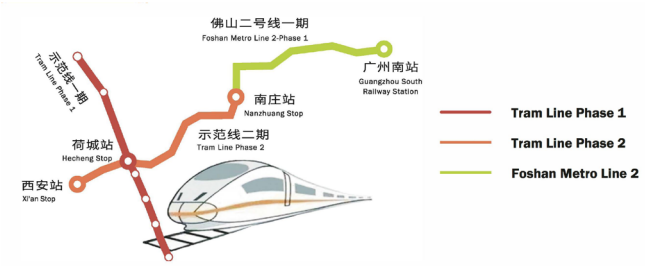
World's first commercial fuel cell-powered tram line – successfully in operation since 2019

Foshan Gaoming Hydrogen Tram

The acknowledgement of climate change as a major global issue that requires rapid attention has seen the recent, swift development and adoption of clean and sustainable transportation solutions – such as hydrogen fuel cells to power vehicles. In December 2019, CRRC Qingdao Sifang, one of the world's leading rolling stock manufacturers, and Ballard Power Systems launched the world's first hydrogen tram line, operating in Gaoming District, Foshan City, China.



The heavy-duty fuel cell tram was jointly designed by CRRC and Ballard, meeting stringent rail safety and reliability standards.

Operating on the west bank of the Xijiang river, the tramline consists of 10 stops across 6.5km, connecting Foshan's urban center with Guangzhou South Railway Station – an expanding hub serving the highspeed rail network.

The hydrogen tram developed by CRRC is powered by a combination of hydrogen fuel cells, a lithium-ion battery, and electric motors. The fuel cells generate electricity by combining hydrogen and oxygen, producing water and electrical energy. The energy is then used to power the electric motors that drive the tram's wheels. The lithium-ion battery serves as a secondary power source, providing additional energy for uphill climbs and acceleration.

Ballard fuel cell in numbers

Start of operation	2019
Passenger capacity	394
Total kilometers	>425,000
Top speed	70km/h
Range per refueling	125km
Ballard product	FCveloCity®-XD

The tram line connects bus stations, large residential communities, administrative and commercial centers, parks and factories. Since the launch of the project, five hydrogen trams have provided clean and sustainable transportation for over 600,000 passengers, with residents appreciating its quiet operation and zero-emission.

Powered by two Ballard FCveloCity®-XD 200kW fuel cell modules, the tram achieves a maximum speed of 70km/h with a maximum passenger capacity of 394 people. With the fuel cell trams now successfully running for more than three years, Ballard and CRRC have gained significant experience with hydrogen-powered rail systems – which can be positively applied to future projects.

> "After more than three years of operation and nearly half a million driven kilometers, we can say that hydrogen fuel cell technology is a solution for future commercial transportation."
>
> *Jack Fang,*
> *Customer Care, Ballard Power Systems*

The fuel cell tram has currently recorded a total of more than 425,000km driven during 35,000 operating hours, while meeting the target of 97% fuel cell availability.

The hydrogen refueling station at Zhihu depot has a daily capacity of 1,000kg of hydrogen and can serve a maximum of two trams at once. It takes just fifteen minutes to refuel the hydrogen trams, which provides 125km of range. Having now completed more than 3,500 refuels for fuel cell trams, the concept has proven itself.

CRRC's hydrogen tram project in Gaoming District, Foshan City, China is a promising example of how hydrogen fuel cell technology can be used to create clean and sustainable transportation solutions.

The project has achieved impressive results since its launch in 2019, and it is primed to continue to serve as an important model for an increasing number of transportation providers in the future.

About Ballard Power Systems

Ballard is a world leader in the development, manufacture, sale, and servicing of PEM hydrogen fuel cells. With more than 44 years of experience, Ballard represent decades of innovation and engineering leadership in clean energy solutions. Our fuel cell technology powers buses, trucks, trains and ships, as well as stationary power systems.
To learn more about Ballard, please visit: www.ballard.com

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