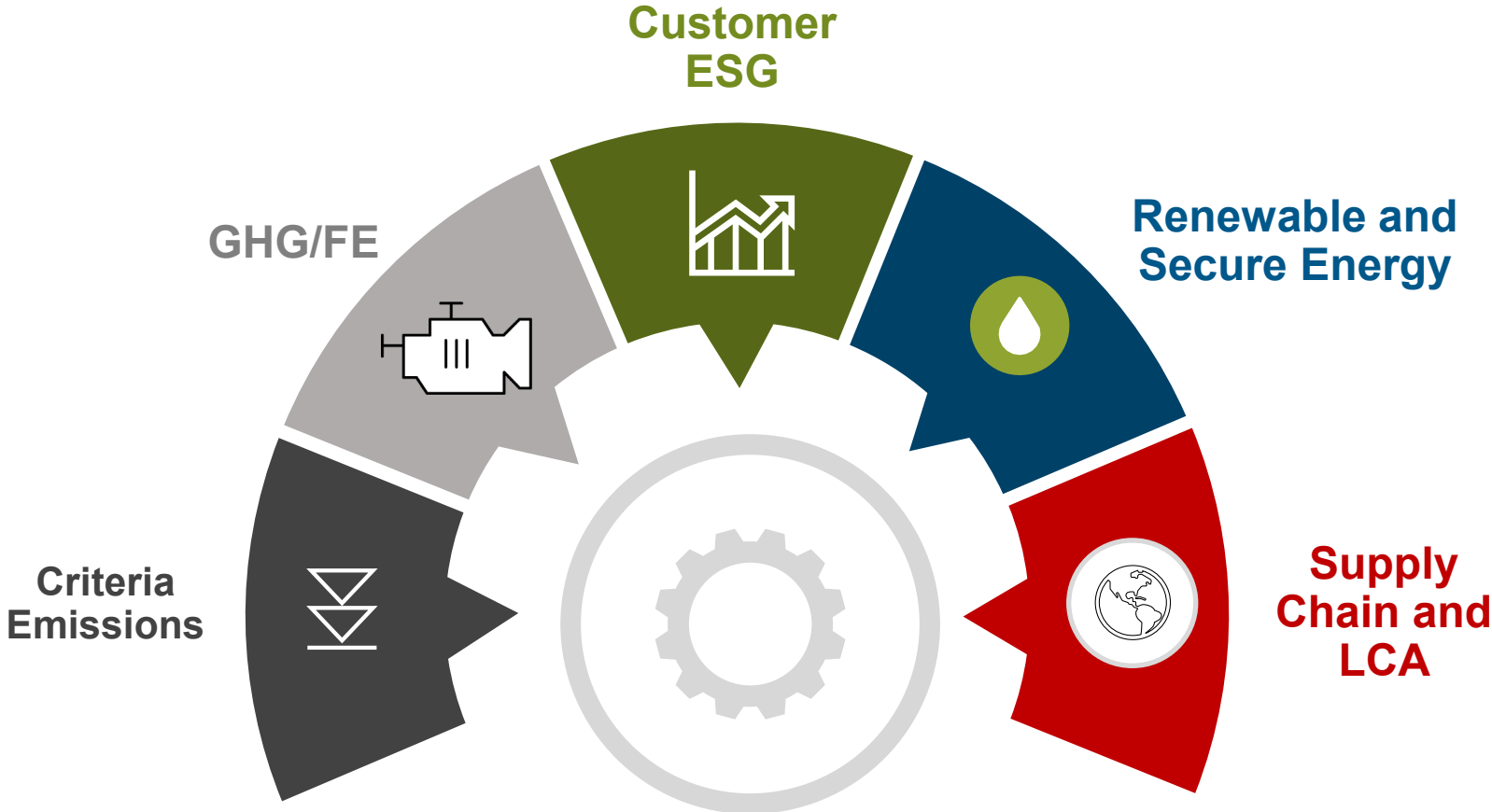


**Achieve zero
emissions by 2050**

2023 Smoky Mountain Mobility Conference
Oak Ridge National Laboratory

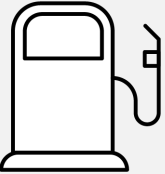
Tim Frazier, PhD
VP Cummins Research and Technology

Technology Drivers (A few new drivers and a lot more ambiguity)



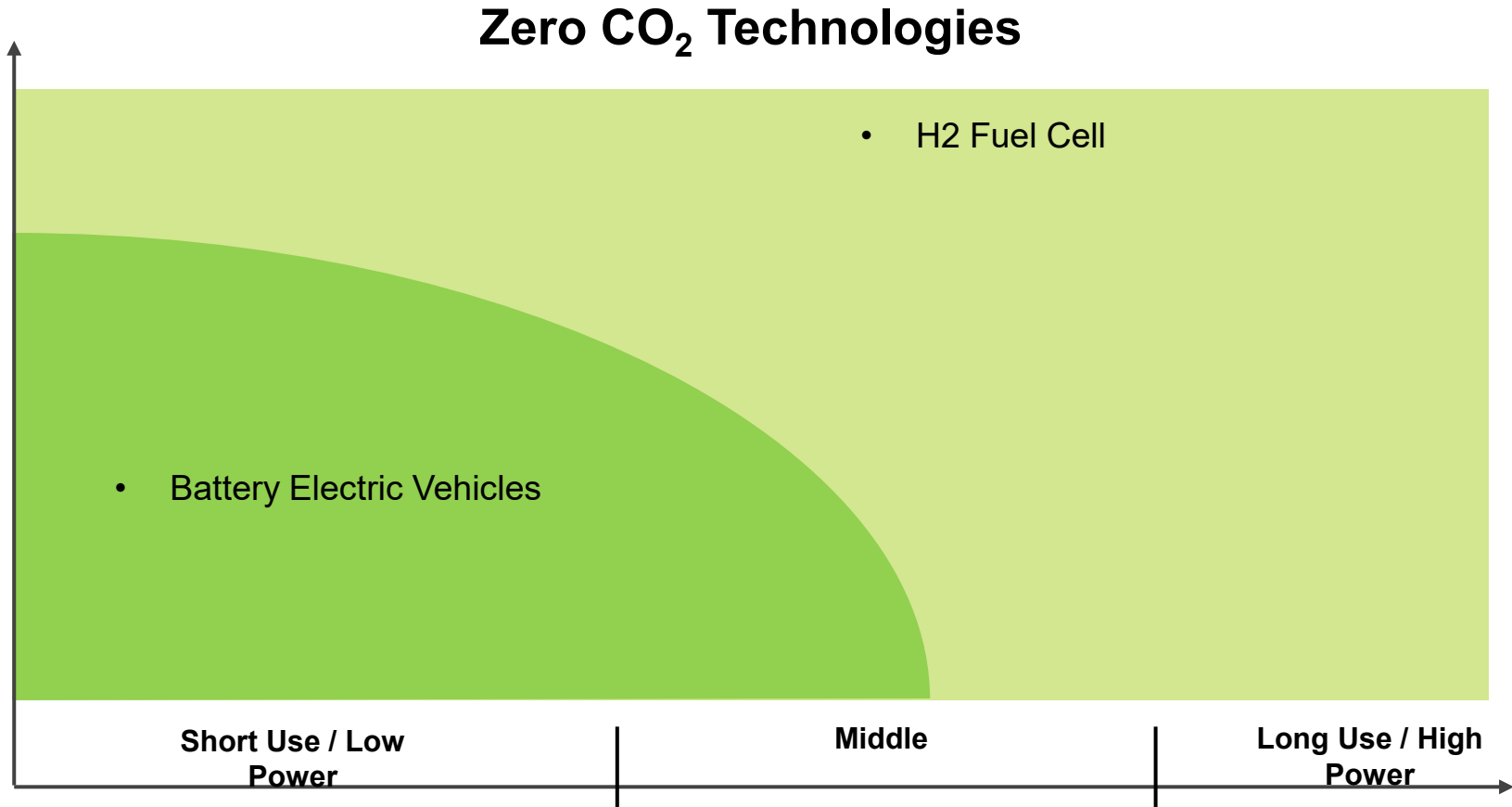
Ideal Case: Binary Use Cases Transition to Two Solutions

Diesel



Versatile
Reliable
Low Cost
Ubiquitous

- Use Case
- Regulations
- Incentives
- ESG
- Infrastructure
- Business Model
- ...



4 CONSIDERATIONS FOR CUSTOMERS

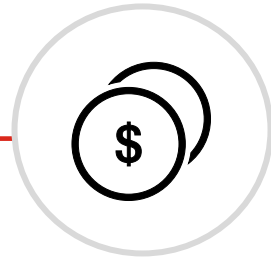
WHEN ADOPTING TECHNOLOGY



**Can the technology
get the job done?**

*Can I complete
the mission?*

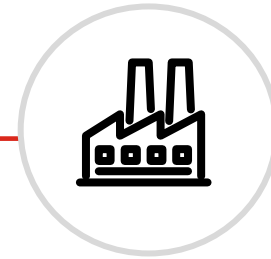
*Do I need to adjust
my business ops?*



**Can my business
afford it?**

What is my TCO?

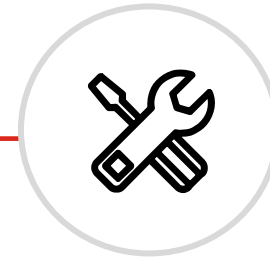
*What are my
boundaries?*



**What is the fueling
infrastructure?**

*What experience
do I have?*

*Can I rely upon it
every day?*



**What is the service
infrastructure?**

*How do I prepare
for it?*

Addressing a Wide Range of Application Will Require Multiple Methods...



HEAVY-DUTY
TRUCK



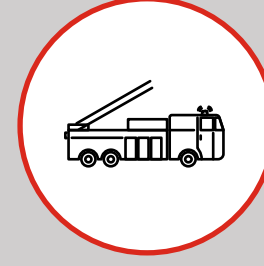
MEDIUM-DUTY
TRUCK



BUS



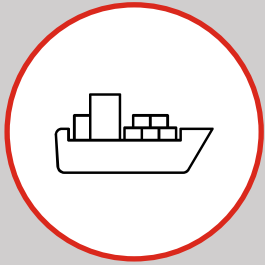
OIL AND GAS



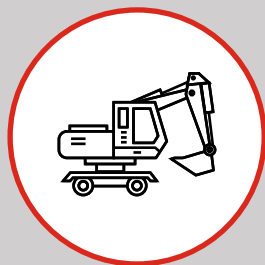
FIRE AND
EMERGENCY



CONSTRUCTION



MARINE



MINING



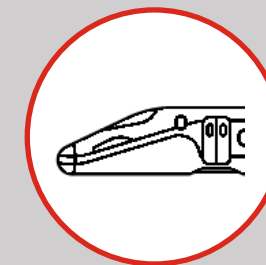
POWER
GENERATION



DEFENSE



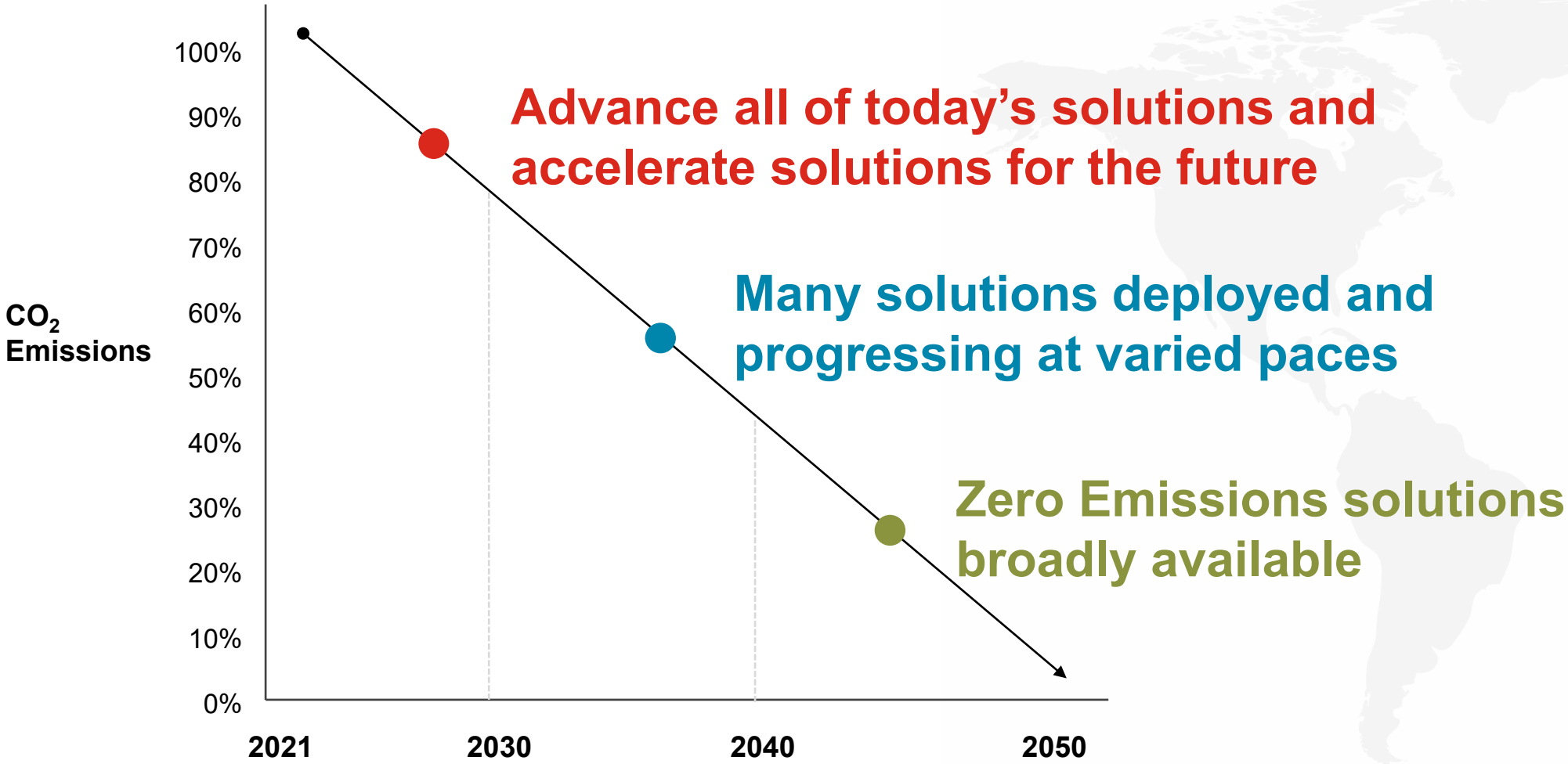
AGRICULTURE



RAIL

**A Single Solution Will Not Win in These Hard-Working,
Hard-to-Abate Sectors**

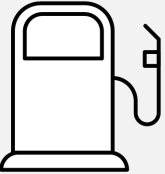
OUR VIEW ON HOW THE TRANSITION UNFOLDS



Driving factors: energy source decarbonization and infrastructure investment, regulatory advancements, and customer pull

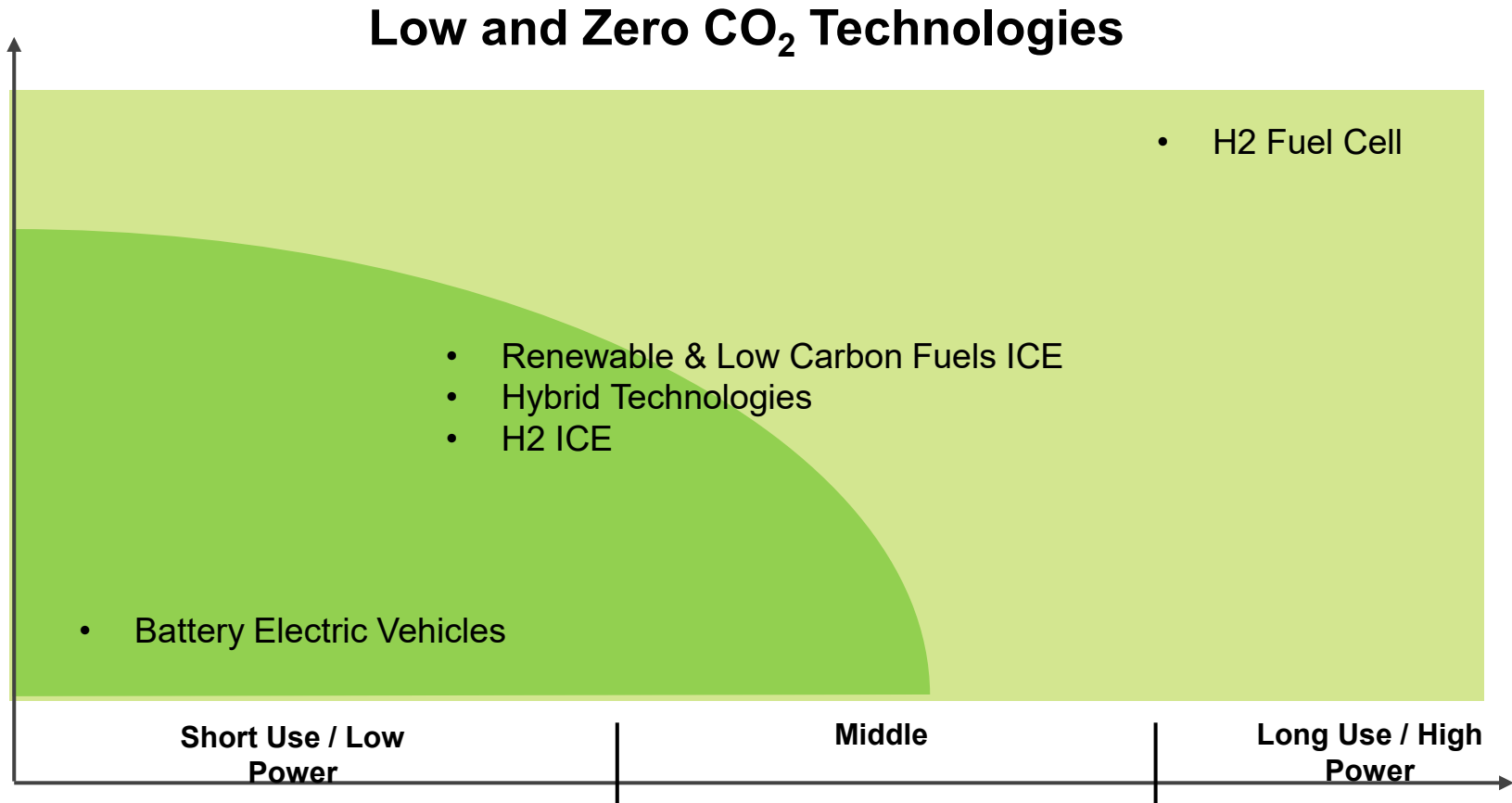
Bridging Solutions Enable Going Further... *Faster*

Diesel

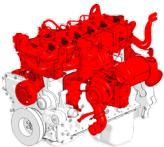


Versatile
Reliable
Low Cost
Ubiquitous

- Use Case
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- ...



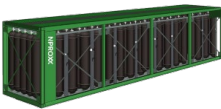
Aggregation of Critical Enabling Technologies Necessary



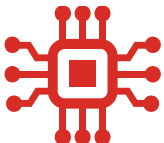
ICE Power



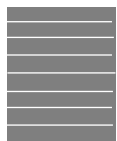
Axle and Traction Drive



Energy Storage



Controls



Fuel Cells



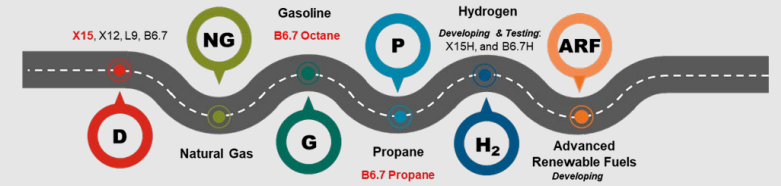
Power Electronics



Electrolyzers & Clean Energy

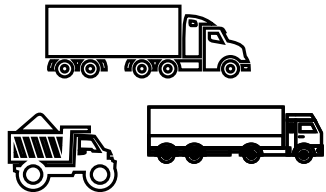
- Minimize **technology building block** portfolio to avoid proliferation
- Invest in right **optionality of all** to minimize technology switching costs

Transformational Platforming: **Fuel** **Agnostic Unified Global Platform** Reliable | Durable | Scale | Common



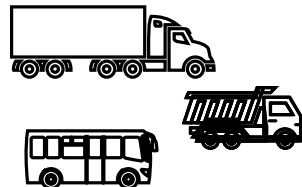
X

Clean Diesel
 Natural Gas
 Hydrogen



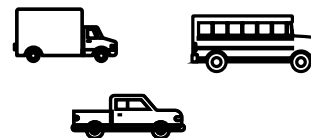
L

Clean Diesel
 Natural Gas
 Hydrogen



B

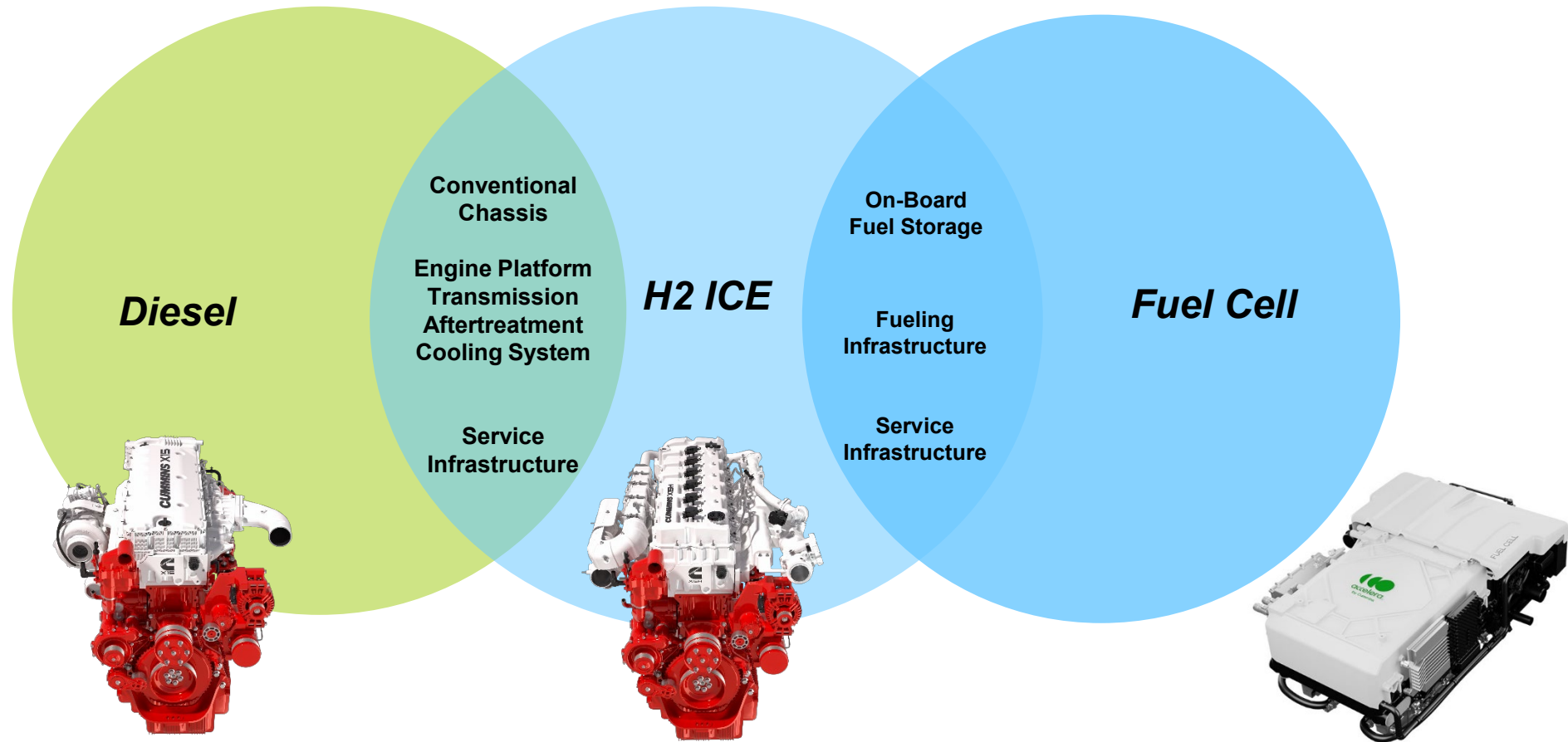
Gasoline
 Propane
 Clean Diesel
 Natural Gas
 Hydrogen



Fuel Agnostic Benefits

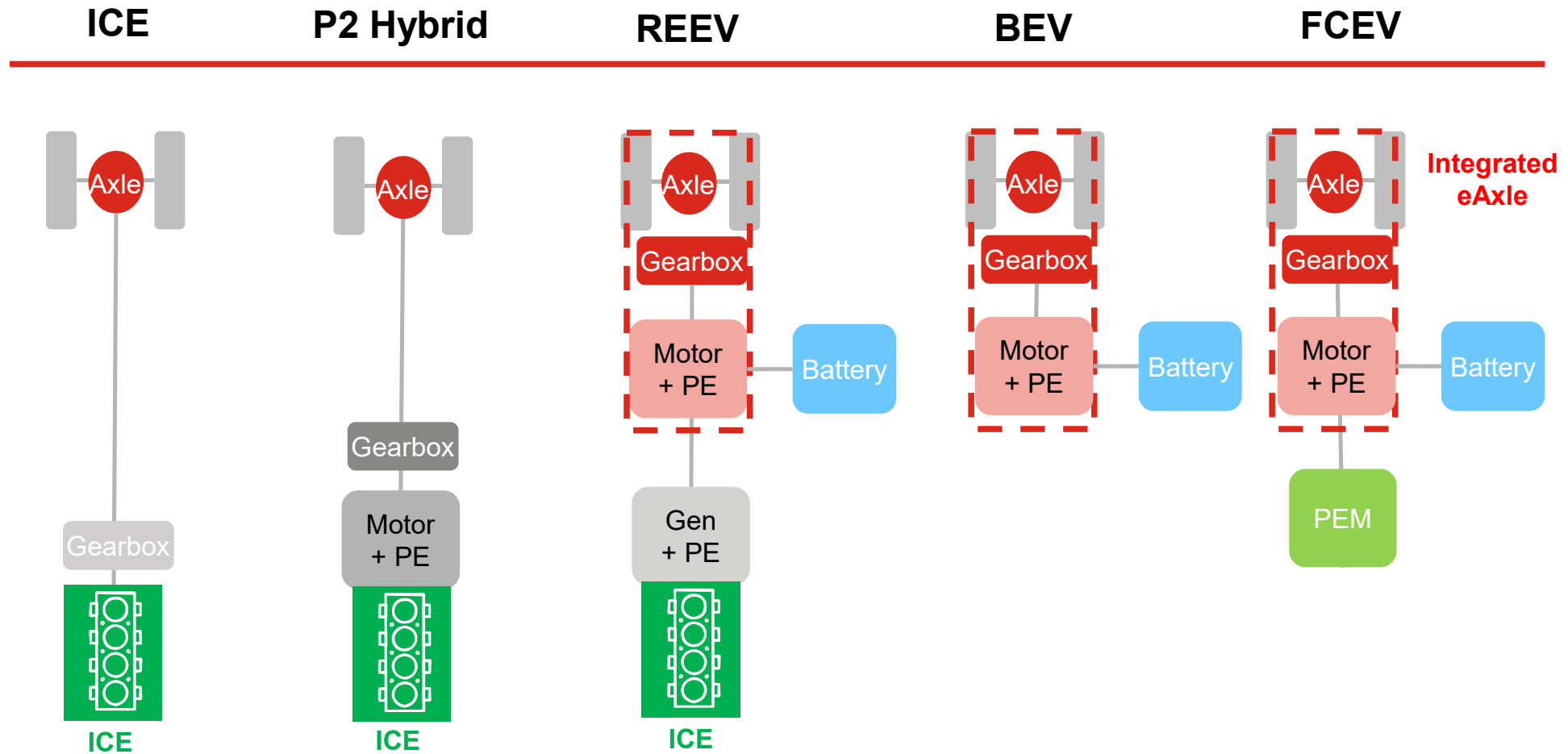
- Enables lower carbon fuels
- Reduce engine cost and development time
- Reduce OEM integration hurdles

Fast Maturity due to Technology Commonality

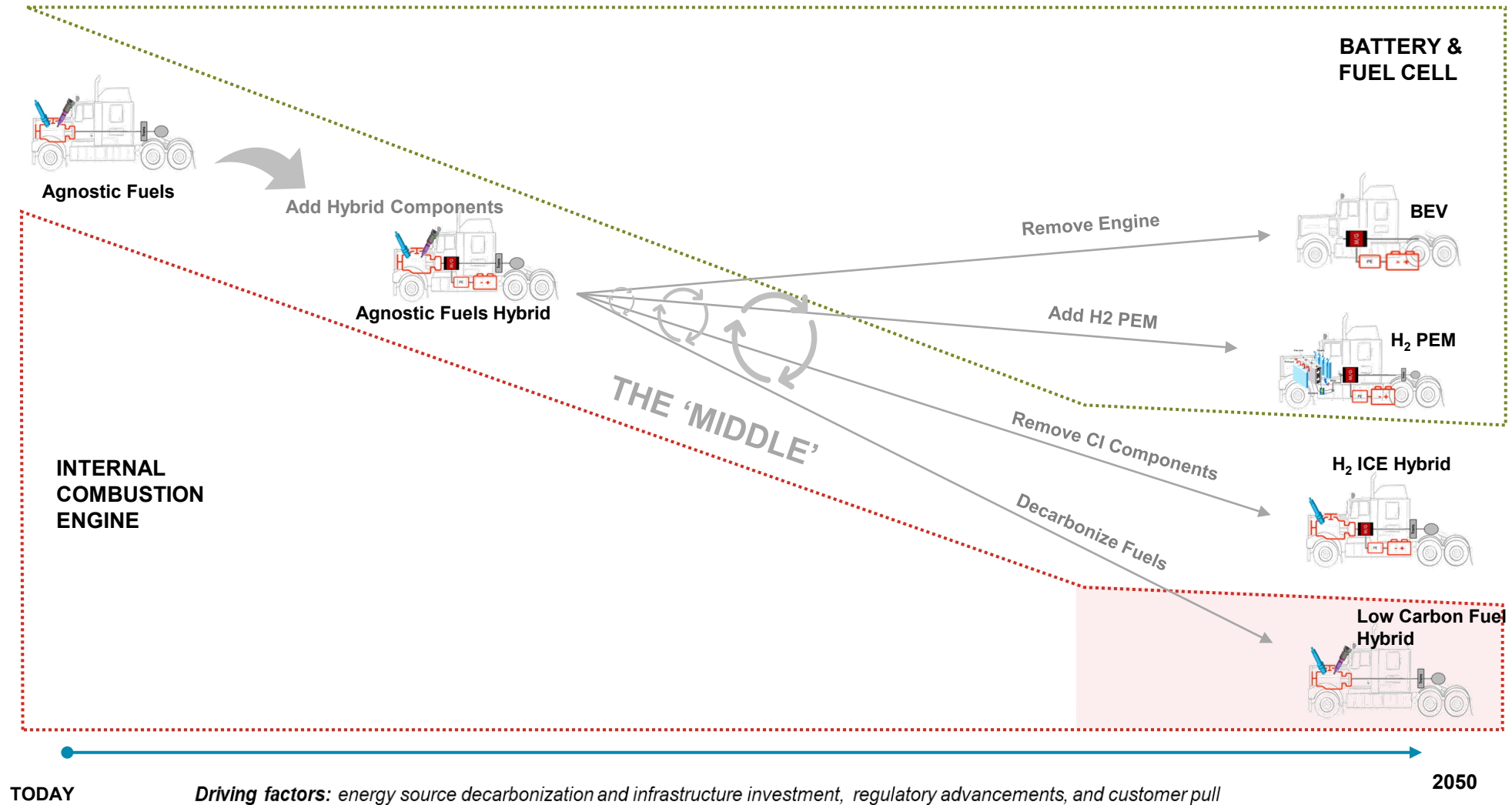


...and Accelerating Bridge to Fuel Cell

Transformational Platforming: **Complementary Electrified** Global Platform



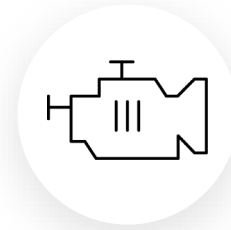
Messy Middle is *made resilient* by leveraging technology building blocks



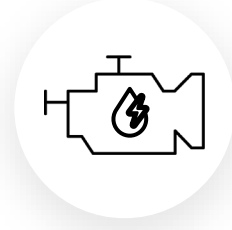
GOING FURTHER FASTER ON WELL-TO-WHEELS EMISSIONS AND PRODUCT LIFECYCLES

BY INNOVATING THE
ENERGY SOURCES AND THE
POWER SOLUTIONS

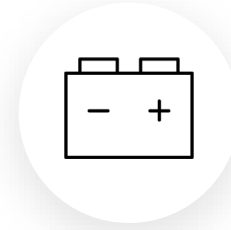
POWER SOLUTIONS



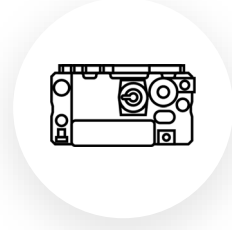
**ADVANCED
ENGINES**



HYBRID



**BATTERY
ELECTRIC**



**FUEL CELL
ELECTRIC**

ENERGY SOURCES



LOW CARBON FUELS

*Expand CNG, RNG,
Bio/Renewable Diesel*



ELECTRICITY

*Decarbonize
the grid*



HYDROGEN

*Produce
green H₂*