



Martin Romjue

KRYSTAL ELECTRIC BUS SUPPLIES ROI VOLTAGE

THE REVOLUTIONARY NEW 36-PASSENGER BUS ALREADY OFFERS SUBSTANTIAL SAVINGS THAT ARE EXPECTED TO MULTIPLY WITH ADVANCING TECHNOLOGY IN THE NEXT FEW YEARS.

C

By Martin Romjue, editor

— Krystal Infinity aims to generate some new buzz about electric vehicles with the launch this year of its EVOlution all-electric mini-bus.

As the only electric mini-bus of its size so far on the U.S. market, the KK38 EVOlution is leading the charge against current perceptions that electric vehicles are too expensive and impractical for fleet operators.

True, the EVOlution has a base price of \$459,000, but when conservative estimates of return-on-investment (ROI) are factored in, along with myriad intangible benefits, the EVOlution can be a reasonable investment when used for shuttle routes. ROI numbers are only set to improve in the next five years as battery technology becomes more efficient and expected increases in demand for electric buses will bring better production-related economies of scale.

“The basis is the route you are driving on — how many miles will you drive in a year?” says David Webb, president of Capitol Coachworks Inc. in Capitol Heights, Md., the exclusive distributor of the KK38 EVOlution. “The best application is a shuttle one. If you don’t put miles on it, you won’t have the savings.”

Evolution Evolving

Webb debuted the EVOlution, the first zero emissions all-electric mid-sized shuttle bus, to the federal government July 25-26 at the 11th annual National Motor Vehicle and Aviation Training Ex-

FYI: EVOlution Tech Specs

The EVOlution is built on a commercial International chassis. Before the Krystal steel roll cage body is mounted, the engine and accessory drive systems are removed and replaced with a 230-volt AC continuous primary drive and a 40 kW liquid-cooled flux vector motor controller accessory drive. Under a fast charge, the batteries can fully recover in less than one hour. The shuttle bus also has sealed electrically isolated battery modules that do not produce any gases, and a drive train free of any emissions. Krystal has set up a national technical support network for its electric and hybrid diesel electric buses.

position (FedFleet 2011) in Orlando, Fla. The expo is considered the largest national transportation event for the federal government agencies that contract for vehicles.

The 38-foot long plug-in electric vehicle, based on the Krystal KK38 bus model, is capable of a 150-mile range under average loads with a maximum speed of 65 mph. The bus has immediate torque and a maximum speed of 72 mph, but by setting the governor at 65 mph, it can extend the batteries.

Since LCTMag.com first reported the Krystal EVOlution debut on July 27, Webb spoke to LCT Magazine for this issue about the future of electric buses and provided some back-of-the-envelope estimates on energy savings and ROI for operators.

Webb underscores the point that ROI will only go up in coming years, but beyond any hard-nosed cost-benefit analysis, there is a vast set of intangible ROIs for an electric bus that cannot be quantified. “The most obvious advantage is environmental because of the gases not being spewed into the atmosphere,” Webb says. “You also have a quieter and smoother ride than fossil fuel buses. It’s a more comfortable experience for the riders.”

What is the Hard-Core ROI?

Webb estimates the overall out-the-door (OTD) cost of an EVOlution now comes out to just under \$500,000 when options and charging equipment are included. A

Evolution ROI Estimated Cost Savings



*Based on 25,000 annual service miles

Fuel/energy: \$15,000/yr

Maintenance: \$5,000/yr

Purchase price: \$154,000 net less by 2016

Federal, state and/or local tax incentives, rebates and/or grants

Evolution ROI Intangibles

An electric bus can attract more clients, command higher rates, and generate more revenue based on the following factors:

Helps clean air and cut pollutants

Promotes a greener fleet image

Meets corporate clients’ green RFP criteria

Provides a smoother, more comfortable ride

Minimizes vehicle noise

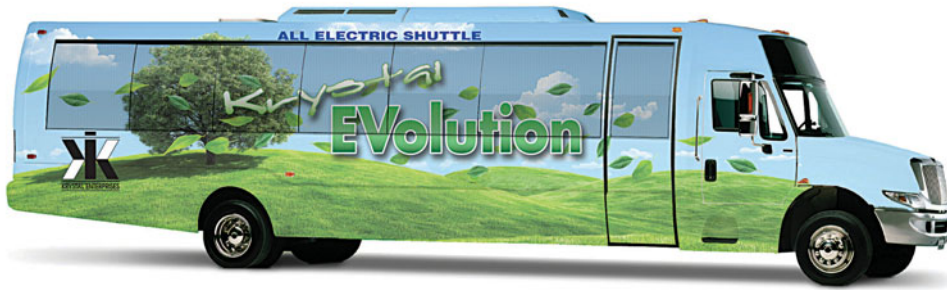
Reduces burdens on natural resources

Creates community good will

Electric Bus Outlook

- ▶ The global market for electric buses and taxis will rise 8.7 times in the next 10 years to \$60 billion annually.
- ▶ There are 480,000 non-motorcoach buses worldwide and 135,000 being bought for fleets each year. So far, only 12% worldwide are electric.
- ▶ There are 53 pure electric bus manufacturers worldwide. Krystal Infinity is the only one in the U.S.

Source: IDTechex.com Report on electric buses and taxis 2011-2021



The Krystal Infinity KK38 EVolution is a 36-passenger, ADA-compliant all-electric bus that is considered a major breakthrough for the U.S. medium-sized bus and shuttle market.

comparable diesel mid-size Krystal bus would cost about \$200,000 OTD, and a diesel-hybrid model would cost about \$300,000 OTD.

Using conservative calculations, an EVolution that runs 25,000 miles per year will save about \$15,000 per year in diesel fuel/energy costs once you've factored in the cost of electricity to charge the batteries, Webb says. The EVolution saves another \$5,000 in maintenance costs annually since electric buses don't need belts,

hoses, filters, oil, tune-ups, and a myriad of mechanical parts. Total net operational savings per year: \$20,000.

Going just by the numbers, when you compare the EVolution with the cost of a diesel bus, it would take 15 years of operational savings to make up the cost difference, assuming you run 25,000 miles per year. Of course, that ROI time period would decline the more miles the bus runs in a year.

Overall, a diesel-hybrid bus brings

a fuel/energy net costs savings of 33%, compared to a diesel-only bus, Webb says. [A diesel bus gets 6 mpg, while a diesel/hybrid gets 9 mpg]. But an all-electric bus brings an additional 50% in fuel/energy net cost savings beyond a diesel-hybrid, Webb estimates. Those savings also can rise in future years if the price of diesel fuel increases due to energy market shocks and/or strong demand.

"The gain on investment will go up as you get more miles out of the new generation batteries," Webb says. "You leave the electric motor in as you get the new batteries."

How Will ROI improve?

Of course, ROI also increases if the price of the bus declines, which is projected for the next five years and beyond, Webb says. The price of a bus generally increases an average of 5% per year in a normal vehicle market. When you factor in the expected upgrades in battery technologies, along with better-scaled bus production costs, Webb projects that a Krystal EVolution will cost about \$431,000 in 2016, about 6% below the 2011MY sticker

LCT E-NEWS

LCT's weekly e-Newsletter!



WHAT YOU GET:

- 01. The latest in Industry News
- 02. Company announcements
- 03. What you should know about events, associations, laws & regulations, and market trends
- 04. Airlines, "Green" vehicles, technology, and economic trends impacting chauffeured transportation



Sign up for a free subscription on www.lctmag.com



Krystal EV bus dealer David Webb has done some solid ROI projections.

price of \$459,000.

However, real savings grow when you figure that an EVolution would cost

\$586,000 in 2016 based on five years of annual 5% market price increases. So technology and production advancements will actually save an electric bus buyer a net of \$154,000 on the purchase price by 2016.

"The initial cost decreases as the battery technology gets going and gets cheaper," Webb says. "Volume brings economies of scale down. It reduces the payback period and increases the rate of return over time."

Production Rollout

Krystal plans an initial production release of 10 EVolution buses to fulfill a unique contract from unnamed federal agencies, Webb says. Federal government clients,

initial buyers of the EVolution, will be able to order more shuttles beyond the first 10. "We anticipate a lot of activity," he says.

Capitol Coachworks already has sold hundreds of Krystal vehicles, including at least 40 diesel-hybrid electric shuttles, to many federal agencies through contracts with the General Services Administration. Those include the U.S. Army, U.S. Navy, U.S. Marines, Veterans Administration, Department of Energy, and National Park Services.

Krystal developed the EVolution through a strategic partnership with Winston Batteries, an affiliated manufacturer of Rare Earth Lithium-Yttrium and Sulfur rechargeable batteries. The launch of the EVolution culminates a rapid timeline that started with Krystal devising the EVolution vehicle concept and design in November 2010; promoting an initial smaller prototype electric bus version at the 2011 International LCT Show in February; and then re-adapting the concept to the larger KK38 model. The KK38 is more viable for now, but Krystal likely will introduce a smaller version electric shuttle in the future, Webb says.

Financing An EVolution

Capitol Coachworks Inc. estimates a monthly payment of \$7,100 for six years, based on a financing rate of 8% or less with good credit. Information: (800) 636-9188; www.capitolcoachworks.com

Limo Industry Uses

For commercial operators and private limousine companies, the EVolution will prove ideal for wine tours, nights out on the town, weddings, and other special events with a predictable route range, Webb says. The EVolution is a sound investment for any chauffeured transportation operation that handles client runs where the bus returns to its base each night or serves government and corporate transportation contracts with environmental requirements, he says.

"It's not a line-haul bus and not a tour coach vehicle, but if [operators] are interested in virtually no maintenance and fuel costs, and they have long time horizon, and they have an environmental perspective, it's a great opportunity." **LGT**

Keeping You in Motion



**Transportation
Insurance
Brokers**

800-248-2877 ▶ 818-246-2800

www.tibinsurance.com

**LOS ANGELES • NEW YORK • BALTIMORE
MINNEAPOLIS/ST. PAUL • ORLANDO**

CA LIC. #0705008