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Vale Partners with Wabtec on Alternative Fuels Study and Orders Three FLXdrive Battery-Electric Locomotives



The goal is to eliminate the railroad's emissions in the future with battery power and alternative fuels

RIO DE JANEIRO, July 13, 2023 - Vale announced a partnership with



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The three 100% battery powered FLXdrive locomotives will be used on the Carajás Railroad (EFC), which runs the world's largest iron ore train consisting of 330 railcars transporting 45,000 tons. Today, three to four diesel locomotives pull the train. Once delivered, the FLXdrives will join the diesel locomotives to form Brazil's first hybrid consist pulling the train uphill for 140 kilometers in Açailândia, in the state of Maranhão, where fuel consumption is the highest. The FLXdrives will replace the two diesel locomotives, known as "dynamic helpers," that are used to pull the train uphill today.

Wabtec will build the FLXdrive locomotives at its plant in Contagem (state of Minas Gerais). The locomotives' delivery is forecast for 2026.

"Initially, we are maximizing energy efficiency, replacing the diesel locomotives in the dynamic helper with battery ones, but the idea is that, in the future, the other locomotives on the train can be fueled by ammonia. This way, we would have a clean operation at EFC," explains Vale's Director of Energy, Ludmila Nascimento. "This agreement is the first of many that we are seeking in order to accelerate the decarbonization of our railway operation," she adds.

Vale and Wabtec will work together on a study to use ammonia as a clean alternative fuel, which does not emit CO₂. The study will initially be carried out as lab tests to validate performance, emission reductions, and feasibility. Among the advantages of ammonia is the fact that it allows the locomotive a longer range than other carbon-free fuels. In addition, ammonia has a high-octane rating and an established large-scale distribution infrastructure. The two companies will carry out the study in a laboratory over the next two years.

Regenerative Energy

The FLXdrive locomotive's energy management system recharges the batteries along the route as the train brakes. "It's what we call regenerative energy produced by dynamic braking. Today, that energy is lost when a traditional locomotive brakes. In the downhill sections, we will be able to recharge the batteries, without having to stop the train's

The FLXdrive locomotives are estimated to save 25 million litres of diesel per year, considering the consumption of all the railway's trains that use the dynamic helper. This savings would reduce carbon emissions by approximately 63,000 tons, the equivalent emissions of around 14,000 passenger cars per year.

"Technological advances in battery power and alternative fuels are accelerating the decarbonization journey for railroads," says Danilo Miyasato, President and General Manager of Wabtec for Latin America. "Vale's innovative approach to adopting alternative fuels for its locomotives will benefit its customers, shareholders, and communities. The FLXdrive provides Vale productivity, safety, fuel economy, and emission reductions for its rail network."

Net Zero

In 2020, Vale announced an investment of between US \$4 and \$6 billion to reduce its direct and indirect emissions (scopes 1 and 2) by 33% by 2030. Today, Vale's rail network represents 10% of the company's carbon emissions. The initiative is one more step towards achieving the goal of zero emissions net carbon emissions by 2050, in line with the ambition of the Paris Agreement to limit global warming to below 2°C by the end of the century.

The company also committed to reducing its net emissions from its value chain (scope 3) by 15% by 2035.

About Vale

Vale is a global mining company that exists to improve lives and transform the future together. One of the world's largest producers of iron ore and nickel and a major copper producer, Vale is headquartered in Brazil and operates around the world. Its operations comprise integrated logistics systems, including approximately 2,000 kilometres

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leader in sustainable mining, and a benchmark in creating and sharing value.

About Wabtec

Wabtec Corporation is revolutionizing the way the world moves for future generations. The company is a leading global provider of equipment, systems, digital solutions and value-added services for the freight and transit rail industries, as well as the mining, marine and industrial markets. Wabtec has been a leader in the rail industry for over 150 years and is the worldwide leader in the decarbonization of freight rail. Visit Wabtec's website at www.wabteccorp.com.

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At Wabtec, we help our customers overcome their toughest challenges by delivering rail and industrial solutions that improve safety, efficiency and productivity.

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