

Pune Inc | From campus lab to startup: Hydrovert Energy aims to transform India's urban mobility with hydrogen powertrains

Pune-based Hydrovert Energy's powertrains are designed as direct substitutes for diesel and CNG engines, particularly in segments where electrification has struggled.

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Satyajit Phadke (right) with co-founder Supriya Patwardhan with their Hydrogen Powered Motorcycle. (Express Photo)

Written by Alister Augustine

In [Pune](#), well known for its research institutions and growing startup ecosystem, a clean energy company is quietly working on a technology it believes could redefine how Indian cities power their vehicles and generators.

Hydrovert Energy, co-founded by scientist-entrepreneur Satyajit Phadke, is developing hydrogen fuel cell powertrains—components that generate power and deliver it to the wheels—and generators aimed at replacing polluting diesel engines with zero-emission alternatives. It is incubated at Venture Center, an initiative of the National Chemical Laboratory, and works out of the NCL campus.

Born on campus

Phadke, 40, who serves as the chief executive officer and chief technology officer of the company, traces the origins of Hydrovert Energy not to a boardroom, but to an academic laboratory in the US. “I got exposed to the field of hydrogen fuel cells during my PhD, where my research focused on developing a critical membrane for this technology,” he said.

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His doctoral work at the University of Florida, completed in 2010, was followed by further research stints at the Massachusetts Institute of Technology and Princeton University.

Those years shaped his long-term ambition. “Due to my education, I always had the desire to develop and manufacture products powered by hydrogen,” said Phadke.

That ambition took concrete shape after he returned to India in 2019, along with co-founder Supriya Patwardhan, who has an MBA from Mannheim Business School in Germany and over a decade of experience in sales, operations, and strategy across India and Europe. Phadke began exploring how hydrogen technologies could be adapted to Indian conditions. After two years of research and planning, they incorporated Hydrovert Energy Private Limited in 2021.

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Cleaning up the environment

At the core of Hydrovert’s work is a simple idea with far-reaching implications: using hydrogen fuel cells to generate electricity without producing harmful emissions.

“Currently, we depend on diesel, petrol, CNG, and coal for transport and power generation. All of these result in CO₂ and other harmful emissions. The only emission from our hydrogen powertrains is pure water,” Phadke said.

Unlike conventional internal combustion engines, hydrogen fuel cell systems do not emit greenhouse gases or particulate matter from the tailpipe. Hydrovert’s powertrains are designed as direct substitutes for diesel and CNG engines, particularly in segments where electrification has struggled.

One such segment is cargo mobility. The company has developed a 10-kilowatt hydrogen powertrain that has been deployed on a cargo three-wheeler, a workhorse vehicle widely used for last-mile deliveries in Indian cities. The prototype is currently undergoing testing and certification. “This market is heavily served by diesel and CNG engines, which are a major source of urban pollution, and our hydrogen powertrain is a zero-emission replacement,” said Phadke.

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Hydrovert plans to expand this technology to light and medium commercial vehicles in the coming years. Parallely, the startup has developed a hydrogen-powered generator set

designed to replace diesel gensets, which are increasingly restricted in urban areas due to air and noise pollution. The hydrogen genset produces electricity with minimal noise, low heat output, and zero tailpipe emissions. It is currently being tested at the NCL Innovation Park in Pune, where Hydrovert's workshop and office are located.

Operating from within the NCL campus has also helped the company engage with the wider community. Hydrovert regularly participates in outreach programmes organised by the Innovation Park for students and young visitors. "We give demos of our products in operation so people can actually see what is possible with next-generation clean technologies," said Phadke.

Supporters and sceptics

Institutional support has also played a crucial role in the company's journey as Hydrovert is working under a programme sponsored by the Maharashtra Energy Development Agency (MEDA), with the NCL and the Central Institute of Road Transport (CIRT) as partners. Under this initiative, CIRT is developing certification standards for hydrogen-powered cargo three-wheelers, a key step towards deploying such vehicles on Indian roads. MEDA is also exploring pilot deployments of these vehicles for garbage collection in Maharashtra.

Phadke said, "Garbage and air pollution are two major concerns for Indian cities. Using hydrogen-powered three-wheelers for waste collection can address both, while also creating public awareness about clean technologies."

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Like many deep-tech startups, Hydrovert faced scepticism in its early years. He said, "One of the major obstacles was the lack of belief in new technologies as we spent countless hours explaining the techno-economics of hydrogen fuel cells to investors." Initial development was supported through grants from agencies such as the central Department of Science and Technology, Department for Promotion of Industry and Internal Trade, and United Nations Industrial Development Organization (UNIDO), along with corporate social responsibility funding. As the products reached trial stages, private investors began to show greater interest.