

The many benefits of fuel cell technology

The use of fuel cell technology in the Starbus Fuel Cell bus ensures a host of benefits. They cover both efficiency & performance parameters as well as the environment.

Enhances Efficiency & Performance

- Gasoline engines in conventional buses are less than 20% efficient in converting chemical energy to power whereas Starbus Fuel Cell offers 40-60% efficiency, i.e. 3 times more
- Starbus Fuel Cell ensures 50% reduction in fuel consumption
- A dependable, mobile and flexible system
- Domestically produced fuel – no dependency on foreign policies
- Fast refuelling ensures reduced downtime

Improves the Environment

- Reduction of air pollution today - possibility of eliminating pollution in future
- The only emission is water vapour
- In the conventional sense, Starbus Fuel Cell is a **ZERO POLLUTION** bus
- Totally safe, clean & quiet operation
- Starbus Fuel Cell is **COMPLETELY NOISELESS** because it doesn't run on a combustion engine, thereby emerging as a major driver of environmental initiatives
- Significantly enhanced ride experience for both driver and passengers because of:
 - Quiet & effortless acceleration, for less fatigue
 - Quiet & smooth ride, for a highly relaxing journey



Technical Specifications

Bus	LPO 1625 Hydrogen Fuel Cell Bus
Seating Capacity	30
Fuel Cell Power System	Hydrogen Fuel Cell
Fuel Cell Gross Peak Power	85 kW
Air Compressor for Fuel Cell	Single Stage Twin Screw Type
Fuel System	Roof-mounted Hydrogen Cylinders; 4 nos. (205 l capacity each)
Total Useful Amount of Fuel	14.5 kg
Electric Propulsion Motor	2 Rear - AC Induction Motors with Summation Gearbox
Peak Power Output of Motor	186 kW
Rated Speed	Idle: 600 r/min; Max.: 2100 r/min
Rated Torque	1050 Nm @ 800 r/min
Energy Storage System	Li - Ion Battery
Steering	Hydraulic Power Steering
Suspension	Pneumatic Suspension & Hydraulic Double Acting Telescopic-type Shock Absorber at Front & Rear
Brakes	Full Air Dual Circuit SCAM with ABS
Tyres	11 R 22.5 Radial Tubeless; 7 nos.
Electrical System	System Voltage - 24 V DC; Battery - 2 x 12 V, 150 Ah; Alternator - 75 A
Max. Speed	70 km/h
Gradeability	17%
Wheelbase	6300 mm
Body Dimensions (LxWxH)	12000 mm x 2600 mm x 3500 mm
Floor Height	390 mm

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For more information, please visit our website:
www.buses.tatamotors.com or email: businfo@tatamotors.com

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The arrival of
zero pollution transportation
in India



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Across the world, governments are introducing legislation that ensures the adoption of practices for a cleaner and greener world. A major focus is on finding cleaner alternate fuels for use in public transportation. The objective is to use fuels that are sustainable.

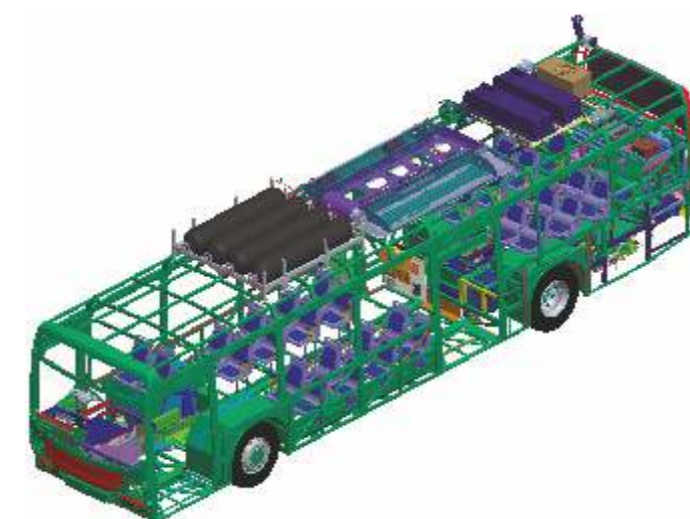
A pioneering role

In India, Tata Motors has always led the drive for using cleaner fuels for public transportation. Way back in 1999, the company introduced CNG buses, followed by the revolutionary CNG Electric Hybrid buses in 2010. And now in 2012, it has taken the lead to introduce the **latest fuel cell technology** with the new **Starbus Fuel Cell bus**.



Internationally accepted 'clean, green' bus

The technology that powers the Starbus Fuel Cell is used in many countries, to run both passenger cars and public transportation. In London alone, over 100 fuel cell buses transport people. Another 50 such buses are running in North and South America, Europe, Asia and Australia. In India, once again Tata Motors has played a pioneering role by bringing this first-of-its-kind technology on Indian roads.



The fuel stack is fitted on the rear module of the bus, as shown below:



Get to know fuel cell technology

About three times more efficient than combustion, a fuel cell operates like a battery but without any need for recharging. The fuel cell generates electricity and water as long as the fuel - hydrogen and oxygen, are supplied to it.

- The power to drive the bus motor involves an electrochemical process, not combustion
- Hydrogen and oxygen combine to generate electricity which is converted to mechanical energy, to drive the motor
- Fuel cell vehicles produce **zero pollution** since only water and heat are the by-products

How does a fuel cell work?



A fuel cell consists of two catalyst coated electrodes with an electrolyte

- When hydrogen enters the anode, electrons & protons from the atoms get separated due to the catalyst
- Protons pass through the electrolyte to the cathode
- Electrons are directed through an external circuit, thereby generating electricity
- At the cathode, oxygen combines with the protons & electrons to produce water and heat

Individual fuel cells are placed in a row to form a fuel cell stack, to generate a high amount of electrical energy, to power a vehicle

In Starbus, a Proton Exchange Membrane (PEM) type of fuel cell is used due to high power density, which can vary the output quickly for start-up, making it popular for use in automobiles

