

Electric Fuel wants to change the way America rides the bus.

And that's a breath of fresh air.

A New Reality:

Electric Fuel Transportation Corp.'s revolutionary zinc-air fuel cell has made zero-emission transportation a reality. Following an intensive development program funded in part by the US Federal Transit Administration, EFTC has introduced the first practical full-sized all-electric transit bus.

The Need:

A single diesel-engine bus generates as much air pollution as 4,000 passenger cars. In addition to the environmental damage associated with gasoline-run vehicles, diesel exhaust poses a particular threat to human health, and has been closely linked both to cancer and to an alarming increase in childhood illnesses involving reduced lung function.

The Solution:

Electric Fuel offers mass transit planners a clean break from the problems of conventional bus transportation. EFTC's Zinc-Air system provides the muscle behind zero-emission vehicles that meet all industry standards for speed, range and acceleration — all at a price that competes with petroleum-based fuel. Mounted into standard forty-foot city transit buses, EFTC's fuel cell system is the driving force behind tomorrow's transportation.

The Zinc-Air Zero-Emission Electric Transit Bus

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The Electric Fuel Advantage

On the Road — Full Time

- Eight hours continuous service without recharge
- Rapid, Zinc-Air module exchange in minutes at the end of the driver's shift
- Freedom from the "plug-in-and-wait" recharge of conventional electric buses
- No on-site charging or fueling infrastructure

Top Performance — All Day Long

- Meets or exceeds conventional bus standards under all city conditions
- Zinc-Air fuel cell stack provides continuous power for cruising
- Auxiliary rechargeable battery handles peak power demands, and recaptures energy during braking
- Operation of air conditioning and other peripherals with no performance degradation
- Zinc-Air specific energy of 200 Wh/kg (watt-hours per kilogram) — dramatically higher than any existing EV system

A Clean Transportation Option that Works

- Zero tail-pipe emissions
- Safe, environment-friendly fuel cell materials
- Quiet operation that cuts city noise pollution

The Bottom Line — An Economical Alternative to Diesel Fuel

- Total operating costs comparable to standard diesel buses
- Centralized refueling strategy that keeps fleet costs down
- Low man-hour maintenance requirements
- Petroleum independence and predictable cost-per-mile

Bus Specifications

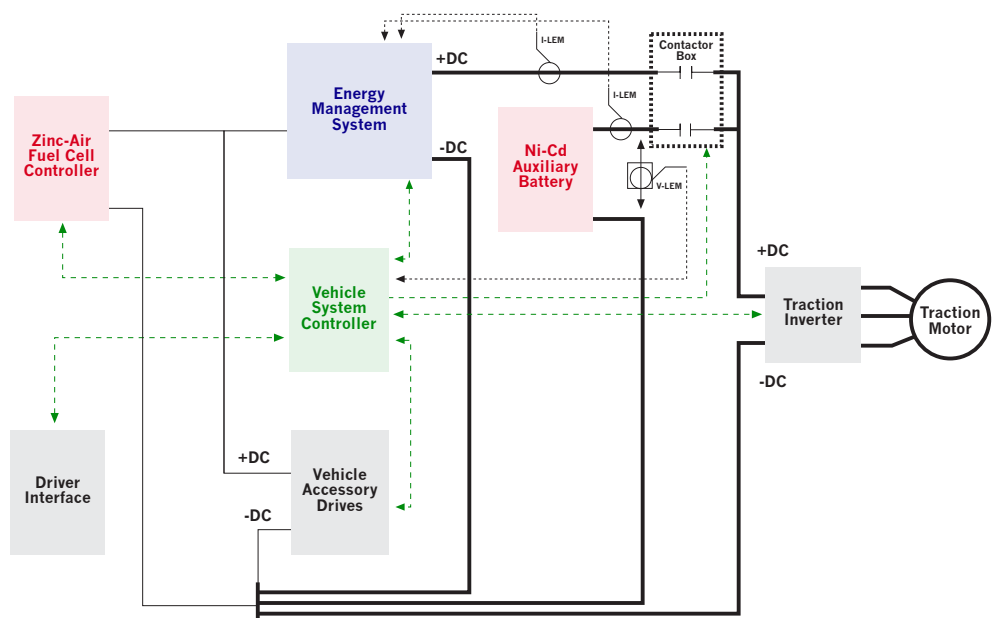
Vehicle Model	40-ft. NovaBus RTS transit bus	
Vehicle Weight	Seated Load Weight (SLW) 36,700 lb. Gross Vehicle Weight (GVW) 40,000 lb.	
Drag and Tire Resistance Parameters (est.)	Frontal Area 84 sq. ft. Drag Coefficient 0.55 Rolling Resistance Coefficient 0.011	
Electric Drive Train	General Electric 200 hp liquid-cooled induction motor and DC-AC traction inverter	
All-Electric Hybrid Energy System		
	Zinc-Air Fuel Cell	Auxiliary Battery (Ni-Cd)
Energy Capacity	312 kWh	22 kWh
Voltage	250V - 400V	310V
Power Rating	99 kW for 3 min 56 kW continuous	125 kW peak
Bus Performance		
	Conditions	Performance Goal
Maximum speed at GVW		52 mph
Continuous Operation at GVW	straight road, 0% grade, 10 kW accessory load	32 mph speed, 175 mile range
Gradeability at SLW	16% grade	7 mph
	2.5% grade	44 mph
Acceleration at SLW	Speed (mph)	Elapsed Time (sec)
	0-10	5.6
	0-20	10.1
	0-30	19.0
	0-40	34.0
Driving Cycle Range at SLW (with accessories operating)	CBD-14 Cycle	95 mile range (design) >100 mile range (actual) < 8 hours (actual)
	Modified NY Bus Cycle (3.9 mph avg. speed)	47 mile range (design) >12 hours



Zinc-Air Fuel Cells installed on bus



Electric Fuel Zinc-Air 47-cell module



Block Diagram of All-Electric Transit Bus System