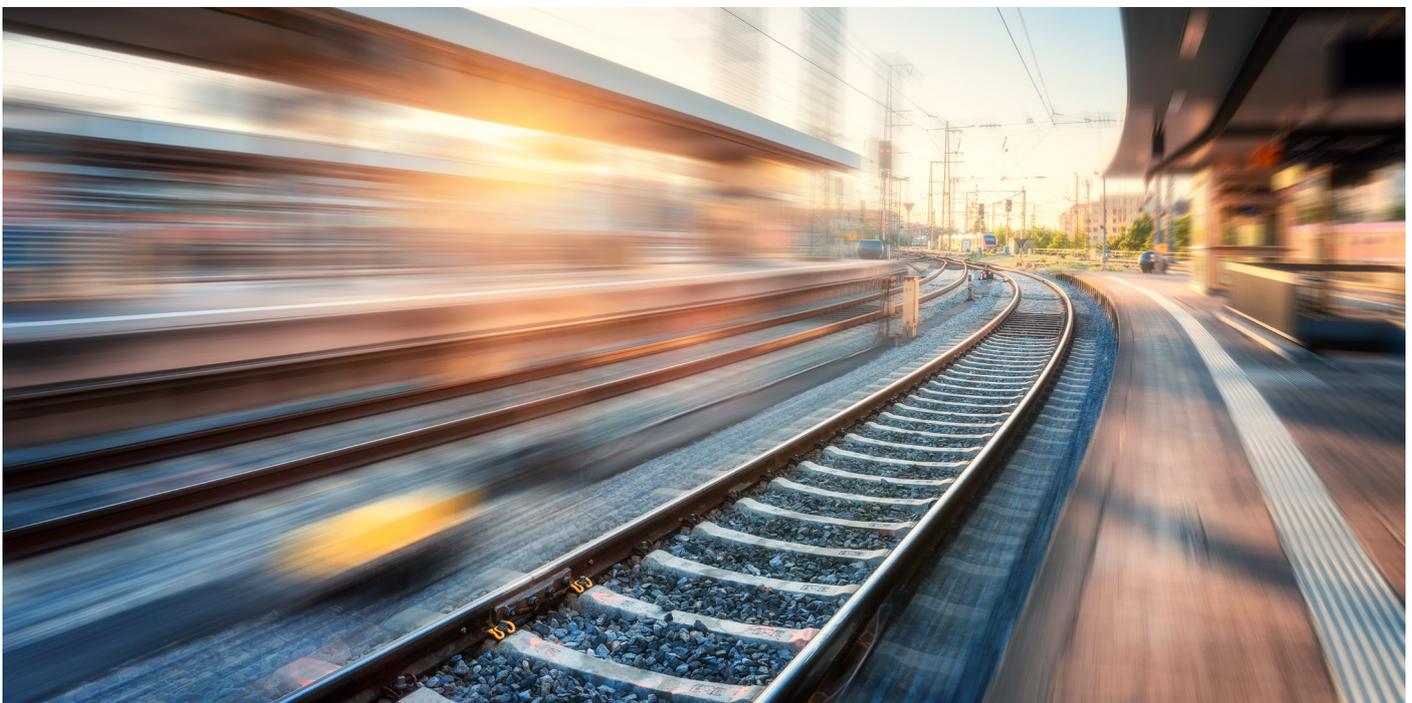


Cummins

There's Only One Destination Zero – But Many Ways Cummins Can Help You Get There



As a technology company committed to meeting the world's sustainability challenges head-on, Cummins's mission is to power a greener, more prosperous world.

We call this Destination Zero. Our broad portfolio of power solutions is innovative, dependable, and helps customers around the world improve their efficiency and environmental credentials.

Nowhere is this more apparent than in the rail industry.

Rail has a long history of underpinning economic growth. It transforms lives, businesses and communities. It has the potential to support responsible consumption and a circular economy in the face of increasing urbanisation and population growth.

Rail reduces road congestion and carries more customers and freight using less energy and producing fewer emissions than most other

modes of transport. Cummins recognises the potential of developing increasingly sustainable, more resilient and safer railways for everyone.

Our vision, experience and technical expertise help us look beyond the obvious and bring critical thinking to all sustainability challenges. Many companies are pursuing alternative power as a potential answer to the world's climate goals, and Cummins is leading the charge in battery, fuel cell and hydrogen production technologies. In fact, we're way ahead of the curve.



Our fuel cells and hydrogen technologies have already powered applications in the US, and now innovation continues to revolutionise passenger rail in Europe.

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Alstom is among the first railway manufacturers in the world to develop hydrogen fuel cell-powered passenger trains using Cummins technology. The zero-emission, low-noise Coradia iLint™ entered commercial service in Germany in 2018. It is re-positioning possible through a combination of different innovative elements: clean energy conversion, flexible energy storage in batteries, and smart management of traction power and available energy.

Specifically designed for non-electrified lines, it is clean and sustainable while ensuring high levels of performance. It's the

perfect illustration of Cummins's commitment to designing and delivering innovative and environmentally friendly solutions.

But what exactly is a hydrogen fuel cell and how does it work?

In simple terms, hydrogen fuel cells produce electricity from a chemical reaction caused by combining hydrogen and oxygen atoms. This reaction causes the hydrogen to split into protons and electrons. The protons pass through the proton exchange membrane unimpeded and proceed to the cathode side, while the electrons are blocked and forced to travel through an

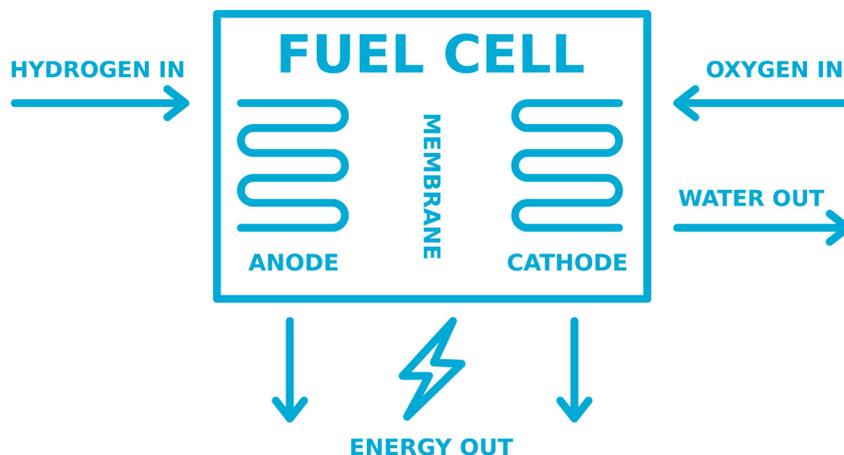
external circuit. As they travel along the external circuit, they provide the electricity to drive a motor. Eventually the hydrogen protons and electrons reunite and combine with oxygen to produce water – the only emission.

And when hydrogen is generated from renewable electricity, like solar, wind or hydropower, it is a completely decarbonised, renewable, fuel.

But there are many benefits to this technology beyond the environmental ones. It is inherently more efficient and reliable compared to the traditional combustion engine, due to having fewer moving parts.

But while technology such as hydrogen fuel cells are proving to be a viable path for a carbon-neutral future in a variety of mobile and stationary applications, our technological savvy and real-world experience tell us that some operators are not ready to adopt this technology yet, despite their environmental aims. There's the remote operational nature of many machines to consider and the availability of resources within a specific region – not to mention the commitment and cost involved in modernising their fleets and infrastructure. In fact, there are many social and economic factors why the transition to technologies such as hydrogen will be a gradual one.

And that's fine. Wherever you are in your sustainability journey, Cummins has a clean, durable, low-carbon solution to drive you forward on your journey to Destination Zero.



In the short term, there's plenty we can do, and plenty that we're already doing. For example, clean diesel technology is already part of Cummins's broad portfolio of products and results in a highly efficient, virtually smoke-free engine, which can significantly lower greenhouse gases with Tier 4 and Stage 5 engines. Cummins engines are also capable of running on alternative fuels, such as HVO which can lower your carbon footprint with no immediate change to fleets and infrastructure.

In addition to alternative fuels, innovative data analytics and reporting have an important role to play in optimising equipment performance and emissions reduction. PrevenTech® is Cummins's newest remote engine monitoring and reporting solution. By combining engine hardware, digital technologies and data-driven expert analysis, PrevenTech® delivers proactive recommendations that allow customers to increase equipment availability, improve safety and reliability, and enhance operational efficiency.

The journey we're on is a first-class ticket to a better, brighter future for all. And as the rail industry blazes a trail towards Destination Zero, Cummins will continue to drive innovation – helping customers meet their short-term sustainability goals and stay on track towards those longer-term decarbonisation aspirations.

Find out how Cummins can get you to Destination Zero at

www.cummins.com/company/esg/environment/destination-zero



WE'RE NOT JUST ON TRACK. WE'RE AHEAD OF THE CURVE.

From clean diesel to hydrogen fuel cells, we're making great strides to help rail operators around the world improve efficiency and meet their sustainability goals. Tomorrow's technology, hard at work today – Cummins fuel cell technology was the first in the world to power hydrogen trains in commercial operation.

Learn more at cummins.com/rail
or scan the QR code below.



**FOR
A WORLD
THAT'S
ALWAYS ON™**