



## WELCOME TO EBUS

Ebus is the premier developer and integrator of electric drive technology for transit applications. Ebus pioneered the 22-foot electric bus and trolley platform that is now available in all-electric, hybrid and fuel cell models. For over a decade, Ebus has deployed highly efficient, battery-electric vehicles from California to Connecticut.

The innovative design and engineering behind Ebus transit solutions allow city fleets to step into the world of electric drive transportation and reap the benefits of clean, reliable and fuel-efficient transportation.

Ebus' advances with battery-electric propulsion evolved into the accomplishment of developing the **first cost-effective plug-in hydrogen fuel cell bus**. With traditional fuel cell buses priced over \$2 million, the Ebus model makes plug-in hydrogen fuel cell vehicles a reality for clients wishing to purchase in the \$600,000 range.

The **Ebus Plug-in Fuel Cell Bus** is 22 foot long with 22 seats and is based on proven electric drive technology. It is available at the low price (for a fuel cell bus) of \$650,000. Discount prices are available for larger quantities. Delivery is about 4 months.

The original 22-foot (22 passenger) **Ebus Electric Buses and Trolleys** have been upgraded for fast-charging and are priced at \$295,000 and \$315,000, respectively. Micro-turbine hybrid versions are available of the buses and trolleys.

Ebus will integrate its new fast-charge all-electric, fuel cell electric or hybrid electric propulsion system into larger buses, from mid-size 30 foot to full-size 40 foot platforms. Retrofit conversions of existing buses are available.

Please contact **Ebus Sales** for a customized solution.



## **ABOUT EBUS**

Since 1998, Ebus has been on the cutting edge of providing electric drive technology solutions for transit applications. A leader in this arena, Ebus pioneered the 22-foot electric bus and trolley platform that continues being manufactured in all-electric, hybrid-electric and fuel cell versions.

Ebus' team of skilled managers, designers, and production specialists are based in the 4-acre facility in Downey, California.

Cities throughout the United States have benefited from the range of cost-effective, electric drive vehicles manufactured domestically by Ebus. Electric drive is what all of Ebus' vehicles have in common and no team has more experience with this technology than Ebus.



## **OUR PRODUCT LINE**

Ebus has a proven track record of providing the highest quality electric drive buses and trolleys. The current product line includes a range of fast-charge electric, hybrid-electric and fuel cell electric buses, and fast-charge electric and hybrid-electric trolleys. Each vehicle represents years of research and development culminating in the availability of clean, reliable and fuel-efficient transit solutions.

**Electric Drive** is the common denominator of all the vehicles that Ebus provides. An electric traction motor drives the rear axle instead of an internal combustion engine, as in an ordinary bus. The electric traction motor is powered by the battery system, via an inverter.

**In an all-electric bus**, the battery system needs to be re-charged periodically from an external charger connected to the electric grid. With the optional 90KW Fast-Charger, this becomes fast and convenient.

**In a fuel cell bus**, the fuel cell system can charge the battery system continuously and there is no requirement to connect to an external charger. However, it may still be desirable to do so, since electricity from the grid is always the cheapest. Driving range is only limited by the amount of hydrogen available. The fuel cell bus can also be charged with the optional 90KW Fast-Charger and be operated in battery-electric mode with the fuel cell turned off.

**In a series hybrid-electric bus**, a micro-turbine generator serves the role of continuously charging the battery system and there is no requirement to regularly connect to an external charger. The amount of fuel onboard determines the driving range of the hybrid vehicle.

Ebus manufactures its 22 foot buses and trolleys "from the ground up", but is also capable of providing a complete turn-key hybrid system for larger transit buses, new or existing.

For more information, please select from the drop-down menu above.



## **EBUS PLUG-IN ELECTRIC FUEL CELL**

### **The Opportunity**

With Federal and State agencies working to reduce our dependence on fossil fuels, the transportation industry is searching for an alternative. Hydrogen is emerging as the long-term solution.

### **Why Hydrogen?**

Hydrogen is the most common element. Hydrogen can be extracted through reformation of natural gas or electrolysis of water. The electric power for the electrolysis can in the future come from renewable sources, such as sun or wind. In the meantime, hydrogen is already being produced in vast quantities from natural gas for industrial purposes, such as petroleum refining and hydrogenization of vegetable oils (margarine). Diverting just a small amount of that hydrogen for transportation would support thousands of fuel cell buses thus bridging the transition to a renewable source of hydrogen.

### **Why is the Ebus Plug-in Electric Fuel Cell Bus significantly less expensive than existing fuel cell buses?**

Ebus Plug-in Electric Fuel Cell Bus - \$650,000/one or \$495,000/four or more Other Fuel Cell Buses - \$2,000,000+/one The Ebus Plug-in Electric Fuel Cell bus is derived from its proven and compact (22 foot) battery-electric bus, therefore requiring a much smaller fuel cell system. The bus platform was specially designed from the beginning to accommodate a large battery, placed between the axles for the lowest possible center of gravity. The Ebus fuel cell systems is built around the Ballard fuel cell stack. Ballard is recognized as the worldwide leader in fuel cell stacks.

Fuel cell bus projects by other companies, on the other hand, have been conversions of ordinary full-size diesel buses, none of which ever existed in pure battery-electric form. Without a large battery, the fuel cell system has to be much larger, as well as the size of the hydrogen tanks, increasing the cost dramatically. The Fuel Cell bus developed by Ebus is the most affordable on the market today at \$650,000. As with all Ebus vehicles, fleet pricing and discounts are available. To learn more about the Fuel Cell bus, please **click here** to download a brochure.



## **EBUS ELECTRIC**

Battery-electric propulsion is the **cleanest, quietest** and **most economical** propulsion method available today. Driving range for the Ebus Electric Bus is approximately 45 miles between charges, which can be accomplished in about 30 minutes with the Ebus-built 90KW Fast-Charger.

The Electric Bus is ideal on urban circulator routes, university campuses, or in residential neighborhoods where the very low noise level is appreciated. The 22-foot long bus accommodates 22 seated passengers and 10 standees.

Regenerative braking also increases the energy efficiency of each bus by returning energy to the battery system whenever the vehicle is decelerating. Low maintenance nickel cadmium batteries provide about 45 miles of operation between charges and have a life expectancy of up to 2,000 cycles.

The Ebus 22 foot Fast-Charge Electric Bus starts at \$295,000, plus taxes and shipping. The 90KW Fast-Charger is priced at \$58,000 and can support multiple buses or trolleys.

To learn more about the Electric bus, please **click here** to download a brochure.

For more information about Electric Drive technology, please visit: Electric Drive Transportation Association – [www.electricdrive.org](http://www.electricdrive.org)



### **HYBRID-ELECTRIC BUS**

Ebus hybrid-electric buses are designed to seat 22 passengers, plus standees, and are fully ADA compliant, making them ideal for a variety of applications and routes including: circulator, shuttle, campus and neighborhood service.

For those transit applications requiring greater range than battery-electric propulsion can provide, or where it is not feasible to provide fast-charging on the route, Ebus offers a proven, **ultra-low emission micro-turbine** as an onboard hybrid generator. When so equipped, the range is limited only by the amount of fuel in the tank. There are two versions of the micro-turbine: one operating on HD-5 propane and the other on low sulfur diesel fuel. The micro-turbine is supplied by Capstone Turbine Corporation and has been certified by the California Air Resources Board (CARB) for transit applications. The micro-turbine is clearly the most cost-effective solution to extending range, while maintaining clean and quiet operation.

The hybrid-electric bus starts at \$325,000.

To learn more about the 22-foot micro-turbine hybrid electric bus, please **click here** to download a brochure.

For more information about Electric Drive technology, please visit: Electric Drive Transportation Association – **[www.electricdrive.org](http://www.electricdrive.org)**



### **FAST-CHARGE ELECTRIC TROLLEY**

Battery-electric propulsion is the cleanest, quietest and most economical propulsion method available today. Driving range is approximately 45 miles between charges, which can be accomplished in about 30 minutes with the Ebus-built 90 KW Fast-Charger.

The electric trolley is ideal on urban circulator routes, university campuses, or in residential neighborhoods where the very low noise level is appreciated. The 22 foot long trolley accommodates 22 seated passengers and 10 standees.

Regenerative braking increases the energy efficiency of the trolley by returning energy to the battery system whenever the vehicle is decelerating.

Low maintenance nickel cadmium batteries provide about 45 miles of operation between charges and have a life expectancy of up to 2,000 cycles.

The Ebus 22 foot Fast-Charge Electric Trolley starts at \$305,000, plus taxes and shipping. The 90KW Fast-Charger is priced at \$58,000 and can support multiple buses or trolleys.

To learn more about the Fast-Charge Electric Trolley, please **click here** to download a brochure.



### **HYBRID-ELECTRIC TROLLEY**

Ebus hybrid-electric trolleys are designed to seat 22 passengers, plus standees, and are fully ADA compliant, making them ideal for a variety of applications and routes including: circulator, shuttle, campus and neighborhood service.

For those transit applications requiring greater range than battery-electric propulsion can provide, or where it is not feasible to provide fast-charging on the route, Ebus offers a proven, ultra-low emission micro-turbine as an onboard hybrid generator. When so equipped, the range is limited only by the amount of fuel in the tank. There are two versions of the micro-turbine: One operating on HD-5 propane, the other on low sulfur diesel fuel.

The micro-turbine is supplied by Capstone Turbine Corporation and has been certified by the California Air Resources Board (CARB) for transit applications. The Micro-turbine is clearly the most cost-effective solution to extending range, while maintaining clean and quiet operation.

The hybrid-electric trolley starts at \$335,000.

**Click here** for the micro-turbine hybrid-electric 22 foot trolley specifications.





## THE HYDROGEN SOLUTION

### **Increased use of hydrogen as a fuel can provide benefits to energy security, the environment and economic growth.**

Hydrogen can benefit energy security through energy diversification as it can be produced from a variety of primary energy sources, including renewables. For this reason, hydrogen is a leading alternative to oil. When used in transportation applications, hydrogen can benefit the environment because it can be produced and used in ways that improve air quality and reduce greenhouse gas emissions. Hydrogen can contribute to economic growth through job development, investment opportunities, and the creation of a sustainable, secure energy supply. Supporting advanced Fuel Cell technology positions your organization as an environmental and technological pioneer in zero emission transportation.

### **Why is hydrogen used as a fuel?**

Hydrogen has the highest energy content per unit weight of any known fuel-52,000 Btu/lb (120.7 kJ/g). It burns cleanly. When hydrogen is burned with oxygen, the only byproducts are heat and water. When burned with air, which is about 68% nitrogen, some oxides of nitrogen are formed. The process of converting hydrogen to energy using engines or fuel cells is much more efficient than the comparable gasoline counterparts.

### **How does hydrogen compare with other fuels like gasoline and diesel?**

- Hydrogen can be totally nonpolluting (water is the exhaust).
- Hydrogen can be economically competitive with gasoline or diesel.
- Hydrogen can be as safe as gasoline, diesel, or natural gas.
- Hydrogen can help reduce our dependence on imported fuels.
- Hydrogen can be produced in any country or locale from a variety of energy sources.

Sources: U.S. Department of Energy, National Hydrogen Association

### **Where can I fuel a hydrogen vehicle?**

**Click here** to find hydrogen fueling stations in the U.S. and Canada.

For more information about Hydrogen technology, please see available links:

National Hydrogen Association – [www.hydrogenassociation.org](http://www.hydrogenassociation.org)

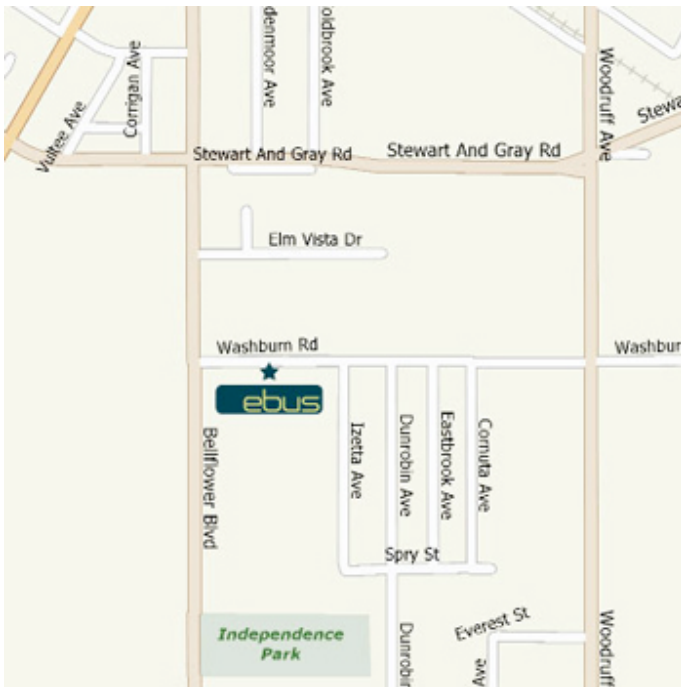
Fuel Cells 2000 – [www.fuelcells.org](http://www.fuelcells.org)

Ballard Power Systems – [www.ballard.com](http://www.ballard.com)



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